
Designing a Knowledge Resource to Address Bounded Rationality and Satisficing for ICT Decisions in Small Organisations

A Dissertation submitted to the Department of Information
Systems



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By

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Declaration

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Abstract

Many Small Organisations in South Africa do not effectively adopt ICT in their operations due to lack of knowledge and information. This Design Science study sets out to understand the situation and possibly proffer a solution. In particular, this study attempted to establish the relevance of information for ICT decision tasks. The sources of information for Small Organisations, as related to ICT decisions, were elicited through semi-structured interviews. This study also attempted through the same research method to ascertain if a reliable information source will be useful and ultimately improve the Bounded Rationality situation. The survey showed the Internet as the top information source, followed by social capital for Small Organisation- ICT decisions. Then, through the design thinking process guided by Hasso-Plattner-Institute School of Design Thinking (HPI-D) methodology, the information gathered from this survey process was used to create an appropriate, consolidated and enhanced Internet information source. A final prototype website was built, incorporating features and content as gathered from the respondents (the design criteria). Finally, a questionnaire survey was administered as a tool for the testing and evaluation stages of the design. The preliminary results indicate expected high usability and effectiveness of the proposed solution.

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Chapter 1: Background

This research documents a Design Science project conducted to address the need for better and informed Information and Communications Technology (ICT) decisions in Small Organisations. In this study, Small Organisations are the focus although most of the literature refers to Small and Medium Enterprises (SMEs), which Small Organisations are classified under.

SME definitions vary from country to country with the most popular definition indices being the number of employees and turnover (Esselaar, Stork, Ndiwalana, & Deen-Swarray, 2008). In South Africa, SMEs form part of both the formal and informal business sectors of the economy (Luiz, 2011; Meldrum, Simpson, & Willington, 2012).

SMEs account for 90% of the formal businesses in South Africa (Smit & Watkins, 2012); therefore, taken together, SMEs are the largest employer of labor in the country. This makes them relevant with respect to the economic development of the nation. Given this level of relevance, there is less than sufficient attention given to SMEs and entrepreneurs from government and industry as well as from academics (Alonso-Mendo, et al., 2009; Kyobe, 2011).

There are many challenges faced by Small Organisation operations in South Africa, most notably that they face the highest failure rate in the world (Fatoki & Garwe, 2010). Among the challenges SMEs face are a lack of resources in terms of support (Chigona et al, 2005), technology, knowledge (Brown et al, 2006) and infrastructure (Abid, Rahim, & Scheepers, 2011; Houghton & Swan, 2011).

In order to address these challenges, many have proposed the use of ICT as an effective solution. Presently, Small Organisations are not yet adopting ICTs to a satisfactory degree and this has been attributed to numerous factors. This study proposes a Knowledge Base prototype as a solution, recognizing the importance of information in decision tasks such as whether to adopt technology.

The remaining parts of this chapter are dedicated to providing a background on Bounded Rationality and Satisficing, which explains the situation individuals and, indeed, Small Organisations find themselves in when faced with a decision task, ICT decision-making included. Other sections detail the motivation for the study, the research questions the study set out to answer, and our approach to the study. Finally, an outline of the structure of the thesis is presented.

1.1 SMEs and ICTs

Significant transformation through ICT is evident in improvement of Small Organisations' competitiveness (Ismail, Jeffery, & Van Belle, 2011; Lin, Nagalingam, Kuik, & Murata, 2011), performance (Innes & Wiesner, 2011), collaboration (Bos et al., 2011; Ceccagnoli, Forman, Huang, & Wu, 2012), brand positioning (Arketing, Lim, Zhou, & Cui, 2010), information sharing with privacy (Bélanger & Crossler, 2011; Smith, Dinev, & Xu, 2011), and better decision-making (Gorla, Somers, & Wong, 2010). - Small Organisations are being carried along with ICT advancement because of their key role in the economic development of many countries worldwide (O. O. Fatoki, 2012; Tan, Teo, & Lai, 2010).

Unfortunately, many of the ICT interventions in Small Organisations have failed for a variety of reasons, including the lack of appropriate skills to operate these technologies (Straub, 2009; Taylor, 2010). There is also too much information about ICTs than the average Small Organisation has time to process or gain access to (Caneghem & Campenhout, 2010; Gunawan, 2013; Jansen et. al, 2011). This is due to the perception that their scale of business does not require such thorough or extensive research. The result is that, despite the plethora of available ICTs that can aid competitiveness in Small Organisations, there is still a relatively low level of adoption among the sector worldwide (Abid et al., 2011; Alonso-Mendo et al., 2009; Kähr & Steinert, 2010; Okoli, Mbarika, & McCoy, 2010; Zhou & Bai, 2012).

1.1.1 Bounded Rationality and Satisficing

Decisions in Small Organisation are mostly made by individuals (Culkin & Smith, 2000; Jansen, et al, 2011). These individual decision-makers may have several

constraints in the decision task due to limited knowledge or the pressure of other organisational tasks assigned to them. As a result, these decision-makers may not attempt to reach the highest level of best choice in their decisions; they rather go for just any level, which may even be the lowest acceptable level of choice for the decision. This behaviour is termed, *satisficing* (March & Simon, 1958).

Organisations need to make decisions in practically all of their operations. For this task, they are bound to be on a continuum of irrationality or rationality, being risk taking or risk averse (Li, Troutt, Brandyberry, & Wang, 2011; Mpofu & Watkins-Mathys, 2011; Y. Wang & Ahmed, 2009). These attitudes are a result of the cognitive limitations of individuals and the cost of gathering and processing information for the decision-making task. This is described as *Bounded Rationality* (Simon, 1979). The complexity of the situation or the ability to optimally evaluate all possible choices is, in most cases, unachievable for them.

These are some of the decision-making challenges in organisations, though not peculiar to just Small Organisations. The following section attempts to explain the focus on these types of organisations.

1.2 Research Motivation

Decision tasks are immensely complex decisions characterized by time pressure and lack of information. Small Organisations have many limiting factors, mainly due to their size, which results in limited access to resources, manpower and infrastructure, just to mention a few.

Small Organisations thus can benefit from assistance with ICT decisions, recognizing that all decision-makers tend to experience bounded rationality and satisfice. The provision of pertinent information to assist in decision-making and selecting optimal choices may assist Small Organisations in achieving improved ICT decision-making. This also may result in better chances for the sustainability of the sector and the way in which they operate in a country.

1.3 Research Objectives and Questions

The purpose of this exploratory study is to investigate the existence of Bounded Rationality and Satisficing in South African Small Organizations' ICT decision-making. The study also uses the Design Science Approach in proposing an artefact to provide support in addressing the phenomenon within the SME sector.

To meet this purpose, the study intends to answer the following research questions:

1. What are the bounded rationality and satisficing obstacles that small organizations face in their ICT decision situations?

In answering this question, the following objective is intended:

- To explore and understand the Bounded Rationality and Satisficing related obstacles that Small Organisations face in their ICT decision situations.

2. How can an ICT knowledge base website help the bounded rationality and satisficing of South African small organisations' ICT decision-making?

In answering this question, the following objective is intended:

- To propose an artefact prototype that can serve as a guide in Small Organisations ICT decisions.

1.4 Research Scope

For the purpose of this study, the following concepts are emphasized:

Small Organisations: These are a classification of Small and Medium Organisations but in the research context refers to those with up to 25 employees. This classification is according to the National Small Business Act 1996, as amended in 2004, which stipulates varying definitions for each industry sector, including number of employees, turnover, and value of assets (See Appendix A). It also includes small Non-Profit Organisations (NPOs) and Non-Governmental Organisations (NGOs).

ICT (Information and Communications Technology): These are the mix of computer-based as well as telecommunication technologies of various kinds including audio-visual systems, enterprise software, storage, etc. They help individuals and organisations manipulate, store or share information, and improve their business operations.

1.5 Research Approach

The exploration of Bounded Rationality and Satisficing in South Africa will come from interacting with local Small Organisation operators through semi-structured interviews. After the exploration, the artefact design criteria will be elicited through the same method. This will also ensure transparency and accessibility for future extension of the work by other researchers.

The research process will be extending design criteria from an initial mock-up prototype presented during the survey. The process will also involve gathering further design criteria from the intended users, which will be documented as criteria for building the second and final artefact; this will be evaluated by testing its usability and effectiveness in providing ICT knowledge to users.

1.6 Contribution of Research

A useful ICT Knowledge Base website that will aid Small Organisations in making better informed decision-making is the key expected outcome of this study. This final artefact, hence, will also contribute to the sustainability of Small Organisations in South Africa. Additionally, the validity of the adopted process of eliciting design criteria and evaluating the resulting artefact will be a valuable contribution to Information Systems knowledge, practice and Design Science.

1.7 Outline

The thesis consists of five chapters, and a detailed appendix section. The following paragraphs summarize the remaining chapters:

The *Literature Review* chapter contains sections that deal with different studies on organisational and Small Organisation decision-making processes, the use of information in decision-making as well as the existence of the research phenomenon in theory.

The *Research Design and Methodology* chapter begins by introducing Design Science research, presenting the assumptions about Design Science ontology and epistemology and the type of Design Science approach engaged in this study. The ethical considerations and other research practices engaged in the study are also detailed.

The *Prototype and Implementation* chapter describes the prototype designed from the elicitation in the previous chapter. The evaluation of the final artefact is also presented here.

The final chapter, *Discussion and Conclusion* brings discussions and conclusion of the study based on the research findings. The research implications are discussed and suggestions for extending the current study are presented.

Table 1: Summary of the Study

Research Question 1	Research Method	Research Results
What are the bounded rationality and satisficing obstacles that small organizations face in their ICT decision situations?	Understanding Observation Semi-structured Interviews	Small Organisations search for information to meet their ICT needs however they are usually overwhelmed and ultimately settle for anything that comes their way. Cost and ROI drive the purchase of ICTs for their operations.
	Research Action	Research Implications
	Collecting existing information from literature Gathering users' needs from purposely sampled respondents	An unambiguous ICT knowledge resource will foster better ICT decisions in terms of rate and quality in the SME sector.

Research Question 2	Research Method	Research Results
How can an ICT knowledge base website help the bounded rationality and satisficing of South African small organisations' ICT decision-making?	Design Science approach	A community driven self-sustaining website for South African Small Organisations, a resource for making informed ICT decisions
	Research Action	Research Implications
	Designing and building an ICT Information Knowledge Base website for the South African Small Organisations context	Enriched social capital and information for South African, Small Organisations ICT decisions

Chapter 2: Literature Review

This chapter will discuss decision processes in organisations, comparing the differences in the process in Small Organisations against larger organisations. The theory of Administrative Behaviour is also explained as it sheds more light on the decision practices and situation in Small Organisations. The concluding part presents a summary of the chapter.

2.1 Types of Organizational Decision-Making

Generally, decision-making is an organisational function preceding every action in any organisation. These decisions can be broadly categorized as operational, tactical or strategic or (Lynch, 2011).

Operational decisions are very important, tense and stressful usually with a strict deadline and, as such, very complex. Though this may not always be the case, they drive daily operations necessary for the running of day-to-day activities of the organisation.

Tactical decisions address intermediately critical issues, such as resource allocation and performance monitoring, whose effects can be felt over a medium range of time, while operational decisions have low criticality, determining things such as resource use and labour productivity.

Strategic decisions are highly critical decisions that have long-term effects. Strategic decisions are of greatest relevance to this study as they impact organisational performance (Lieberman-Yaconi, Hooper, & Hutchings, 2010) and are highly sensitive to a firm entailing core deliberations such as which technologies to purchase to improve business process. Information input for this type of decision is usually the immediate environment consisting of close friends and associates. This is more commonly known as social capital.

The benefits of these social capitals are popular in literature (Lampe, Vitak, & Ellison,

2013; Widen-Wulff & Ginman, 2004). However, it is debatable whether the fate of an important task, such as a Small Organisation's strategic decision, should be left to external individuals (Jansen et al, 2011). Although involving more actors in a decision may be a way of spreading risk, it has the psychological effect of leaving the decision-maker in a somewhat confused state and with less confidence because the decision was not solely theirs (Jansen et al, 2011).

Strategic decision-making, as crucial as it is, follows a very informal process in Small Organisations, with little intelligence put into the process (Mitchell, Shepherd, & Sharfman, 2011). In the end, the decision made may not even be fully understood by the decision-maker. In other words, the level of expertise or intelligence of those involved is the measure of intelligence of the decision. The information input to the task can also only be of as much quality as the level of education, knowledge or skill set of the individuals in the decision maker's social circle (Boulding et al., 1994; Dixon, Thompson, & Mcallister, 2002; Nilsson, 2008).

Strategic decisions could generally follow either a rational, bounded-rational or intuitive process. The rational process is usually identified with large organisations and also with the use of quality information and a sequentially outlined procedure to ensure perfection of choice making (Ivanova & Gibcus, 2003). Some argue that rational decision-making also exists in Small Organisations' strategic decisions but with less sophistication than in larger organisations (Lieberman-Yaconi et al., 2010).

Bounded-rational decision-making is a process in which a decision is taken with the presence of limited resources such as information and time, but a course of action is pursued nonetheless, only satisfying the minimum requirements for achieving the goal. This is also known as Satisficing—a term formed by merging the words satisfying and sufficient (Ivanova & Gibcus, 2003).

This means that bounded-rational decisions do not maximize resources but only settle at a point where the outcomes are just good enough and perhaps ethical (Lieberman-Yaconi et al., 2010). Intuitive decision-making engages the barest minimum analytic reasoning and is also commonly identified with Small Organisations. Some also argue that intuitive decision-making is not guess work but a complement to rationality, and

it is characterized by a complex, quick and an unbiased unemotional state (Mulders & VanDenBroek, 2012). However, it is commonly employed in an unstable environment (Ivanova & Gibcus, 2003). Effective intuitive decision-making may be plausible because, when a process is repeated frequently, a decision-maker may not need to do in-depth analysis in order to make another similar decision at a different time (Nilsson, 2008). All of these are common practices in organisational decision-making.

Table 2: Summary of Strategic Decision-Making Patterns

Summary of Strategic Decision-Making Patterns		
Rational	Bounded-Rational	Intuitive
Comprehensive	Bounded by time and resources	Sudden, ready insight
Perfect information	Incomplete information	“Gut feeling”
Systematic	Limited ability to be comprehensive	Seemingly independent of empirical knowledge
Step-by-step, Phasic	Incremental	Absence of analysis or formulae
Logical, analytical	Non-linear and iterative	No conscious deliberation
Linear	Complex, inter-related combination of steps	Automatic
Utility maximization	Utility maximization not always ultimate goal	Random guessing
One optimal solution	Accept an alternative that is “good enough,” “satisficing”	Thoughts, conclusions, or choices produced by subconscious mental processes

Apart from the three broad strategic decision-making patterns (rational, bounded-rational and intuitive), others also exist which are closely related to the main ones. The incremental model (Mintzberg, et al., 1976) describes an iterative rather than sequential set of actions. The Garbage Can model defines the decision-making process as “organized anarchy”, which may or may not start with a problem or end with a solution. An individual, when identifying their information needs for a particular situation, will engage in at least one task in order to meet this need. This will involve searching out information in any manner in order to utilize or transfer it to solve the problem (Shih, 2004).

2.1.1 Information and Decision-Making

There are several definitions of decision-making in literature. The most common

definition relates to the act of making a choice between at least two alternatives. Some define it with respect to the distribution of resources, usually limited, to a situation. Another definition explains it as transforming information and knowledge into managerial actions (Ogarcă, 2010).

Information resources are abundant; ironically, they are hard to come by when needed. Technologies and internet access abound, and the most buoyant and competitive economies are those that have been able to maximize information for adoption of technology (Mutula & Van Brakel, 2006).

This means that the fact that there is plethora of information does not guarantee its use. According to Wilson's definition, "human information behavior is the entirety of human behavior towards information channels and sources, as well as their passive and active information searching and information use" (Wilson, 2000). Information seeking on its own is defined as the purposive attainment of information from selected information sources or carriers (Johnson, 1996, 1997). When trying to understand information, different aspects need to be considered because the sources vary in their channels of delivery, vary in sources within the channels, and also vary in the messages carried through these media.

Johnson (2009) designed a four-quadrant model of theories about human information behavior. He mapped various theories existing at the time of the study about human information behavior in a continuum of accidental-purposive on the horizontal axis and acquisition-avoidance on the vertical axis as shown in Figure 2.1. The vertical axis represents human beings' attitude to information, characterized by the inner motivation states of information needs, placing the desire to acquire information at the top end and the tendency to avoid it at the bottom extreme. The horizontal plane represents the attitude of an individual to the information source or carrier.

The characteristics in the upper right hand quadrant are those seen in purposive acquisition of knowledge. They guide the individual along a purposeful search path, and also help them structure a concrete plan for their information search (Johnson, 2009). People will react to information and the carrier based on their information needs, and also on a number of factors related to their perception.

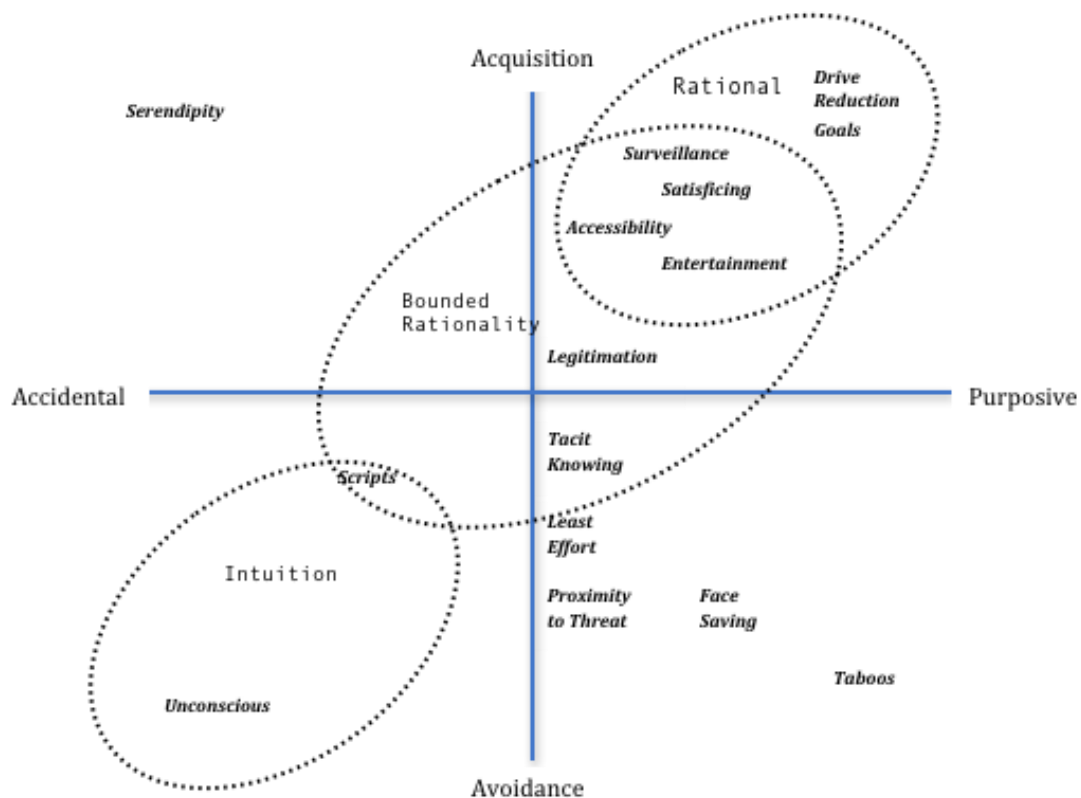


Figure 1: Mapping rationality in human information behaviour – Revised

Human information seeking behaviour is a function of an individual's perception of its relevance to their needs. There is always a lot of information but some information is more relevant to certain circumstances than to others. The technology of today makes provision for accessible and useful information that is unambiguous even though largely external to the user of the information. Although there may be information gaps regarding which kind of information is actually needed, an individual will be motivated to search for information not only to reduce uncertainty about a situation but also to satisfy the personal quest for knowledge, depending on the individual. Generally, Johnson's model represents an individual's information needs in the quadrants with those with greater information needs in the upper right quadrant.

2.1.2 Factors Affecting Decision-Making in Small Organisations

Decision-making is essential for business strategy, new product development, and staffing as well as many other tasks in the organisational set-up. It is generally

assumed that in economic actions, business people will make a rational decision (Ivanova & Gibcus, 2003), but in practice this is not so. Another assumption is that all relevant information for decision tasks is available to decision-makers. Decisions in Small Organisations are affected by a number of factors both internal and external to the given situation. These factors are broadly classified as individual (decision-maker), environment and situation (decision) (Papadakis et al, 1998), and all three interplay in a decision situation.

The decision-maker impacts on the decision situation by the approach they take to making the decision. The decision could be based on emotion, intuition or information (Ogarcă, 2010). The situation, in response, impacts the decision-maker in the sense that if the outcome of the decision results in a profit or a loss, the decision-maker will determine whether or not to adopt the same or an alternative strategy in a subsequent decision situation.

The decision-maker impacts the environment in which they function by operating in the location and also by the effects of the strategic decisions they take with respect to the business (Papadakis et al., 1998). Vice versa, opportunities and threats in the environment impact on the decision-maker who then turns to inputs from social capital as well as information in order to handle the situation. This will result in the introduction of new technologies and solutions in the environment and, ultimately, affects the technological advancement and innovation in the environment.

2.1.3 ICT Investment Decision-Making in Small Organisations

Many Small Organisations unsuccessfully invest in ICT. This is in part because they are ill-prepared for this investment task (Comella-Dorda et al, 2002; Lyytinen & Robey, 1999). This high rate of failure is connected with the ICT investment decision-making model in these organisations (Rantapuska & Ihanainen, 2008). Small Organisations are also not expected to treat ICT investment decisions the same way they handle other investment decisions because they are strategic to the sustainability of the business.

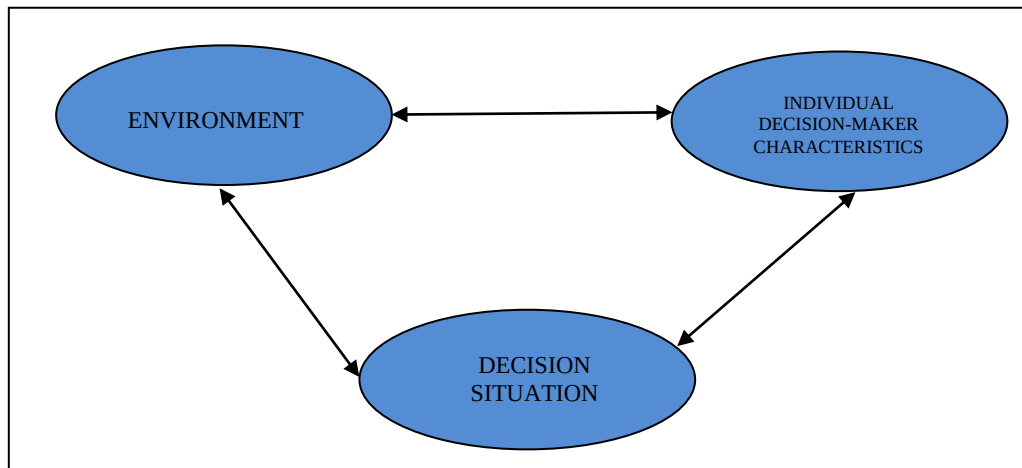


Figure 2: Interplay of Factors Affecting Decisions in SMEs

When ICT investments are made, the effects or consequences of the investment decision can either be financial or non-financial, affecting hardware, software, processes, and people as well as data. This effect could also be negative or positive. The combination of all these factors summarily forms the value of an ICT investment.

Financial consequences are measured in terms of the revenues and profitability. Revenue is calculated by cash flow estimation – overheads and earnings. Profitability is measured in terms of profits and losses. Mostly in financial considerations for ICT investments, revenue is a bigger determining factor than profitability. Risk is also considered in investment decision-making but this is largely concerned with the uncertainty of the investment decision. The following explains four common ICT investment decision-making models in literature.

2.1.3.1 The Financial Model

This approach is the typical method for investment decisions in most organisations. Basically, investment decisions are based on how much inflow and outflow of cash directly results from the investment decision. Measures of this usually include:

- **Net Present Value:** This is a mathematical calculation of the opportunity cost of capital. If the calculation results in a figure greater than zero, then a decision to invest is favorable.
- **Payback Period:** This is the interval between when the total cost adds up to the total gains, in incoming cash flow of an investment. It is the length of time

an investment takes to pay for itself; hence, the shorter the payback period, the safer it is to invest in it.

- **Return on Investment (Simple ROI):** This is a value calculated in percentage and it measures the total gain alongside the total cost of making an ICT investment.
- **Internal Rate of Return:** This is a measure of the starting point where the Net Present Value is zero after putting aside all inward and outward cash flows. This is rarely used in Small Organisations.

2.1.3.2 The Portfolio Model

This decision-making model is project based, measuring decision criteria against investment projects.

- **Investment Mapping:** This involves mapping investment proposals against the benefits of the investment and the investment orientation. Investment orientation means the business processes, market power and infrastructure of the organisation.
- **Investment Portfolio:** There are three factors considered in using this decision-making approach and the results help to prioritize alternatives.

(i) *Net Present Value*

(ii) *Contribution of the investment to the technology domain*

(iii) *Contribution of the investment*

- **Bedell's Method:** This method uses the response of the following questions in making an investment decision:

(i) *Which Information Systems should be developed?*

(ii) *Should the organisation invest in Information Systems?*

(iii) *Which activities should the organisation invest in?*

The model aims to create a balance between quality and importance of ICT investments, favoring the quality above importance.

2.1.2.3 The Ratio Model

Effectiveness in organisations is comparable to using ratios. Ratios of different kinds are also used in ICT investment decisions (Renkema & Berghout, 1997). These ratio comparisons are not limited to financial statistics as seen in the following listed methods.

- **IT Assessment:** This strategically measures IT effectiveness. Historical data within the organisation is analysed and used as a basis for decisions on new ICT investments.
- **Return on Management (ROM):** In this method, the belief is that management is a scarce resource. The added value of management is compared against the cost incurred to have management and is ultimately used to determine ICT investment choice.

2.1.3.4 The Multi-Criteria Model

Non-financial consequences have effects that are impossible to measure fiscally. The differences and incomparability between these and effects that can be measured monetarily could hamper ICT investment decisions. This necessitates the multi-criteria approach, which is commonly used in business ICT decision situations. Several variants of this approach are being used today (Cheikhrouhou et al , 2008; Kou et al, 2011).

Generally, the method involves setting pre-defined design criteria and objectives for each investment alternative. Weights, based on the importance of the alternative, and scores are then given to each criterion, which determine the final score of each alternative. This final score is arrived at by the value resulting from the product of the weights and the score of all listed design criteria. This method can be intensively complex; hence, it is not usually applied in Small Organisations. Two approaches are briefly mentioned below.

- **Strategic Investment Evaluation and Selection Tool Amsterdam (Siesta):** This method involves the use of custom software, questionnaires and an incorporated model. The technological and business factors are considered in

the decision through a risk and benefit analysis from the model (Renkema & Berghout, 1997).

- **Information Economics:** This method combines the financial method of enhanced ROI and non-financial measures, business and technology. Each of the three measures has several decision criteria as depicted in the figure below.

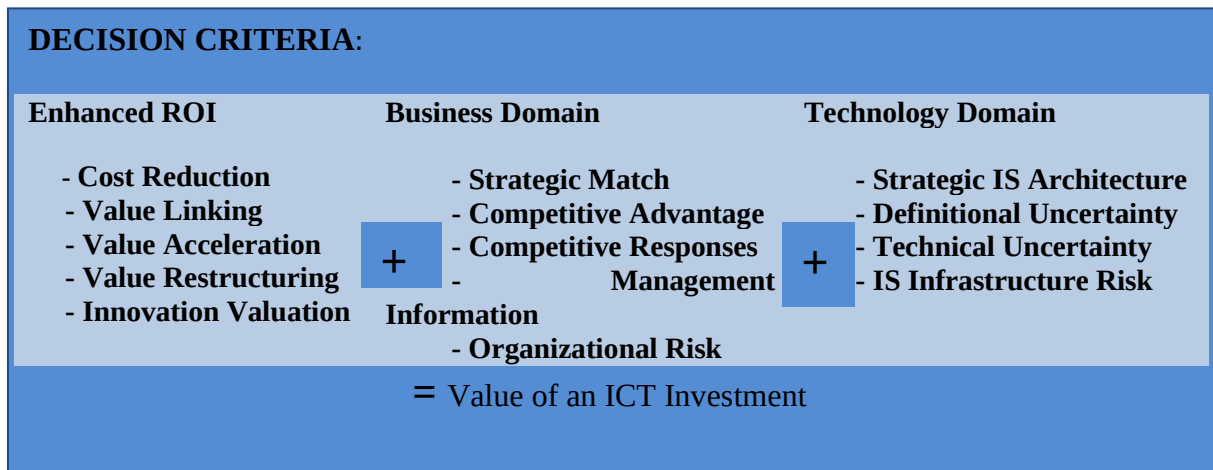


Figure 3: Information Economics Method

2.1.4 Strategic Information Systems Planning

Strategic Information Systems Planning (SISP) is a term that describes the process of determining the set of ICTs that will help businesses in achieving competitiveness and better decision-making (Pita et. al, 2011). The process has evolved over years and with the growing dynamism of the globalized world, the scope of SISP now entails improved infrastructure architecture and user satisfaction (Cassidy 2006; Lientz 2010). The role of information in many business functions including decision-making is very crucial however; it is one that has been highly undermined. This makes SISP a useful tool in aiming to avoid ICT investment failures in organisations.

The SISP process is intensive; involving several levels of analytic thinking and the resources required may or may not be available to small organisations. It may however not be completely ruled out as a method in use by even small organisations.

2.2 Theoretical Background

The concepts of Bounded Rationality and Satisficing are explained thoroughly in the Theory of Administrative Behavior. The following sub-sections expand on its description.

2.2.1 Theory of Administrative Behaviour

The Theory of Administrative Behavior (TAB) is a study of the decision-making process in an administrative organisation. It claims that decision-making is the crux of administration and that the vocabulary of TAB must be derived from the logic of the psychology of human choice. It attempts to describe administrative organisations in a way that they can be scientifically analysed.

The Theory of Administrative Behaviour describes the process by which organisational employees carry out their tasks. Proposed by Simon (1976), it describes an Administrative Man who pursues his self-interests but most times is unaware of what these interests are. Although the Administrative Man is cognizant of the possibility of multiple decision alternatives, he is disposed to settle for an adequate solution rather than to search for the most advantageous one. According to Simon, there are two key concepts associated with this theory: Bounded Rationality and Satisficing.

Bounded Rationality reflects on the cognitive imperfections of decision-makers. “Boundedly rational agents experience limits in formulating and solving complex problems and in processing information.” He prescribes three dimensions of making current rationality more realistic while maintaining rigour. They are:

- Limiting what sort of utility functions are available
- Recognizing the costs of gathering and processing information
- The possibility of having a “vector” or “multi-valued” utility function

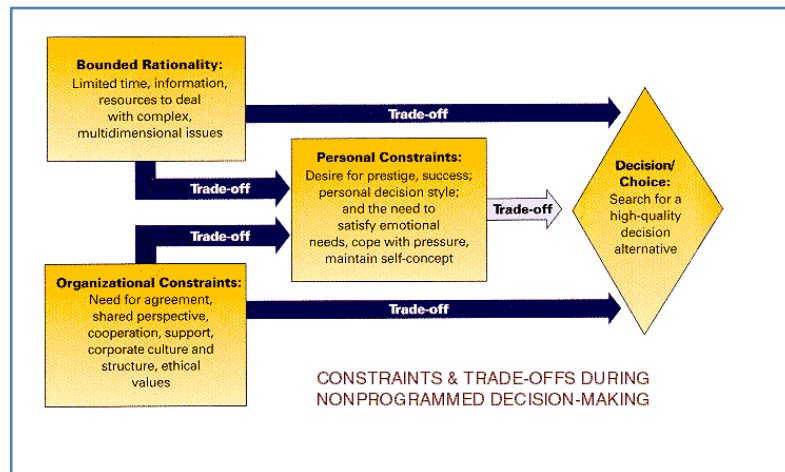


Figure 4: Rationality Limits in Decision-Making as Theory of Administrative Behaviour Explains

Bounded rationality assumes that absolute rationality in decision-making is seldom achievable (Ballester & Hernández, 2012) for several reasons. It leads to excess information, which is commonly referred to as information overload (Chen, Shang, & Kao, 2009; Slotegraaf & Atuahene-Gima, 2011). Hence, it can be inferred that people are at best, only partially rational. This causes people to make guesses in decision-making situations.

Satisficing is a behavior that tries to attain at least some minimum level of a particular variable, and not attempt to attain the maximum possible value. Satisficing combines “satisfying” and “sacrificing” i.e. the satisficing solution satisfies some criteria and sacrifices others.

Furthermore, satisficing in decision-making explains the tendency to select an option that meets some given need, or to pick the choice that seems to address most needs rather than achieving an optimal solution. This could also occur during group decision-making situations where a choice that everyone in the group agrees to will be the most acceptable—but not necessarily the best solution.

Many Small Organisation decision-makers rely on close friends and relatives as their first source of information. This also could be an option when they are unsure about what the best outcome of a situation could be. Satisficing is not necessarily a bad thing in decision-making. When there is an unlimited amount of information and a choice must be made, satisficing is a welcomed option.

The complexity of a decision situation or the ability to optimally evaluate all possible choices is a huge factor to be considered in choice or decision-making. People are constrained by factors such as information, cognition levels and computational abilities. This thus necessitates the use of technology in a pre-processing process to aid the complex decision-making task.

2.3 Summary

Decision-making in SMEs is usually done informally because of the nature of the organisation. There are usually one or two decision makers who may be holding multiple roles in the organisation. These decision-makers, when faced with multiple tasks, tend to incorporate limited information for crucial tasks such as decision-making. Mere gut-feeling or intuitive knowledge is therefore more rampant in SME practice (Ekanem & Smallbone, 2007).

The SME decision-makers thus find themselves in a situation of bounded rationality and cannot help but satisfice in most decision situations. Many MIS literature and research mention rationality as a concept but its measure in ICT decisions is also a phenomenon of interest. Decision support systems are also common in the literature surrounding ICT decisions. This study focuses on this sparsely researched level of rationality (Ranganathan & Sethi, 2002) in ICT decisions.

Chapter 3: Research Design and Methodology

3.1 Introduction

The focus of this chapter is to motivate the research methods employed in carrying out this research. This research methodology section elaborates on Design Science research, its ontology and epistemology, some of the different methods guiding Design Science research, and the motivation for the method in this study.

3.2 Research Method

3.2.1 Research purpose

This study is exploratory, seeking to explore and understand the situation SMEs find themselves in when they have to make a decision, particularly an ICT decision. We will understand, from literature, the organisational decision-making practices in organisations, especially individual decision-makers. This understanding will be considered in the design of an artefact, which will be used to address the bounded rationality and satisficing situation they are faced with during decision-making, especially ICT decisions. This study also explores how SMEs get information for the complex decision-making task and incorporate the findings from the empirical exercise into a final artefact designed to solve the problem

3.2.2 Research paradigm

Information Systems research paradigms are broadly classified into three categories: Positivist, Interpretive and Critical (Myers, 2009). However, there are also other categories such as Post-Positivist and Pragmatic (Johnson & Onwuegbuzie, 2004). Design Science is neither Positivist nor Interpretivist (Goles & Hirschheim, 2000) it is rather best described as pragmatic as appropriated in this study. The cycles of observation and interventions involved make it similar to Interpretivism and Action Research (Goldkhul, 2011) but action and change clearly distinguish its definition

(Braa & Vidgen, 1999). Every research must fall under one of these classes, depending on the appropriateness as defined by the researcher and the research objectives (Myers, 1997).

Research paradigms are discussed in terms of the epistemology or ontology that is adopted within each domain. Epistemology seeks to understand and question the ways and manner 'true knowledge' is attained. The focus of epistemology is on the interaction between the object of knowledge and the knowledge that is attained, explaining the effect of the subject on the process of attaining knowledge. Ontology focuses on establishing if a 'real world' is existent or not and whether there is any reality outside human speech and cognition processes.

This study aligns with Design Science epistemology by showing in the appropriated guidelines of conduction, and evaluating the research. The research explores a problem relevant to current issues and also contributes to the body of (design) knowledge; this is showing how true knowledge can be achieved. In addition, applying and adding to existing knowledge, which is inherent in design science, the study demonstrates its epistemological stance. The study applies this by the manner in which knowledge is achieved and that knowledge influences the guidelines for designing and evaluating IT artefacts (Niehaves, 2007). Ontologically, when designing an artefact, the aim is to produce objective knowledge. Hence, this study assumes that it is possible to achieve objective knowledge (Hevner et al., 2004).

3.2.3 Research Timeframe

The aim of this research is to understand a phenomenon, design an artefact and evaluate some aspects of the artefact after use. Therefore, this study involved multiple data gathering, over a little period of time.

For the first round of surveys were collected between April and August (the first three interviews were conducted in April 2013; the next two interviews in May 2013; another three interviews were conducted in June 2013; two other interviews were conducted in July 2013; and the final three interviews were done in August 2013). The second round of surveys was done by sending a URL (Uniform Resource

Locator) out to the initial respondents as well as others and they were also directed to an online survey which was used to evaluate the website. The results were determined using a counting method (Law et al, 2010). The aggregation of the timelines could be argued as a longitudinal approach since the respondents were surveyed multiple times (Cavana et al., 2001). This longitudinal time frame is appropriate for the conduct of a design science research due to the fact that the study involves an iterative process, which required evaluation and re-evaluation. In addition, this contributed to the rigor required in an Information Systems Masters research as well as the Design Science approach.

3.2.4 Research Strategy

Research in Information Systems can approach theory either by an inductive or a deductive reasoning approach. Deductive (or theory testing) research tests patterns and concepts from theory using empirical data (Bhattacharjee, 2012). Inductive (theory building) research infers theoretical concepts and patterns from observed data (Bhattacharjee, 2012). It moves from specific observations, begins to detect the regular patterns observed, forms tentative hypotheses, explores it further and then finally develops a general conclusion or new theory.

This study will take on the deductive reasoning approach to theory because it allows for testing of observations, which are deduced from theory and make confirmations and comparisons using empirical data (March & Storey, 1995).

3.2.5 Data Gathering and Analysis Techniques

In this study, the primary data were collected through qualitative surveys employing semi-structured interview method. The researcher had (conducted preliminary studies) by searching through literature to become more knowledgeable in the phenomenon of Bounded Rationality and Satisficing. This phase allowed the researcher the opportunity to compare literature findings with the real-life situation. The design criteria for the artefact were also drawn from this process.

There was a pre-design phase which entailed using secondary data from the results of

previous study. A set of questionnaires was sent out to Small Organisations in Cape Town to raise awareness about ICT adoption within the Small Business community (Ismail et al, 2011). A valuable amount of information from the result of this survey helped in putting together a catalogue of articles that was populated on the first prototype – the mock up.

All interviews were conducted in like manner; there was an audio recording of the sessions except for four respondents who declined to be recorded. However, all the interview sessions were done with the researcher taking notes as a contingency plan, and as a show of engagement and insight from the feedback being provided by respondents. The notes proved helpful for the purpose of clarity during the transcription process, also done by the researcher to ensure immersion as well as accuracy.

After the interviews, the information collected was promptly transcribed to text so as to ensure that all reactions and responses were adequately noted to prevent loss of vital information. Body language as well as other non-verbal cues were adequately recorded as well.

3.2.6 The Research Instrument

The Hasso-Plattner-Institute School of Design Thinking (HPI-D) Process guidelines practice conduction of qualitative interviews in the Observe stage of the framework. This was the same process carried out in this study. It was also appropriate because this study likewise sought to gather insights about users' needs (Thoring & Müller, 2011). The interviews were semi-structured because it better allowed the respondents to be expressive of their thoughts (Saunders et al, 2003).

The interview was divided into six sections (See Appendix B)

- Section 1 was introductory, with a brief overview of the purpose of the interview.
- Section 2 was a brief of ethical procedures and formalities.
- Section 3 captures demographic information of the respondents.
- Section 4 went into the bounded rationality and satisficing questions, which were labeled Information Needs and Toolkit Questions for better understanding by respondents who wanted to see the questions before hand.

- Sections 5 and 6 were for conclusions and appreciation of the respondents.

Table 3 below depicts this more clearly.

Table 3: Data collected and mapping to research question in interview schedule

Data Collected	Research Question (RQ) Mapping	Section Of Interview Schedule
Demographics		Section 3
Name of Organisation		
Organisation's operating sector		
Number of years of existence		
Short description of business		
Designation/Department of participant		
Information Needs and Sources Questions		Section 4
What is your view on the role which ICTs are playing/can play in your business?	RQ 1	a
What is the ICT investment decision-making process in your organisation?	RQ 1	b
What in your own opinion affects investment in an ICT (e.g. support, skills available, price, technicality, reliability, etc.)?	RQ 1	c
How knowledgeable would you rate yourself in the area of ICTs?	RQ 1	d
What information, in your opinion, is needed for ICT investment decisions?	RQ 1	e
Where do you currently look for or find information about ICT decisions?	RQ 1	f
What are some of your experiences with respect to finding ICT information, especially for investment decisions?	RQ 1	g
How will a dedicated information website affect your organization's ICT investment decisions or improve your organization's technology maturity/readiness?	RQ 1	h
Please name a few websites that are of interest to you. What makes the site(s) attractive to you?	RQ 1	i
Information Toolkit Layout Questions		Section 4
What are your comments about the Home page?	RQ 2	i
What are your comments about the Resources page?	RQ 2	ii
What are your comments about the Events page?	RQ 2	iii
What are your comments about the Connection hub page?	RQ 2	iv
Any other general comments?	RQ 2	v
Information Toolkit Questions		Section 4
What will give this website an edge over the Internet or any other information website you may know of?	RQ 2	a
What do you NOT want on this website in terms of context, content, etc.?	RQ 2	b
Would you be willing to rate articles on the website or write reviews about articles on the website?	RQ 2	c

3.2.7 Target and sample population

The target population for the study was Small Organisations decision-makers in Cape Town. The respondents were selected purposefully because of the consideration that these individuals are the major stakeholders in the use of the artefact being proposed.

A sample is purposeful when it is selected based on certain criteria. A purposeful sample may also be referred to as a typical case sample, The underlying principle of selecting information-rich cases that is common to all techniques of collecting samples (Patton, 1990; Sandelowski, 1995) was practiced in this study.

Purposeful sampling helps in the elicitation of information-rich cases that bring depth to a study. An information-rich case is one that helps the researcher learn a lot about the issues that are of most significance to a research purpose (Coyne, 1997). The sample allows the maximization of the opportunity to elicit rich data due to the variation of categories of SMEs in the Cape (See Appendix C).

Convenience was not the first consideration, rather the quality of the sample that can be selected from the population that Cape Town adequately satisfies. Also, the researcher declined to interview two respondents because one was only just starting to set-up their business and had not yet defined their strategy to the level of ICT usage. A second respondent was also not eventually interviewed because they run a school children's transport service and had no formal set-up of their operations.

3.2.8 Data Analysis

All interviews were transcribed from tape and notes (for those who declined to be recorded). The emerged concepts and themes from the transcripts were organised and coded in a thematic analysis process. This process is explained in more detail in the next chapter, section 4.1.1.

3.3 Design Science Research

Design Science is a method used in creating, building and evaluating an innovative artefact for use in solving an identified problem. The method aims at improving relevant real-life problems, designing an artefact and evaluating the product to measure the value it has added to the problem situation and also to explain the resulting implications. Prototypes are acceptable output artefacts especially for proof-of-concept purposes. There are several approaches in Design Science research, including case studies, evaluations and interviews. (Becker et al., 2009; Wang et al., 2011).

3.3.1 Methods of Design Science

Design Science is practiced in different ways, resulting in it being referred to in several terms such as Design Thinking and Action Design Science. Each method entails a flexible series of steps and iterations, all having individual methods and resulting in different artefacts (Lee et al, 2012; Sein et al, 2011; Voigt et al 2013; Wang et al., 2011).

Although Design Science (DS) as a methodology is still being situated in the IS field (Kuechler & Vaishnavi, 2008), a current general consensus is that it is expected to result in an IT artefact that addresses a relevant real-life problem (Sein et al., 2011). The artefact can either be an instantiation (implementation), a prototype (model), a method or a construct (Orlikowski & Iacono, 2001). There is a set of practice guidelines associated with DS research. A very popular one is by Hevner et al. (2004) whose principles are outlined in Table 4. There also exists the ADDIE (Analysis-Design-Development-Implementation-Evaluation), ASSURE (Analyze learners — State standards & objectives — Select strategies, technology, media & materials — Utilize technology, media & materials — Require learner participation — Evaluate & revise) and UDL (Universal Design for Learning) model among others (Davis, 2013; Yi & You, 2012).

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Table 4: Guidelines for Conducting Design Science Research

S/N	Guideline	Explanation
1	Design as an artefact	The Design Science research is required to produce a feasible artefact which could be an implementation, model, construct or method
2	Problem relevance	Design Science research has an objective of creating a technology solution for relevant business problems
3	Design Evaluation	Efficacy, utility and quality of the artefact should exhibit rigor in the method of evaluation
4	Research Contribution	Verifiable contribution of the design artefact, foundation and/or methodology must be provided
5	Research Rigor	Design Science must apply rigor in constructing and evaluating the design artefact
6	Design as a Search Process	Searching out an effective artefact entails using available means to attain desired goals within the laws of the problem environment
7	Communication of research	Both management and technology-oriented audiences must adequately understand the design science research.

Another popular Design Science approach is the Design Thinking approach illustrated below and the six phases explained thereafter in our implementation.

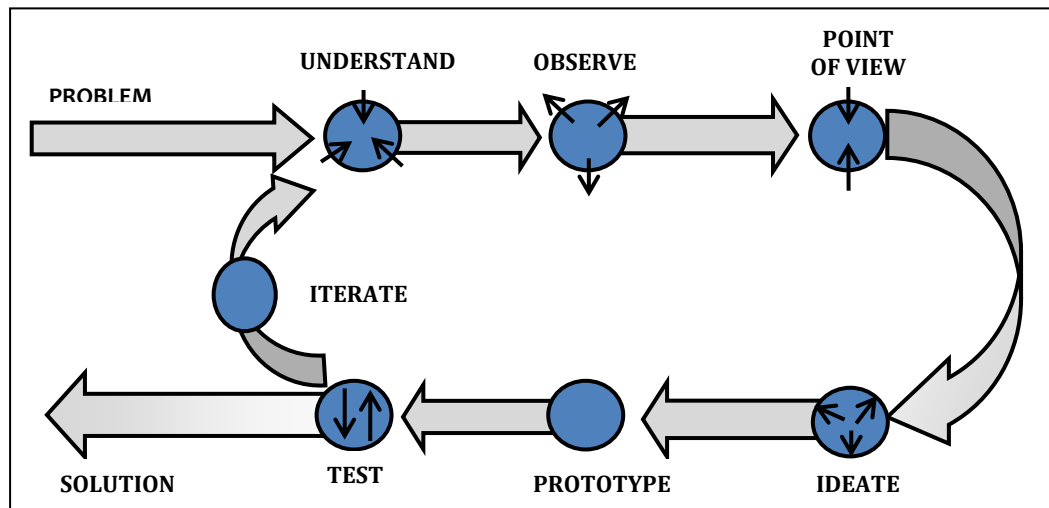


Figure 5: The Design Thinking Process

3.3.2 The HPI Design Thinking Model

In this study, the Design Science model proposed by the Hasso-Plattner-Institute: HPI School of Design Thinking (HPI D-School) will be adopted. Their model consists of a set of procedures and tools, which merge methodologies originating from ethnography and design together with business and technical skills. This approach is

aimed at the eliciting hidden needs of people and matching the needs to current technology solutions that make business sense. The goal is to come up with a method, process or instantiation that will be beneficial to all stakeholders.

The HPI-D Model is derived from methods used in human-centered innovation. Design problems, also referred to as wicked problems (McKay et al, 2012), require a mix of analytical and intuitive thinking which have been combined into a sequence of steps to guide design practitioners. The iterative, nonlinear process begins with the individual using the product or service with the designer at the center of all possible solutions.

HPI D-School's Design Science process involves six consecutive phases: Understand, Observe, Point of View, Ideate, Prototype, and Test. These phases are iterative; however, one could move back and forth between the phases of the process, according to the requirements of each step's outcome.

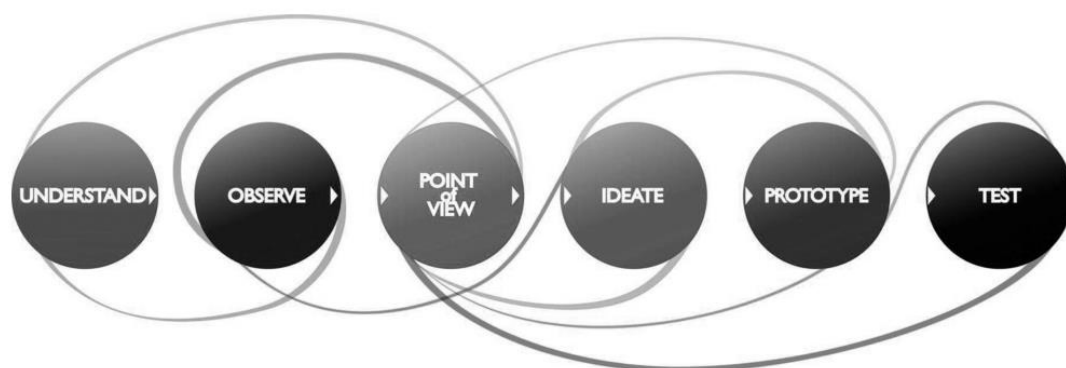


Figure 6: The Design Thinking Process Model at HPI D-School

3.3.2.1 Phase 1 - Understand

This process starts with a broad description of the problem area without explicitly defining what the problem is. The designer is not knowledgeable in the problem area; hence, the goal is to become an expert on the issue.

In order to get a better understanding of bounded rationality and satisficing decision-making in SMEs, literature and several academic papers were reviewed in order to

gain an understanding of the problem. Interviews were also conducted with thirteen Cape Town-based SME decision-makers. The aim of this phase of the interviews was to study the nature and prevalence of the phenomenon among the population sample.

3.3.2.2 Phase 2 - Observe

This phase entails the comparison of field observations with literature that was gathered in Phase 1. The aim of this was to elicit the unvoiced requirements from the audience and their salient needs.

The different concepts and discourse about bounded rationality and satisficing as discussed in literature were compared with the findings from the transcript of interviews conducted. Reviews from the transcripts content were compared to see if they described our concepts from literature and theory (Lee et al., 2012).

3.3.2.3 Phase 3 - Point of View

The analysis of perspectives from Phase 2 above helps the designer approach the problem situation from the user's point of view. This is important because there is assurance that the solution being proffered is a direct response to a real-life problem.

From the comparison of literature and interview transcripts, the perspective of this study is that information is vital for SME decision tasks, whether the information is from trusted friends and associates or from the Internet. Another key factor is the need for availability of local content that matches and fits into the South African context.

3.3.2.4 Phase 4 - Ideate

The ideas gained for the previous stage can be creatively put together to form a user requirements specification list. These design criteria are framed in the ideate stage of the design thinking process. There is as much as possible accommodation for ideas in this stage as the focus is on quantity and not necessarily quality (Açar & Rother,

2011).

From the point-of-view stage, there are a number of design criteria for the proposed artefact. These are used suggestions to create a more image-oriented website, an interactive interface in the form of a forum or chat room, tutorials, and content filters to aid searching for on-site materials, etc.

3.3.2.5 Phase 5 - Prototype

Promising ideas or ideations are converted to prototypes. Prototypes do not necessarily have to be expensive implementations because feedback from the test phase is inputted and incorporated, making it an iterative stage.

This study began with a prototype which was presented during the interviews with the respondents. Their feedback was incorporated into the design consideration of the final artefact.

3.3.2.6 Phase 6 - Test

A prototype is effectively tested in its use and realization. The design criteria are gotten from users who are, therefore, in the best position to validate the model. The main goal is to get their feedback and possibly use it for an iteration of the model.

The respondents used our first prototype during the interviews and were requested to give inputs in order to improve the model. Their feedback was incorporated into a second iteration and they were again asked to test and validate it, this time, responding to a questionnaire.

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Table 5: Application of Design Thinking Process in this Study

Stage	Objective	Method	Input	Output
UNDERSTAND	Get a better understanding of the phenomena	Literature review	Secondary data	Documentation
OBSERVE	Gather insights about users' needs	Interview with proposed users and stakeholders	Problem definition, research questions	Interview transcripts
POINT OF VIEW	Micro theory about users' needs	Interview	Sketches and notes, Interview transcripts	Point of View
IDEATE	Generate ideas and decide which one(s) to further develop	Consider points raised by proposed users and stakeholders	Point of View	Design Criteria
PROTOTYPE	Self-explanatory representation of concept	Prototyping	Design Criteria	Prototype
TEST	Gather feedback from users and stake holders on concept and prototype	Show the prototype to potential users and let them work with it	Prototype	Feedback of test results

3.4 Confidentiality and Ethics

Ethics in research is very important and it relates to the responsibility on a researcher of the consequences of the research and its results. Every Information Systems research has value embedded, irrespective of the approach and ethical dispositions, one of which could be critical, interpretive or means-end (Iivari, 2007). As in most Design Science research, this study will adapt a means-end ethical stand (Iivari & Venable, 2009).

Means are the ways and methods people engage while ends are the outcomes and results achieved (Pai & Arnott, 2013). Researching with a means-end ethical perspective involves understanding ways (means) of achieving certain goals (ends) without necessarily querying the legitimacy of the goal. Likewise, a means-end evaluation of the artifact designed in this research will focus on the effectiveness of the designed artefact in achieving the goal of information use in ICT decision-making.

Caution was exercised in this research, and information was related as explicitly as possible during the surveys. Strict confidence of respondents' information was maintained, and only relevant parts of the information provided were made public. Other identifiable information has also been masked to protect the respondents' information.

The respondents were required to sign a consent form (See Appendix D) before the interviews began. This serves as a proof that their participation in the research was voluntary. Likewise for the online survey, the respondents were asked about their willingness to participate in the survey.

Other precautions to ensure confidentiality and ethics include an approval from (See Appendix E) the UCT and Information Systems Ethics Committee. This approval validated that the procedure of the research was not in violation of individuals' and organisations' rights. An introductory letter (See Appendix F) from the Information Systems Department helped sensitize the respondents about the purpose of the study and also about their rights to respond to the questions they were asked.

3.5 Reliability, Validity and Workability of the Research

In order to suitably justify our design criteria for building and evaluating our artefact, empirical research was incorporated and data gathering methods to evaluate them. All of these methods have inherent weaknesses and strengths. Their effects on the validity of the study are discussed in the following sections.

This study has incorporated the survey and Design Science research methodologies in this study. The objective of survey research is to get a better understanding of a concept (Pinsonneault & Kraemer, 1993), which is traditional science, while Design Science aims to design artefacts that address real life problems. Naturally, the principles that will guide the measurement of the quality of the research will differ due to the dissimilar purposes.

Traditional science measures quality of research by the results validity and reliability (Miller, 1986). Reliability is measured by the level of consistency between the outcomes of different researchers or different occasions by the same research

(Hammersley, 1992). The transparency in the explanation of the actions and events experienced by the researcher is another measure. Validity is described, on the other hand, as the precision in the relationship between the empirical account of a concept and the theory that is being used to explain the research phenomenon (Hammersley, 1992).

In addressing reliability of results from a research conducted by different research methods as is in our case, the study falls back on the concept of triangulation (Conboy et al., 2012; W. Kuechler & Vaishnavi, 2012). Some argue that triangulation shows naiveness in epistemology and ontology (Blaikie, 2000); however, the chosen approach seems reliable based on the fact that the two methods are exposed to different biases (Atkinson & Hammersley, 2007). These biases were noted and adequately addressed, and as such their convergence cannot be totally misleading.

In addressing validity, Hammersley (1992) explains that express access to reality is unattainable and therefore hampers the knowledge of truth despite the superiority and magnitude of observed data (Atkinson & Hammersley, 2007). It would therefore suffice to assess validity by comparing how compatible the assumption of the study is with the phenomenon or the empirical evidence available to corroborate the claim (Hammersley, 1992). Holding on to the transparency in our data collection methods analysis and presentation, the reliability and validity of the research is confirmable and the findings are accurate.

In addition, the novelty of the Design Science approach in Information Systems research still raises some doubt in the academic world in terms of quality. Aside from the role of validity and reliability in addressing this, the quality of problem solving research which goes beyond explaining and understanding a concept can be measured in terms of the workability of the artefact that is produced. This is measured by whether or not the solution results in meeting the needs of the design criteria within the problem's context (Greenwood & Levin, 2007).

The chosen research methods in this study have different measures of quality. The survey method forms a basis for validating our design criteria and evaluating our artefact. The study also ensures reliability and validity by transparently presenting our

research process; in addition, the workability of the solution informs the basis for the claim also.

To ensure the trustworthiness of the research results, the researcher followed the following procedures:

During each interview, the researcher ensured that notes were being taken and also carried the respondents along in the note taking, making them explain statements that were unclear to ensure that the facts were taken down accurately.

Regarding the artefact, the mock-up was presented with simple features and no advanced features in order to stir up thoughts from the respondents rather than giving hints that they may have tended to agree with on assumption that the researcher is an authority in the IT field.

3.6 Generalization

Surveys are best suitable either in situations of classifying or describing the relationship between research variables as well as in forecasting their pattern of influence (Sapsford, 2007). They are useful in making statistical generalizations provided the precision in such a generalization is explained and shown in the significance and confidence level.

It is true that knowledge built in a particular context may not fit in another context and therefore care must be taken when generalizing such knowledge. It is, however, possible to transfer knowledge from one context to another provided one carefully reflects on what is different and common to both contexts in terms of history and features (Greenwood & Levin, 2007). Design Science designs artefacts for use in specific contexts (March & Simon, 1958). If the context changes, it becomes crucial that the artefact be used in the new context, after which there must be an evaluation and further development for it to be applicable.

This study does not claim that the findings are generalizable beyond the context of SMEs within South Africa. If they are to be taken outside our defined context, the study recommends the use, analysis, evaluation and extension of features accordingly.

3.7 Limitations

The survey conducted for this study was limited. This is due to the fact that, of the forty email requests for participation sent out to an online directory of SMEs in Cape Town, almost half of the emails bounced back. Furthermore, of the remainder, only one respondent replied. A second set of reminder emails was sent to the addresses and still no response was received. The researcher therefore resorted to face-to-face and word of mouth requests which yielded a more encouraging response. Even though some respondents scheduled and could not meet up, a total of seventeen semi-structured interviews were eventually conducted. The researcher decided that the saturation point had been attained at this number because no further new design criteria were being elicited from the process.

To make up for this shortcoming, the second evaluation of the artefact was done using an online questionnaire survey that was adapted from the interview questions. Again, respondents were not easy to come by, bringing the questionnaire respondents to fifty-four.

3.8 Summary

This chapter started by explaining details of the Design Science approach as well as related concepts and techniques employed in the study. Summarily, it was argued that in solving problems, researchers must play an active role in developing a solution, not merely explaining it (Holmström, et. al, 2009). Following through with this, the limitations and ethical considerations employed were also narrated for transparency of the process and also to provide a basis for interested researchers who may wish to extend the work.

Chapter 4: Prototype Development and Evaluation

This chapter presents an analysis of the survey research findings of the study on addressing bounded rationality and satisficing in South African SMEs. The analysis was done using thematic analysis.

4.1 Prototype Development

The final artefact is an information website designed not intuitively but informed by the needs of the intended users; a rigorous requirements elicitation was conducted. This process helped the researcher in determining key design criteria

The study presents the final prototype model for addressing bounded rationality and satisficing in SMEs. An initial prototype, the mock-up, was built and the screenshots of the interface are in Appendix G. Drupal 7, which is a framework for building a Content Management System (CMS), was chosen to help design the website. The study also explains the design criteria and its implementation in the sections following.

4.1.1 Requirements Gathering through Data Analysis

The interviews were transcribed manually and loaded as a single document into the qualitative analysis tool, atlas.ti7. The tool was used to generate and group codes, which were further used in the analysis.

The speech of each participant was entered on a new line. The transcripts were typed in sentence case. Some parts of the recordings were inaudible and were represented by an ellipses sign (...). The transcript was divided into utterances, which was considered our unit of analysis. An example of a full transcript is in Appendix H.

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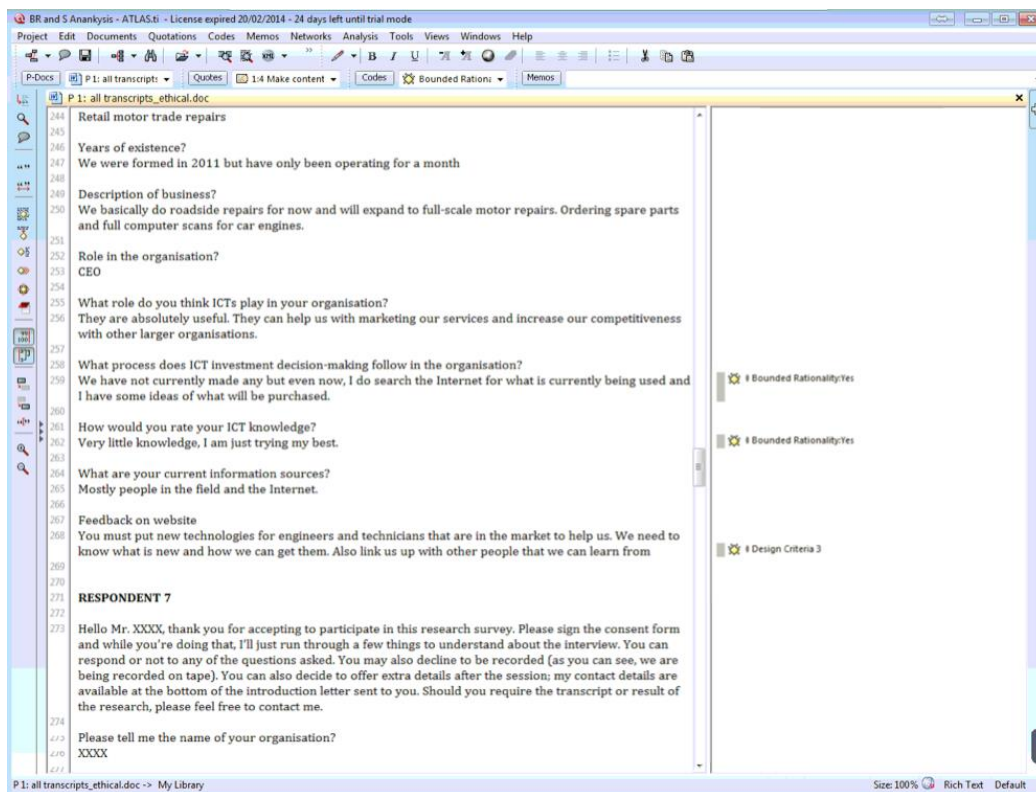


Figure 7: Coding of transcripts in atlas.ti7

Groups of utterances that highlighted knowledge of the relevant discourse were the focus of the dialogue and thus coded (Belkin et al, 1987). The researcher analysed each interview with a focus on these utterances. This analysis helped in eliciting knowledge on the following:

- Explicit and tacit knowledge on the subject of enquiry.
- Factors to consider in design, which may have been overlooked by a regular practitioner.
- Salient truths from what is not said by the respondents.

The representation of data gathered is presented as follows:

- The respondents' direct quotes are represented by quoted italics to denote the coding of bounded rationality and satisficing quotes as well.
- The respondents' responses that represented design criteria are represented in uppercase character.
- Other important notes that aid the researcher understanding are emphasized in parenthesis.

The findings from data analysis of the interview surveys are presented hereafter, showing the design criteria and confirmation of the existence of bounded rationality and satisficing from the respondents.

In order to confirm this prevalence in South African SMEs, the study attempted to understand the importance of information, which is key in the ICT decision-making task. The current sources of information for these SMEs ICT decisions and their experience with these sources were also sought. Where BR was confirmed, the study further sought to know if a reliable information source would help them improve the situation.

4.1.1.1 Bounded Rationality

From data collected, it was revealed that, indeed, SMEs experience bounded rationality in ICT decisions. Statements such as the following confirmed this. When asked about the process of ICT decision-making with the organisation, one respondent mentioned that:

“We look at how successful the service is, the cost and ROI on payments incurred. The partners discuss the options and then make a decision, also with financial considerations therein.”

Statements such as the following show the trait but point to the fact that some SMEs have devised a way of managing the situation to a certain extent:

“The request is channeled through me to the Management Committee. They decide based on funds and need to purchase or not. The ICT must facilitate the business and prospect for ROI. The process is quite easy for us to figure out even though we are not IT experts and we consult independent ICT service providers who give technical specifications before the Management Committee meets and decides.”

Some other respondents said,

“The IT personnel advise the company on which technologies the company must use.”

“...when we need more (ICTs) we will ask the professionals to do that for us.”

“I try to find out from people who are good in IT and then after listening to what they tell me I choose whether I can afford it or not.”

“We have not currently made any but even now, I do search the Internet for what is currently being used and I have some ideas of what will be purchased.”

4.1.1.2 Satisficing

When asked about the respondent's knowledge of ICTs, the following were the majority of the kinds of responses gotten:

“Intermediate, but also relatively because of the keen interest that drives self-study.”

“Maybe seven out of ten, but then this is relative on which type of ICT.”

“Very little knowledge, I am just trying my best.”

“I know a bit from reading on the Internet and you learn from forums and blogs about other ICTs.”

“I am very good in the software I use but there are so many software applications, I'm not good in everything but what I use, I know it very well.”

4.1.1.3 Sources of Information

It was observed that some of the SMEs knew what to look for but were sometimes at a loss on where to find this exact information. Statements such as the following evidenced this:

“The consent of all decision-makers is sought. We invest based on needs and durability or lifespan as well as usefulness of the solution. The needs are outlined and then a consensus is reached on the alternatives available. A full understanding of our needs is gotten by research.”

“We just do a need-based research”

“When we have a problem, we try to search for information, investigate the alternatives thoroughly. Based on the information we have, we then decide on which technology to purchase or acquire.”

The conclusion based on the above is that SMEs in South Africa do not effectively adopt ICTs due to lack of knowledge and information required for the task. Hence, the objective to understand the situation and also to propose a possible solution is validated.

The findings from the above show that SMEs consider cost and ROI to be of major importance in ICT decisions. This is a pointer to the fact that they satisfice. They are not knowledgeable in understanding several other determining factors crucial for the most suitable ICTs for their operations. They, therefore, focus on the financial implications and considerations, which are more familiar to them at the expense of considering the added value and contextual fit of such technologies.

4.1.1.4 Design Criteria

From all of the respondents, the researcher feels that the study does not need to make a case for the usefulness of information from the Internet as a means of addressing the situation. Over eighty per cent of the respondents made reference to the Internet, Google and some other Internet resources as their information source.

The second most popular information source for ICT decisions for South African SMEs was different forms of social capital evident in the references to knowledgeable people who were not necessarily a part of the organisation.

These validate the study’s proposal for an ICT information website to address the BR and Satisficing situation. However, in order to avoid loss of value or duplicity of interventions, the first prototype was presented as the last part of the survey in order to gain an understanding of what the expectation is from such a website.

When asked about feedback on the first website prototype, responses gotten formed the basis for the following eight design criteria.

DESIGN CRITERION 1 – Build a more graphic interface. The respondents generally wanted an interface that is not overwhelming and user friendly. They expressed of the current prototype:

“That’s already way too complicated!”

“The current display looks quite intimidating because it is too text-based as it is. Make the headings bigger; add more pictures. ”

DESIGN CRITERION 2 – Incorporate local content. The respondents wanted solutions that have been implemented within the South African context as well as being able to talk to people that are in similar business situations. The expressed:

“Make content South Africa specific and less international content”

“Localized content will be useful. Include success stories i.e. where solutions have been utilized and the results.”

DESIGN CRITERION 3 – Fostering relationships. After the use of Internet the next most used source of information according to respondents was feedback from those who had implemented ICTs. The respondents particularly wanted a platform to interact with such people.

“Forums are useful. Lists of suppliers, manufactures and solutions would be nice. “

“Forums will definitely be good for questions.”

“Also link us up with other people that we can learn from.”

DESIGN CRITERION 4 – Audio-visuals. This criterion was important for people who had some level of knowledge but did not consider themselves experts. They reckoned that they would make better ICT decisions from self-study of audiovisual materials. Some expressed:

“There could also be text and video tutorials that can be downloadable.”

DESIGN CRITERION 5 – Identity management and Security. It was also important to respondents that they were connecting with knowledgeable people. They wanted to be safe to share information as well as be the judge of who was credible to take advice

from by knowing the profile of the people who would be sharing experiences with them.

“Segmentation by operating sector will be a vital tool.”

DESIGN CRITERION 6 – Reliability of information. The need to share risks in ICT decision-making in SMEs is exhibited here. Having many people rate a product or service highly was important to respondents. Some expressed:

“Starring, Voting systems would be really nice. Search or filter by ratings.”

“We could use it to easily get access to people who offer IT services around Cape Town so I think it is very useful.”

DESIGN CRITERION 7 – Presentation of information. The respondents had a lot to say about what would help them read a website post and navigate to the information they required. They expressed:

“It will be nice to have options like: ‘I need a website, desktop, etc’, then have a review of three different software and then I can pick the best option.”

“The more knowledge summaries provide, the deeper one will want to go. Present information such that your audience does not get bored immediately.”

“Also consider people who can access the Internet only from their phones. “

“We can check the website on our phone also to make it faster.”

“Software reviews will also be good to have.”

“It is very nice, especially if we can have people who we can chat with about our business in the forums.”

“It is very good and you can put the forums for us to chat and ask questions from others.”

DESIGN CRITERION 8 – Information and searching. Specific information and ability to search was important as shown in the following excerpts.

“Information on ICT needs for Small businesses will be very useful.”

“Information on how to use ICTs efficiently for different scales of operation, etc. will also be useful. For the prototype, please include more information about ICT hardware, troubleshooting and less technical information.”

“Summaries of resources and the classifications will make it a bit better.”

“Yes, it would be helpful if it contains dedicated ICT information”

4.1.2 Prototype Design

Our implementation was done with Drupal 7.22/MySQL 5.3/Apache 2 which was the latest version at the commencement of the first prototype. The first prototype is being hosted online at ict4smme.ngportal.com on a Linux server running Apache and MySQL 5.3.

A total of one hundred and twelve modules were installed, activated and enabled to extend the functionality of the website to meet the design criteria listed in the previous section. The table below describes the matching of the modules to the design criteria listed in the previous section. The full module listing is available in Appendix I.

Table 6: Matching of some module function to design criteria

Design Criteria	Corresponding Module
A graphic interface on the web pages	Contextual links; Image; Views; etc.
Localised Content	Content translation
Social Capital Interaction	Comment; Forum
Learning Content	Custom content panes; Custom rulesets; Filedepot; Media
Identity Management and Security	Contact; Database logging; Flag; Mollom; Syslog
Reliability of sources and information	Comment; Poll
Good presentation format	Aggregator; Block; Calendar; Chaos tools; CKEditor; Color; Custom content panes; TagClouds; Responsive Theme
Information Searching	Advanced Help; Current Search Blocks; Taxonomy
Other Criteria: Site Administration, Maintenance, etc.	Admin Menu; Apps; Backup and Migrate; Bulk Export; Dashboard; Database logging

4.1.2.1 Drupal Framework

Drupal is a Content Management System (CMS) based on open-source systems. It is written in PHP and supports the IIS/Apache web server and PostgreSQL/MySQL database technologies. It has many powerful features such as modules, controlled vocabularies (taxonomy), and role-based permissions as well as tools for managing community-based data (Papanicolaou & Heckel, 2010). These are the key features

that informed our choice for Drupal above other CMS such as Joomla and Wordpress.

Drupal is open-source and the latest version can be downloaded free from the Internet at <https://drupal.org/download>. Security as well as user customization is considered in the design of Drupal. There is provision for adding countless modules to meet user needs and for easy deployment through a Graphical User Interface (GUI). There is also comprehensive online documentation (<https://drupal.org/documentation>) and a strong developer and user community (<https://drupal.org/community>) which lends credence to the popularity and stability of Drupal.

A key consideration for the utilization of Drupal is the taxonomy feature. Taxonomies make content easy to find and retrieve. The feature helps create a relationship between content categories in a non-technical way. It also provides controlled vocabulary system for hierarchical relationship of content, making it easy to use.

4.1.2.2 Design Criteria

Scientific design of an artefact must meet certain predefined requirements. In Design Science, the focus is not on knowledge pursuit but, rather, the essence of the exercise is to design a solution that meets predefined goals (Hevner et al., 2004), i.e. design criteria.

The initial prototype was built, used within context and then evaluated through semi-constructed interviews with SMEs. The result of the evaluation led to the development of the second artefact. This phase provided the following design criteria for the second model.

Design Criteria 1 (DC1): Build a more graphic interface.

Design Criteria 2 (DC2): Incorporate local content.

Design Criteria 3 (DC3): Foster relationships with individuals in SME operations through “forums and chat rooms” as well as ICT service provider directory.

Design Criteria 4 (DC4): Incorporate a learning center that will have “downloadable video and text tutorials.”

Design Criteria 5 (DC5): Identity management and security.

Design Criteria 6 (DC6): Reliability of information through ratings, comments and success stories of ICT implementations.

Design Criteria 7 (DC7): Presentable format of information.

Design Criteria 8 (DC8): Searching Information.

The design criteria are phrases derived from the survey regarding the functions and purpose the artefact is meant to perform. The criteria are justified by logical reasoning, which is derived from the Theory of Administrative Behaviour earlier discussed. These were used in the development of the final artefact.

In adherence to Design Science our artefact is innovative in solving a real life problem and emphasizes efficacy, i.e., usefulness (Hevner & Chatterjee, 2010). These design criteria are carefully selected in order to create a balance between the research subjects/users and practitioner/researcher. The aim is to have a solution that is applicable within context in addition to going through scientific rigor.

Following the theory of administrative behavior, the study understands that individuals, such as SME decision-makers, are constrained by cognition and available information among other factors in the complex task of decision-making. SMEs also value social capital in making ICT decisions by accepting recommendations from fellow decision-makers who have adopted ICTs ahead of them. Thus, the study accepts the design criteria for an information website that provides complete and accurate ICT information as well as a discussion forum feature that allows interaction and the leverage of social capital. The implementation of the design criteria is further described in the following section.

4.1.3 Website Content

The quality of information on websites is key in determining the effectiveness of a website (Zhang, Keeling & Pavur, 2000). Studies attempting to understand information usually border around the explanation of what information is, the behaviour of the information and the forms it takes. The most common attributes of quality information is, the users' perception of the correctness, relevance,

accessibility, trustworthiness, currency, relevancy and ease of understanding (Boell & Cecez-Kecmanovic, 2010; Zhang, Keeling & Pavur, 2000; Katerattanakul & Siau, 1999).

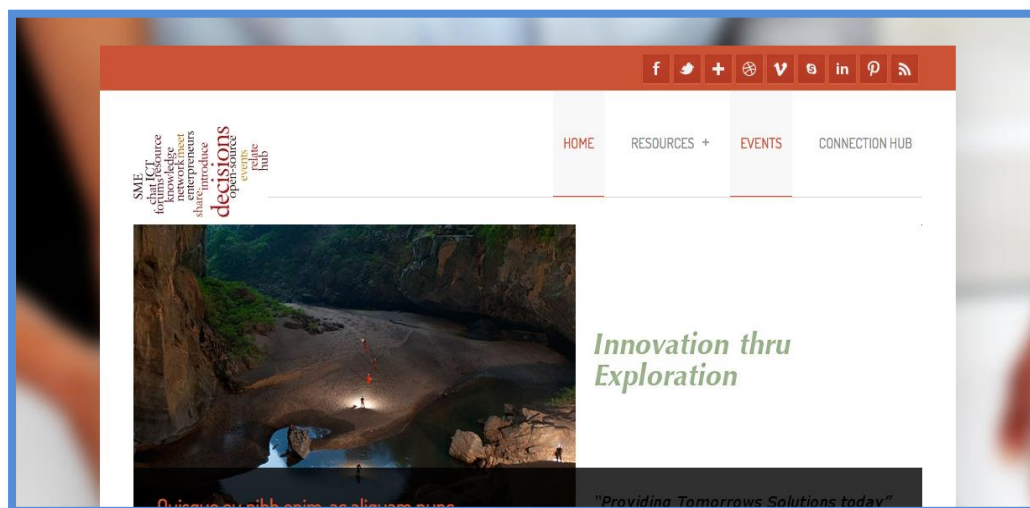
The prototype contains rich information gathered through a rigorous process of information searching. Having the knowledge from a previous study (James, 2012) on some types of information required by Small Organisations, a target list of content was populated on the website (See Appendix J). Information is the basic ingredient for decision-making and, as well, the core of bounded rationality. This made the focus on the attributes of information paramount in this study. The website content therefore considered information carriage, accessibility of information and subject domain as the attributes of the information populated on the website.

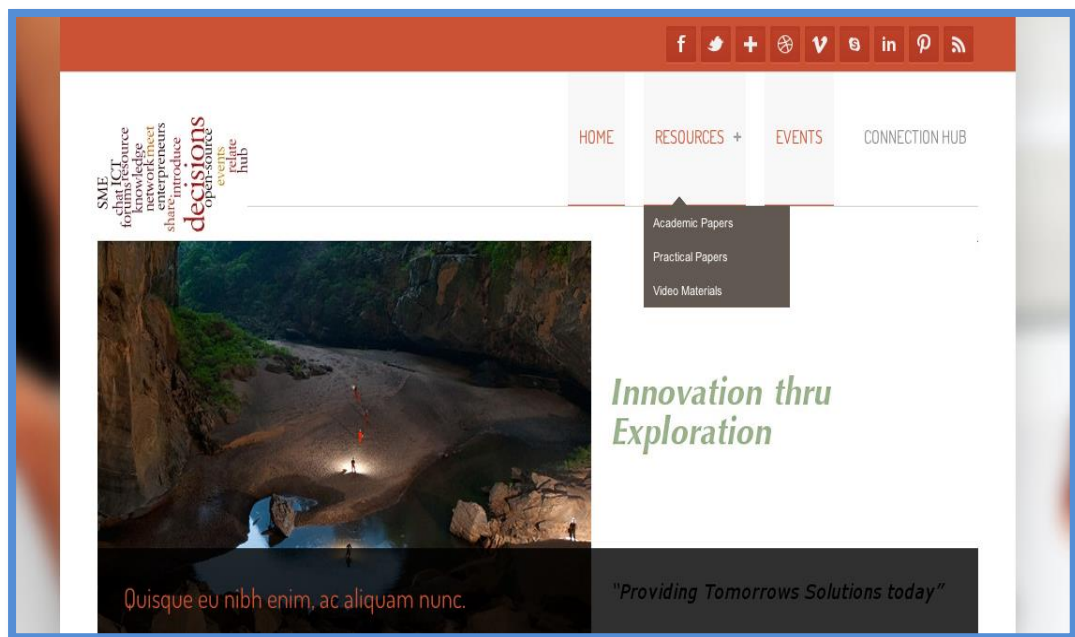
4.1.4 Functional Description

The final prototype design resulting from the research on Addressing Bounded Rationality and Satisficing for ICT Decision-Making in Small Organisations is hereby presented. The design criteria drawn from interviews with proposed users of the final artefact have been implemented. The website is accessible at technowiki.ngportal.com. The main features currently available are described in the following sections.

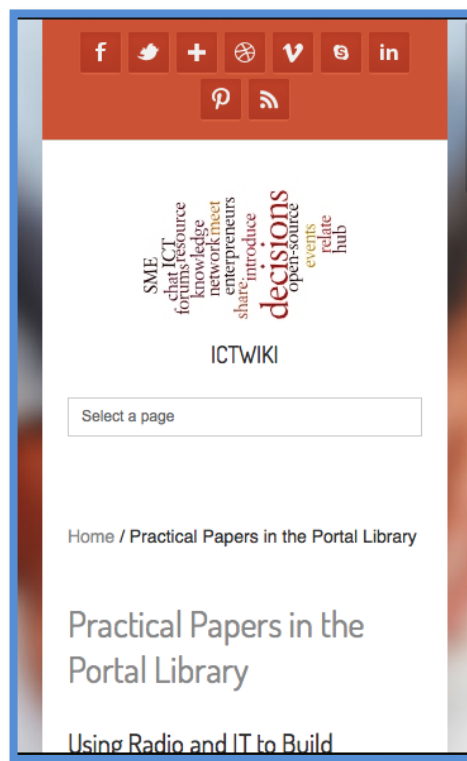
Figure 8: Knowledge Base Website Screenshots

- **Graphical user interface with clear navigation menu**





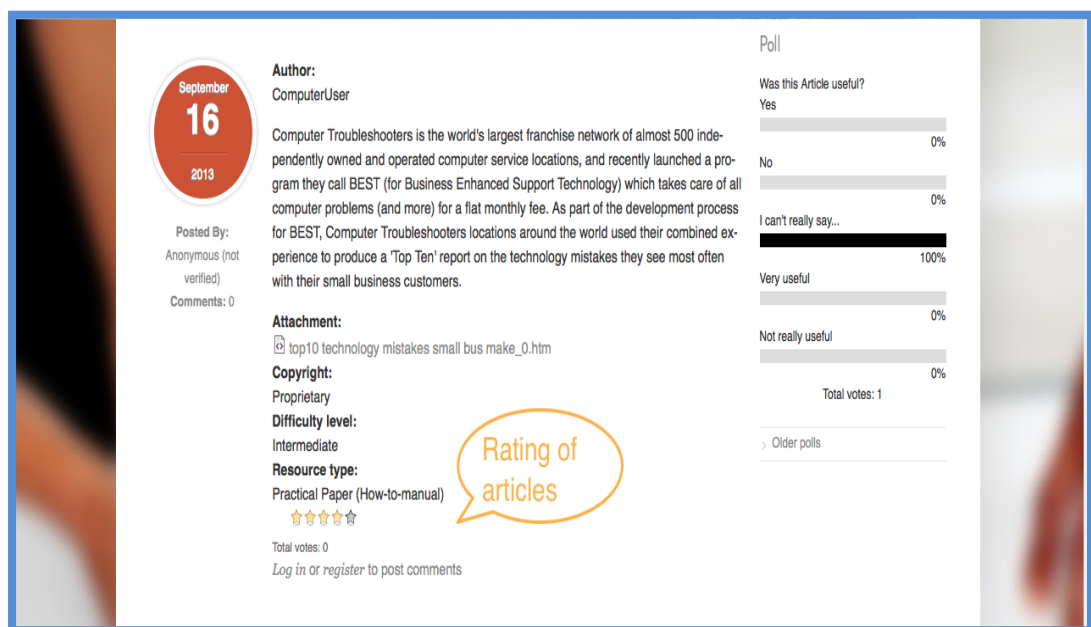
- **Responsiveness to Mobile Users on different devices – mobile and ipad**





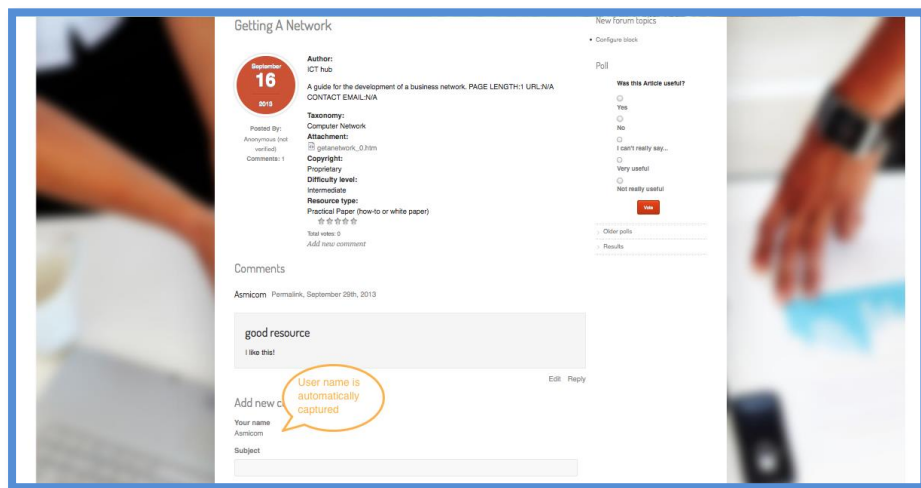
- **Rating of Articles**

When an article is rated, it is pushed up the list of popular articles and it is more trusted as reliable by readers. To rate an article, the user simply hovers over the stars underneath a post and clicks at the level or rating desired.



- **Commenting**

Comments are another way of ensuring reliability. This feature is available only to registered users. It also addresses identity management, making the details of the person who is commenting visible and, as such, users can decide whether or not to rely on the comments provided.



- **Forum Discussion**

Active forum topics						New forum topics
	Topic	Replies	Views	Last post	Forum	Poll
	South African NGO ICT Impact Survey 2007 by Anonymous (not verified) on Mon, 16/09/2013 - 2:09pm		2	by Anonymous (not verified) Mon, 16/09/2013 - 2:09pm		Was this Article useful? Yes 0% No 0% I can't really say... 100% Very useful 0% Not really useful 0% Total votes: 1 Older polls
	E-Commerce Glossary by Anonymous (not verified) on Mon, 16/09/2013 - 2:09pm		1	by Anonymous (not verified) Mon, 16/09/2013 - 2:09pm		
	The 10 best IT certification Web sites by Anonymous (not verified) on Mon, 16/09/2013 - 2:09pm		2	by Anonymous (not verified) Mon, 16/09/2013 - 2:09pm		
	Breaking through the haze: understanding and leveraging cloud computing. by Anonymous (not verified) on Mon, 16/09/2013 - 2:09pm		1	by Anonymous (not verified) Mon, 16/09/2013 - 2:09pm		
	IP Telephony from A to Z by Anonymous (not verified) on Mon, 16/09/2013 - 2:09pm		2	by Anonymous (not verified) Mon, 16/09/2013 - 2:09pm		

- **Downloadable Content**

Using Radio and IT to Build Community in Africa

September
16
2013

Author:
DOT-COM Alliance

An article on a workshop on 'Building a Sense of Community in African Countries through Radio and Information Technology (IT).

PAGE LENGTH:1

URL:N/A

CONTACT EMAIL:kyasin@edc.org

Posted By:
Anonymous (not verified)
Comments: 0

Taxonomy:
Artificial Intelligence (AI)

Attachment:
Using Radio and IT to Build Community in Africa_0.htm

Copyright:
Proprietary

Difficulty level:
Beginner
Intermediate

Resource type:
Practical Paper (How-to-manual)

New forum topics

Poll

Was this Article useful?

Yes 0%

No 0%

I can't really say... 100%

Very useful 0%

Not really useful 0%

Total votes: 1

> Older polls

Security and Identity Management

- **Preventing Spam with Captcha**

User account

Create new account
Log in
Request new password

Username *

Spaces are allowed; punctuation is not allowed except for periods, hyphens, apostrophes, and underscores.

E-mail address *

A valid e-mail address. All e-mails from the system will be sent to this address. The e-mail address is not made public and will only be used if you wish to receive a new password or wish to receive certain news or notifications by e-mail.

Word verification *

WVPS (verify using audio)

Type the characters you see in the picture above; if you can't read them, submit the form and a new image will be generated. Not case sensitive.

Create new account

New forum topics

- Configure block

Poll

Was this Article useful?

Yes 0%

No 0%

I can't really say... 100%

Very useful 0%

Not really useful 0%

Total votes: 1

> Older polls

- **User registration to control and ensure reliability**

The screenshot shows a user registration page. At the top, a red error message states: "The e-mail address yomikabiawu@yahoo.com is already registered. Have you forgotten your password?". Below this, the "User account" section includes links for "Create new account", "Log in", and "Request new password". The "Username" field contains "Sparkle". The "E-mail address" field contains "yomikabiawu@yahoo.com". A "Create new account" button is visible. To the right, a "Poll" section asks "Was this Article useful?" with options: "Yes" (0%), "No" (0%), "I can't really say..." (100%), "Very useful" (0%), and "Not really useful" (0%). The total votes are 1.

- **Login**

The screenshot shows a user login page. At the top, there are two sections: "Who's online" and "Who's new". The "Who's online" section lists "ikwilkadmin". The "Who's new" section lists "Asmicom". Below these, the "User login" section includes fields for "Username" (containing "Asmicom") and "Password" (containing "*****"). There are links for "Create new account" and "Request new password". A "Log in" button is at the bottom.

4.2 Prototype Evaluation

The focus of Design Science research is to tackle real life problems by creating and evaluating artefacts that meet specified needs. The design aspect has been previously covered and the following sections will address the evaluation of the designed artefact.

There are different types of artefact evaluations but it is important that specified functionality decided during the design phase in the context of the problem is tested. The efficiency or effectiveness of the new solution in addressing the problem must also be clearly shown (Venable, 2006).

Design Science artefact evaluation can be observed in an experiment or with a

simulation. As Venable (2006) explains, an artefact may be evaluated naturalistically or artificially. In naturalistic evaluation, real users are asked to perform tasks that would be required of the artefact in a real life situation. This will result in an observation with tangible results and measures. In an artificial evaluation, however, the users in the evaluation process are not the intended users, they may be the artefact designers themselves and the tasks also not a real scenario. This evaluation could be valuable when there are limiting factors that constrain the researcher including cost, time and other environmental factors.

This study adapted a naturalistic evaluation engaging real users of the intended website. A couple of other considerations for website evaluations were adapted from studies from literature (He et al, 2013; Law et al, 2010; Natris, 2013; Ou & Sia, 2010).

4.2.1 Evaluation Criteria

The evaluation exercise was conducted mainly with the aim of measuring the efficiency of the research approach – Design Science as well as the effectiveness of the artefact in addressing Bounded Rationality and Satisficing. There were three main criteria in the evaluation process: Heuristic Evaluation, Information Quality and Usability.

The Heuristic Evaluation (Natris, 2013) was aimed at evaluating the effectiveness of the approach in addressing Bounded Rationality. It entailed measuring how well the website enabled the users to learn things about ICTs by themselves. Information Quality evaluation was aimed at measuring the effectiveness of the approach in addressing satisficing. Information Quality is a user's assessment of information based on criteria such as accuracy, reliability, etc. (Ou & Sia, 2010). Usability evaluation was targeted at evaluating the efficiency of the website.

The overall evaluation adapted a combination of user judgments and counting methods to determine the performance and quality of the website. The measurement of user perceptions is used in user judgment evaluation. For counting methods, a list of attributes is outlined for testing. The attributes were derived from research phenomena and associated literature.

The list of attributes for the evaluation conducted was thus based on the following features:

- Identity management which addresses reliability of information on the website. This feature is exhibited in the
 - User registration
 - Comment feature of the website
 - Rating of articles
- Website presentation which addresses the motivation to use the website. The features incorporated for this include:
 - Website responsiveness on mobile devices of different screen resolutions
 - A better graphical layout for the final website display
- Other criteria including:
 - Searching
 - Information quality
 - A better graphical layout for the final website display

All respondents were directed to the website link of the new prototype and were also asked to view the website on a mobile device. They were contacted by email and word-of-mouth to visit the website and complete the pop-up survey that appears on the website. Others were sent an email containing the survey link and directed to fill out the survey. The table below shows the mapping of the survey to the evaluation.

Table 7: Mapping of Evaluation Criteria to Research Objectives

Type Of Evaluation	Research Concept	
Heuristic	Bounded Rationality	} Research Phenomenon
Information Quality	Satisficing	
Usability	Design Science	— Research Approach

4.2.2 Evaluation Results

The evaluation result is presented in Table 4.3 below. The factors considered in the evaluation are Heuristic, Usability and Information Quality (Natris, 2013; Ou & Sia,

2010). Twenty-three respondents filled out the survey after visiting the new website but only twenty-two were usable. This subsection will report on the Heuristic and Information Quality, while the next subsection will report on the Usability of the website.

Table 8: Evaluation Results Breakdown

Research Concept	Question	Extremely Satisfied	Satisfied	Neutral	Dissatisfied	Extremely Dissatisfied	Yes	No	Unsure
Heuristic	How would you rate the quality of information on ICTWIKI?	6	15	1	0	0	21/22	1/22	0
Heuristic	Would you trust information on ICTWIKI for your ICT decisions?	5	16	1	0	0	21/22	1/22	0
Information Quality	Would you rely on comments made by registered users on ICTWIKI?	6	12	0	4	0	18/22	4/22	0
Usability	How would you rate the mobile responsiveness of ICTWIKI?	5	11	6	0	0	16/22	6/22	0/22
Usability	How would you rate the accuracy of search results on ICTWIKI?	2	15	1	4	0	17/22	1/22	4/22
Usability	How would you rate the user-friendliness of ICTWIKI website?	9	13	0	0	0	22/22	0	0
Heuristic and Information Quality	How would you rate Information on ICTWIKI giving you a better idea of ICT for your business?	5	16	0	0	0	21/22	0	0

4.2.2.1 Website Effectiveness

The measure of website effectiveness was based on the Heuristic and Information Quality evaluation. Most of the respondents said they would trust the content of the website and comments from its users. They also mostly felt they learnt more about ICTs from the website information. It is important to mention that this prototype version of the website contains many social network plug-ins; hence, it will accommodate more comments, both locally and also on the associated social network.

In addition, the respondents, in some comments they wrote, indicated that the new website is more responsive and preferred than the previous one. They indicated that it contains optimized images unlike the old website. They also mentioned that it seemed to have more images than the old website. Another reason for the high responsiveness is that the theme features were replaced in this website version.

4.2.2.2 Website Usability

The usability of the new version of the website was determined by the following measures. Respondents were asked to access the website over their mobile devices (See Appendix H). They were able to use all the features on the final artefact website more easily than the mock-up version on the mobile platform. The contents on the final artefact are also better spaced with bold headings which encouraged them to read the articles and to easily get to the ones they were interested in. One respondent did comment that the tag cloud was missed. The tag cloud was a nice feature on the landing page of the mock-up.

Another feature that was mentioned was the color combination on the new website. Most mobile devices have fewer colors than desktop computers. Hence, it was important that fewer colors must be used in the production website. The new website had the same look-and-feel over the multiple devices.

4.3 Summary

This chapter presented the prototype development of the knowledge base website for Addressing Bounded Rationality and Satisficing in South African SMEs ICT decisions. The highlights of the knowledge elicitation survey, which helped in understanding the Bounded Rationality existence and from which the researcher also derived the design criteria are further explicated in the subsequent sections.

The goal of the exploratory phase of the research was to gain insight about Bounded Rationality and Satisficing in the decision-making process of South African SMEs. Furthermore, the study proposed an information website in an attempt to address this.

Chapter 5: Discussion and Conclusions

This chapter discusses the findings from the study. The reflection presented is based on the measured performance (i.e. effectiveness and efficiency) of the website. This provides a basis for a stand on the quality of the solution preferred. It also informs the extent of the success of the design research. The contribution of the study is highlighted and, in light of the limitations encountered during the process, recommendations for future work are also proposed.

5.1 User Interactions with the Website Prototype

Respondents were asked to visit the website both on their mobile phones and their desktop (See Appendix K). The responses received show a very high positive response to their interactions with the website.

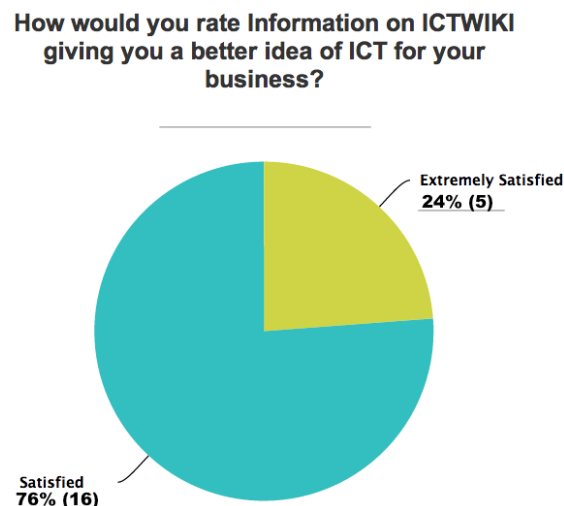


Figure 9: Response distribution on Information Quality

Over seventy percent of the Small Organisation decision-makers were satisfied with the level of understanding of ICTs that the website information provided. Twenty-three percent expressed extreme satisfaction on this measure. Also interesting is that none of the respondents were unsure about the level of valuable knowledge of ICTs gotten from the website. Neither did any of the respondents respond negatively on this

(See Figure 8).

This evaluation measure, in addressing bounded rationality for decision-making in Small Organisations, comes across as being an effective solution for the problem.

In terms of the use of social capital in making decisions, the website has adequately accommodated this important feature. This is corroborated by the positive response rate in the reliance on the website users' comments in decision-making (See Figure 9). This positivity is also reflected in the trust of the current website information as reported in Figure 10.

Would you rely on comments made by registered users on ICTWIKI?

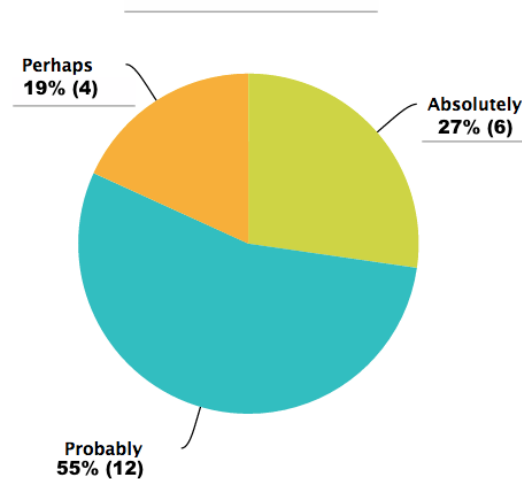


Figure 10: Response distribution on Reliability on Users' Comments

Would you trust information on ICTWIKI for your ICT decisions?

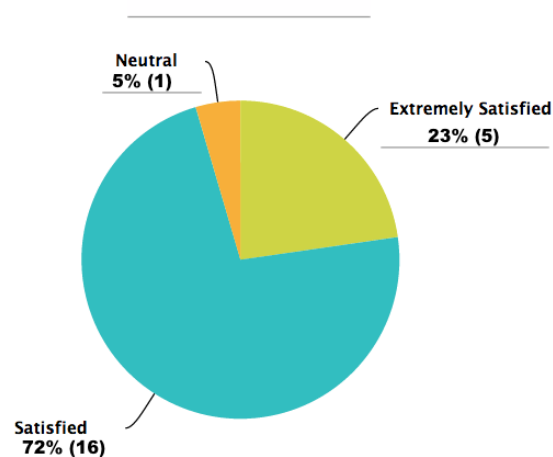


Figure 11: Response distribution on Trust of Website Information

Again, on Information Quality, the website ranks very high, with over ninety percent of respondents being satisfied. Four percent of the respondents are unsure but none have reported negativity in this measure. The high rating of Information Quality would suggest that the artefact provides better satisficing since the decision-makers now have richer input in their decision task. Figure 11 details the distribution.

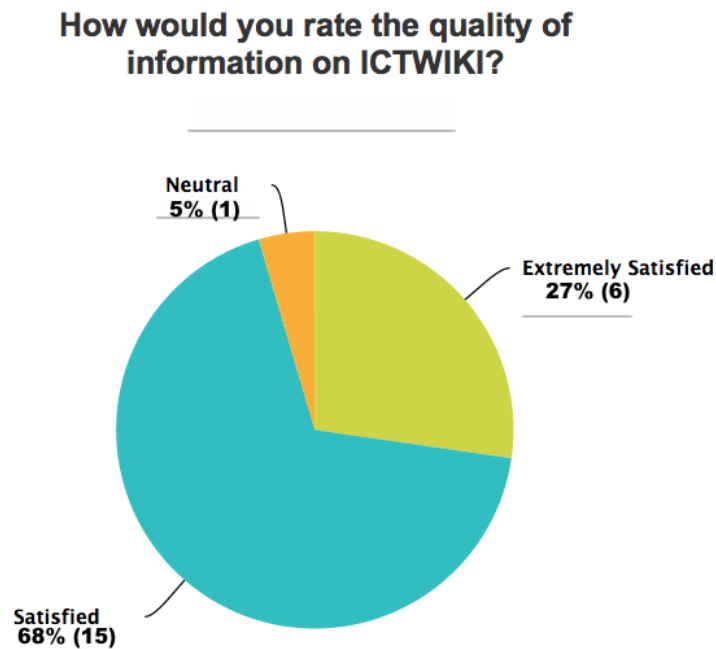


Figure 12: Response distribution on Information Quality

5.2 Prototype Usability

The Usability of website measure and discussion is aimed at helping to evaluate the level of effectiveness of the research approach in addressing the research problem.

Given that over ninety percent of Internet users in South Africa, this consideration was deemed important in the design. The survey incorporated and tested a mobile device usage and responsiveness measure. The results are displayed in the figure 12 below. Over seventy percent of respondents were satisfied with this feature.

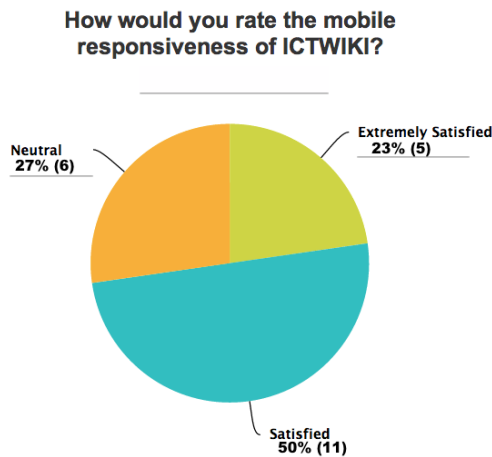


Figure 13: Response distribution on Mobile Responsiveness of the website

On the measure of the User-friendliness of the website prototype, a clear indication of satisfaction and extreme satisfaction was recorded in the responses.

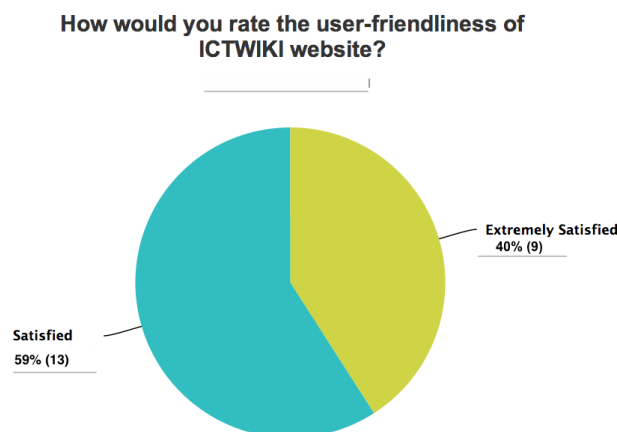


Figure 14: Response distribution on User-friendliness of the Website

The Search function on the website is aimed at helping to locate particular resources on the website. This feature was the least well received by respondents. A fraction of the respondents were dissatisfied with this feature. On further enquiry through telephone follow-up, it was discovered that some users were not able to use the feature at all because it just did not appear in their options. This was later discovered as a bug in the Drupal Search function.

How would you rate the accuracy of search results on ICTWIKI?

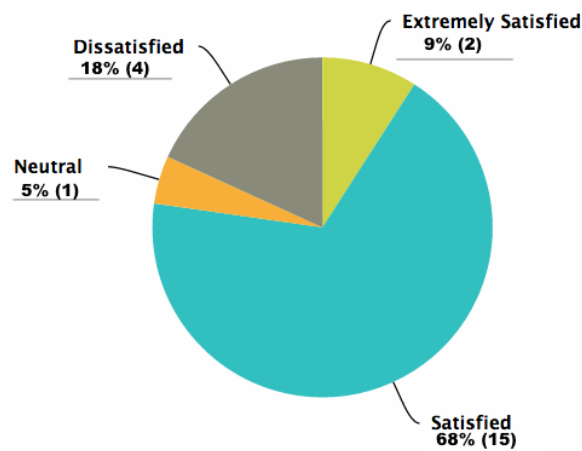


Figure 15: Response distribution on Search function on the website

5.3 Reflections on Findings

This study presents the concepts of bounded rationality and satisficing in explaining the possible reasons for the low quality and rate of ICT decisions in the South African SME sector. It purports that information, which is associated with the rationality in the decision-making process, at the level of these Small Organisations is largely informal and is from two main sources: the Internet and social capital around them. Taking these in mind, a website prototype was designed to address the problem and this approach was further evaluated to test its applicability.

This initial prototype was designed from a practitioner point of view and was taken to the respondents to confirm if the preconceived notions of their needs was accurate. The responses showed that these decision-makers were interested in the website however; their first impression on the landing page of a website determines whether or not they would delve further to get the required information from the website source. Adjustments were made and a second prototype was designed to verify that the changes were suitable and whether the information content of the website would now be evaluated, and this proved successful.

The Internet contains information that is often general and may not necessarily be

applicable to the context of the individual, in this case, the South African SME decision-makers. The complexity of this situation is what is referred to as the bounded rationality; the study decided to verify its existence within context. The study also went ahead, on confirmation of the dominance of this situation, to propose an artefact, an ICT information website, which would incorporate the use of social capital as well as localized content to address the situation.

Our findings showed that Small Organisation decision-makers are able to discern valuable information. Despite that, the full functionality of the website being imperfect, (e.g. the faulty Drupal Search function) there were high ratings on the quality of information. This is an indicator that the Small Organisation decision-makers do have a keen interest in getting to know about ICTs.

The study accepts that social capital is useful where the information being received is from individuals who have previously invested in the technology that is being inquired about. However, the World Wide Web may be less useful in acquiring the knowledge need for these ICT decisions. The positive responses on reliance on comments provided on the website also attests to this.

5.4 Research Contribution

This research makes a contribution to the IS field in the Design Science domain. Pure computer scientists are not required to concern themselves with any other factors than the technology they develop, but this puts the onus on IS researchers and practitioners to develop systems and solutions that are useable within context. This is the value and uniqueness of the IS field and this key factor has been demonstrated in the execution of this study.

The confirmation of the phenomenon of bounded rationality and satisficing in ICT SME decision making from the study is also valuable in charting the direction of interventions in the sector. This is useful not only to academics but also to governments and other bodies interested in SMEs especially for reasons associated with economic development.

In practice, also, the research is beneficial to Small Organisations as it contributes to the extension of their capabilities, not just by implementing solutions but by the value and increase in intelligence of SMEs through active engagement in information searching. When there is assurance of success in finding answers to task related problems, SMEs which naturally would turn to informal and social capital for the most strategic decisions should be able to turn to the available formal and more accurate information sources made available by this research.

There is also an example from this research on how design science researchers structure their design process. The approach of this research entailed using best practice knowledge to propose a solution. Interaction with users of the proposed system served as an important input into the final prototype developed. This also gives a rich insight into how the class of respondents achieves learning. Using this approach, we can be assured that the designed solution addresses the stated problem for the small business owners.

5.5 Recommendations for Future Work

The study recognizes that design requirements differ for unique Small Organisations. For this reason, the most important features implemented were selected from the most frequently occurring requirements elicited from the respondents. In addition, as the concept of bounded rationality explains, the full understanding of the problem situation is always too broad. As such, the tightness of fit of our prototype to the situation comes from the fact that sustaining such a website will be community-driven and people's needs will be met as they interact with each other through forums on the website.

User registration on the website helps to verify the identity of site users. This feature can be extended to incorporate a full profile definition page for users. Ratings and comments by users can also be viewed and judged based on the profile information. The users can also be enabled to upload articles they come across; the decision to trust this information also be based on the profile information.

Another recommendation for reliability and sustainability of the website may be

getting a number of academic institutions to contribute to the website academic content. Student technology assignments and evaluations can be uploaded as an incentive to them for their work. They are assured that their assignments are not just archived but posted somewhere and contributing to knowledge. Practical papers can be sourced from free or licensed white papers that contain minimal marketing and more informative content on the benefits of the technologies being described.

The final website prototype is far from a finished product. Despite that, it satisfactorily helped in ascertaining the effectiveness of the website and content in the problem. There are a few suggestions that may further advance this research. The website can be further strengthened by the completion of all other aspects of the website functionality such as the user profile summary, events calendar and notifications. These features are seen in websites such as the Silicon Cape Initiative website.

Also, the actual effect of this website and other similar ones will be an interesting phenomenon to study. After the establishment of information such as is available on this website prototype, a study that measures the change in Small Organisations' decision-makers level of knowledge will be a valuable extension of this study.

5.6 Conclusion

The outcome of this study has implications, which are highlighted herein as a closing remark. One value of this research is the added knowledge on information use in SME ICT decision-making process. Decisions essentially require information; however, information is usually dispersed, incomplete and inadequate. According to literature, SMEs lack the required information for decision-making. Some literature posits that quality information is not highly regarded; rather ROI and other factors determine ICT adoption in SMEs.

The surveys conducted reveal otherwise, with most of the decision-makers interviewed either actively search information or outsource the task to more knowledgeable individuals. The artefact designed will help SMEs make better decisions in terms of applicability, although not necessarily creating better

information. Thus, the information on the prototype website is not necessarily better than that on the Internet as a whole; rather, the claim is that the website's information is better situated to the context of users who are SME decision-makers in Cape Town.

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Appendices

Appendix A: SME Definitions According to 2004 Small Business Act

Sector or subsectors in accordance with the Standard Industrial Classification	Size or class	Total full-time equivalent of paid employees Less than	Total annual turnover Less than	Total gross asset value (fixed property excluded) Less than
Agriculture	Medium	120	R 4.00 m	R 4.00 m
	Small	50	R 2.00 m	R 2.00 m
	Very small	10	R 0.40 m	R 0.40 m
	Micro	5	R 0.15 m	R 0.10 m
Mining and Quarrying	Medium	200	R30.00 m	R18.00 m
	Small	50	R 7.50 m	R 4.50 m
	Very small	20	R 3.00 m	R 1.80 m
	Micro	5	R 0.15 m	R 0.10 m
Manufacturing	Medium	200	R40.00 m	R15.00 m
	Small	50	R10.00 m	R 3.75 m
	Very small	20	R 4.00 m	R 1.50 m
	Micro	5	R 0.15 m	R 0.10 m
Electricity, Gas and Water	Medium	200	R40.00 m	R15.00 m
	Small	50	R10.00 m	R 3.75 m
	Very small	20	R 4.00 m	R 1.50 m
	Micro	5	R 0.15 m	R 0.10 m
Construction	Medium	200	R20.00 m	R 4.00 m
	Small	50	R 5.00 m	R 1.00 m
	Very small	20	R 2.00 m	R 0.40 m
	Micro	5	R 0.15 m	R 0.10 m
Retail and Motor Trade and Repair Services	Medium	120	R30.00 m	R 5.00 m
	Small	50	R15.00 m	R 2.50 m
	Very small	10	R 3.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Wholesale Trade	Medium	120	R50.00 m	R 8.00 m
	Small	50	R25.00 m	R 4.00 m
	Very small	10	R 5.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Commercial Agents and Allied Services	Medium	120	R50.00 m	R 8.00 m
	Small	50	R25.00 m	R 4.00 m
	Very small	10	R 5.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Catering	Medium	120	R10.00 m	R 2.00 m
	Small	50	R 5.00 m	R 1.00 m
	Very small	10	R 1.00 m	R 0.20 m
	Micro	5	R 0.15 m	R 0.10 m
Transport	Medium	120	R20.00 m	R 5.00 m
	Small	50	R10.00 m	R 2.50 m
	Very small	10	R 2.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Storage	Medium	120	R20.00 m	R 5.00 m
	Small	50	R10.00 m	R 2.50 m
	Very small	10	R 2.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Communications	Medium	120	R20.00 m	R 5.00 m
	Small	50	R10.00 m	R 2.50 m
	Very small	10	R 2.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Finance	Medium	120	R20.00 m	R 4.00 m
	Small	50	R10.00 m	R 2.00 m
	Very small	10	R 2.00 m	R 0.40 m
	Micro	5	R 0.15 m	R 0.10 m
Business Services	Medium	120	R20.00 m	R 4.00 m
	Small	50	R10.00 m	R 2.00 m
	Very small	10	R 2.00 m	R 0.40 m
	Micro	5	R 0.15 m	R 0.10 m
Community	Medium	120	R10.00 m	R 5.00 m
	Small	50	R 5.00 m	R 2.50 m
	Very small	10	R 1.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m
Social and Personal Services	Medium	120	R10.00 m	R 5.00 m
	Small	50	R 5.00 m	R 2.50 m
	Very small	10	R 1.00 m	R 0.50 m
	Micro	5	R 0.15 m	R 0.10 m

Appendix B: Interview Schedule



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Information Website Semi-Structured Interview

Introduction

Interview Number:

Institution Number:

Date:

Duration:

- Introduction and greetings
- Purpose of the interview explained
- The respondent will be briefed about the ethical procedures regarding the information from the interview.
- The respondent will be assured of confidentiality and anonymity fears.

1. Rights of the Respondent

The respondent is provided with the following information

- The respondent may respond to any question
- The respondent may decline to be recorded
- The respondent may offer any information at a later time.
- The respondent may ask for a copy of the research results
- The respondent will be sent the summaries or recordings of the interview for validation

2. Demographics

- Name of Organisation.....
- Organisation's operating sector.....
- Number of years of existence.....
- Short description of business.....
- Designation/Department of participant.....

3. General Interview Questions Outline

Information Needs and Sources Questions (INSQ)

- a. What is your view on the role which ICTs are playing/can play in your business?
- b. What is the ICT investment decision-making process in your organisation?
- c. What knowledge, in your opinion, is needed for ICT investment decision?
- d. What attributes in your own opinion, affect investment in an ICT (e.g. support, skills available price, technicality, reliability, etc.)?
- e. How knowledgeable would you rate yourself in the area of ICTs?
- f. Where do you currently look for or find information about ICT decisions?
- g. What are some problems you have previously been encountering due to lack of ICT information?
- h. How will a dedicated information website affect your organization's ICT investment decisions or improve your organization's technology maturity/readiness?

Information Toolkit Questions (ITQ)

- a. What will give this website an edge over the Internet or any other information website you may know of?
- b. Please name a few websites that are of interest to you. What makes the site(s) attractive to you?
- c. What do you NOT want on your site in terms of text, content, etc.?
- d. Would you be willing to rate articles on the website or write reviews about articles on the website?

Information Toolkit Layout Questions (ITQ)

- a. The mock-up website will be shown to the respondent and their comments on the layout and navigation will be noted.

4. Conclusion

A brief review of the interview

5. Appreciation

Appreciation of the respondent

Appendix C: Small Organisation Respondents Profile

SME Sector	Respondents
Agriculture	1
Electricity, Gas & Water	1
Construction	1
Motor Trade & Repair Services	1
Commercial Agents	1
Business Services	3
Social & Personal Services	3
Other: NPO/NGO	2

Appendix D: Consent Form



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CONSENT FORM

I/we certify that I/we am/are in sound state of mind to participate in the study of requirements for building an information website for SMEs ICT Information Needs. The researcher may request some documentaries for further study from you.

By signing this form you confirm your participation in the research on “Information Needs for ICT Decisions in SMEs” either through face to face interviews or questionnaires in exceptional situations.

Signature.....

Date:

Appendix E: Ethics Application Form



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Commerce Faculty Ethics in Research Committee

Updated Ethics Form March 2013

Any individual in the Faculty of Commerce at the University of Cape Town undertaking any research that involves the use of human subjects, or research that may hold ethical consequences for the University of Cape Town, is required to complete this form and obtain approval before conducting research. The completed form should be submitted as an electronic document to departmental Ethics Committee representatives for submission to the Commerce Faculty Ethics in Research Committee. Please also submit electronic copies of your research proposal, informed consent form or other information used to obtain consent, and any questionnaires or other material shown to subjects.

1. PROJECT DETAILS

Project title: The ICT information Needs of Small Organisations in South Africa: a Design Science Approach

Principal Researcher/s: Oluyomi Olufemi Kabiawu

Email address: Kbwolu001@myuct.ac.za

Research Supervisor: Prof. J.P. VanBelle

Email address: Jean-paul.VanBelle@uct.ac.za

Co-researcher(s): NIL

Email address: N/A

Brief description of the project:

Data collection: (please select)

☒ Interviews ☐ Questionnaire ☐ Experiment ☐ Secondary data ☐ Observation
☐ Other (please specify):

Procedure: (please describe)

Respondents will be contacted physically or via email and a written introduction to the research will be given. A

request will then be made for them to be interviewed and as proof of their consent; they will sign a consent form. The interview will last about twenty minutes. They will also be asked to navigate an offline demo website and feedback about the artefact will also be requested.

2. PARTICIPANTS

Characteristics of participants:

Gender: all
Race / Ethnicity: all
Age range: all
Location: Western Cape
Other: Not applicable

Race / Ethnicity:

Have you included a “**Prefer not to Answer**” response category in your questionnaire? (please select)

☐ Yes ☐ No ☒ Not applicable

If you answered ‘No’ why not?

Affiliations of participants: (please select)

☐ Company employees ☐ UCT staff ☐ General public ☐ UCT Students
☒ Other (please specify): Decision makers in Small Organisations

If your sample includes children (aged 18 and below), mentally incompetent persons, or legally restricted groups please explain below why it is necessary to use these particular groups. If subjects are minors or mentally incompetent, please describe how and by whom permission will be granted? If you are including children under the age of 18 and are not getting parental consent, please explain why you believe that their parents would consent if it was possible to contact them.

3. ORGANISATIONAL PERMISSION

If your research is being conducted within a specific organisation, please provide organisational permission or explain how permission will be obtained.

The organisations will include SMEs, SMMEs, NGOs, and any other organisation which has between one and twenty employees.

Are you making use of UCT students as respondents for your research? (please select) ☐ Yes ☒ No
If yes, have you contacted Executive Director: Student Affairs for permission? (please select) ☐ Yes ☐ No
Was approval granted? (please select) ☐ Yes ☐ No ☐ Awaiting a response

Are you making use of UCT staff as respondents for your research? (please select) ☐ Yes ☒ No
If yes, have you contacted Executive Director: Human Resources for permission? (please select) ☐ Yes ☐ No
Was approval granted? (please select) ☐ Yes ☐ No ☐ Awaiting a response

Contact Emails: Executive Director: Human Resources (Miriam.Hoosain@uct.ac.za)
Executive Director: Student Affairs (Moonira.Khan@uct.ac.za)

4. INFORMED CONSENT

What type of consent will be obtained from study participants?

- ☒ written consent
☐ anonymous survey
☐ oral consent (please justify)
☐ other (please specify)

How and where will consent/permission be recorded?

The respondents will be given a form to sign as proof of their consent. They will also be allowed to discontinue the exercise at any point in time within the interview for whatever reasons they may have.

5. CONFIDENTIALITY OF DATA

What precautions will be taken to safeguard identifiable records of individuals? Please describe specific procedures to be used to provide confidentiality of data by you and others, in both the short and long run. This question also applies if you are using secondary sources of data that is not anonymous.

Identity of respondents will not be disclosed at any point within the report and discussion of the thesis. Demographics are collected only for validity and authenticity purposes. No direct reference will be made to the personality of the respondents at any point of reporting the exercise.

6. RISK TO PARTICIPANTS

Does the proposed research pose any physical, psychological, social, legal, economic, or other risks to study participants you can foresee, both immediate and long range? (please select)

☐ Yes ☒ No

If yes, answer the following questions:

1. Describe in detail the nature and extent of the risk and provide the rationale for the necessity of such risks
2. Outline any alternative approaches that were or will be considered and why alternatives may not be feasible in the study
3. Outline whether and why you feel that the value of information to be gained outweighs the risks

What authorship agreement have you reached with your co-researchers or supervisor?

☐ This research is not intended for publication

☒ Standard authorship agreement (principal researcher first author, co-researcher(s) and supervisor(s) co-authors)

☐ Customised agreement (please specify below):

I certify that we have read the the UCT Authorship Policy, and Commerce Faculty Authorship Guidelines ☒ (<http://www.commerce.uct.ac.za/Commerce/Information/research.asp>)

I certify that that the material contained herein is truthful and that all co-researchers and supervisors are ☒ **aware of the contents thereof.**

I understand that it is my responsibility to conduct research in accordance with the ethical requirements of ☒ **UCT.**

Applicant's signature:

Date:

CHECKLIST	SELECT
A full copy of a research proposal or a literature review with methodology is attached	☒
Research proposal/ interview schedules / cover letters / questionnaires / forms and other materials used in the study are attached/ consent form	☒
Organisational consent letter / UCT student or staff approval letter	NA ☐

On your cover letter to your questionnaire have you included the following? 1. The following UCT Logo  2. A sentence explaining the aim of the research 3. Sentences of a similar nature to below must be included in the cover letter or consent form: This research has been approved by the Commerce Faculty Ethics in Research Committee. Your participation in this research is voluntary. You can choose to withdraw from the research at any time. The questionnaire will take approximately X minutes to complete You will not be requested to supply any identifiable information, ensuring anonymity of your responses. Due to the nature of the study you will need to provide the researchers with some form of identifiable information however, all responses will be confidential and used for the purposes of this research only. Should you have any questions regarding the research please feel free to contact the researcher (insert contact details). 4. Have you scanned in your signature for the last section of the form?	NA ☐ ☒ ☒ ☒ ☒ ☒ ☐ OR ☐ ☒ ☐
--	--

For Ethics committee representative only Recommendation(s): Signature: Date:
For Ethics committee chairperson only Recommendation: Signature: Date:

Appendix F: Ethics Approval Letter

UNIVERSITY OF CAPE TOWN



Faculty of Commerce Ethics in Research Committee

Courier: Room 2.26 Leslie Commerce Building Upper Campus University of Cape Town
Post: University of Cape Town • Private Bag • Rondebosch 7701
Email: Harold.Kincaid@uct.ac.za
Telephone: +27 21 650 5041
Fax No.: +27 21 650 4396

UCT/COM/120/2013

28th March 2013

Oluyomi Olufemi Kabaiwu
University of Cape Town
Kbwolu001@myuct.ac.za

Dear Researcher

Project title: The ICT information Needs of Small Organisations in South Africa: a Design Science Approach

This letter serves to confirm that the project entitled, "The ICT information Needs of Small Organisations in South Africa: a Design Science Approach", as described in your final submitted protocol 2013, has been approved. You may proceed with the research.

Please note that if you make any substantial change in your research procedure that could affect the experiences of the participants, you must submit a revised protocol to the Committee for approval.

Best wishes for great success with your research.

Regards,

Harold Kincaid

Professor Harold Kincaid
Commerce Faculty Ethics in Research Committee

"OUR MISSION is to be outstanding teaching and research university,
educating for life and addressing the challenges facing our society."

Appendix G: Letter of Introduction



UNIVERSITY OF CAPE TOWN
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Department of Information Systems

Leslie Commerce Building

Engineering Mall, Upper Campus

Private Bag, Rondebosch, 7701

Cape Town

Tel: (021) 650-2261

Fax No: (021) 650-2280

Dear Participant,

REQUEST TO PARTICIPATE IN A RESEARCH SURVEY

I am an Information Systems Masters student at the University of Cape Town. I am conducting a research on building an information website for SMEs ICT information needs. Due to the current globalized world in which SMEs operate, there is need to adopt technology widely used today in order to be competitive.

The aim of this study is to understand and apply the requirements for building an online Information Toolkit that will make specific information that will be useful to SMEs when they need to make ICT decision. The study will also like to collect feedback about the net benefits of this website. This information will be collected through face-to-face interviews.

This is to request your participation in the interview survey. The interview will be last up to an approximate of 20 minutes. The data gathered will be kept confidential. Your identity will remain unidentified and no recognizable details such as name, address and phone will be demanded. The gathered data will be processed with strict secrecy.

Your involvement in the survey is voluntary. The set of questions have been approved by the Commerce Faculty Ethics in Research Committee. I will be delighted to send you a copy the final report. I thank you in advance for your expected participation.

Kind Regards,

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OR

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Cell: +27 790 800 797

Appendix H: Prototype Mock-Up Screenshots



Figure – The home page



Figure – The Resources page



Figure – The Academic Papers page



Figure – The Practical Resources page



Figure – The Events Calendar month view



Figure – The Calendar Event View



Figure – The ICT Information Resource Classification View



Figure – The ICT Information Resource Summary View



ICT INFO TOOLKIT

Cape Town: Clear sky, 13 °C
Frank Logout






HOME
RESOURCES
EVENTS FOR YOU
CONNECTION HUB

Network Security Essentials for Your New Small Business

Tue, 03/05/2013 - 08:19 -- alphabeta

A white paper on network security essentials for small businesses. PAGE LENGTH:9
URL: www.watchguard.com CONTACT EMAIL: N/A








Tags:
Internet/Network Security

Author:
Watchguard

Copyright:
Proprietary

Technical Level:
Intermediate

Classification:
Practical Paper (how-to or white paper)

Taxonomy:
Internet/Network Security





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Subject

ACTIVE FORUM TOPICS

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- N/A alphabeta
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- Software on a shoestring budget alphabeta
- Using Radio and IT to Build Community in Africa alphabeta

Technology Diffusion

- Website development
- Computer Program
- Technology Infrastructure
- Virtualization Cloud
- Computing E-commerce Enterprise
- Resource Planning (ERP) System
- Internet/Network Security VOIP
- Computer Network Open source software (OSS)

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Figure – The Information Resource Detail View

Appendix I: Sample of Transcripts

Interview 1	
INTERVIEW TRANSCRIPT	ANALYSIS
1. Introduction	
<i>Hello XXXXXX.</i> <i>My name is XXXX. I'm a postgraduate student of XXXX and I'm conducting a research on the Information Needs of Small Organisations.</i> <i>Ok</i> <i>Like already presented to you in the Introduction letter, just an overview of what I'm trying to achieve. I'm trying to build an information portal for Small Organisations that will help them make ICT investment decisions. That's why I came to your organisation and I trust you will be able to help out with the research.</i> <i>Ok. Can I ask you a question?</i> <i>Ok.</i> <i>What is an ICT investment decision? What do you mean by investment?</i> <i>Ok. With Small Organisations, the perception is that they make do with what they have and don't tend to apply so much of technology in their operations. It is assumed that they are mindset that it is unnecessary or expensive to invest in technology. And I do not think it necessarily is so. So I think giving them more information about the options of available to them for their specific businesses can help them change their perception and improve their operations. So investment would mean that it would help them make decisions to purchase an ICT or maybe just expand/improve some of those they currently employ in their operations.</i> <i>So, it does not really mean they pay for new software for example; you might also use a free Google product. Yes. And just invest time into using them, not just new technology.</i>	

2. Rights of the Respondent	
<i>Just to let you know the following:</i> ➤ <i>You may or may not respond to any question</i> ➤ <i>You may decline to be recorded</i> ➤ <i>You may offer any information at a later time.</i> ➤ <i>You may ask for a copy of the research results</i> ➤ <i>You can be sent the summaries or recordings of the interview for validation if you so desire.</i>	
3. Demographics	
<i>Can you tell me the name of your Organisation?</i> <i>The full name is Name-of-the-Company interactive Inspiration. Although we go by the name of Name-of-the-Company.</i> <i>What sector does your organisation belong?</i> <i>What does that question mean? Ok. There are different sectors of organisations; some are NGOs, some are Manufacturing Industries, some are small business? Which one do you fall under? Essentially, we're not for profit, working primarily with NGOs and Small social businesses. The emphasis on social side of things and not profit sides of these.</i> <i>How many years has your company been in existence?</i> <i>Probably, about a year. As an organised organisation.</i> <i>Can you again give a brief description of what your organisation does?</i> <i>Name-of-the-Company is an incubator for social innovation and social incubation projects. We work with social entrepreneurs to bring their ideas to reality.</i> <i>Can you expatiate on how you improve the organisations?</i> <i>The organisations have different needs. Some are in the early stage and have a vague idea of some issue they want to address. In this situation, we get people to from a vague idea to a concrete way to address it. For others, they already have started their organisation and are looking to expand, for example, monetary evaluation or difficulty in knowing whom to go to address their difficulties. With those, we connect them to other people working in that sector or with similar experiences to cater of r the needs their projects require.</i> <i>Are you focused mainly on startups or already established organisations?</i> <i>Primarily startups for the reason that large scale organisations are quite rigid in their structures, so its difficult to change what they do and also talk to</i>	

<i>individuals...having said that, we are trying to work with a few. But essentially, we want startups to have a major barrier to entry because it is difficult to start something by yourself, whereas if you don't know what to do or where to go to or how to do things. It can be extremely daunting whereas if you already working with these organisation, you can have support structures already existing. So the focus is providing this support structure for people.</i> <i>What's your role in the organisation?</i> <i>My role? My role is more like coordination.</i> <i>What does that entail?</i> <i>Pretty much everything. As an organisation structure, there are three of us co-coordinating. We are trying a network of consultants who will be</i>	<i>The respondent is a decision-maker in the organisation.</i>
4. General Interview Questions	
Information Needs and Sources Questions (Bounded Rationality and Satisficing Determinant)	
<i>What is your view on the role which ICTs are playing/can play in your business?</i> <i>We try to use ICT as much as possible. We use a lot of free software even though sometimes they are not necessarily what we are really looking for. It works but it is not quite there.</i> <i>What is the ICT investment decision-making process in your organisation?</i> <i>We have no budget so we communicate or brainstorm by email or Whatsapp or Dropbox. After researching, we share findings through these tools. So our process is mainly using what we know to address our needs.</i> <i>What in your own opinion affects investment in an ICT (e.g. support, skills available, price, technicality, reliability, etc.)?</i> <i>How knowledgeable would you rate yourself in the area of ICTs?</i> <i>It varies. With some criteria or in some aspects expert and in other situations intermediate or not at all.</i>	<i>Absolute rationality is not achievable for reasons such as limited information or resources. There is also inability to optimally evaluate all possible choices.</i> <i>Some level of information searching is conducted before ICT decision-making.</i>

What information, in your opinion, is needed for ICT investment decisions? <i>Some things we've recently found out could have been useful if we had pre-knowledge. For example, ICTs that can be used by startups, options such as the SANGONET and their benefits and usefulness.</i> Where do you currently look for or find information about ICT decisions? <i>Facebook, Twitter, emails, Google, Dropbox, Personal experience, Social capital, etc.</i> What are some of your experiences with respect to finding ICT information, especially for investment decisions? <i>There is a lot of general content that are not related or relevant to our situation. The information is not always refined to our exact needs but sometimes useful things pop up. A lot of random information comes up most times. Sometimes I know what I'm looking for, other times I don't know what I'm looking for, and I just search.</i>	Design Criteria
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Appendix J: List of Modules in Final Prototype

Module 1 (M1): *Administration menu (7.x-3.0-rc4)*. This provides a dropdown menu to most administrative tasks and other common destination destinations (to users with the proper permissions).

Module 2 (M2): *Advanced help (7.x-1.0)*. Allows advanced help and documentation

Module 3 (M3): *Aggregator (7.19)*. Aggregates syndicated content (RSS, RDF, and Atom feeds).

Module 4 (M4): *Apps (7.x-1.0-beta7)*. Provides an interface for installing Apps from a Drupal app server

Module 5 (M5): *Backup and Migrate (7.x-2.7)*. Backup or migrate the Drupal Database quickly and without unnecessary data.

Module 6 (M6): *Block (7.19)*. Controls the visual building blocks a page is constructed with. Blocks are boxes of content rendered into an area, or region, of a web page.

Module 7 (M7): *Bulk Export (7.x-1.3)*. Performs bulk exporting of data objects known about by Chaos tools.

Module 8 (M8): *Calendar (7.x-3.4)*. Views plug-in to display views containing dates as Calendars.

Module 9 (M9): *Chaos tools (7.x-1.3)*. A library of helpful tools by Merlin of Chaos.

Module 10 (M10): *CKEditor (7.x-1.12)*. Enables CKEditor (WYSIWYG HTML editor) for use instead of plain text fields.

Module 11 (M11): *Color (7.19)*. Allows an administrator to change the color scheme of compatible themes.

Module 12 (M12): *Comment (7.19)*. Allows users to comment on and discuss published content.

Module 13 (M13): *Contact (7.19)*. Enables the use of both personal and site-wide contact forms.

Module 14 (M14): *Content translation (7.19)*. Allows content to be translated into different languages.

Module 15 (M15): *Contextual links (7.19)*. Provides contextual links to perform actions related to elements on a page.

Module 16 (M16): *Current Search Blocks (7.x-1.2)*. Provides an interface for creating

blocks containing information about the current search.

Module 17 (M17): *Custom content panes (7.x-1.3)*. Create custom, exportable, reusable content panes for applications like Panels.

Module 18 (M18): *Custom rulesets (7.x-1.3)*. Create custom, exportable, reusable access rulesets for applications like Panels.

Module 19 (M19): *Dashboard (7.19)*. Provides a dashboard page in the administrative interface for organizing administrative tasks and tracking information within your site.

Module 20 (M20): *Database logging (7.19)*. Logs and records system events to the database.

Module 21 (M21): *Date (7.x-2.6)*. Makes date/time fields available.

Module 22 (M22): *Date All Day (7.x-2.6)*. Adds 'All Day' functionality to date fields, including an 'All Day' theme and 'All Day' checkboxes for the Date select and Date popup widgets.

Module 23 (M23): *Date API (7.x-2.6)*. A Date API that can be used by other modules.

Module 24 (M24): *Date Popup (7.x-2.6)*. Enables jquery popup calendars and time entry widgets for selecting dates and times.

Module 25 (M25): *Date Repeat API (7.x-2.6)*. A Date Repeat API to calculate repeating dates and times from iCal rules.

Module 26 (M26): *Date Repeat Field (7.x-2.6)*. Creates the option of Repeating date fields and manages Date fields that use the Date Repeat API.

Module 27 (M27): *Date Tools (7.x-2.6)*. Tools to import and auto-create dates and calendars.

Module 28 (M28): *Date Views (7.x-2.6)*. Views integration for date fields and date functionality.

Module 29 (M29): *Delete content and users (7.x-1.1)*. Allows deletion of all nodes, comments and users on a site. Useful for development or prior to launching a site.

Module 30 (M30): *Devel (7.x-1.3)*. Various blocks, pages, and functions for developers.

Module 31 (M31): *Devel generate (7.x-1.3)*. Generate dummy users, nodes, and taxonomy terms.

Module 32 (M32): *Devel node access (7.x-1.3)*. Developer blocks and page illustrating relevant node_access records.

Module 33 (M33): *Display Suite (7.x-2.2)*. Extend the display options for every entity type.

Module 34 (M34): *Display Suite Extras (7.x-2.2)*. Contains additional features for Display Suite.

Module 35 (M35): *Display Suite Format (7.x-2.2)*. Provides the Display Suite Code format filter.

Module 36 (M36): *Display Suite Forms (7.x-2.2)*. Manage the layout of forms in Display Suite.

Module 37 (M37): *Display Suite Search (7.x-2.2)*. Extend the display options for search results for Drupal Core or Apache Solr.

Module 38 (M38): *Display Suite UI (7.x-2.2)*. User interface for managing fields, view modes and classes.

Module 39 (M39): *Facet API (7.x-1.2)*. An abstracted facet API that can be used by various search backends.

Module 40 (M40): *Features (7.x-2.0-beta1)*. Provides feature management for Drupal.

Module 41 (M41): *Feeds (7.x-2.0-alpha7)*. Aggregates RSS/Atom/RDF feeds, imports CSV files and more.

Module 42 (M42): *Feeds Admin UI (7.x-2.0-alpha7)*. Administrative UI for Feeds module.

Module 43 (M43): *Feeds Import (7.x-2.0-alpha7)*. An example of a node importer and a user importer.

Module 44 (M44): *Feeds Tamper (7.x-1.0-beta4)*. Modify feeds data before it gets saved.

Module 45 (M45): *Feeds Tamper Admin UI (7.x-1.0-beta4)*. Administrative UI for Feeds Tamper module. Field API to add fields to entities like nodes and users.

Module 46 (M46): *Field SQL storage (7.19)*. Stores field data in an SQL database.

Module 47 (M47): *Field UI (7.19)*. User interface for the Field API.

Module 48 (M48): *File (7.19)*. Defines a file field type.

Module 49 (M49): *File entity (7.x-1.2)*. Extends Drupal file entities to be fieldable and viewable.

Module 50 (M50): *Filedepot (7.x-1.0)*. Filedepot File Management System

Module 51 (M51): *Filter (7.19)*. Filters content in preparation for display.

Module 52 (M52): *Flag (7.x-2.0)*. Create customized flags that users can set on

content.

Module 53 (M53): *Flag actions (7.x-2.0)*. Execute actions on Flag events.

Module 54 (M54): *Forum (7.19)*. Provides discussion forums.

Module 55 (M55): *Google Analytics (7.x-1.3)*. Allows your site to be tracked by Google Analytics by adding a Javascript tracking code to every page.

Module 56 (M56): *Help (7.19)*. Manages the display of online help.

Module 57 (M57): *Image (7.19)*. Provides image manipulation tools.

Module 58 (M58): *Job Scheduler (7.x-2.0-alpha3+0-dev)*. Scheduler API

Module 59 (M59): *Job Scheduler Trigger (7.x-2.0-alpha3+0-dev)*

Module 60 (M60): *Libraries (7.x-2.0)*. Allows version dependent and shared usage of external libraries.

Module 61 (M61): *Link (7.x-1.1)* Defines simple link field types.

Module 62 (M62): *List (7.19)*. Defines list field types. Use with Options to create selection lists.

Module 63 (M63): *Locale (7.19)*. Adds language handling functionality and enables the translation of the user interface to languages other than English.

Module 64 (M64): *Media (7.x-1.2)*. Provides the core Media API

Module 65 (M65): *Media Internet Sources (7.x-1.2)*. Provides an API for accessing media on various internet services

Module 66 (M66): *Media: YouTube (7.x-2.0-rc1)*. Provides YouTube support for File Entity and the Media module.

Module 67 (M67): *Menu (7.19)*. Allows an administrator to customize the site navigation menu.

Module 68 (M68): *Menu Block (7.x-2.3)*. Provides configurable blocks of menu items.

Module 69 (M69): *Menu Block Export (7.x-2.3)*. Provides export interface for Menu block module.

Module 70 (M70): *Menu breadcrumb (7.x-1.3)*. Allows you to use the menu the current page belongs to for the breadcrumb.

Module 71 (M71): *Menu Firstchild (7.x-1.1)*. Allows creating parent menu items without path that link to their first viewable children.

Module 72 (M72): *Mini panels (7.x-3.3)*. Create mini panels that can be used as blocks by Drupal and panes by other panel modules.

Module 73 (M73): *Module filter (7.x-1.7)*. Filter the modules list.

Module 74 (M74): *Mollom (7.x-2.4)*. Automatically moderates user-submitted content and protects your site from spam and profanity.

Module 75 (M75): *Node (7.19)*. Allows content to be submitted to the site and displayed on pages.

Module 76 (M76): *Number (7.19)*. Defines numeric field types.

Module 77 (M77): *Options (7.19)*. Defines selection, check box and radio button widgets for text and numeric fields.

Module 78 (M78): *Page manager (7.x-1.3)*. Provides a UI and API to manage pages within the site.

Module 79 (M79): *Panel nodes (7.x-3.3)*. Create nodes that are divided into areas with selectable content.

Module 80 (M80): *Panels (7.x-3.3)*. Core Panels display functions; provides no external UI, at least one other Panels module should be enabled.

Module 81 (M81): *Panels In-Place Editor (7.x-3.3)*. Provide a UI for managing some Panels directly on the front-end, instead of having to use the backend.

Module 82 (M82): *Path (7.19)*. Allows users to rename URLs.

Module 83 (M83): *Pathauto (7.x-1.2)*. Provides a mechanism for modules to automatically generate aliases for the content they manage.

Module 84 (M84): *Poll (7.19)*. Allows your site to capture votes on different topics in the form of multiple-choice questions.

Module 85 (M85): *RDF (7.19)*. Enriches your content with metadata to let other applications (e.g. search engines, aggregators) better understand its relationships and attributes.

Module 86 (M86): *Search (7.19)*. Enables site-wide keyword searching.

Module 87 (M87): *Shortcut (7.19)*. Allows users to manage customizable lists of shortcut links.

Module 88 (M88): *Social media (7.x-1.0-beta13)*. Example module to demonstrate module social media.

Module 89 (M89): *Social Media Links Block (7.x-1.x-dev)*. The Module provides a block that display links (icons) to your profiles on various social networking sites.

Module 90 (M90): *SQL Server (7.x-1.2)*. Driver for SQL Server and SQL Azure.

Module 91 (M91): *Statistics (7.19)*. Logs access statistics for your site.

Module 92 (M92): *Stylizer (7.x-1.3)*. Create custom styles for applications such as Panels.

Module 93 (M93): *Superfish (7.x-1.8)*. jQuery Superfish plugin for your Drupal menus.

Module 94 (M94): *Syslog (7.19)*. Logs and records system events to syslog.

Module 95 (M95): *System (7.19)*. Handles general site configuration for administrators.

Module 96 (M96): *TagClouds (7.x-1.9)*. TagClouds makes weighted tag clouds from your taxonomy terms.

Module 97 (M97): *Taxonomy (7.19)*. Enables the categorization of content.

Module 98 (M98): *Taxonomy Manager (7.x-1.0-rc2)*. Tool for administrating taxonomy terms.

Module 99 (M99): *Text (7.19)*. Defines simple text field types.

Module 100 (M100): *Token (7.x-1.4)*. Provides a user interface for the Token API and some missing core tokens.

Module 101 (M101): *Tracker (7.19)*. Enables tracking of recent content for users.

Module 102 (M102): *Trigger (7.19)*. Enables actions to be fired on certain system events, such as when new content is created.

Module 103 (M103): *TVI: Taxonomy View Integrator (7.x-1.0-beta2)*. Enables automatic application of views to taxonomy terms and vocabulary.

Module 104 (M104): *Update manager (7.19)*. Checks for available updates, and can securely install or update modules and themes via a web interface.

Module 105 (M105): *User (7.19)*. Manages the user registration and login system.

Module 106 (M106): *Viewfield (7.x-2.0)*. Defines a field type to display a view.

Module 107 (M107): *Views (7.x-3.5)*. Create customized lists and queries from your database.

Module 108 (M108): *Views content panes (7.x-1.3)*. Allows Views content to be used in Panels, Dashboard and other modules, which use the CTools Content API.

Module 109 (M109): *Views UI (7.x-3.5)*. Administrative interface to views. Without this module, you cannot create or edit your views.

Module 110 (M110): *Weather (7.x-1.5)*. Displays METAR weather data

Module 111 (M111): *Widgets (7.x-1.0-rc1)*. Enables easy management of code snippets like Twitter, Facebook and Google+ buttons.

Module 112 (M112): *WYSIWYG Filter (7.x-1.6-rc2)*. Provides an input filter that allows site administrators configure which HTML elements, attributes and style properties are allowed.

Appendix K: List of Knowledge Base Content

Author/ Organisation	Article Title	Copyright	Technical Level (how much ICT knowledge required)	Article Type	Tag(s)	Taxonomy
Hannon Hill	5-Week Guide to Successful CMS Implementation & Integration	Proprietary	Expert	Practical Paper (how-to or white paper)	Customer Relationship Management (CRM) System; Cyber terrorism	Customer Relationship Management (CRM) System; Cyber terrorism
TechRepublic	10 free security tools that actually work	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Internet/ Network Security; Cyber terrorism	Internet/ Network Security; Cyber terrorism
Global Knowledge	10 Ways Hackers Breach Security	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Worms and Trojans	Worms and Trojans
TechRepublic	10 free Microsoft programs worth checking out	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Computer Program	Computer Program
TechRepublic	Make your presentations	Proprietary	Beginner/	Practical	Presentations	Presentations

	outstanding by breaking these 10 habits		Novice	Paper (how-to or white paper)		
TechRepublic	10 dirty little secrets you should know about working in IT	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	IT Profession	IT Profession
TechRepublic	10 cool things you can do with a USB flash drive	Proprietary	Expert	Practical Paper (how-to or white paper)	Storage devices	Storage devices
TechRepublic	10 ways to learn new skills on the cheap	Proprietary	Intermediate	Practical Paper (how-to or white paper)	IT Profession	IT Profession
Global Knowledge	12 Things To Know When Troubleshooting Your Network	Proprietary	Expert	Practical Paper (how-to or white paper)	Computer Network	Computer Network
Paul Dravis (infoDev)	Open Source Software - Perspectives for Development	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Open source software (OSS)	Open source software (OSS)
Andrew Dymond; Sonja Oestmann	A Rural ICT Toolkit for Africa	Proprietary	Expert	Practical Paper (how-to or white paper)	General Telecommunications Options; Broadband Communications	General Telecommunications Options; Broadband Communications
Elizabeth Moore;	City of Seattle Information Technology Residential Survey	Creative Commons	Intermediate	Academic Paper	Technology Diffusion;	Technology Diffusion;

Andrew Gordon (University of Washington)	Final Report			(research oriented)	Technology Infrastructure	Technology Infrastructure
Elizabeth Moore	Information Technology Access and Adoption in Seattle	Proprietary	Intermediate	Academic Paper (research oriented)	Technology Diffusion; Technology Infrastructure	Technology Diffusion; Technology Infrastructure
Jupitermedia Corp.	Best Practices for Developing a Web Site	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Website development; World Wide Web (WWW or W3)	Website development; World Wide Web (WWW or W3)
Jupitermedia Corp.	The Do-It-Yourself Security Audit	Proprietary	Expert	Practical Paper (how-to or white paper)	Internet/Network Security	Internet/Network Security
Jupitermedia Corp.	Open Up the Knowledge in Your Organization	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Knowledge Management Systems (KMS)	Knowledge Management Systems (KMS)
Jupitermedia Corp.	What to Expect with Virtualization	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Virtualization	Virtualization
Jupitermedia Corp.	Extreme Savings: Cutting Costs with Wide-Area Data Services	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Wide Area Network (WAN)	Wide Area Network (WAN)
Jupitermedia	Getting Started with	Proprietary	Intermediate	Practical	Virtualization	Virtualization

Corp.	Virtualization			Paper (how-to or white paper)		
Jupitermedia Corp.	The Guide to Branch Office Connectivity	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Computer Network; Wide Area Network (WAN)	Computer Network; Wide Area Network (WAN)
Forrester Consulting	Optimizing Users And Applications In A Mobile World	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Mobile computing; Wide Area Network (WAN)	Mobile computing; Wide Area Network (WAN)
Riverbed	5 Steps to Successful IT Consolidation	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Technology Infrastructure; Computer Network	Technology Infrastructure; Computer Network
WebMediaBrands Inc.	What to Expect from Cloud Computing	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Cloud Computing	Cloud Computing
Jupitermedia Corp.	Choosing the Right Server	Proprietary	Expert	Practical Paper (how-to or white paper)	Servers	Servers
Trend Micro	Web Threats - Challenges and Solutions	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Cyber terrorism; Internet/Network Security	Cyber terrorism; Internet/Network Security
HP	Rethink virtualization in business terms	Proprietary	Intermediate	Practical Paper (how-	Virtualization	Virtualization

				to or white paper)		
HP	Storage Networking, Part 1: SANs and Fiber Channel	Proprietary	Expert	Practical Paper (how-to or white paper)	Storage Area Network (SAN)	Storage Area Network (SAN)
HP	Putting the Green into IT	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Green IT	Green IT
John Fronckowiak	SOA Best Practices and Design Patterns - Keys to Successful Service Oriented Architecture Implementation	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Service Oriented Architecture (SOA)	Service Oriented Architecture (SOA)
HP	Getting virtualization right: Five virtualization rules every organization must know	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Virtualization	Virtualization
Riverbed	Network-Based Backup and Data Replication with Riverbed	Proprietary	Expert	Practical Paper (how-to or white paper)	Storage Area Network (SAN); Wide Area Network (WAN)	Storage Area Network (SAN); Wide Area Network (WAN)
Sunbelt Software	Comparing Email Management Systems That Protect Against Spam, Viruses, Malware and Phishing Attacks	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Internet/ Network Security; Cyber terrorism	Internet/ Network Security; Cyber terrorism
Epicor	Bringing Web 2.0 to the Enterprise: Leveraging Social Computing Technologies for	Proprietary	Intermediate	Practical Paper (how-to or white	Web 2.0	Web 2.0

	ERP Applications			paper)		
MarkWalker	Guide to Managing ICT in the Voluntary and Community Sector	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
Ta-Tao Chuang; Kazuo Nakatani; Duanning Zhou	An exploratory study of the extent of information technology adoption in SMEs: an application of upper echelon theory	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Technology Diffusion	Technology Diffusion
Global Knowledge	Applying Knowledge Management to Project Management	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Knowledge Management Systems (KMS)	Knowledge Management Systems (KMS)
Kerstin Fink and Christian Ploder	Balanced system for knowledge process management in SMEs	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Knowledge Management Systems (KMS)	Knowledge Management Systems (KMS)
Jose Esteves	A benefits realisation road-map framework for ERP usage in small and medium-sized enterprises	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Enterprise Resource Planning (ERP) System	Enterprise Resource Planning (ERP) System
Marl_ Bijker	ERP Options for Small Businesses	Creative Commons	Intermediate	Academic Paper (research oriented)	Enterprise Resource Planning (ERP) System	Enterprise Resource Planning (ERP) System
Riaan Brand	Development of a Business Framework to integrate informal	Creative Commons	Beginner/ Novice	Academic Paper	Technology Diffusion	Technology Diffusion

	SMMEs and Entrepreneurs with the formal South African Economy			(research oriented)		
Anonymous	Building Your Own Website	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Website development	Website development
Hannon Hill	Content Management Systems - Buyer's Guide	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Content Management System (CMS); Website development	Content Management System (CMS); Website development
CBS Interactive	Cloud Computing-Latest Buzzword or a Glimpse of the Future?	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Cloud Computing	Cloud Computing
rPath	Cloud Computing in Plain English	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Cloud Computing; Virtualization	Cloud Computing; Virtualization
CBS Interactive	Cloud Computing-What is its Potential Value for Your Company?	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Cloud Computing	Cloud Computing
Sun Microsystems	Take Your Business to a Higher Level	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Cloud Computing	Cloud Computing
Sun Microsystems	Optimizing Applications for Cloud Computing Environments	Proprietary	Expert	Practical Paper (how-	Cloud Computing	Cloud Computing

				to or white paper)		
Sun Microsystems	Introduction to Cloud Computing Architecture	Proprietary	Expert	Practical Paper (how-to or white paper)	Cloud Computing	Cloud Computing
idealware	Comparing Open Source Content Management Systems: Wordpress, Joomla, Drupal and Plone	Proprietary	Intermediate	Academic Paper (research oriented)	Content Management System (CMS)	Content Management System (CMS)
Improvement and Development Agency (IDeA)	Core Competency Diagnostic Tool - Programme, Project and Change Management	Proprietary	Intermediate	Practical Paper (how-to or white paper)	E-Collaboration; Customer Relationship Management (CRM) System	E-Collaboration; Customer Relationship Management (CRM) System
IBM	Basic Computer and Communication Tools	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Broadband Communications; Desktop Computer	Broadband Communications; Desktop Computer
IBM	Common Web Site Misconceptions	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Website development	Website development
Anonymous	Create a printed form	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Computer Program	Computer Program
Mike Nutt; Gilson	The Story Economy: Digital Storytelling in Economic and	Creative Commons	Intermediate	Academic Paper	Digital storytelling	Digital storytelling

Schwartz	Community Development			(research oriented)		
Jean-Paul Van Belle	Digital Storytelling	Creative Commons	Beginner/ Novice	Practical Paper (how-to or white paper)	Digital storytelling	Digital storytelling
Lesley Dean	Using Open Source Software on the Desktop	Creative Commons	Intermediate	Academic Paper (research oriented)	Open source software (OSS)	Open source software (OSS)
CNET Networks	ZDNet Make the Case Series: IT Business Case Template: Make the Case for Desktop Operating System Upgrades	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Operating System (OS);Computer Program	Operating System (OS);Computer Program
CNET Networks	ZDNet Make the Case Series: IT Business Case Template: Make the Case for Directory Services	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Directory Services; Database	Directory Services; Database
NGO Connect Africa	NGO - ICT and e-Readiness Assessment Tool	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
Potential Africa	e-Readiness Brief	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
Educause	7 Things To Know About Digital Storytelling	Proprietary	Beginner/ Novice	Practical Paper (how-to or white	Digital storytelling	Digital storytelling

				paper)		
Technology Council	The e-Health Readiness Guide	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
Philip Zaayman	Functional Requirements of eCRM Solutions For The South African SME Sector	Creative Commons	Intermediate	Academic Paper (research oriented)	Customer Relationship Management (CRM) System	Customer Relationship Management (CRM) System
AbilityNet	Easy, Free and Quick ICT Accessibility	Proprietary	Beginner/Novice	Practical Paper (how-to or white paper)	Computer Program	Computer Program
TechRepublic	Disaster Recovery Plan between (Client X) and (Client X)	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Disaster Recovery	Disaster Recovery
CNET Networks	ZDNet's Make the Case - Business Case Template for Enterprise Search	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Enterprise Search Technology; Database	Enterprise Search Technology; Database
Anabel Gutierrez; Jorge Orozco; Alan Serrano	Factors affecting IT and business alignment: a comparative study in SMEs and large organisations	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Strategic Alignment	Strategic Alignment
Tommaso Federici	Factors influencing ERP outcomes in SMEs: a post-introduction assessment	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Enterprise Resource Planning (ERP) System	Enterprise Resource Planning (ERP) System

Richard Heeks; Richard Duncombe	A Handbook for Enterprise Support Agencies in Developing Countries	Creative Commons	Intermediate	Academic Paper (research oriented)	Technology Infrastructure	Technology Infrastructure
Philip Van Zyl	Grow your business using social media	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Social Networking (Facebook, MySpace LinkedIn, Plaxo, Ning)	Social Networking (Facebook, MySpace LinkedIn, Plaxo, Ning)
Accredit UK	Guide To Purchasing ICT: A Good Practice Guide For Small Business	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
Step Two Designs	How to evaluate a content management system	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Content Management System (CMS)	Content Management System (CMS)
NCVO	ICT Signposting Guide for Small Voluntary and Community Organisations	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
Entrepreneur.com	How To Choose The Best Linux For Your Business	Proprietary	Expert	Practical Paper (how-to or white paper)	Linux	Linux
AbilityNet	How to Commission & Design Accessible Websites	Proprietary	Expert	Practical Paper (how-to or white paper)	Website development	Website development
WebMediaBr	Get ready for Windows 7	Proprietary	Intermediate	Practical	Operating System	Operating System

ands Inc.				Paper (how-to or white paper)	(OS)	(OS)
Varintorn Supyuenyong ; Nazrul Islam; Uday Kulkarni	Influence of SME characteristics on knowledge management processes	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Knowledge Management Systems (KMS); Enterprise Resource Planning (ERP) System	Knowledge Management Systems (KMS); Enterprise Resource Planning (ERP) System
Neil Ernstzen	Operation Virtualization	Creative Commons	Intermediate	Academic Paper (research oriented)	Virtualization	Virtualization
Anonymous	Towards A Framework to Empower South African SMMEs and NGOs Through Appropriate ICT	Creative Commons	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
Anonymous	ICT4D Snippets	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Technology Diffusion	Technology Diffusion
Anonymous	Information technology for small business	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Computer Program; Technology Infrastructure	Computer Program; Technology Infrastructure
Global Knowledge	The OSI Model: Understanding the Seven Layers of Computer Networks	Proprietary	Expert	Practical Paper (how-to or white paper)	Computer Network	Computer Network

The Times	Making talk cheaper - IPABX and VOIP for SMEs	Proprietary	Intermediate	Practical Paper (how-to or white paper)	VOIP	VOIP
Entrepreneur.com	A Roundup of Apps and Tools	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Computer Program; Website development	Computer Program; Website development
Isolet Jansen	Implementing a Greener ICT Solution	Creative Commons	Intermediate	Academic Paper (research oriented)	Green IT	Green IT
Barry J. Grundy	The Law Enforcement and Forensic Examiner's Introduction to Linux	Proprietary	Expert	Practical Paper (how-to or white paper)	Linux	Linux
CNET Networks	ZDNet Make the Case Series: Business Case Template for Updating and Replacing Notebook PCs	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Notebook Computer	Notebook Computer
CNET Networks	ZDNet Make the Case : Linux Migration	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Linux	Linux
CNET Networks	ZDNet Make the Case : Voice over Internet Protocol (VOIP) Solutions	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	VOIP	VOIP
Sunday	Making talk cheaper	Proprietary	Beginner/	Practical	General	General

Times			Novice	Paper (how-to or white paper)	Telecommunications Options; VOIP	Telecommunications Options; VOIP
Maryla Bialobrzeska; Susan Cohen	Managing ICTs in South African Schools - A Guide for School Principals	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
ICT hub	Guide to Managing ICT in the Voluntary and Community Sector	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
Wen-Lung Shiau; Ping-Yu Hsu; Jun-Zhong Wang	Development of measures to assess the ERP adoption of small and medium enterprises	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Enterprise Resource Planning (ERP) System	Enterprise Resource Planning (ERP) System
Sun Microsystems	Migrating From Microsoft Office to OpenOffice.Org or StarOffice 9	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Computer Program	Computer Program
John Wiley & Sons Ltd	Mobile Device Management for Dummies	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Mobile computing; Competitive Advantage (through Information Technology)	Mobile computing; Competitive Advantage (through Information Technology)
Theresa Janse van Rensburg	National Innovation Competition 2009 Student Business Plan Competition _ Group 1	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Competitive Advantage (through Information Technology)	Competitive Advantage (through Information Technology)
Natasha	NGO-In-A-Box : Specially	Proprietary	Beginner/	Practical	Open source	Open source

Primo	Selected Free & Open Source Software		Novice	Paper (how-to or white paper)	software (OSS)	software (OSS)
Anonymous	Non Profits and Technology Usage Survey	Proprietary	Beginner/ Novice	Academic Paper (research oriented)	Technology Diffusion	Technology Diffusion
SANGONeT	Open Source Fundamentals and Migration	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Open source software (OSS)	Open source software (OSS)
Engvall Anders; Hesselmark Olof	Options for Terrestrial Connectivity in Sub-Saharan Africa	Creative Commons	Intermediate	Academic Paper (research oriented)	General Telecommunications Options	General Telecommunications Options
Fabien Houeto; Cyrille Anato; Romaric Sagbo; Joel Hounsou	VSAT Solution for Education: A Case Study for the Institute of Mathematics and Physics	Creative Commons	Expert	Academic Paper (research oriented)	General Telecommunications Options; Broadband Communications	General Telecommunications Options; Broadband Communications
Andrew Peel	Dummies-Guide-To Developing a Web Presence	Creative Commons	Intermediate	Academic Paper (research oriented)	Website development; World Wide Web (WWW or W3)	Website development; World Wide Web (WWW or W3)
Chris Petzer	Developing a web-presence: A practical guide from getting your own domain to designing an	Creative Commons	Intermediate	Academic Paper (research	Website development; World Wide Web (WWW	Website development; World Wide Web (WWW

	effective website			oriented)	or W3)	or W3)
Boumediene Ramdani; Peter Kawalek	Predicting SMEs' adoption of enterprise systems	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Enterprise Resource Planning (ERP) System	Enterprise Resource Planning (ERP) System
Kostas Metaxiotis	Exploring the rationales for ERP and knowledge management integration in SMEs	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Enterprise Resource Planning (ERP) System; Knowledge Management Systems (KMS)	Enterprise Resource Planning (ERP) System; Knowledge Management Systems (KMS)
David H. Brown; Laddawan Kaewkitipong	Relative size and complexity: e-business use in small and medium sized tourism enterprises in Thailand	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	E-commerce	E-commerce
Anonymous	How ICT-Ready is Your NGO?	N/A	Beginner/ Novice	Academic Paper (research oriented)	Technology Diffusion	Technology Diffusion
Marie Griffiths;Ben Light	Innovation in ICT Adoption by SMEs - An investigation into resistance practices at an SME consultancy	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	Technology Diffusion	Technology Diffusion
IBM	Definitive requirements for delivering successful SOA-based solutions.	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Service Oriented Architecture (SOA)	Service Oriented Architecture (SOA)
World Bank	Guide to Resources for NGOs	Proprietary	Beginner/	Practical	Resource	Resource

	and Other Organizations of Civil Society		Novice	Paper (how-to or white paper)	Acquisition	Acquisition
Anonymous	Sample Internet Usage Policy	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Internet	Internet
Anonymous	Sample Preventive Maintenance Task Sheet for Desktop PCs and Laptops	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Desktop Computer; Notebook Computer	Desktop Computer; Notebook Computer
SAP	Evaluating SaaS Solutions: A Checklist for Small to Midsize Businesses	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Software as a service (SAAS)	Software as a service (SAAS)
Pieter Willem van der Walt	Developing a Scalable Information Architecture for an Enterprise Wide Consolidated Information Management Platform.	Creative Commons	Intermediate	Academic Paper (research oriented)	Technology Infrastructure; Knowledge Management Systems (KMS)	Technology Infrastructure; Knowledge Management Systems (KMS)
Economic Commission for Africa	Indicators of Information and Communications Technologies	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Technology Infrastructure; Technology Diffusion	Technology Infrastructure; Technology Diffusion
Global Knowledge	Security on a Budget	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Internet/Network Security	Internet/Network Security
Faizel Sedick	An Introduction to Virtualization	Creative	Expert	Academic	Virtualization	Virtualization

		Commons		Paper (research oriented)		
CNET Networks	ZDNet Make the Case : Server Architecture Consolidation	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Client/Server architecture	Client/Server architecture
Craig M. Parker; Tanya Castleman	Small firm e-business adoption: a critical analysis of theory	Creative Commons	Intermediate	Academic Paper (research oriented)	E-commerce	E-commerce
City of Seattle	City of Seattle Information Technology Indicators Project - Small Business and Information Technology Report	Proprietary	Intermediate	Academic Paper (research oriented)	Technology Infrastructure	Technology Infrastructure
Ada Scupola	SMEs' e-commerce adoption: perspectives from Denmark and Australia	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	E-commerce; Technology Diffusion	E-commerce; Technology Diffusion
Liz Bronder; Seth Fleisher	The SME Toolkit: The Ultimate Way Of Wholesaling Advisory Services Using Technology	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
John Wiley & Sons Ltd	SOA Adoption for Dummies	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Service Oriented Architecture (SOA)	Service Oriented Architecture (SOA)
Bridges.org	Comparison Study of Free/Open Source and Proprietary Software	Proprietary	Intermediate	Practical Paper (how-	Open source software (OSS)	Open source software (OSS)

	in an African Context			to or white paper)		
SANGONeT	South African NGO ICT Impact Survey 2007	Proprietary	Intermediate	Academic Paper (research oriented)	Technology Diffusion	Technology Diffusion
Sun Microsystems	Kickstart Your Transition to the Cloud With Cloud Computing Services from Sun	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Cloud Computing	Cloud Computing
Quest Software, Inc.	The Hidden Costs of Freeware - A Critical Look at the Costly Use of 'Free' Software	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Freeware	Freeware
Anonymous	Tips and Tricks for Access 2000	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Computer Program	Computer Program
TechRepublic	The 10 best IT certification Web sites	Proprietary	Intermediate	Practical Paper (how-to or white paper)	IT Certification	IT Certification
Hannon Hill	Top Ten CMS Buying Mistakes	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Content Management System (CMS)	Content Management System (CMS)
CNET Networks	Top 10 Windows XP tips of 2008	Proprietary	Intermediate	Practical Paper (how-to or white	Operating System(s)	Operating System(s)

				paper)		
Global Knowledge	Troubleshooting Made Easy In Linux	Proprietary	Expert	Practical Paper (how-to or white paper)	Operating System(s)	Operating System(s)
IBM	Breaking through the haze: understanding and leveraging cloud computing.	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Cloud Computing	Cloud Computing
John Wiley & Sons Ltd	Virtualization for Dummies	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Virtualization	Virtualization
Simha R. Magal; Parag Kosalge; Nancy M. Levenburg	Using importance performance analysis to understand and guide e-business decision making in SMEs	Creative Commons	Beginner/ Novice	Academic Paper (research oriented)	E-commerce	E-commerce
ICT hub	Voice Over IP (VOIP) - Introductory Guide for the Voluntary Sector	Proprietary	Intermediate	Practical Paper (how-to or white paper)	VOIP	VOIP
Shoretel	IP Telephony from A to Z	Proprietary	Intermediate	Practical Paper (how-to or white paper)	VOIP	VOIP
Prof Alison Gillwald	Towards an African e-Index - SME e-Access and Usage	Proprietary	Intermediate	Academic Paper (research	Technology Diffusion	Technology Diffusion

				oriented)		
Gartner	Best Practices for Deploying Hosted Virtual Desktops	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Virtualization	Virtualization
John A. Daly	Volunteers, information and communication technologies, and development	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
CNET Networks	ZDNet Make the Case : Virtual Private Network (VPN)	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Virtual Private Network (VPN)	Virtual Private Network (VPN)
Anonymous	Web Site Questionnaire	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Website development	Website development
CNET Networks	ZDNet Make the Case : Web Collaboration Solutions	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	E-Collaboration	E-Collaboration
CNET Networks	ZDNet Make the Case : Web Services Application Development	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Website development; Customer Relationship Management (CRM) System	Website development; Customer Relationship Management (CRM) System
Wesley Grisdale	ERP Options for Small Businesses	Creative Commons	Intermediate	Academic Paper	Enterprise Resource Planning (ERP)	Enterprise Resource Planning (ERP)

				(research oriented)	System	System
CNET Networks	ZDNet Make the Case : Wireless Security	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Internet/Network Security; Wi-Fi	Internet/Network Security; Wi-Fi
IBM	Create an Effective Small Business Web Site	Proprietary	Intermediate	Practical Paper (how-to or white paper)		
IBM	E-Commerce	Proprietary	Intermediate	Practical Paper (how-to or white paper)	E-commerce; Website development	E-commerce; Website development
IBM	E-Commerce Glossary	Proprietary	Intermediate	Practical Paper (how-to or white paper)	E-commerce	E-commerce
IBM	E-Commerce Kick-Start Guide	Proprietary	Intermediate	Practical Paper (how-to or white paper)	E-commerce	E-commerce
ICT hub	Getting A Network	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Computer Network	Computer Network
IBM	Get Ready to Sell Online	Proprietary	Intermediate	Practical Paper (how-to or white	E-commerce	E-commerce

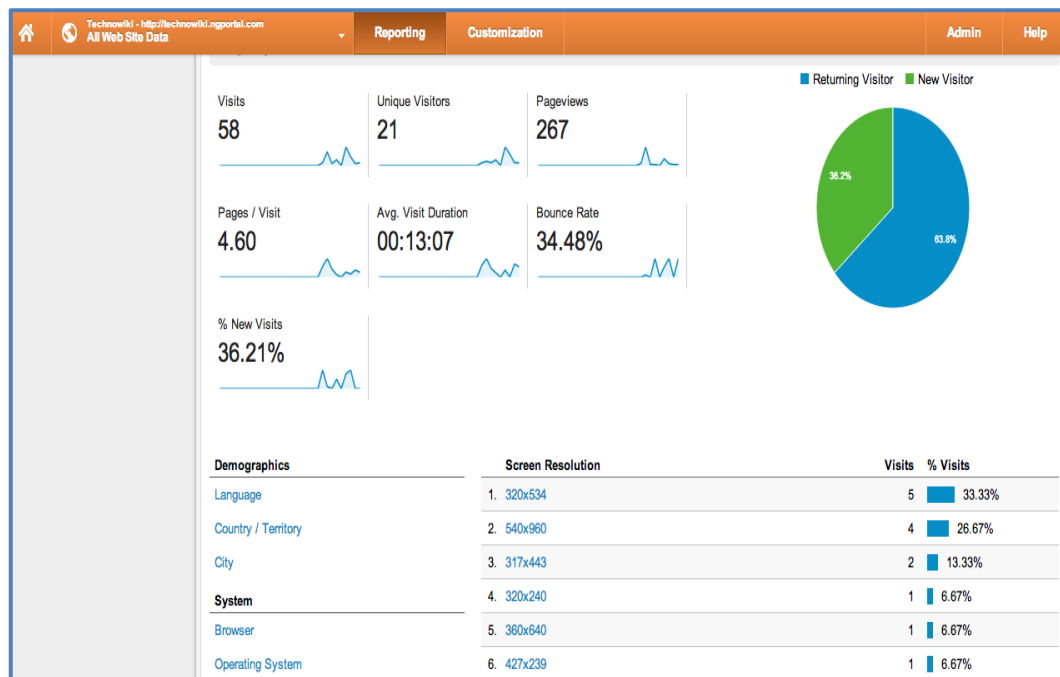
				paper)		
SANGOTeCH	Getting Started on Your IT Infrastructure	Proprietary	Beginner/Novice	Practical Paper (how-to or white paper)	Technology Infrastructure	Technology Infrastructure
Bridges.org	Guide to free IT	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Resource Acquisition	Resource Acquisition
Independent Online	IBM offers low-cost solution for Africa	Proprietary	Beginner/Novice	Practical Paper (how-to or white paper)	Linux;Open source software (OSS)	Linux;Open source software (OSS)
Jonathan Peizer	ICT Toolsets	Proprietary	Beginner/Novice	Practical Paper (how-to or white paper)	Resource Acquisition; Computer Program	Resource Acquisition; Computer Program
SANGOTeCH	Tech Tips: An IT Cheat Sheet	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Computer Network; Servers	Computer Network; Servers
HP	Bringing the edge to the data center data protection strategy for small and midsize companies with remote offices	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Virtualization; Database	Virtualization; Database
Watchgaurd	Quickly Configured VPNs Facilitate Rapid Retail Expansion	Proprietary	Intermediate	Academic Paper (research oriented)	Virtual Private Network (VPN)	Virtual Private Network (VPN)

Watchgaurd	Reliable VoIP Delivery Calls for High-Powered Solution	Proprietary	Intermediate	Academic Paper (research oriented)	VOIP	VOIP
Watchgaurd	Network Security Essentials for Your New Small Business	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Internet/Network Security	Internet/Network Security
Anonymous	Evaluating Your e-Commerce Website	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Website development; E-commerce	Website development; E-commerce
Anonymous	Project Workbook	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Project Management	Project Management
Dewald Roode	Information Infrastructure in SMMEs	Creative Commons	Intermediate	Academic Paper (research oriented)	Technology Infrastructure	Technology Infrastructure
lasa	How to Evaluate ICT Use for Small Organisations	Proprietary	Beginner/ Novice	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
IBM	Online Marketing Checklists	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Website development	Website development
HMTECH.IN	Tips for Setting up Computers in	Proprietary	Intermediate	Practical	Desktop Computer;	Desktop Computer;

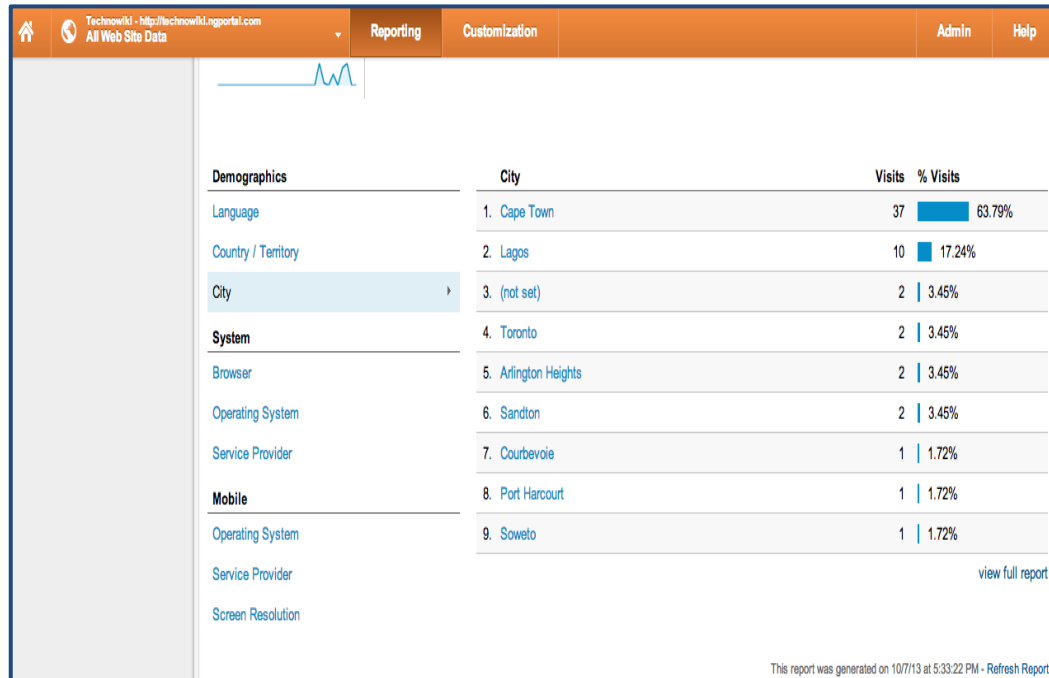
FO	the Home			Paper (how-to or white paper)	Computer Program	Computer Program
Microsoft Corporation	Simple tools that make people work better together	Proprietary	Intermediate	Practical Paper (how-to or white paper)	VOIP;Instant Messaging (IM)	VOIP;Instant Messaging (IM)
ComputerUser	The Top 10 Technology Mistakes Small Businesses Make (And How To Avoid Them)	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Technology Diffusion	Technology Diffusion
Wikipedia	Digital storytelling	Proprietary	Beginner/Novice	Academic Paper (research oriented)	Digital storytelling	Digital storytelling
DOT-COM Alliance	Using Radio and IT to Build Community in Africa	Proprietary	Beginner/Novice	Academic Paper (research oriented)	Radio	Radio
bidorbuy	Software on a shoestring budget	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Freeware	Freeware
Future Publishing	Benchmarked: Ubuntu vs Vista vs Windows 7	Proprietary	Expert	Academic Paper (research oriented)	Operating System (OS)	Operating System (OS)
kiwanja.net	Frontline SMS	Proprietary	Intermediate	Practical Paper (how-	Cellphone; Instant Messaging (IM)	Cellphone; Instant Messaging (IM)

				to or white paper)		
Givengain	Frontline SMS by Givengain	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Computer Program	Computer Program
Knowledgebase	KnowledgeBase	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Resource Acquisition	Resource Acquisition
NGOConnect Africa	Overview	Proprietary	Beginner/ Novice	Academic Paper (research oriented)	Resource Acquisition	Resource Acquisition
SANGONeT	NGO in a box: Security Edition	Proprietary	Intermediate	Practical Paper (how-to or white paper)	Internet/Network Security	Internet/Network Security

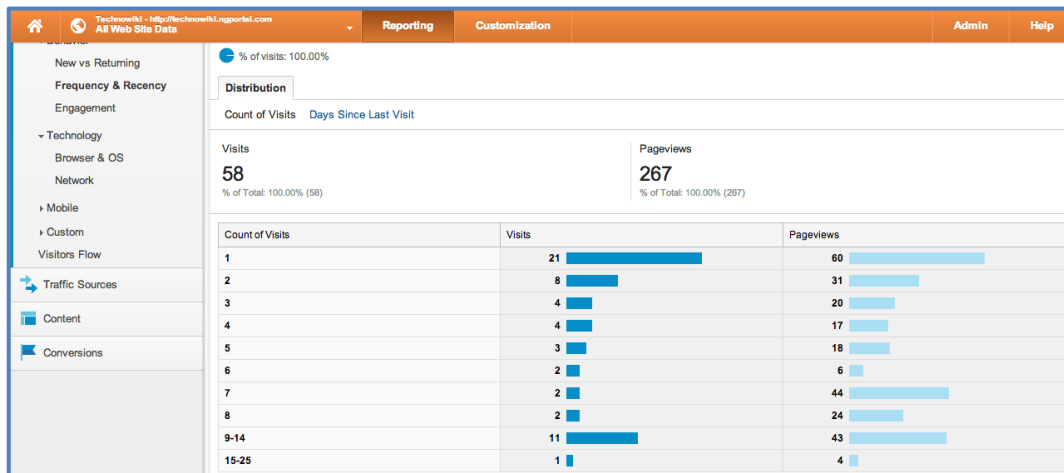
Appendix L: Final Website Interaction and Audience



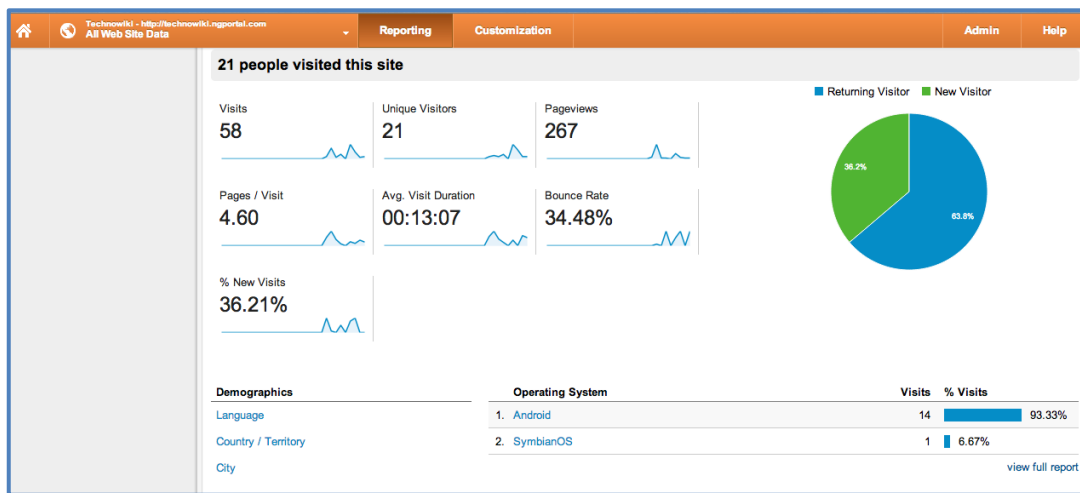
Unique versus Return Website Visits



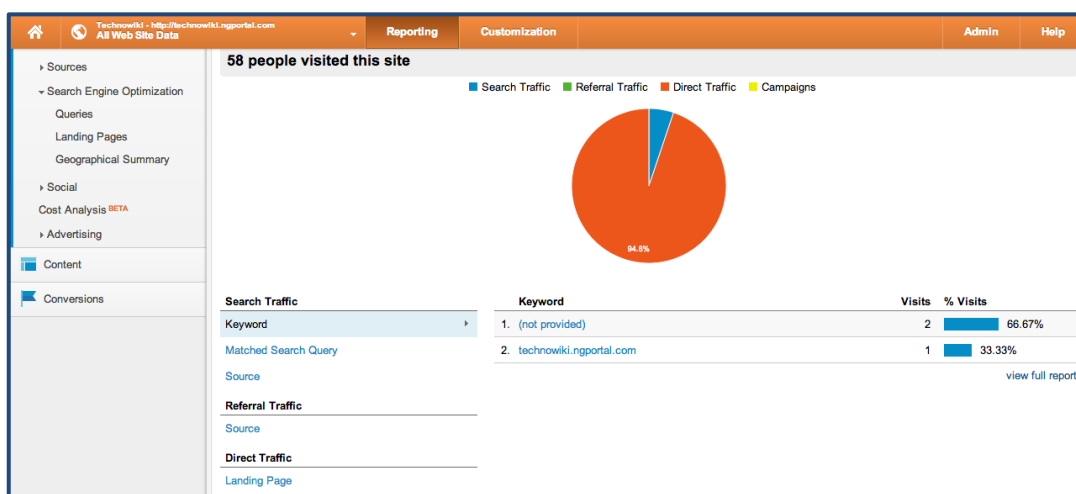
Demographics of Website Visitors



Page Views of Website Visitors



Page Views of Website on Mobile Devices



Total Number of Website Visitors