DEVELOPING A FRAMEWORK FOR BUSINESS ANALYSIS OF PUBLIC ESERVICE SYSTEMS

By

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DECLARATION

I, Shivani Naicker, declare that this dissertation is a representation of my own work, written and executed by myself. This dissertation has not been previously submitted to any university or institution of higher learning for the award of another degree. All information cited from published or unpublished works has been acknowledged.

__ 02 December 2020

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Approved for final submission

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DEDICATION

This dissertation is dedicated to my husband Vegan who has given me unconditional love.

To my beautiful daughters, Nevada and Taytum, you inspire me to always be the best version of myself.

Abstract

The emergence of the fourth industrial revolution (4IR) digital era is relentlessly morphing habits of social interaction and conducting business. Organizations within the multitude of sectors which constitute a nation's economic engine are forced to respond to this evolution. Governments the world over are under constant pressure to improve the efficiency and overall effectiveness of the means by which services are delivered to citizens. Public eservice is an interactive internet based service provided by Government to their citizens. Some of these services include viewing and payment of utility bills, application for new services such as, water and electricity, renewal of motor vehicle licences, supplier registrations, submission of tenders, reporting of faults and viewing of buildings plans. As Government gears up to heed the call for growing service delivery demands against the backdrop of 4IR, there has been a marked accelerated effort in the implementation of several information and communication technology (ICT) based constituent service delivery systems. In crafting and optimizing such systems, business analysis is a crucial early stage. Literature portrays largely ineffective business analysis as a major contributing factor to the alarming high failure rate of modern day public eservices systems. Compounding the above is a lack of widely accepted practice guidelines and a scarcity of robust academic literature supporting business analysis in the public eservices domain.

This dissertation is driven by the primary aim of the development of a business analysis framework specifically for public eservice projects. Following a critical analysis of literature, a set of components are distilled to form a theoretical framework of practice guidelines. The components derive from knowledge areas deemed critical for business analysis and present essential tasks, tools and techniques for Business Analysts plying their expertise in public eservices projects.

The Design Science methodological approach further hones the framework after an iterative process of feedback and adjustment. A handful of Business Analysts are purposively selected for focus group participation and serve as change agents in the Design Science cycle. The Design Science cycle evolved the business analysis framework to an eventual seven components namely, Project Committee, Business Analysis Plan, Requirements Analysis, Business Collaboration, Requirements Changes, Solution and BA Review.

The ADVIAN classification method provides an analytical tool for identifying the relationships between these components and the components that are vital for the effectiveness of the framework. The impact of change to one component on the other components is highlighted and this analysis confirms the robustness of the inclusion of components in the eventual framework. Further, the results of the ADVIAN analysis provides

foresight into the impact of changes made to the framework when tailoring to a specific project. This will be of value to project teams wanting to utilize the framework across eservice projects. The use of ADVIAN shows the impacts of changes to the components of the framework when components are altered. It shows the impact of each component on the other.

By understanding the current challenges faced by public eservices, it is hoped that the developed framework will offer a contribution to the gap in the business analysis domain with particular focus on the public eservice systems.

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Acronyms

ADVIAN	ADVanced Impact Analysis
AS	Active Sum
BA	Business Analyst
BABOK	Business Analysis Body of Knowledge
BU	Business Unit
CIM	Cross Impact Matrix
ICT	Information and Communication Technology
IS	Information System
KA	Knowledge Area
PS	Passive Sum
QFD	Quality Function Deployment
VOC	Voice of Customer

Chapter 1: Introduction

This chapter frames this research undertaking. It provides an introduction to public eservices and business analysis within the public sector. Subsequent sections provide a background to the study in section 1.1, its context in section 1.2, the research problem in section 1.3, the research aim, objectives and questions. In section 1.4, intended contribution of the study in section 1.5, the study research design in section 1.6 and finally the structure of this thesis in section 1.7.

1.1 Background of the study

This thesis is published against the backdrop of one of the deadliest pandemics faced by humanity. The coronavirus (COVID-19) is the first pandemic in human history where technology and social media has been used on a colossal scale to keep people safe, productive and connected while being physically apart (WHO, 2020). While billions of people are confined to their homes, the ICT community has a critical role to play in assisting governments, businesses and people everywhere to cope with the unprecedented crisis. ICT technologies and services support access to healthcare, education, and essential goods and services safeguarding the social and economic fabric of societies worldwide (ITU, 2020). Even before the COVID19 pandemic, the web has rapidly evolved into the medium for mobile telephony, media and technologies on various types of devices at home, school and the workplace.

In this globalized 4IR era, emerging technology is incessantly used to provide efficient access to services and products and increase production levels by organisations across economic sectors. Since the late 1990s, there has been accelerated ICT adoption in the government space that has greatly evolved the interaction between citizens and businesses with government. This led to the introduction of *eservices* within the egovernance space (Zaied, 2012, Stančić,Ivanjko and Garic, 2017). (Pleger, 2020, p. 2) defines 'eservices' simply as " the electronic provision of a service to customers". Often, the terms 'e-government' and 'eservices' are used synonymously (Qureshi et al., 2017). eServices provides a tool for effortless use of government activities and functions (Mustafa, Ibrahim and Mohammed, 2020). Government's utilizing of eservices has the potential to reduce resource consumption, increase public support and raise the assessment of government performance (Alameri, Bostan and Akman, 2017, Qureshi, Salman, Irfan and Jabeen, 2017).

The use of e-government tools is attracting a substantial amount of attention with regard to their ability to make service provision easier and more flexible (Alameri et al., 2017, Lagrandeur and Moreau, 2014, Mustafa et al., 2020).

'*Public eservices'* is an interactive internet based service provided by government to their citizens. Public eservices provide more convenience to citizens where business can be done from the comfort of their homes as opposed to the transit to one of the municipality's customer care centres (Qureshi et al., 2017, Mustafa et al., 2020). Some of the eservices offered to customers include viewing and payment of utility bills (Mustafa et al., 2020), application for new services (water and electricity), renewal of motor vehicle licences, supplier registrations, submission of tenders, reporting of faults and viewing of buildings plans to name a few. One of the fundamental aspects of e-government projects to be considered a success is for citizens to be satisfied and well served. If this is not the case, citizens will revert to traditional channels for interacting with government (Avdic and Lambrinos, 2015; Anthopoulos, Reddick, Giannakidou and Mavridis, 2016). Traditional channels include the physical transit to local offices or citizens having to wait in telephonic call centres queues to address their issues.

During government transitions to eservices systems, a critical stance must be taken to requirements analysis (Alexandrova, 2012, Alexandrova, 2018). One of the underlying factors for a well-developed functional application is thorough analysis on business requirements (Bani-Salameh, 2015). Despite the importance of business analysis for public eservices projects, the field does not appear to have a well-accepted framework dedicated for public eservices projects. The public sector remains distinctively dissimilar from the private sector (Sarantis, Smithson, Charalabidis and Askounis, 2010; Yusuf, Tangke and Pontoh, 2018, Balikuddembe and Nakirijja, 2018). It appears that this 'private-public gap' is often forgotten by a multitude of IT consultants, IT companies and government officials. Information systems that have been specifically designed for the private sector are picked and then attempts are made by government to *shoehorn* it into the contradistinctive reality of public sector systems (Heeks, 2003). The private and public sector distinctly require their own approaches in the development of systems suitable for each sector and their own business analysis to create these systems. Intersecting these business analysis and eservices fields creates a challenge namely, eservices research gravitates to accentuate the unique characteristics of public software system development despite domain-independent tools, methods and solutions in the business analysis domain (Alexandrova, 2012).

Hass (2015) states that time and again the practice of business analysis eludes to a highly regarded discipline within organizations. The establishment of BA communities, the sharing of best practises and knowledge and improving the competencies are common challenges experienced by business analysts. A disciplined and value-added BA Practice is required to respond to 21st century demands and challenges (Hass, 2015). The 21st century presents opportunistic times, coupled with the underlying turbulence that the opportunities

come with. In our inter-connected 21st century global economy, businesses are confronted with challenges that have never been experienced previously.

There is heightened interest among researchers to understand the impact of eservices on citizens, their loyalty to these services, level of satisfaction, expectation on the service quality as well as how this knowledge can guide the development of better frameworks to provide eservices (Stančić et al., 2017). Assia and Lucia (2020) argues that the limited amount of literature available suggests that business analysis in the public sector is substantially ignored or is haphazardly applied and has not been adequately explored in academic research.

Due to the distinct challenges experienced in the public sector, eservices requirements practises must be analysed in a governmental context. This study proposes an innovative business analysis framework with practise guidelines customized for eservices system development.

1.2 Context of the study

South Africa is confronted with numerous service delivery challenges that are exacerbated by socio-economic issues of poverty, illiteracy, inequality, insecurity, shortage of skills and *corruption*, despite well-defined service delivery principles. The investment and commitment of government to improve the lives of citizens with service delivery via egovernance has predominantly not produced the desired outcome (Mawela, Ochara and Twinomurinzi, 2016). This makes local government crucial as it is at the forefront of understanding the needs of its citizens' and hence becomes government's 'delivery arm'. This study was carried out at Ethekwini Municipality, one of the largest metropolitan municipalities in South Africa. Eservices projects were currently being implemented in this municipality during the course if this study.

There are reports and other evidence that suggest that there have been major eservices development projects where the eservices were never utilized by the public (Avdic and Lambrinos, 2015). There is thus a compelling need to improve the development process to ensure successful eservices in a holistic sense

It is against this backdrop that an in-depth investigation into the business analysis (BA) for eservices systems is embarked upon in this study. For an eservices solution to be considered a success, the customers must be well served and satisfied, as this is the most important aspect of eservices projects. When customers are not adequately served or satisfied, they revert to conventional channels for municipal interaction.

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1.3 Research Problem

Eservices is one of the most significant recent investments in the public sector. However, scholars often infer that eservices projects experience more failures than successes (Sarantis et al., 2010: Alexandrova, 2012: Tambouris, Kaliva, Liaros and Tarabanis, 2014; Avdic and Lambrinos, 2015; Anthopoulos et al., 2016; Mawela et al., 2017; Bonuke, 2020). With many governments having communicated strategies highlighting implementation plans for numerous eservices initiatives, there have been minimal successful implementations of eservices projects (Heeks, 2003; Mawela, 2017, Mawela et al., 2017). Tambouris et al. (2014), Avdic and Lambrinos (2015) and Mustafa et al. (2020) argue that as many as 85% of eservices projects fall short of their intended targets despite the significant investments in these projects. These failures more often than not relate to insufficient planning and design and gaps between project design and actual reality. This is elaborated below:

> *"Although requirements practices are of critical importance for public organizations and their ability to meet the changing needs of their constituents, the state-of-the-art is that practitioners dedicate very little attention to their methodical application, and researchers focus insufficiently on the unique challenges and demands posed by the public and governmental context" (Alexandrova, 2012, p. 339).*

The prominent role of business analysis is well recognised in the effective development of a software product and in reducing project risks (Thomas and Senapathi, 2019). Research conducted in software development shows that deficiencies and failures of software systems frequently originate in the requirements activities (Jonasson, 2016; Atkins, 2013; Ouhbi, Idri, Fernández-Alemán and Toval, 2015; Sivaji, Deniel, Kuppusamy, Hashim, Abidin, Bajuri, Sazali, Musa, Abdullah and Chuan, 2019).

One of the leading causes for this seems to be the inadequacy of relevant skills and knowledge of those involved in the analysis activities. Likewise, there appears to be little attention paid to the holistic thinking of public eservices system development. Despite the growing body of knowledge on software development practices, there is a scarcity of well subscribed to knowledge on effective business analysis practice in general (Thomas and Senapathi, 2019). The agile approach lucidly advocates adaptation and tailoring in line with business needs, technology and time (Ozkan, 2019; Dovleac, Ionica and Leba, 2020). Aim, objectives and research question

This study is situated at the heart of public eservices development with a paramount focus on improving business analysis and the successful implementation of public eservices systems. The study aims to create a business analysis framework with practice guidelines to address the various challenges of public eservices development. The framework will aid

business analysts to conduct business analysis specifically for eservice systems development in the public sector.

This study sets out to address identified challenges in business analysis stages of a public eservices system project. There appears to be a gap in this area of the literature. In line with this the following research aim is stated:

- To improve business analysis in public eservices systems projects

To achieve this aim, the following research objectives (RO) need to be satisfied:

a) RO1: To evaluate existing business analysis approaches adopted for public eservices systems projects
b) RO2: To determine the key knowledge areas, process flows and activities in business analysis applicable to eservice systems
c) RO3: To develop a framework of practice guidelines for business analysis of eservice systems
d) RO4: To validate the components and to determine the nature of the interfaces between components in the framework

A research question serves as the mainstay of the study and embodies the aim and objectives. The following primary research question is asked:

- What is an effective framework for improved business analysis of public eservice systems?

The secondary research questions are:

- What existing business analysis approaches are adopted for public eservice systems projects?
- What are the knowledge areas, process flows and activities in business analysis for eservice systems?
- What are the components required to create a framework of practice guidelines for business analysis of eservice systems?
- What are the interrelationships between the components and how do they impact on each other?

1.4 Intended contribution of this study

The public and private sectors have differing demands on eservices systems meant to provide products and services to their customers (Yusuf et al., 2018). This study contributes to the area of public eservices systems development by attempting to enrich existing knowledge. At the time of writing there appears to be limited literature in this area. The additional contribution is the exploration of the ADVIAN method to evaluate the complexity of the components that constitute the framework. This evaluation reveals the direct and indirect impacts of all components in the framework, thus providing detailed insights for tailoring the framework to better fit organizational and team characteristics.

Many frameworks are static and prescriptive, where impacts of adaptation are unknown. This study highlights the impacts of changes to the business analysis framework as impacts analysis is applied to each framework component using ADVIAN. The results of the ADVIAN analysis provides foresight into the impact of changes made to the framework when tailoring to a specific project. This will be of value to project teams wanting to utilize the framework across eservice projects. The use of ADVIAN shows the impacts of changes to the components of the framework when components are altered. It shows the impact of each component on the other.

This study believes that a robust tailored solution for eservices business analysis could contribute towards improving the overall quality of these systems. This study adopts a stance that a basis for thorough and complete business analysis requires a framework of practice guidelines to support the development of high quality eservices systems. The focus of this study is to contribute towards improving business analysis as this is the foundation for well-developed and highly beneficial eservices. Using live eservices projects within a municipality to create and mature the framework is positioned as a valuable contribution. Municipalities that are often multi-faceted and complex now have a frame of reference for business analysis on their eservices projects. This study is undertaken in a municipality in Kwa-Zulu Natal.

1.5 Study research design

Table 1 outlines the study's research philosophy, theory formulation, research strategy, research method, data collection tools and data analysis methods. These are then briefly discussed.

Table 1: Summary of study research design

Research Design	
Research Philosophy	Pragmatism
Theory Formulation	Circumscription
Strategy	Qualitative
Method	Design Science Research
Data Collection Tools	Focus Group Questionnaires
Data Analysis Methods	Content Analysis Cross Impact Analysis

A pragmatic philosophical view is adopted by the researcher for this research study as knowledge claims emerge from constructive knowledge, actions, situations, intervention and consequences. This view is associated with *problem solutions* (Creswell, 2017) making it appropriate as a framework is built for an identified problem of business analysis for eservices systems.

Circumscription generates knowledge that can only be acquired via the specific action of construction, making it notably important in understanding DSR (Dolgopolovas, Dagienė, Jasutė and Jevsikova, 2019). The iterative research effort emerges knowledge and is a crucial part of DSR. The circumscription process conjectures that knowledge gained is credible in specific situations only. A business analysis framework is built using DSR for an identified problem (business analysis) in a specified domain (public eservices) deeming circumscription most suitable as knowledge unearthed will pertain to that situation.

Insights are needed into business analysts' perceptions on the effectiveness of the created framework to conduct business analysis when working on eservices projects. A small purposively selected group of participants were implicated in this research as change agents. Their feedback is used to further improve on the business analysis framework. Therefore, this study adequately aligns with a qualitative strategy. The ADVIAN (ADVanced Impact ANalysis) tool was selected for a more detailed and robust data analysis of participant feedback. This analysis allowed for determining the effects on the overall integrity of the framework when

certain components are tailored. This aspect differentiates this framework from other static framework of practice guidelines as the impact or effect of *tailoring* can be scrutinized.

Tailoring or customization of the framework is expected in use as project characteristics and challenges (Paul, 2018) may differ from one instance to the next.

Design science research (DSR) is the methodology applied in this research study. This philosophy gravitates towards problem solutions and "what works" (Creswell and Creswell, 2017) deeming it apt for this study. The DSR approach endeavours to concentrate human creativity to design and construct artefacts that are useful in application environments (Hevner and Chatterjee, 2010). (Hevner and Chatterjee, 2010) further affirms that the relevancy gap that has badgered academic research in the information systems and management domain can be addressed by DSR. DSR is used to build and evolve (via iterations) the proposed eservices business analysis framework. The artefact being the business analysis framework is constructed with its rigor tested through its use in a realistic municipal environment. This is achieved using the guidelines that are concisely detailed in chapter 3.

The data collection tools used in this study include focus group and questionnaires. The focus group will be involved in the DSR iterations. Following the DSR sessions questionnaires using open and closed ended questions will be administered to participants to gather data. The data gathered from the DSR sessions and questionnaires will be analysed using content analysis to deduce findings. ADVIAN will be applied for the cross impacts analysis using the framework evaluation completed by the participants.

1.6 Structure of the thesis

This thesis consists of six chapters that are organized as indicated in figure 1.

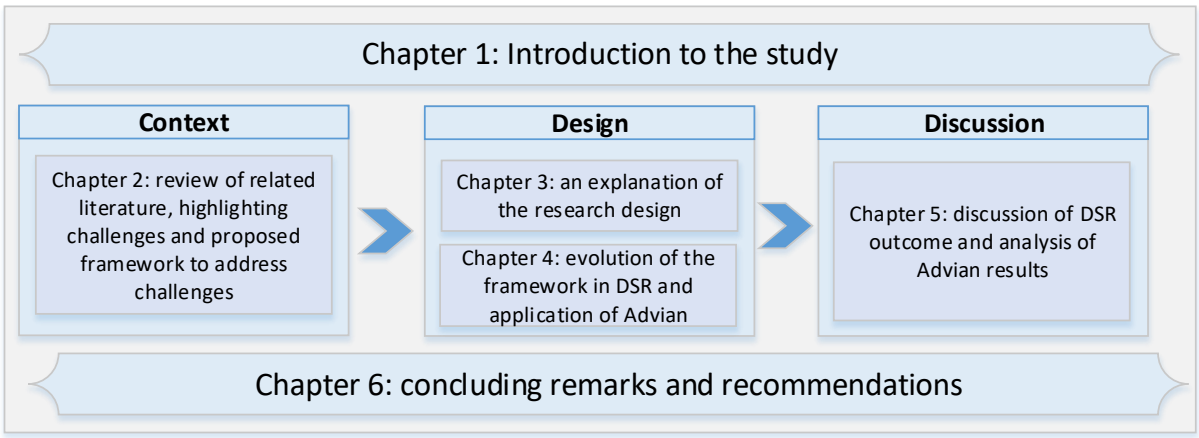


Figure 1: Structure of the thesis

(Source: Constructed by the researcher)

Chapter one presents a succinct introduction of the research study. The problem statement, research question and sub questions, research aim and objectives and a summary of the study research design are outlined in this chapter. The problem is that there is no business analysis framework of practice guidelines for public eservices projects. To address this, the research question *"What is an effective approach for improved business analysis of public eservice systems?"* is answered with four research objectives. Research objective 1 and 2 will be dealt with in chapter 2 and research objective 3 and 4 will be addressed in chapter 4.

The business analysis overview together with its benefits, the approaches to business analysis, overview of eservices, and the synthesis of challenges are analysed from literature and presented in chapter two. The objectives in developing the business analysis framework also emanate from this chapter. Chapter three describes the research framework applied in the study and delves into the research methodology focussing on the application of DSR to actualise the aim and objective of the study. The data collection and data analysis tool (ADVIAN) is also discussed. Chapter four showcases the framework and its implementation using DSR. Chapter five presents elucidation of the data analysis. The final chapter six provides a summary of the overall study, possible future work, recommendations and the conclusion.

Chapter 2: Literature review

The literature review is a central part of any research study since it allows the researcher to gain familiarity with the subject's background and its current 'state-of-the-art'. Through a literature review the researcher can determine other aspects, ideas, approaches, methodologies and encountered obstacles in the discourse. This chapter presents a selection of related and relevant reviewed material on business analysis and eservices. The aim is to evaluate current approaches to business analysis adopted for public eservices systems projects, determine key business analysis knowledge areas, process flows and activities for public eservice systems and propose a conceptual framework of practice guidelines for the conduct of business analysis of eservice systems.

The chapter commences with an overarching view of business analysis and the business analyst in section 2.1, and discusses the role of the business analyst (and the potential benefits of *effective* business analysis). Current approaches to business analysis in the eservices domain is then examined in section 2.2, specifically literature on quality function deployment (QFD) and BABOK. The discussion then progresses into the interface of these aspects together with the methodological approaches and experienced challenges. Thereafter the literature on eservices is reviewed. A background to eservices is provided in section 2.3, followed by identification of challenges in eservices projects and challenges in the delivery of eservices in South Africa. Thereafter, business analysis challenges in e-services projects are discussed in section 2.4 and summarised in section 2.5.

2.1 An overarching view of business analysis and the business analyst (BA)

In the mid-1980s there were various systems development methodologies but they had a strong concentration on the system side, frequently at the cost of not always meeting business needs. The understanding of authentic business problems received minimal to no attention from developers. This was not well received by customers. Progressively through the 1980s and 1990s changes started when businesses became more global and competitive and systems quickly became more complex. This led to a shift in focus from technological adoption to accomplishing what business was attempting to achieve (Jonasson, 2016).

Since the early 1990s business analysis has evolved into a discipline that is involved with comprehending of business problems, evaluation of appropriate solutions and requirements definition (Paul and Tan, 2015; Paul, 2018). With recent technological developments, access to ICT is more widespread and more customers are demanding different mediums such as web and mobile applications for business. Hence, there is a renewed need for *business analysis* in this new frontier.

BABOK Guide (2015) defines business analysis as: *"the practice of enabling change in an enterprise by defining needs and recommending solutions that deliver value to stakeholders. Business analysis enables an enterprise to articulate needs and the rationale for change, and to design and describe solutions that can deliver value" (BABOK, 2015: 2).*

Business analysis is customarily the first stage of the system development process where the understanding and definition of functionalities together with the constraints of the proposed system is explored (Bani-Salameh, 2015; Shah and Patel, 2016; Smoots, Garstenauer and Blackburn, 2016). Business analysis is concerned with analysing, quantifying, tracing, communicating, developing and managing requirements that define the system (Bani-Salameh, 2015; Schupp, Wichmann and Goetting, 2016). It is the practice of defining needs of an organization and recommending solutions that will benefit the organization and all stakeholders. Prior to resource allocation or even valuable resource exhaustion, the known problem is addressed to ascertain knowledge of the system expectations. This practice involves the use of various tools and techniques that are used to elicit definitive requirements and provide solutions for the needs or problems faced by the organization. The ultimate goal of any organisation is to accumulate good quality requirements to ensure quality products (Bani-Salameh, 2015). Very often the term 'business analysis' is used interchangeably with 'requirements engineering'.

A '*business analyst'* (BA) is an operative for change whose specialised knowledge is used to provide solutions and guide business to their desired goals (BABOK, 2015). BAs gain mastery in business analysis by having a lucid comprehension of business analysis, knowing their audience, knowing their project, having knowledge of the business domain, having knowledge of their technical domain, cognizing their analysis techniques and growing their value (Venkataraman, 2011). They assist with identifying new opportunities, help businesses understand their current processes, elicit requirements and recommend solutions to both challenges and future goals (Cadle, Paul and Turner, 2010; Mathiesen, Bandara, Delavari, Harmon and Brennan, 2011; Paul, 2018). Whilst on the business analysis journey on projects, relationships are built and BAs become trusted advisors and advise decision makers on making right decisions. A combination of skills and experience make a 'good' BA which in turn should produce successful products and solutions to the business (Blais, 2011). Projects of magnitude require BAs' to delve into the project and provide intricate details such as defining decisions, understanding consequences, understanding trade-offs between options, clarifying uncertainties and understanding the risk tolerance levels (Edvardsson, Gustafsson, Olsen and Witell, 2014). Business analysts' role can include being a requirements engineer, process analyst, business systems analyst, systems analyst, business architect, data analyst, enterprise analyst, product manager/owner or management consultant (BABOK, 2015).

All these roles require analysing needs and solutions, designing strategies, understanding organisation problems and goals, driving change and facilitating stakeholder collaboration (Uskov, Yalamanchili, Singh and Penumatsa, 2016). Hence a BA can be described as any person who carries out business analysis activities regardless of what their organizational job title may be. There are also underlying competencies that BAs' possess to effectively carry out business analysis. These competencies include analytical and problem solving skills, business knowledge, behavioural characteristics, communication skills, interaction skills and the ability to use tools and technology (BABOK, 2015).

2.2 The role of a business analyst (BA)

The BA role has evolved through time. Initially business analysis was seen to be a part of the developer's job which was known as systems and requirements analysis. This role was also dependent on the organization and the tools used within the organization. In recent years though, the BA role is maturing into a value-added role functioning as a link for communication between developer and the customer (Jonasson, 2016; Brandenburg, 2020). BAs are instrumental in facilitating communication amongst people and the various departments that have contrasting views and speak different "languages". They essentially bridge the business and IT gap (Venkataraman, 2011). They listen to the problems experienced by the business, understand the opportunities and delve into details to grasp the processes. The following are key responsibilities of BAs (Venkataraman, 2011; Cadle et al., 2010; Uskov et al., 2016; Brandenburg, 2020; Paul, 2018; Paul and Tan, 2015):

- Assessment of cardinal functions and business processes in an organization
- Identification, analysis and translation of user requirements into IT project specification
- Exploration of viable solutions to meet those business needs
- Developing a holistic view that surpasses just the current project, platform or software/system in the organization
- Creating of plans for proposed IT solution and identification, communications and risk management related to the solutions

In addition to the aforementioned responsibilities it is imperative for a BA to understand the larger context within which they work. This context includes understanding the business domain, the technical environment, the project and enterprise (Venkataraman, 2011). Whilst few BAs are involved in analysis and development of strategy, it is important they have knowledge about the organizational strategy so their work can be carried out to support the strategy and achieve business objectives (Cadle et al., 2010; Paul, 2018).

Requirements definition has been recognized as a focal aspect of the work done in business analysis. A requirement is defined as '*any externally observable characteristic of a desired system*' (Paul and Tan, 2015, p. 3). Clear, hidden, structured and unstructured requirements are to be identified and analysed in the analysis process. Requirements analysis is the inaugural stage in product development. Based on the analysis and determined design from the analysis, prototypes are built, tested and evaluated. The requirements are elicited, analysed and evaluated before the design and specification is developed. User and stakeholder requirements must be understood by the BA for development of a project in the correct way (Bani-Salameh, 2015; Balikuddembe and Nakirijja, 2018). BAs are instrumental in understanding the needs of the customer and relaying these needs in the best possible way to relevant parties. A proverb by Albert Einstein seems apt: *"If you can't explain it simply, you don't understand it well enough"*.

2.3 A discussion on the risks of poor business analysis

The failure of many software projects is largely attributed to poor quality requirements contrived for the project (Alexandrova, 2012; Audytra, Hendradjaya and Sunindyo, 2016; Bonuke, 2020; Egeland, 2019). Requirements become complex as the various sets of conflicting software needs from differing stakeholders must be taken in consideration. Meeting user requirements is one of the key elements to successful software development; however poorly specified requirements produce a system that fails to meet the user's needs and business objectives. Incomplete, inconsistent, ambiguous and unclear requirements are the root cause for the failure of the requirements gathering phase. The repercussions of incorrect analysis from the onset are detrimental to the project success. BAs play a vital role in eliciting requirements during the inaugural stage of the project. Requirements elicitation is not a simple gathering process but rather a process of exploring, collaborating, discovering, and inventing (Wiegers, 2020). A BA is not a scribe. They possess the required tools and techniques that are essential to congruously elicit user requirements. An absence of this step can result in detrimental negative effects on the project in its entirety. Without a lucid comprehension of requirements or problems experienced by the business, poor solutions are then engineered resulting in the business being *short changed*.

Project schedule and costs are gravely impacted as a consequence of poorly written, vague, missed or misconstrued requirements, or numerous requirements emerging subsequent to the requirements phase (Shah and Patel, 2016). The length of projects can potentially be tripled due to bad or missing requirements (Egeland, 2019). In addition, errors in requirements are inclined to result in a greater effort to rectify (Brandenburg, 2020) when discovered much later in the project life cycle.

This unforeseen and added effort inflates project costs. Effective business analysis reduces if not eliminates the increased project costs and schedule distinctly concerning requirements. Defective requirements can result in software defects, customer discontentment, inadequate or incorrect functionality, elevated costs and indeed total failure of the project (Atkins, 2013; Audytra et al., 2016; Brandenburg, 2020). A greater focus and time dedicated to business analysis helps in alleviating these identified problems at the early project stages. As a valued competency in business, BAs can focus exclusively on the needs of business and add business value. For any project to be successful, the prime objective is to obtain the right requirements.

2.4 Current approaches to business analysis

Current literature was reviewed in an attempt to uncover existing approaches to business analysis in the eservices domain. Despite the researcher's best efforts, literature seems mostly scarce on the specific topic with limited mentions of eservices business analysis. There seems to be a dearth of specific work that addresses requirements practices and the unique challenges in the public sector context (Assia and Lucia, 2020). In terms of what is discussed in the literature, '*Quality function deployment'* (QFD) is widely used in business analysis with mention of it being used in the public sector. BABOK (2015) reveals itself as a popular framework among business analysts in both commercial and public sector projects. BABOK (2015) and QFD are discussed in the following sub-sections.

2.4.1 Quality function deployment (QFD)

QFD is a popular and integrated approach which obtains user requirements, converts them into the complete product specification and satisfies the customer's requirements at all stages of the product development life cycle (Sener and Karsak, 2010; Zawati and Dweiri, 2016; Ionica, Leba and Dovleac, 2017; Fang, Li and Song, 2020). Originally developed by Professors Shigeru Mizuno and Yoli Alao in Japan, this approach has a history from the 1960s (Pusparani, 2019) with a vast range of domain applications. The goal of these two pioneers was to create a product that would consider customer satisfaction prior to building the product rather than during or after the development. QFD assists with translating the '*voice of the customer'* (VoC) into new services or products that aims to genuinely satisfy their needs. In QFD, for the duration of the development process the customer's voice is *unfolded* to create products that are more responsive to the customer's needs (Fang et al., 2020).

QFD comprises of four phases. The first phase entails translating VoC (also referred to as technical measurement) into service or product design quality. Phase 2 converts the necessary technical measurements into sub parts of service or part attribute.

Phase 3 encompasses transferring important sub parts of service or part attribute to processes, and finally phase 4 involves the conversion of basic processes into service requirement or day-to-day production (Yildirim,Yildirim and Ozcan, 2019; Xu and Zhang, 2020).

Phase 1 of QFD is fulfilled using the product planning matrix known as the '*house of quality*' (HOQ) shown in figure 2. Using HOQ, customer requirements are translated into technical aspects (Sener and Karsak, 2010; Lee, Ru,Yeung,Choy and Ip, 2015; Pusparani, 2019; Xu and Zhang, 2020; Yildirim et al., 2019).

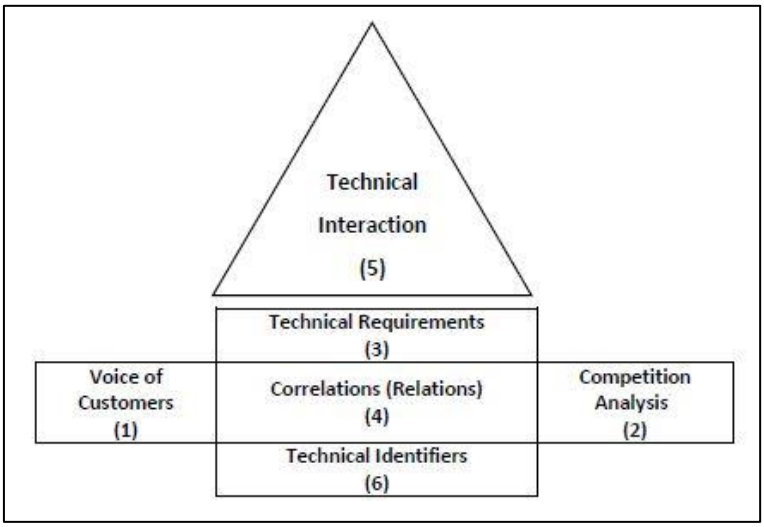


Figure 2: House of quality (Source: Yildirim et al., 2019)

Yildirim et al., (2019), Zheng, Xu and Xie (2019) and Dovleac et al. (2020) unpack the HOQ in figure 2 as follows:

1. **Voice of the customer** is where customer requirements are retrieved and primed for analysis. This component shows the '*what*' of the customer's demands.
2. **Competition analysis** uses quality scores to identify the extent of customers' demands being met.
3. **Technical requirements** are where business processes are gathered and the '*how*' is established on the manner in which customer expectations will be met.
4. **Correlations (relations)** establishes if the technical requirements meet the customer needs
5. **Technical Interaction** ascertains if the technical requirements positively or negatively affect each other
6. **Technical identifiers** calculate the importance levels of each technical requirement

HOQ is used to elucidate relationships between customer requirements or desires and technical characteristics. Ionica et al. (2017) affirms that QFD can be applied to all stages of software development, including elements such as preliminary analysis, systems analysis, requirements specification, systems design, developments, system integration, testing, implementation and maintenance. Following successful results for the application of QFD on products in the manufacturing sector, QFD was then used in the services sector (Yildirim et al., 2019). In recent times, QFD has also been used to develop public services.

2.4.1.1 QFD in the public sector

Enhancements have been made to the QFD tool to address the unique characteristics of public sector systems. In the public sector, all significant stakeholders inclusive of regulatory authority are included as they may define requirements that address customer demands (Zawati and Dweiri, 2016). The utilization of QFD in the public sector is unique and has shown this sector can use this approach for future improvements where customer requirements are linked to technical specifications. QFD has been beneficial for healthcare systems in the public sector, however Lee et al. (2015) points out the limitation of extended implementation times and decisions aids. Decisions aids are tools or interventions created to enable shared decision making and participation of patients in healthcare decisions.

Whilst QFD has aided in user collaboration during development, some researchers point out limitations and modifications needed to this approach for public sector use. Zawati and Dweiri (2016) argues that two modifications must be incorporated when using QFD in the public sector: first, customer needs must not be the only focus, there must also be consideration of government standards and regulatory requirements; second, it is important to complement this approach with quality analysis tools such as surveys, brainstorming and priority setting analysis.

While user collaboration can facilitate obtaining vital information from users, Zhang, (2017) warns against being cognizant of the size of the organisation when this approach is used. The larger number of collaborative users does not necessarily lead to improved results. It is imperative to select suitable users that will participate in the collaboration to satisfy requirements as opposed to the number of participants. Users possessing different resources may have different impacts on the efficiency of collaborative product development.

A further constraint on the QFD method is that customer preferences and opinions are portrayed in linguistic or numeric forms which can sometimes be subjective, inaccurate and unclear. Lee et al., (2015) suggests the integration of fuzzy logic with QFD to create a more accurate and objective method for QFD implementation.

QFD shows much success with satisfying customer requirements using the voice of the customer to derive requirements for product development. However, informed by literature a few challenges have been identified with using this approach as it stands in the public domain.

2.4.2 BABOK

With a proven track record, bodies of knowledge are artefacts known for accelerating the professionalization of various disciplines. The Business Analysis Body of Knowledge (BABOK Guide), was established in 2003 by the International Institute of Business Analysis (IIBA). One of the cardinal tasks of the IIBA is to certify practitioners (business analysts, specialists on requirements management, project managers and system analysts) and to facilitate uplifting their professional competency (Chernysheva and Shepelenko, 2018). The IIBA's mission statement is listed as the following:

> "*Our **mission** is to provide value through fostering awareness of the issues related to business analysts and creating an environment where business analysts can come together, build relationships, learn from one another and collaborate with other business analysts as well as vendors, corporations and other organizations ..." (IIBA, 2017: 1)*

Following the initial publication in 2006, the BABOK guide was revised in 2009 and 2015. BABOK describes knowledge areas in business analysis, activities, tasks and necessary skills for effective execution (Mathiesen et al., 2011; Meredith, Summons, Park and Cheek, 2019; Chernysheva and Shepelenko, 2018). It delineates commonly accepted business analysis practices and knowledge areas representing areas of distinct business analysis expertise that entail numerous tasks (BABOK, 2015: 4).

Alexander (2019) explains the six knowledge areas in BABOK as follows:

a) **Business analysis planning and monitoring** describes the required tasks to coordinate and organize business analysis activities.
b) **Elicitation and collaboration** provides a description of the needed tasks to be completed to prepare for and conclude elicitation activities, including verification of the results.
c) **Requirements life cycle management** describes the tasks that are concerned with maintenance and management of business requirements and considers all activities from start to finish.
d) **Strategy analysis** ascertains and addresses the tasks concerned with business needs and ensures that change in strategy is applied where necessary.

e) **Requirements analysis and design definition** details the necessary tasks required for organizing, specifying, and modelling business requirements. It also includes the verification of information, determination of solutions and ascertaining of potential realized value.

f) **Solution evaluation** enlists the necessary tasks required for assessment of the delivered performance and worth of a solution. In addition, suggestions are made for improvement that will elevate value.

Figure 3 shows six knowledge areas (changes, solutions, context, value, stakeholders and needs) of BABOK that is used to guide the overall business analysis endeavour. Tasks, activities and the required skill needed for the effective fulfilment of each knowledge area is detailed in BABOK (Chernysheva and Shepelenko, 2018).

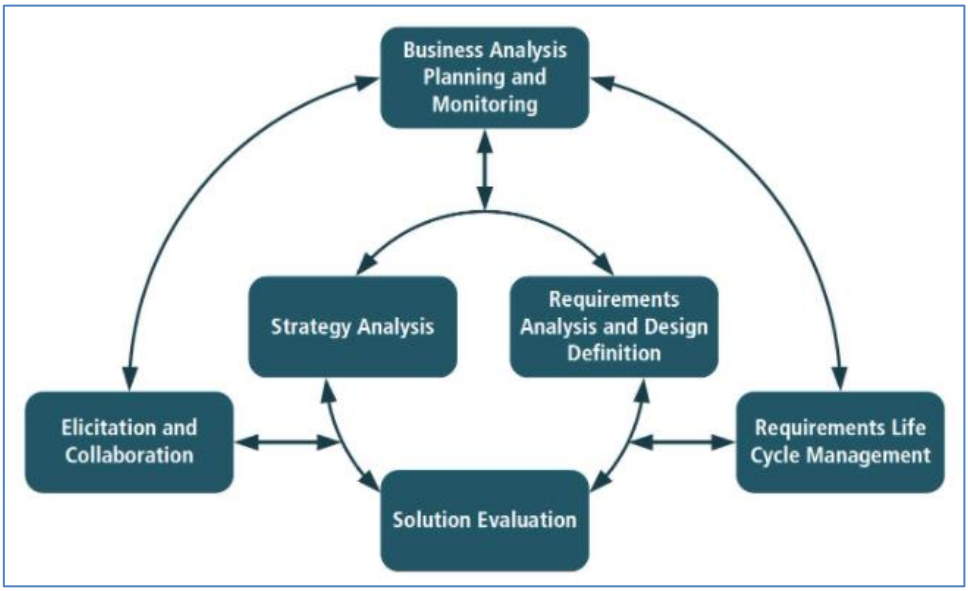


Figure 3: Knowledge areas of BABOK v3 (Source: BABOK, 2015)

2.4.2.1 Difficulties in applying BABOK

While BABOK offers the *what* on business analysis with various types of modelling and techniques, the business analyst should also consider the *how* for their organization when modelling requirements (Jonasson, 2016). Extensive BA experience and expertise is thus crucial when using the BABOK framework which can present a drawback as BAs on projects are not all always on the intermediate or expert level of business analysis. There is no prescribed methodology which may present a further challenge to the inexperienced BA.

BABOK can be a useful source of tasks, tools and techniques however a systematic approach is required for projects in a specific context as in public eservices projects.

Many BAs use BABOK as a guide to perform their business analysis but their business analysis experience influences the selection of activities, tasks and techniques to be used in the projects. BAs' utilizing the agile approach are advised to continually revise, modify and adjust priority tasks, approaches and analysis methods. It is mandatory to provide continuous flexibility of analysis work for the possibilities of change (Chernysheva and Shepelenko, 2018).

While BABOK provides an extensive number of activities, tools and techniques to cover a wide spectrum of projects, the selected activities, tools and techniques best suited for eservices projects are not clearly delineated. The BA will have to sift through this extensive framework to select the most appropriate elements to apply for each eservices project.

BAs are often tasked with a wide spectrum of responsibilities, however certain competencies and skills that are highly regarded by organizations are not contained in BABOK (Meredith et al., 2019). These skills include technical skills, testing, data management, implementation and project management. Bodies of knowledge and standards are developed and updated to achieve project success by controlling numerous project attributes such as cost, scope, time and quality. Nevertheless projects still fail despite applying these standards and bodies and knowledge (Anthopoulos et al., 2016).

This study believes that selected knowledge areas from BABOK can be adapted for the creation of the proposed framework for business analysis of eservices projects. These knowledge areas in BABOK include activities, tools and techniques to cover a wide spectrum of organizational needs, and the activities, tools and techniques that are best suited for public eservices projects can be extracted to create a tailor made framework specifically for eservices projects. This body of knowledge can thus be borrowed from to create a concise framework that is designed specifically for public eservices projects.

2.4.3 Summary of QFD and BABOK challenges

Both QFD and BABOK are used in business analysis, but both approaches have drawbacks. QFD focuses on customer needs, but for use in the public sector there is a need to also consider government standards and regulatory requirements (Zawati and Dweiri, 2016). If these critical elements are not incorporated during the analysis process, the software solution may not be usable.

Another shortcoming of QFD is the need to supplement this approach with quality analysis tools such as surveys, brainstorming and priority setting analysis. The choice of tools that BAs utilize depends on the audience or task at hand.

Whilst user collaboration is invaluable for retrieving information from users, organisation size is a limitation in QFD (Zhang, 2017) as the large number of stakeholders in the public

sector (Mawela et al., 2016, Mawela et al., 2017) may impact the efficiency of collaborative product development. Users must be carefully selected to appease requirements rather than focus on the number of participants. While QFD has benefits for improving product development, there are thus challenges for the public sector as highlighted above.

With BABOK , tasks are arranged into knowledge areas to provide guidance to BAs, but Meredith et al. (2019) points out that the practising BA requires intermediate or expert levels of expertise in each of these knowledge areas making it unsuitable for use by inexperienced BAs. While expertise is required for knowledge areas, tasks, tools and techniques, not all parts of BABOK are important to organizations (Meredith et al., 2019). Elements from Babok can thus be adapted to suit project needs for a specific environment such as those of public eservices projects.

Having discussed business analysis, the next section focuses on eservices. A background is provided, followed by identification of challenges in eservices projects and in the delivery of eservices in South Africa. Thereafter, business analysis challenges in e-services projects are discussed and summarised.

2.5 Background to eservices

Emerging ICT and the recognition of 4IR as a new era has revitalized the outlook of public sector institutions and their strategic plans for delivery of services. Government systems utilizing ICT to better serve citizens is ordinarily defined as '*eGovernment*'. The overall aim is to improve service delivery, and facilitate and improve transactions between government and other entities (Mustafa et al., 2020, Pleger, Mertes, Rey and Brüesch, 2020). The increasing global adoption of ICT in government for public service delivery is a testament to its place as an effective tool (Matavire, Chigona, Roode, Sewchurran, Davids, Mukudu and Boamah-Abu, 2010, Twum-Darko, Noruwana and Sewchurran, 2015). Individuals' and businesses' dealings appear easier using eGovernment where services, information and communication is enhanced. These new channels assist by: ensuring people do not have to repeatedly request the same information; ensuring staff have improved access to information to assist them dealing with the public more efficiently; and by assisting with various parts of government to collaborate with central government.

Under the eGovernment umbrella, services offered electronically are referred to 'eservices'. '*Eservices'* is defined as the use of electronic delivery for government information, programs, strategies and services to citizens" (Lagrandeur and Moreau, 2014, Pleger et al., 2020). The dominance of ICT and its adoption in government institutions from the late 1990s,

had a significant impact on the interactions between citizens and the institutions and resulted in eservices being offered.

Advancements in ICTs have played a significant role in revolutionizing the manner in which public services are provided to citizens globally. Eservices is emerging with increased importance not only in ascertaining success or failure of electronic commerce but also with affording citizens a superior experience as an interactive flow of information is vital in egovernment development (Stančić et al., 2017). Due to the priority public services have received, substantial investments in research and operational eservices projects have been made worldwide (Tambouris et al., 2014).

2.5.1 Identified challenges with eservices projects

Research reveals a variety of factors contributing to eservices challenges. Kumar, Sachan and Mukherjee (2018) identifies limited awareness of citizens, insufficient resources, computer literacy levels as factors. Mustafa et al. (2020) highlights culture, website design, quality of service, privacy, awareness, resistance to change, perceived public value and outcome expectation as other influencing factors contributing to the challenges with eservices. While literature exposes the above challenges, additional challenges are briefly discussed below.

2.5.1.1 Barriers

The language barrier proves to be an adverse element with the use of eservices. Multilingual options for accessing eservices for citizens whose first language is not English is a major issue (Mawela et al., 2017). Citizens have resistance using the website where they are not able to fully understand the language (Kumar et al., 2018, Mustafa et al., 2020).

Stančić et al. (2017) and Hassan et al. (2011) note that challenges with providing eservices include privacy and security barriers, legislative barriers, administrative barriers, technological barriers, cultural barriers and resistance. These constraints and barriers are given as reasons for the resistance and inability to create positive change at a sensible pace during the eservices solutions development process. Often identified as a technical barrier is the absence of flexibility in government's legacy systems and their inability to easily integrate with new technologies. However, this barrier has been debunked by further investigation that discovered that old business processes, deficient business workflows and rules were the actual technical constraints (Alexandrova, 2012).

2.5.1.2 Stakeholders

Stakeholder inclusion and engagement is sometimes viewed as a major failure in eservices projects (Avdic and Lambrinos, 2015). Various stakeholders have their individual

requirements which may often be contrasting, so this has to be considered in eservices development. Stakeholder expectations and needs tend to be ignored when the focus moves onto the technology aspects of the development.

2.5.1.3 Planning

Another relevant challenge is related to the inadequate planning and design of these projects and more so to the gap between reality and design (Tambouris et al., 2014; Anthopoulos et al., 2016). Insufficient time and effort is invested in the initial stages of these projects which results in not achieving the defined objectives of eservices projects. As the years progress, eservices project outcomes are questioned and its potential is debated. Failures, including project failures and not meeting expectations of citizens, results in non-adoption and citizens' reverting back to traditional channels (phone calls and face-to-face visits at offices) and this is exemplified in the literature (Anthopoulos et al., 2016).

2.5.2 Challenges in delivery of eservices within the South African context

The South African government has recently been confronted by numerous challenges in delivery of services (Osah and Pade-Khene, 2020). These challenges include lack of customer service from public sector staff, delayed responses to citizens' requests, lengthy travels to reach municipal offices especially from rural areas, and limited office hours (Mawela et al., 2016). Municipalities are at the forefront of articulating the needs of citizens and become instrumental in delivering them.

The South African government carries out egovernment initiatives concurrently with programmes for poverty relief to better its people's living standards (Mutula and Mostert, 2010). For example the RDP (reconstruction and development programme) was created to meet the basic needs (such as housing, electricity, education, food, water, health, etc) for all their citizens and to also achieve universal access to energy. Despite challenges, South Africa has seen some successful projects such as the National Traffic Information System (eNaTIS), an e-procurement system by the Independent Electoral Commission (IEC) and SARS efiling. eNaTIS is a system used for licencing and registration of motor vehicles; change of ownership/sale of motor vehicle notification; learners licence application and application for driving licences. The IEC developed the e-procurement system to allow open and transparent bidding of government tenders intended to prevent corruption.

The SARS efiling enables citizens and businesses to transact for purposes of submitting tax returns. Mawela et al. (2017) categorises three main types of outcomes for eservices projects:

> *"Firstly, a total failure: the initiative was never implemented or was implemented but immediately abandoned. Secondly, a partial failure: major goals for the initiative were*

not attained and/or there were significant undesirable outcomes. Finally, a successful project: where most stakeholder groups attained their major goals and did not experience significant undesirable outcomes" (p. 151).

Research conducted within the South African context has identified the generic challenges discussed above and added challenges in the eservices space. Some of the barriers towards successful projects include municipal leadership, culture of operating in silos, stakeholder management, need for ICT project champions, ICT skills, language implications and funding (Thakur and Singh, 2013; Mawela et al., 2017; Masemola, Phahlane and Ochara, 2019).

2.5.2.1 Working in "silos"

The decentralized nature of the various functional areas in government (Alexandrova, 2018) leads to non-existent cohesion (Osah and Pade-Khene, 2020) which promotes fragmented interests and isolated functional processes. Working in silos is also referred to as 'fragmentation' and is a common problem in government institutions (Mawela et al., 2017). Disparate systems breed in the quandary of data integrity and data redundancy issues. Various systems have been acquired for different needs of the organisation historically and have been used without integration. Departments tend to focus on their own individual requirements where essential role players are omitted at the initial project stages. This then results in duplication of effort, duplication of systems and poor resource management. This in turns benefits the private sector as they are "happy to sell the same service to different municipalities" (Matavire et al., 2010, p. 158). To fully gain the advantages of eservices, it is imperative to ensure that ICT resources are utilized in a way that will assure that the implemented eservices is sustainable (Masemola et al., 2019).

2.5.2.2 Stakeholders

The non-delivery of stakeholder expectations has been cited by a majority of the researchers that have studied failures of ICT projects in the South African public sector (Mustafa et al., 2020; Thakur and Singh, 2013; Matavire et al., 2010). Stakeholders have to be identified and their needs understood at the initial stages of eservices projects. Relationships with a range of stakeholders are also critical and must be maintained through stakeholder management during the planning and delivery of eservices by municipalities. There are a multitude of stakeholders that government must maintain relationships with.

It is imperative to maintain communication with these key role players as they play a critical role in the implementation and success of eservices projects (Masemola et al., 2019; Sánchez and Macías, 2019). A lack of stakeholder collaboration attributes to the issue of fragmentation and operating in silos.

2.5.2.3 Context centric solutions

Thakur and Singh (2013) argue that systems from government should be specific to their country rather than an off-the shelf product from a different country. The need for more context centric solutions seems to be prevalent as eservices solutions are not a 'one size fits all'. Applications must accommodate the variable factors that influence the particular application in question.

To alleviate these given challenges in the South African context, the business analysis approach must address issues of working in silos, satisfying stakeholder needs and providing more context centric solutions. The framework developed in this study will address *working in silos*, by creating a step to include the relevant role players in management. Due to management interaction with levels above their own, new systems and functionality is communicated. This will help avoid duplication of effort, duplication of systems and poor resource management. To satisfy all *stakeholder needs*, the framework will include the identification and continuous engagement of stakeholders. Continuous stakeholder engagement ensures requirements are well understood and stakeholders are involved during the business analysis process (Sánchez and Macías, 2019). It is imperative that the framework results in *context centric solutions*. Performing specified tasks and using the selected tools and techniques chosen for the framework will ensure solutions apt to public eservices projects.

Whilst an array of challenges are identified in literature, the focus of this research is alleviating challenges surrounding the business analysis aspects for eservices projects. These are discussed next.

2.6 Business analysis challenges in eservices projects

Assia and Lucia (2020) stress a deficiency in academic and practitioner contributions dedicated to the requirements practices and their unique challenges in the government spaces. In spite of requirements processes being presented in the above literature as being of crucial importance for the development of eservices systems, despite the researcher's best efforts, there is an apparent lack of research focus on this area. It is the point of view of this study that there is very little attention dedicated to methodical application of business analysis to address the unique demands and challenges present in the government and public sphere of eservices development, particularly in business analysis. Research and practices on egovernment have mainly centred around interest in technology impacts on public organizations and factors affecting the success of IT projects. The limited literature on the subject suggests that business analysis in the public sector is largely ignored and applied haphazardly and that this status quo has not been adequately explored in academic research (Alexandrova, Rapanotti and Meehan, 2011).

While the prior sections in this chapter provided a holistic view on business analysis and eservices individually, this section concentrates on the use of business analysis in the public eservices domain. Informed from literature, the categories of *stakeholders and decision makers, communication, requirements challenges, user involvement, requirements changes, solution* and *deliverables* have been grouped as business analysis challenges in eservices projects. These categories have been derived following the extensive review of extant literature and are now discussed.

2.6.1 Stakeholders and decision makers

Over recent years, government systems have become essential as they assist stakeholders perform their tasks. To fulfil their mandate, public sector organizations must interact with a multitude of heterogeneous stakeholders. Digital government applications must be representative of the preferences and interests of a multitude of heterogeneous stakeholders and constituents in addition to the influence from elected officials and governing bodies (Alexandrova, 2018). It is imperative to identify stakeholders at the inception of the project so that their needs can be presented and this in turn aids in defining the overall project scope. The manner in which eservices project stakeholders are identified and articulated varies extensively across public sector organizations; however, groups often include politicians, administrative civil servants, citizens, IT companies, enterprises, public sector IT staff, public administration managers, financial institutions, business consultants, collaborating public organizations, etc (Sarantis et al., 2010). Crucial to the implementation of information systems is understanding stakeholders, acknowledging their influence, interacting with them, including them so they participate and ensuring various levels of interactions between them (Hwabamungu, Brown and Williams, 2018). These levels of stakeholder engagement ensures all needs and interests of the relevant parties are well represented. Formulating IS strategy and implementation traditionally was seen as a part of top management, but recent research recognizes the value in acknowledging various stakeholders affected in the context of interest (Hwabamungu et al., 2018). This highlights the importance of identifying stakeholder relations as various stakeholder groups have differing roles and responsibilities. Hence stakeholder groups can potentially be engaged for different activities on differing hierarchical levels and inputs.

It is essential that the decision makers are also known as they encourage and promote the development and utilization of the software (Sánchez and Macías, 2019). Despite stakeholders being identified, they are not always decision makers for a project. Decision makers on a project may also include investors, representing authorities, project managers (among others) that are key for decisions required during the course of the project.

2.6.2 Communication

A lack of open communication has been cited as one of the reasons for failures of projects in the public sector (Bonuke, 2020). Communication is crucial to all involved in the project, although this communication may be required in different forms for the different levels of role players. Stakeholder groups can be hierarchical (Hwabamungu et al., 2018), and different levels of communication are required accordingly. As the analysis proceeds from granular to the more detailed levels of analysis, senior management levels require lesser levels of details. The individuals involved in the *everyday practices* require more frequent communication as they provide refined requirements. Whilst management may be identified as stakeholders they sometimes opt for communication for the purposes of reporting only. All elicitation details and required clarity need not be communicated to them but should be communicated to their teams involved in the *everyday practices.*

A better understanding of complex problems, improvement of communication amongst project participants, facilitating the development of organizational models, formal business processes or systems, documentation of design, automation and improvement of testing practices are some of the ways that requirements practices have been pivotal from a development and design view. Unfortunately, the public sector experiences difficulties in these frontiers especially in effective communication between the business and technical teams, affecting transfer of solution knowledge and documentation (Alexandrova et al., 2011). The required communication between the relevant parties must be well defined and agreed upon at the early stages of a project to avoid communication related challenges in the project.

2.6.3 Requirements challenges

Project failures have been closely linked to inconsistent, ill-defined, inaccurate or conflicting requirements (Alexandrova, 2018). The development of software is dependent on accurate requirements. Unclear specifications, miscommunicated requirements of the project owner, inability to address change requests from users, inadequate understanding of software development, no methodology to ensure user requirements are identified continually, precisely and completely are some recorded failures in public sector software development projects (Selvyanti and Bandung, 2017; Bonuke, 2020).

Understanding and specifying the context of use and user requirements in the preceding stages of design is often not given sufficient attention in eservices solutions (Sánchez and Macías, 2019). One of the most difficult tasks in the analysis activities is identifying user needs as users are uncertain of their requirements (Bahari, Nasirin, Seman, Amboala, Bahar, Ismail and Nistah, 2020). The users attempt to recognize items of significance and nevertheless incline to concentrate on recent notable issues.

These needs are obscure and leads to misinterpretation of the system requirements. If requirements cannot be adequately defined, IS development would be condemned to catastrophe (Bahari et al., 2020).

A significant amount of time and money can be saved by identifying errors and weaknesses of system requirements in the requirements analysis phase rather than the subsequent steps. Finding and fixing errors costs five times more in the design phase, 10 times more in the deployment phase, 20 times more in the pilot phase, and 200 times more following the implementation of the system (Selvyanti and Bandung, 2017). System requirements require constant review and revision to ensure precise requirements are derived during the early analysis phase.

The manner in which software projects are handled in private and public sector differs (Balikuddembe and Nakirijja, 2018). Applying private sector techniques to the public sector to manage requirements elicitation in all likelihood would be inappropriate (Sarantis et al., 2010). Requirements practices ought to be analysed particularly in the context of eGovernment because of the unique challenges experienced in the public sector (Alexandrova et al., 2011). When the needed requirements are understood for their intended context, software developers and management are in a better position to achieve better success in their software implementation endeavours.

2.6.4 User involvement

Stakeholder involvements and their satisfaction is crucial when requirements are gathered from a multitude of stakeholders (Alexandrova, 2018). Initially as a private sector concept, '*stakeholder'* referred to persons who can affect or be affected by the deeds of a business in its entirety (Sánchez and Macías, 2019). With the diversity of stakeholders in egovernment applications, users must be well represented to obtain the desired outcome on eservices projects. Several stakeholders impose several goals on public sector managers resulting in a *'push and pull'* in many directions concurrently. This results in difficulty with balancing conflicting requirements in public sector projects. A spearhead from business must be involved to ensure that a feature developed for the required system is indeed the correct one. This involvement must be adhered to for every requirement that needs to be developed (Huberts et al., 2017).

Despite the trend in the increasing usage of egovernment applications, a developer-centered approach is more dominant rather than a user-centered one in creating the majority of these applications (Sánchez and Macías, 2019). A developer-centered approach uses traditional processes that does not work well with the stakeholder diversity and existent legislation that is associated with egovernment applications.

Egovernment experts realized that these services would gain value from using a user centric approach (Pleger et al., 2020) in the business analysis. It was realized that government could use this concept as it requires involvement from a wide range of stakeholders. Public sector software development project failures such as misinterpreted requirements and inaccurate specifications (Selvyanti and Bandung, 2017), can be avoided with user involvement. A collaborative effort with diversified stakeholders is required for the analysis of the system and its correlating business processes based on current requirements or technology (Alexandrova, 2018). Eservices applications must represent preferences and interests of their various stakeholders.

2.6.5 Changes to requirements

Goals in the public sector can be intangible. A change in public opinion, can consequently effect changes to a goal of the project (Huberts et al., 2017). Changes to requirements must be managed in order to achieve the project's desired goal. Requirements changes actualize from changes in customer's requirements or problems in the requirement specifications, such as ambiguous, redundant, inconsistent or incorrect requirements (Wibowo and Davis, 2020). A change in customer needs can be requested at any point of the project development. A requirements set can change by adding, modifying or deleting new requirements during a project (Sánchez and Macías, 2019). These changes must be managed as project timelines and costs are impacted by the changes.

While the deficient capture of initial project requirements has been identified as a contributing factor to public sector project failures, the continuous desire to change current project requirements is another significant reason for these project failures (Bonuke, 2020). Requirements management is an arduous task. Management of these changes involves activities of change requests, impact analysis and approval or rejection of the requests (Mateen and Amir, 2016). A change request is initiated from the business department requesting the change, but the magnitude of the change request must be analysed to determine the cost involved in implementing the change (Wibowo and Davis, 2020).

Approving authorities are often set up in organizations to approve or reject changes subsequent to evaluating the change impacts and risks. As requirements change, control versions of requirements documents must be managed accordingly (Paul, 2018). Documents often become obsolete due to them not being updated with the modified requirements. The documents are then futile as they do not present a true reflection of the current requirements. It also important to ensure traceability of requirements during the system development. The footprints of requirements from their initiation, applications, uses and continued improvement must be maintained throughout the development life cycle.

2.6.6 Solution

In public sector projects, there is a strong focus on the development and testing of a requirement to establish that it is in fact working. However after the product is taken into the production environment, there is no assessment of whether the system provided the expected value that was intended at the project outset (Balikuddembe and Nakirijja, 2018). Ascertaining project success can differ significantly given the fluctuating parameters of what success is. As shown by some studies, success can be determined by how well a product meets planned requirements. Balikuddembe and Nakirijja (2018) affirms that the project's real value can only be evaluated if the actual product operates as anticipated in the operational environment. This will result in the fulfilment of the overall project objectives. Regrettably a measurement of this nature is often carried out during the support and maintenance phase of the software lifecycle as a post project evaluation exercise (Balikuddembe and Nakirijja, 2018). The solution must be evaluated to confirm that it is performing as specified and identify any limitations of the solution prior to its deployment.

Another dominant problem is failing to understand the business system which will be integrated with existing information systems (Paul and Tan, 2015, Jonasson, 2016). Business analysts must have a sound understanding of the business processes and systems that presently support the business. Solution knowledge plays a vital role in the evaluation of the solution. The understanding of the environment, departments and technology influences solution knowledge and this assists in also identifying the most effective means of solution implementation (BABOK, 2015). This knowledge becomes valuable when validating that the new designed solution does indeed satisfy the business needs requested.

2.6.7 Deliverables

Requirements gathering practices are often achieved by documenting the *wish-list* of a specific business unit (Alexandrova, 2018). This then leaves developers or systems administrators to interpret this wish list and make decisions on design or configuration fundamentally based on technical feasibility. Older systems in government sometimes lack documentation on system functions and business processes (Alexandrova, 2018). Given this scarcity of existing documentation, the process of gathering requirements becomes one of discovery. Business rules in the existing system are often only in the form of system code. Functionality and business rules supporting the functionality are often not documented given the historical nature of government systems. System users are heavily depended on to establish workings of these systems when attempting to add new functionality or create new systems to replace these existing systems.

The intricacies of existing business processes must be well understood as this provides a favoured foundation for future business needs. Customarily the business process and IT constitute an interrelated unit which serves the customer in its entirety (Simonova and Foltanova, 2017). A lucid business process is crucial to providing the equivalent electronic version for public use. Absence of these existing business processes complicates the business analysis process that must be forged ahead for new projects. Requirements methods are applied sporadically, informally and are insufficiently documented in the public sector (Alexandrova et al., 2011). The public sector requires a more formal and consistent application of requirements methods where system functionality and business rules are existent (even though *lightly* documented in keeping with the agile approach) to aid future system enhancements.

2.7 Summary of business analysis challenges in eservices projects

Public eservices development with its requirements methods qualitatively differs from its commercial private sector counterpart (Balikuddembe and Nakirijja, 2018; van Velsen,van der Geest, ter Hedde and Derks, 2009; Assia and Lucia, 2020) in that they aim to deliver public value and not just value for money. It is for this reason that ICT in the public sector has unique requirements that are not completely supported by conventional ICTs and their specific design theories (Church and Moloney, 2012). Solutions for the private sector cannot be promulgated as government solutions (Thakur and Singh, 2013), hence business analysis for eservices must be tailored to be fit for purpose. With the challenges highlighted on providing eservices, a solid business analysis framework can assist to achieve high quality and valuable eservices that will work for both the customer and the business. The factors inferred above must be alleviated by BAs' to improve public eservice systems. However other factors may emerge during empirical (field) work.

Due to the distinct challenges such as stakeholders, communication, requirements challenges, user involvement, requirements changes, solution and deliverables, requirements practices must be evaluated specifically in the eGovernment context (Alexandrova et al., 2011). Requirements from stakeholders is not promoted during the development process when requirements best practices are bypassed on eservices projects. In addition, formal requirements analysis procedures are seldom applied in the public sector (Assia and Lucia, 2020). There is limited evidence of formal requirements practices utilization and methodical adoption to public sector application development projects despite their acknowledged benefits for processes and projects (Alexandrova, 2018).

The identified business analysis challenges are further addressed in 2.6 to see how best they can be resolved.

2.8 Addressing the challenges

Based on the above literature, Figure 4 illustrates a summarized view of the prevalent challenges experienced in business analysis for the development of eservices projects.

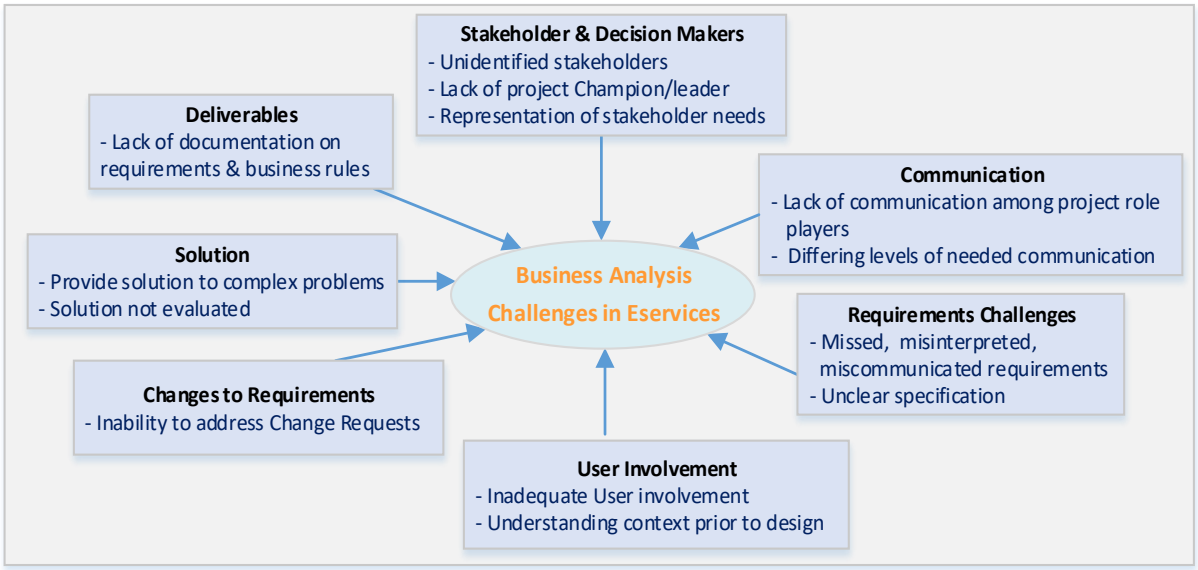


Figure 4: Business analysis challenges in eservices

(Source: Created by the researcher)

The identified challenges with similarities have been grouped; for example, missed requirements, misinterpreted requirements, miscommunicated requirements and unclear specification all relate to requirements and therefore have been grouped under 'requirements'. Figure 4 shows the challenges grouped according to their similarities, resulting in seven groups namely: stakeholders and decision makers, communication, requirements challenges, user involvement, changes to requirements, solution and deliverables (sections 2.6.1 to 2.6.7).

With business analysis for public eservices projects having its own set of unique challenges, BABOK provides an adequate architectural underpinning for the proposed framework to specifically address these issues in the eservices context. The structured approach of QFD provides the valuable step of VoC to explore and discover customer requirements. This essential step is used to translate customer needs to product specifications and ensure customer satisfaction. To alleviate the above experienced challenges, knowledge areas (KA) were adapted from BABOK (2015) to create the framework as shown in Figure 5. VoC from QFD was not added as a component to the conceptual framework but rather incorporated into the four components of the conceptual framework due to customer needs and involvement proving essential to the requirements analysis process.

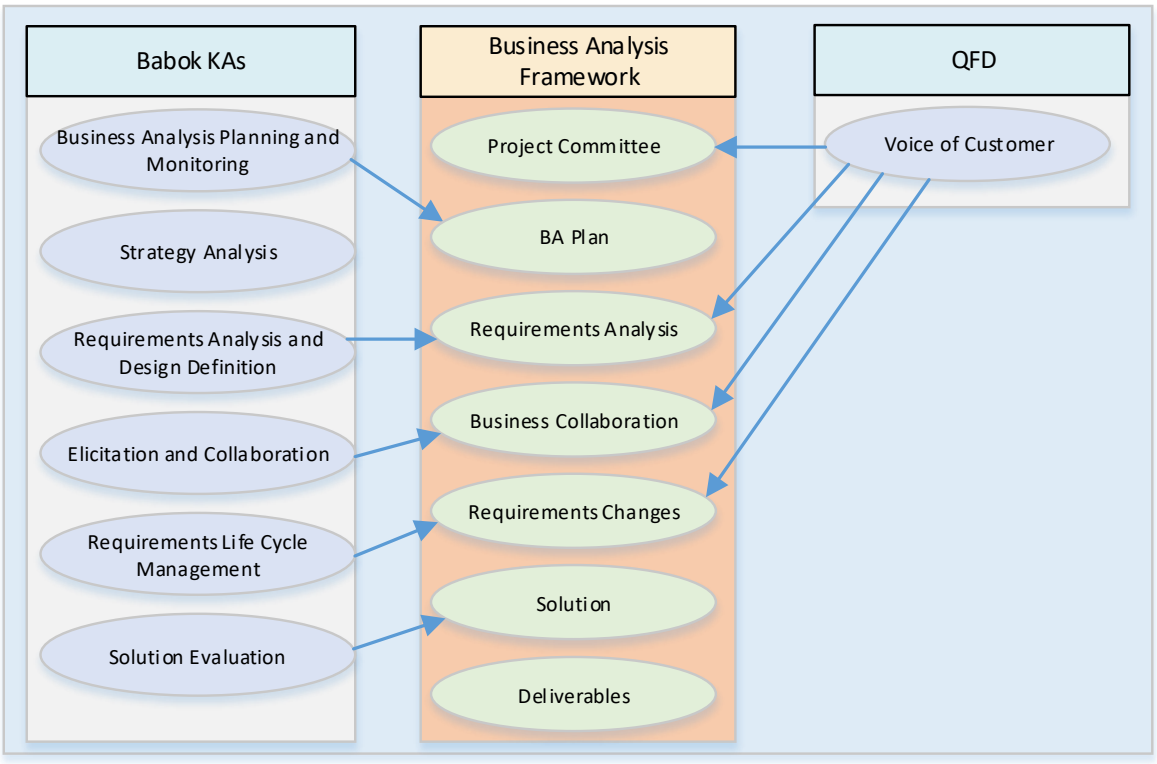


Figure 5: Contribution of BABOK and QFD to the conceptual framework

(Source: Created by Researcher)

Five KAs from Babok (2015) and two additional components (project committee and deliverables) were utilized to create components of the framework (Figure 5 above). These five KAs from Babok were tailored for the conceptual framework to specifically address business analysis challenges for eservices projects.

Literature also revealed '*stakeholder and decision makers'* and '*deliverables'* as challenges for business analysis on eservices projects. Guided by literature, two additional components namely the *project committee* and *deliverables* were added to alleviate the identified problems around '*stakeholder and decision makers'* and '*deliverables'.* Figure 6 shows how the business analysis challenges will be linked to the seven components of the framework, namely *project committee, BA plan, requirements analysis, business collaboration, requirements changes, solution* and *deliverables*.

The seven components of the framework and their linkage to the identified challenges in Figure 4 are illustrated in Figure 6.

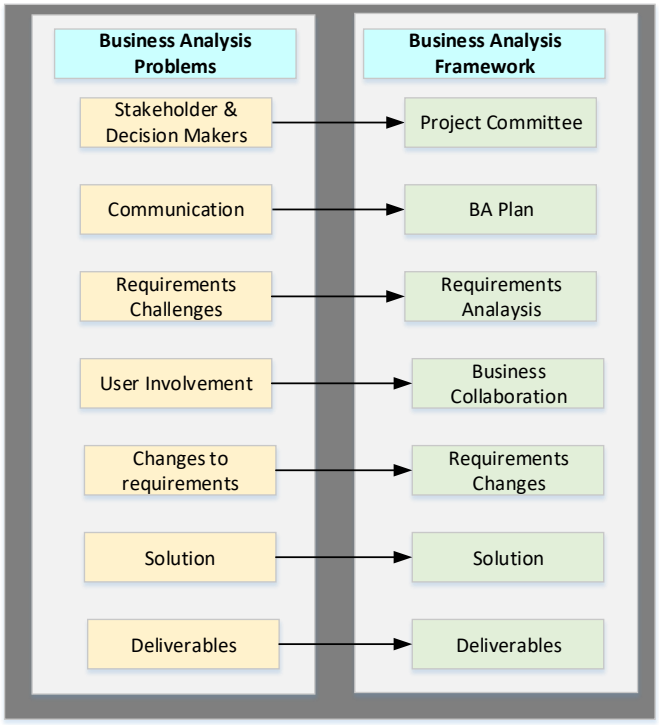


Figure 6: Framework components mapped to problems

(Source: Created by the Researcher)

Problems emanating from requirements, stakeholders, communication, changes and collaboration will be mitigated using the framework proposed in Figure 7. Each of the framework components will address one or many of the inferred challenges. Tools and techniques are required throughout the business analysis process. Selection of tools and techniques most appropriate is dependent on the project context, kind of system to be developed, availability of resources and types of users/stakeholders. Many tools and techniques can be utilized to obtain optimal results (Bani-Salameh, 2015). Despite an absence of research data on requirements-related tools or practice preferences in the public sector, in all probability generic office tools such as spreadsheets, word processing project templates are utilized to create requirements specification documents (Alexandrova, 2018). The framework provides suggested tools and techniques best suited for business analysis on eservices projects. Sections 2.6.1 to 2.6.7 will discuss each component in greater detail.

To commence the business analysis process, the framework process flow is designed to start at the first component being the project committee. Once all activities are complete from this component, the BA can work on the following component being the *BA plan*. The requirements analysis is the subsequent step where the requirements elicitation will be actioned. Following requirements analysis, the *business collaboration* step will be done. Subsequently the *solution* step is then performed. The final step to be performed in the framework is the *deliverable* step.

The agile approach promotes an iterative manner to software development hence business analysis must be carried out accordingly. The *requirements analysis, business collaboration* and *requirements changes* components have been put into an iteration in the framework. Changes in any one of these components directly affect the other two components. This iteration in the framework allows the business analyst to revisit a component and apply the required changes.

2.8.1 Project committee

The purpose of the *project committee* is to establish a team with relevant representatives from all departments involved in the project. The activities in this step include identifying key role players for decision making, establishing authorities for authorizing change requests and the process to execute change requests. The techniques for this step includes conducting stakeholder analysis, mind mapping, scope modelling and interviews. Visio is the selected tool to be used.

The '*stakeholder'* concept is often described as person who can affect or be affected by the activity of a business. The application of this ideology can also be done in the public sector particularly in egovernment initiatives (Sánchez and Macías, 2019). The public sector has a wide range of stakeholders whose participation is crucial for the development of integrated services which historically was implemented in isolation. It is important to identify all stakeholders due to the projects often affecting various departments in a public sector environment (Osah and Pade-Khene, 2020). Stakeholders usually include participants that directly (key stakeholders) or indirectly affect the project. Public sector projects include a range of stakeholders with whom relationships must be maintained (Masemola et al., 2019). Key stakeholders are important on the committee as decisions directly affect them and may have colossal impacts if they are not involved in critical decisions. A *project committee* with these stakeholders is critical to ensure their needs are acknowledged and they are involved in the decision making process. It is imperative to include all key stakeholders as they provide a bridge between the business and solution requirements. Stakeholders may include the project sponsors, project champion, project managers, BA, subject matter experts, business users, senior managers from business and IT departments (to mention a few). The committee also brings to the fore the strategy and value of the planned services to be offered. Every organisation has a strategy and the eservices offered should be aligned to that strategy. For the organisation to meet their set goals, their projects must align to the organisation's strategic intentions (Atkins, 2013). Plans and intentions are openly communicated hence assisting with the transparency of agendas for all involved.

2.8.2 BA plan

The purpose of the *BA plan* is to establish the business analysis approach for the project. Activities of this step entails establishing the methodology to the project, defining mandatory documentation, managing information and specifying how changes will be handled from requisition to authorization, specifying the breakdown of tasks and the timing of each and specifying formality of documentation required for each stakeholder The techniques for this step includes conducting workshops, item tracking and stakeholder engagement. Visio, Excel and MS Word are the suggested tools to be used.

The efforts of business analysts and stakeholders must be organized and coordinated. The plan should include the outlining of business analysis tasks, activities, deliverables and selection of a methodology (BABOK, 2015). Once activities are identified, the appropriate tasks and deliverables can be established. The relevant stakeholders are identified together with what business analysts needed from the stakeholders and what the stakeholders need from the business analysts. It is also important to establish the plan for stakeholder engagement. Poor communication is cited as one of the factors for project failures amongst various others (Anthopoulos et al., 2016). The communication management process for stakeholders should be well orchestrated as this contours the best way to collaborate with the relevant role players. The BA should evaluate and document what needs to be communicated, the most appropriate method of delivery (verbal or written), applicable audience, frequency of the communication, level of detail best suited for stakeholders, and level of formality for the communication (BABOK, 2015). The level formality of documentation usually goes hand in hand with the methodology selected, which may result in documentation being formal or informal. Various stakeholders may have differing preferences with regard to the methods of communication. This must be agreed upon together with the level of information required for each stakeholder. Documented plans are essential as it eliminates the event of individuals having to recall decisions taken. Business analysts must be aware of biasness when trying to recall decisions or information as the human memory can be unreliable, especially if complex information is being recalled or concerns an event that transpired a while back (Rajander, 2020). These plans must be reviewed and shared to ensure expectations and communication requirements are met.

2.8.3 Requirements analysis

The purpose of *requirements analysis* is to list the tools and techniques to be used for requirements elicitation. The activities in this step include application of tools and techniques to establish requirements, and providing guidance to stakeholders for the analysis techniques to be used.

The techniques for this step includes document analysis, interviews, focus groups, scope modelling, process analysis, process modelling, interface analysis, prototype and JAD session. Visio, Nimbus and Excel are the suggested tools to be used.

Bani-Salameh (2015) defines '*requirements'* as statements that detail what the system or software should do or the services and needs that the system must provide. Eliciting requirements is the first stage of eservices projects and is critical in the business analysis process. Requirements elicitation involves having a deeper understanding of gathered requirements and not just a gathering process (Vujicic, Scepanovic and Jovanovic, 2016). This process can be aided by the use of appropriate methods, tools and techniques. Following the identification of requirements sources such as stakeholders, requirements are established to satisfy users' expectations. This is generally an iterative process between the stakeholders and the business analyst. The needs of stakeholders can be identified by applying requirements elicitation techniques such as meetings, focus groups, workshops and interviews. The process of requirements discovery, refinement and validation should not be underestimated (Weir, 2017). These needs in all probability will change as the project progresses hence is an iterative process.

Software development is dependent on proper requirements. Failures in government software development projects are associated with ill-defined, inconsistent, inaccurate, conflicting or missing requirements (Alexandrova et al., 2011). These issues in turn adversely affect the usability of the application, that is, accessibility, satisfaction of the end user and ease of use. Despite requirements practices and processes being of vital importance for the public sector, very little attention is dedicated by practitioners to its methodical approach (Alexandrova et al., 2011). One out of every three public sector IT projects fail either due to failing to deliver necessary business functionality or missed targets (Twum-Darko et al., 2015).

Requirements analysis aims to amass good quality requirements that contribute to quality business functionality. This step makes use of the various business analysis tools and techniques to elicit requirements from the various sources available on the project. Stakeholders are afforded an opportunity to voice their challenges and opinions on the current system and the new requirements for the desired system. Often stakeholders exhibit the

current system during this process to showcase the current state, demonstrate its short comings and recommend enhancements (Sivaji et al., 2019).

2.8.4 Business collaboration

The purpose of the *business collaboration* step is to communicate and confirm requirements, issues or relevant information to the business.

The activities in this step entails engaging stakeholders to clarify issues that may have arisen during the requirements elicitation process, obtain business and user perspectives, gain confirmation on requirements and present design options. The techniques for this step includes workshop (for review) and interviews. The suggested tools are Excel and Word.

Following the *requirements analysis* step, confirmation of the elicited requirements is essential to improve the correctness of the system in development. Inaccurate, ill-defined, inconsistent, conflicting or missing requirements (Alexandrova et al., 2011, Alexandrova, 2018) that contribute to project failures is reduced if not eliminated when requirements are ratified by the business departments providing them. It is important to carry out confirmations with stakeholders using hard evidence where possible (Rajander, 2020). Using audit logs, emails, policy documents and meeting minutes is useful when seeking intricate or historical information. The lack of collaboration amongst stakeholders in a project can result in project delays in the form of elicitation of incorrect requirements, vague or lack of management with expectations and lack of communication (Weir, 2017). Effective collaboration requires lucid factual communication together with being flexible and adaptable to change. All stakeholders need to be supported as they form an integral part of the entire project team. Stakeholders have the right to expect analysts to speak their language, learn their business and their goals for the system, structure their requirements into the software requirements specification, and to be treated with respect by developers while sustaining a professional and collaborative attitude (Simonova and Foltanova, 2017). They should be consulted with and encouraged to engage in open group discussions which assist in collapsing silos in the work environment.

2.8.5 Requirements changes

During the *requirements changes* step, changes initiated by business are analysed together with ascertaining their impacts and risks. This serves as the purpose of the requirements changes step. The activities in this step entail managing changes and ensuring requirements are still fit for a function. The techniques for this step includes change request log, impact/risk analysis, requirements prioritization and change request approval. Excel and Visio are the suggested tools for this step.

Changes to requirements can arise at any stage of the software development lifecycle despite the initial set of requirements being well documented. The continual changes (modifications, additions, deletions) in requirements amidst development impacts the quality, defects, cost and schedule of the final product (Haleem and Beg, 2015). Requirements changes have to be managed as the project progresses. This is often done via change requests where the impacts of the changes are assessed and either accepted or rejected. Changes requested by the business department should always follow the change control process.

The steps draws from the '*project committee'* step where the change control process was agreed upon. Key stakeholders that have already been identified at that step should be approving the requested changes. Changes to requirements often affect time lines on the project and hence require the relevant authorizations prior to being effected.

Unclear requirements and changes to requirements are key contributions to project failures (Jonnasson, 2016). Organizations attempt quick fixes for this problem by acquiring new tools or hiring consultants, but this may not always be the most appropriate solution. It is imperative to use set processes to take the project from its inception stage to the agreed upon end-product. Management of requirements changes is a challenging task. When changes are handled inadequately, the quality of the product is affected and ultimately produces disappointing results directly from the business and technical teams (Mateen and Amir, 2016).

2.8.6 Solution

The purpose of the *solution* step, is to evaluate the solution. This step must include *business collaboration* to establish their viewpoint on the solution. The activities in this step includes validating the solution, taking corrective action and ensuring business requirements are met. The techniques for this step includes observation, stakeholder engagement, decision analysis and interviews. The suggested tools for this step are Excel and Word.

A solution should resolve a problem the stakeholder is facing or to capitalize on an opportunity. When the intricacies of requirements analysis is complete and communicated to the business, possible solutions are conceived. The pros and cons of the possible solutions are presented before a decision is taken on the 'best fit'. Business analysts play a vital role in satisfying the stakeholder needs by aligning the solution that is designed and delivered to their needs. The business requirements should be met and any limitations identified so corrective action can be taken. The performance and value of the delivered solution used by the organisation must be evaluated and recommendations made for removal of constraints and barriers that impede accomplishing full value (BABOK, 2015). Evaluations can be carried out at various stages of development such as during prototypes or proof of concept, pilot or beta release or operations releases.

The pilot or proof of concept is a limited working version of the solution showing value. The pilot or beta release is a limited deployment or version of the solution to sift through any issues and ascertain how effectively it delivers value prior to implementing the solution completely. Operational releases are complete versions of a full or partial solution used to accomplish a business function, execute a process or achieve a goal.

It is important to engage stakeholders and gain insights into their views on the solution. Performance of a solution is a key, stakeholders should be engaged to establish their satisfaction thereof.

2.8.7 Deliverables

The purpose of the *deliverables* step ensures that requirements and business rules are documented for future use and is accessible to the parties' privy to that information. The activities in this step include creating, sharing and storing projects documentation. The requirements specification is an all-important document in business analysis. It is produced from the requirement analysis step. Techniques such as observation, stakeholder engagement, interviews and focus group used in the requirements analysis step assists with obtaining the information required to craft this document. The suggested tools for this step is Sharepoint (both cloud and local).

Documentation on system functions and business processes is often scarce in the older systems (Alexandrova, 2018). This makes the requirements process one of discovery and modelling instead of capture. Documented functions and business processes assist BAs with having background information that may assist with new requirements. Creating and updating business processes as well as other relevant system information becomes useful for future projects as they serve as a reference for existing functionality and processes. These documents are also valuable as their reuse saves on time and effort. Reuse of artefacts and recommended documented processes can assist projects being successful.

Gregorio (2012) affirms regarding agile projects that artefacts are created specifically for the benefit of a certain project and are discarded shortly thereafter. Informal information such as whiteboard photos or meeting notes constitutes the artefact for many projects. The business analyst should ensure that a repository is set up and maintained for documentation. When using the agile approach, documentation is lean, however this should never be mistaken for none. Sharing the documentation produced for a project assists team members with seeing the way others get things done. It also provides guidelines, a point of reference and encourages learning from other's experiences.

BAs provide a service to assist with revolving problems by performing analysis, applying creative thinking and exhibiting those visions so role players gain clarity and work together around the issue. The researcher believes that the developed conceptual framework will provide functional guidance to perform business analysis and is suitable for further development during impending fieldwork.

Each component of the framework addresses the various challenges identified in literature and provides the navigation for improved business analysis for the development of public eservices systems. Figure 7 presents the proposed business analysis framework for public eservices projects.

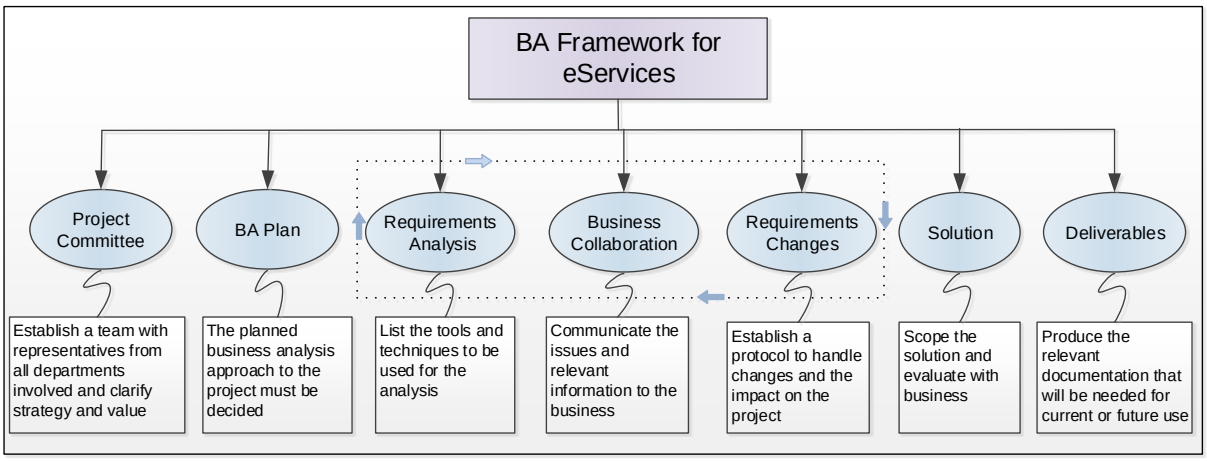


Figure 7: Proposed eservices business analysis framework

(Source: Created by the Researcher)

2.9 Chapter summary

This chapter presented extant literature relevant to the research areas of business analysis and public eservices projects. Business analysis was introduced with particular focus to the benefits that BAs bring to software development projects (section 2.1). QFD and BABOK are presented as two current approaches to business analysis and attention was brought to both their strengths and shortfalls (section 2.2). QFD showed the value of VoC to translate the voice of the customer to product requirements, however the drawbacks include the limitation of organizational size for collaborative development, extended implementation time and the linguistic and numerical manner in which customer preferences are portrayed. BABOK provides KAs accompanied with activities and a variety of tools and techniques. With the numerous options presented, a business analyst's experience proves vital in selecting activities, tools and technique that would best fit for the project at hand.

This chapter identified that the factors of language barriers, stakeholder inclusion and engagement and inadequate planning and design contribute to the failure of public eservices

projects (section 2.5.1). A brief discussion was presented noting the challenges of working in silos, stakeholders and context centric solutions for eservices projects within the South African context (section 2.5.2). The persistent challenges stemming from the practice of business analysis were highlighted as being poorly written, incomplete, inconsistent, ambiguous, vague, misconstrued requirements and requirements emerging subsequent to the requirements phase (section 2.3). Attention was also drawn to the scarcity of literature that exists for business analysis specifically on public eservices projects.

Following the points of discussion on business analysis within the eservices domain, the focus shifted to addressing the identified business analysis challenges specifically for eservices projects (section 2.6). These were noted as stakeholders and decision makers, communication, requirements challenges, user involvement, changes to requirements, solution and deliverables.

Selected KAs from the BABOK were adapted and VoC from QFD was used to create a conceptual framework to address the challenges. Over and above the KAs of BA plan, requirements analysis, business collaboration, changes requirements and solution that were used, additional components of project committee and deliverables were added onto the framework to ensure issues for the specific public eservices context were addressed. This conceptual framework will be further developed during the Design Science Research cycle described in the next chapter.

In conducting this literature review, two of the four research objectives were met. The current approaches to business analysis on eservices projects was presented satisfying research objective 1: **To *evaluate existing business analysis approaches adopted for public eservices systems projects* (RO1).** The KAs pertinent to creating a business analysis framework was identified fulfilling research objective 2: ***To determine the key knowledge areas, process flows and activities in business analysis for public eservice systems*** (RO2).

In conclusion, this review of literature delved into business analysis and the role and benefits of business analysts and unearthed challenges for business analysis and eservices, and finally presented a conceptual framework derived from the literature to address the identified challenges. The rationale for the creation of a business analysis framework for eservices projects is clearly shown in this chapter. Chapter 3 presents the research methodology for this study.

Chapter 3: A description of the research design

The research design used to achieve the research objectives of this study is the focus of this chapter. As noted in the conclusion to chapter 2, research objective 1 and 2 were satisfied in chapter 2 and led to the development of a conceptual framework. In this chapter it is outlined how research objective 3 (*to develop a framework of practice guidelines for business analysis of eservice systems*), and research objective 4 *(to validate the components and to determine the nature of the interfaces between components in the framework)* will be achieved.

This chapter is structured as follows: first, the applied research framework highlighting the manner in which knowledge will be accrued is briefly summarized in section 3.1. This is followed by discussion on the selection of the research philosophy in section 3.2 and the circumscription process for the theory formulation in section 3.3. The choice of the qualitative approach is deliberated for the research strategy in section 3.4. In section 3.5 the application of the DSR approach to create the business analysis framework is discussed, reasons for not selecting action design research are provided, and how design science research is applied in the study is explained. Section 3.6 outlines the data collection method and the selected sampling process, and introduces the study site. Thereafter the data analysis methods are explained in section 3.7. The chapter ends with a discussion of data reliability and validity in section 3.8.

3.1 Research framework

Table 2 below portrays the components of the research design in brief. These are each discussed in greater detail in 3.2 to 3.7.

Table 2: Research design

(Constructed by the Researcher)

Research Design	
Research Philosophy	Pragmatism
Theory Formulation	Circumscription
Strategy	Qualitative
Method	Design Science Research
Data Collection Tools	Focus Group Questionnaires
Data Analysis Methods	Content Analysis Cross Impact Analysis (ADVIAN)

3.2 Research philosophy: Pragmatism

On inception of a research project, the researcher states a *knowledge claim* on the manner of *what* and *how* the researcher will acquire the knowledge during their research (Creswell and Creswell, 2017). The research philosophy that underpins a research endeavour furnishes an orientation for the research study, shows the stance of the researcher and better places the study in the wider research domain. Postpositivism, constructivism and pragmatism are popular research philosophy paradigms commonly used to guide research methods (Creswell and Creswell, 2017, Ryan, 2018).

Postpositivism is an evolution of positivism. Postpositivism is generally affiliated with experiments and quantitative research (Ryan, 2018). It mirrors a deterministic philosophy where causes that affect outcomes are examined. The manner in which outcomes are influenced by causes are examined in a postpositivist study. This philosophy is also reductionistic as the intention is to break ideas into smaller sets to test elements such as the variables that make up hypotheses and research questions. The knowledge produced through a postpositivist lens is founded on attentive measurement and observation of the reality that prevails in the real world. Some form of hypothesis testing is ordinarily required in this research philosophy.

In *constructivism*, the researcher aims to solicit understanding of their environment based in shared experiences (Annansingh and Howell, 2016). Subjective meanings are derived from their experiences. The constructivist researcher attempts to understand the cultural and historical backgrounds of participants by focussing on the specific context in which they live and work. The participants' views of the situation in question is heavily relied upon in this philosophy.

Pragmatism takes the stance that knowledge claims emanate from actions, situations, intervention, consequences and constructive knowledge (Pinto, 2010; Goldkuhl, 2012; Creswell and Creswell, 2017). The philosophy is concerned with problem solutions and "what works". The *bounce* between knowledge and actions makes this philosophy appropriate where intervention is needed and not solely observation. Goldkuhl (2012) argues that while qualitative research is habitually affiliated with interpretivism, pragmatism has influenced Information Systems research to a large degree.

Subsequent to deliberating the paradigms profiled in literature, it was decided that pragmatism is most suitable for this research. The study has a pragmatic outlook as it uses DSR to build and evolve (via iterations) the business analysis framework. While the conceptual framework is developed, intervention is required to test and refine the framework to an artefact that will serve as a solution to the business analysis problems for public eservices projects.

The information emerging from the action of using the business analysis framework for public eservices projects provides valuable knowledge to this study.

3.3 Theory construction: Circumscription

The circumscription process for theory construction befits the use of DSR in this study. Circumscription is imperative in understanding DSR due to it creating an understanding that could only be achieved from the act of construction (Kuechler, 2012). In this process, the theory is developed and aligned while refining the designed artefact (Carstensen and Bernhard, 2019). Kuechler et al. (2012) stresses that circumscription assumes that every fraction of knowledge is valid in specific situations only, and validity often cannot be predetermined from theoretical consideration ahead of time.

As an important element of DSR, iterative circumscription uncovers the reality and knowledge that surfaces from each research endeavour. New understanding and results from each iteration can be integrated into existing knowledge and the developed artefact. The loop back to the initial step of *problem awareness* to refine the proposed design and the stated requirement then closes (Beck,Weber and Gregory, 2013). Furthermore the new gained understanding and knowledge provides a theoretical basis for future DSR projects. The business analysis framework being the designed artefact is refined during the iterations resulting in an improved product with knowledge emerging during the process. This emerging knowledge provides valuable insights for the subsequent iterations, thus resulting in refined knowledge at the conclusion of the DSR process.

3.4 Qualitative Strategy

The qualitative strategy enmeshes the collection, examination and understanding of various experimental materials such as case studies, interviews, people's beliefs, experiences, attitudes, behaviour, and interactions (Renz, Carrington and Badger, 2018; Pathak, Jena and Kalra, 2013). The choice of qualitative research can have a substantial impact on data collection, the analysis of that data and the interpretation of results. This approach uncovers the underlying meaning of data collected and gives voice to the participants (Pathak et al., 2013). Gelling (2015) describes qualitative research as an approach to scientific inquiry that allows researchers to explore human experiences in personal and social contexts, and gain greater understanding of the factors influencing these experiences. Over time, qualitative research in information systems (IS) has gained a significant amount of interest. The difficulty of reducing complex technical and social occurrences in the IS field to quantitative figures has been acknowledged by numerous scholars (Goldkuhl, 2012).

Qualitative research in IS aspires to experimentally investigate a range of experiences regarding IS via qualitative data from various sources such as observations, archival materials, interviews, design efforts and interventions (Conboy, Fitzgerald and Mathiassen, 2012). Goldkuhl (2012) highlights the need to study and analyse IS intricacies in a more open but nuanced way, and a qualitative strategy supports this.

In line with the views of these researchers, this study subscribes to a qualitative strategy as participant insights are needed to adjust the framework in a cycle of evolution and their eventual evaluation of the completed framework. Expert participants play a vital role in the study as they provide individual opinions on the use, effectiveness and impact of the developing framework, as well as sharing their experience which provides valuable insights related to the study. These insights are used to further improve the business analysis framework for eservices. It is for the reasons outlined above that the researcher believes that the study is more closely aligned to a qualitative strategy.

3.5 Design science research (DSR) method

"*Research in IT must address the design tasks faced by practitioners*" (March and Smith, 1995, p. 251). Behavioural science and design science (DS) delineate the discipline of IS research. The focus of behavioural science lies in exploring and verifying theories that analyse and predict human or organizational behaviour. Design science, in contrast, explores the extension of boundaries of human and organizational capabilities by the creation of new and innovative artefacts (Hevner, March, Park and Ram, 2004). The quest of DS is to design and prescribe solutions to real problems, these being activities that traditional science is incapable of addressing. Due to its guiding features and design, DS embraces fields such as engineering, medicine and management (Iivari and Venable, 2009; Dresch, Lacerda and Miguel, 2015; Engström, Storey, Runeson, Höst and Baldassarre, 2020).

Research that is approached via design science utilizes a cycle of *build* and *evaluate* of artefacts to satisfy the identified business needs. Hevner et al. (2004) argues that contriving useful artefacts is complicated due to insufficient creative improvements in domains where current theory is inadequate. Actual problems must be conceptualized and illustrated, the solution must be formulated using relevant techniques, and following the solution implementation, evaluation must be conducted using the befitting criteria (March and Smith, 1995; Hevner et al., 2004; Brandtner, 2017).

Sein, Henfridsson, Purao, Rossi and Lindgren (2011) argues that while DS is stringent on the technology aspects, the artefact is in actuality materialised from interaction with the organisational context. DS has the characteristics of conceptual and technical development

as constructive methods for IS and computer science as applied sciences. Constructive research methods with the category of conceptual development relegate to developing numerous frameworks and models that do not portray any existing reality but instead construct a new reality that does not always have a 'physical' realization (Järvinen, 2007). The 'physical' artefact is the output produced from technical development. The intent of DS is to develop prescriptive knowledge for professionals in a specific discipline and impart experimental insights acquired via investigations of the prescriptions used in context (Engström et al., 2020).

This research being undertaken hinges on the design science paradigm due to its problem solving nature that will help evolve the framework designed to address the identified business analysis issues. Initially conceptualized from theory, the business analysis framework becomes a physical realization from technical development in the form of rigorous use and refinement. Knowledge emanating from the framework use provides valuable insights to BAs' performing business analysis on public eservices projects.

3.5.1 On the possible candidacy of action design research (ADR)

Action design research (ADR) is a contemporary approach that draws from DS. This research method has become a popular and accepted IS research method (Goldkuhl, Cronholm and Lind, 2020; Järvinen, 2007). ADR mirrors the grounding that IT artefacts are *ensembles* constructed throughout development and used within the organisational context (Sein et al., 2011; Dresch et al., 2015; MacKrell and McDonald, 2016). Building the IT artefact, intervening in the organization, and evaluating the artefact concurrently are inseparable and fundamentally interwoven activities of this research process. ADR sees the action researcher collaborating with practitioners to resolve crucial practical problems hence attracting a wider research audience (Järvinen, 2007). ADR advocates for the use of a concrete client as this research method is immensely dependent on the organization while trying to resolve client's specific problems (Iivari, 2015). The researcher is also included as a participant that is active as opposed to a passive observer.

ADR has been considered for this study, however this approach requires close collaboration with the organizational team as they are required to be active participants. Due to the nature of public sector projects having multiple stakeholders from various business units, time constraints would not allow for the engagement with relevant role players needed for ADR. ADR advocates action implementation where the plans are put into practise. Implementation would have an arduous task once again due to the time constraints for this study. ADR attempts to create a change in one definitive local context and does not particularly intend to produce knowledge that can be transferred to other contexts (Engström et al., 2020). For the reasons outlined above, ADR was not utilized in this study.

3.5.2 The application of design science in this study

There are consistent guidelines that have been formulated for the application of design science (Hevner et al., 2004; Peffers, Tuunanen, Rothenberger and Chatterjee, 2007; Gregor and Hevner, 2013; Barafort, Shrestha, Cortina and Renault, 2018). These guidelines are as follows:

1. Create an innovative, purposeful artefact.
2. The artefact is purposeful so it must yield utility for the specified problem in a specific domain.
3. Evaluation of the artefact is crucial.
4. Novelty is equivalently crucial since the artefact must be innovative, solving a heretofore unsolved problem or resolving a known problem more effectively or efficiently.
5. The artefact itself must be rigorously defined, formally represented, coherent, and internally consistent. Design-science research is distinct from the practice of design in this way.
6. The process by which the artefact is developed, and frequently the artefact itself, includes or enables a search process by which a problem space is created and a mechanism posed or enacted to find an effective solution.
7. The design-science research results must be disseminated effectively both to a technical audience (researchers who will extend them and practitioners who will implement them) and to a managerial audience (researchers who will study them in context and practitioners who will decide if they should be implemented within their organizations).

Based on the aforementioned design science principles, this research unfolds as follows: The initial theoretical business analysis framework is created from a critical review of recent literature (guideline 1), to resolve issues experienced in performing business analysis (guideline 2). The focus group will evaluate the framework (guideline 3). The framework will be put to use using a case study to validate if it is effective in resolving the problem (guideline 4). The framework will be evolved through iterations with suggestions from the focus group (guideline 5). Using available means, the framework will evolve to satisfy the business analysis problems in the eservices space (guideline 6), the researcher currently has a published article on the framework developed in this study and its preliminary prototype in a conference proceeding (guideline 7). Figure 8 shows the process flow of creating the business analysis framework.

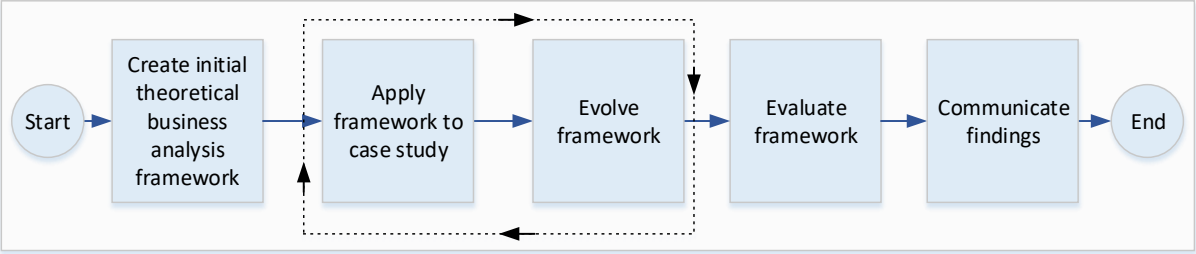


Figure 8: Process flow of the business analysiss framework construction

(Source: Constructed by the researcher)

3.6 Data Collection

Triangulation is "a method used in research to strengthen the design to increase the ability to interpret findings through the use of multiple data sources" (Renz et al., 2018, p. 827). Triangulation has the plausible ability to boost validity of the study and reduce researcher bias. There is controversy around using triangulation to test validity, however agreement is prominent on triangulation to increase confidence in the data, give a more in-depth understanding of the research problem and unveil findings which may have not been noticed using a single method (Renz et al., 2018; Noble, 2019). Triangulation is used to confirm that the data gathered is not as a result of chance or circumstance (Annansingh and Howell, 2016). In order to ensure triangulation, this study will use primary and secondary data sources.

Primary Sources of data collection

The primary source of information is collected as unrefined data that has not been analysed and interpreted before. This data is retrieved from focus groups during the DSR sessions and questionnaires.

Secondary Sources of data collection

The secondary sources of data will consist of e-journals, books, internet sources, journals, case studies (international and national), government publications, newspapers, conference papers and media and press. The nature of information derived from these sources relate to the improvement of business analysis in the context of eservices.

3.6.1 Primary data collection techniques: Focus groups and questionnaires

The researcher deemed the combination of the focus groups and questionnaire techniques as the most suitable data collection techniques in this research. It was discovered that both techniques were suitable for the data collection when housed within DSR.

3.6.1.1 Establishing the focus groups

A focus group is defined as a “moderated discussion among six to twelve people who discuss a topic under the direction of a moderator whose role is to promote interaction and keep the discussion on the topic of interest” (Tremblay, Hevner and Berndt, 2010, p. 600). IT research has seen heightened attention on focus groups and its value in evaluating and refining design artefacts (O'Raghallaigh, Sammon and Murphy, 2012). The extensive level of interaction in a focus group permits for in-depth understanding of reactions of respondents on using the artefact and other issues in the specific environment which influences the design (Brandtner, 2017).

Focus groups are considered a potent evaluation technique for design research projects for the reasons listed below (Gibson and Arnott, 2007; Tremblay et al., 2010; O'Raghallaigh et al., 2012):

1. Flexibility is provided as focus groups can manage an expansive range of domains and topics with an open format.
2. Direct interaction with respondents, domain experts and potential artefact users who are directly accessible to the researcher allowing for any clarification regarding the artefact that may be required as well as probing the participants on specific important design issues.
3. Large amounts of rich data, and an abundant amount of information from qualitative and quantitative feedback are derived from interactions of the focus group. Participants’ reactions, use of the artefact and other issues existent in a business environment that would affect the design emanate from this rich data set.
4. Building on other respondent’s comments, interactions within the group setting allows for the rise of opinions and ideas which normally do not surface in individual interviews.
5. Fast and cost effective, due to several participants being ‘interviewed’ at the same time, focus groups save time and costs.

The focus group will come together in the design science sessions to utilize the business analysis framework on a given eservices project. The same focus group will be included for all iterations for the use of the artefact.

3.6.1.2 Administering a questionnaire

A questionnaire is a direct approach of obtaining information from respondents. The interviewer’s interpersonal skills are absent in this method hence questions should be lucid and compelling, and worded to promote an accurate response (Waltz, Strickland and Lenz,

2016). The responses to questionnaires are critical and valuable contributions for present and future research (Eckerdal and Hagström, 2017). The questionnaire will consist of both open and closed ended questions. Open ended questions are created to enable participants to express their views which provides rich material beneficial to researchers.

The questionnaire will be used in this study to gain insightful information on participants' experience and views regarding the use of the business analysis framework. Questionnaires will be used to elicit feedback after each iteration of DSR as well as at the end when the framework development process is completed.

Questionnaires should be designed in a manner that is well understood by both the respondent and interviewer. Some of the factors to be considered for questionnaire design include required information, target respondents, interviewing technique, question content and response format (Sreejesh, Mohapatra and Anusree, 2014). For this study, the questionnaire was designed to gain insights on the use of the business analysis framework. The target population was confined to BAs that participated in the DS sessions. The questionnaire was designed to be emailed to participants hence was accompanied with clear instructions regarding the desired type of detail. All questions were designed to extract the required information from the respondents for the study. The utility of data was considered hence each was designed to elicit useful data. Both open and closed response format questions were created to allow for open narrative (open ended questions) and predefined answer sets (close ended questions). Following the iterations, the questionnaire was designed to obtain an evaluation of the final artefact and its use. The questionnaire was designed into two sections, one section addressed the BAs' experience when using the framework and the other section addressed the relevance and efficacy of the components. The questions focused on the major changes that were introduced to the framework components during the DSR sessions. The questions were based on the participant's experience, usability and value of using the business analysis framework for an eservices project (The list of questions can be found in appendix A).

3.6.2 Sample Selection for the focus groups and questionnaire

The target population which the researcher intends to make their inferences from must be defined. Sampling approaches are often classified into probability and non-probability sampling (Wilson, 2016). In probability sampling random selection is used to select elements, while in non-probability sampling elements are chosen by the researcher (Turner, 2020). Non-probability sampling is valuable for gathering information in qualitative inquiries and for exploratory purposes. This study applied non-probability sampling methods as the elements (being business analysts) are selected for their knowledge and expertise in the business

analysis domain. Probability sampling allows for random participant selection making this method unsuitable as participants are required to be experienced business analysts in the municipal environment.

Wilson (2016) and Turner (2020) note convenience, purposive, quota, snowball and self-selected sampling as the various types of non-probability sampling techniques.

For this study, purposive sampling was deemed the best suited. Purposive sampling allows for better matching of the study's aims and objectives to the sample resulting in improvement of the rigour and credibility of the data and results (Campbell, Greenwood, Prior, Shearer, Walkem, Young, Bywaters and Walker, 2020). Purposive sampling allows the selection of persons with known or demonstrable experience and expertise in the field of business analysis. Purposive sampling is one of the most common techniques used. While purposive sampling is often used when one's goal is to include participants who represent a broad range of perspectives, purposive sampling may also be used when a researcher wishes to include only participants who meet very narrow or specific criteria. While selected participants can provide a plethora of information on the specific research, Turner (2020) warns against biasness based on researchers' judgements when using this technique. To alleviate bias, criteria were established for the selection of BAs. In this research BAs who have knowledge in business analysis methods applicable to the municipality were selected. The selection of BAs is based on IT experience, IT qualifications and involvement in business analysis for IT projects in a municipal environment.

Qualitative researchers aim to elicit meaning from participant data in order to gain in-depth understanding and insights. Hence smaller focus groups are deemed more appropriate (Campbell et al., 2020). Gibson and Arnott (2007) and Moser and Korstjens (2017) affirm that smaller groups have the advantage of more participation from participants, and they work well when participants show interest in each other's opinions. Moser and Korstjens (2017) suggests 6 to 12 participants for a focus group.

Design Science researchers should aim to assemble participants that will potentially use the proposed artefact and who are familiar with the environment in which the artefact will be utilised (Tremblay et al., 2010). It is imperative to ensure that the target population is represented by the participants selected (Paul, 2018).

In this study, approximately 15 Business Analysts (BA) were selected for the focus group to participate in the DSR sessions as well as the questionnaires thereafter. Key informants need to be deliberately selected as they need to be knowledgeable and skilled regarding the phenomenon being studied (Moser and Korstjens, 2017). The reason for the selection of BAs is that the information sought is very specific and is only available from certain

individuals, groups and organizations. The selected BAs will be experienced in the business analysis specifically within the information technology field as it is imperative to gauge the improvements as viewed by BAs. For the current study the business analysts selected for the group are seasoned business analysts within the municipal environment who could very likely use the artefact for their business analysis.

3.6.3 A description of the study site: A municipality department

This research study was conducted at a category 'A' municipality, meaning a municipality that has exclusive municipal executive and legislative authority in its area. This South African metropolitan municipality is based in Kwa-Zulu Natal and has approximately 26 000 employees within its various clusters and unit. Permission to undertake the research within the municipality was obtained from the municipality's *'Institute of Learning'* department which is responsible for the authorization of research in the municipality. Ethical clearance to conduct this research was also obtained from the university. The research was done in the 'Information Management Unit' (IMU) that manages the ICT function. There are approximately 35 IT projects running concurrently within a financial year with some that span for over a year. The '*applications and projects'* department within IMU is responsible for the development of eservices and other applications. All BAs that participated in the study were currently working on IT projects for the 'application and projects' department. The researcher acknowledges that the client being in-house poses a limitation. As with any software project, factors unique to a particular organizational environment affect the projects in its entirety. Modifications to the framework will be required when applied to another municipality.

3.7 A description of data analysis methodologies

This research requires a robust process to distill and interpret the rich set of collected data. Data analysis in qualitative research typically aims to make sense of data by organizing the data, reducing the data via summaries and categories, and identifying and linking patterns and themes in the data (Kawulich, 2004). There are several approaches to qualitative data analysis methodologies which include discourse analysis, cross-cultural analysis, grounded theory analysis, narrative and performance analysis, hermeneutics or interpretive analysis and content analysis to name a few. This study uses content analysis as data from the questionnaires are categorised and interpreted. In addition, the data stemming from the evaluation of the business analysis framework from questionnaires will be analysed using a cross impact analysis method, ADVIAN. Impact analysis methods are used to determine direct and indirect impacts and reveal influential factors for enhancements and system success (Linss and Fried, 2009). Both content analysis and ADVIAN are described in detail below.

3.7.1 An overview of content analysis

Content analysis is one of the many methods used for data analysis in qualitative studies; other methods include phenomenology, grounded theory, historical research and ethnography (Renz et al., 2018).

Identification and analysis of data in its context to create themes is the essence of content analysis (Bedinelli Rossi, Serralvo and Nascimento João, 2014; Bryman and Bell, 2015; Erlingsson and Brysiewicz, 2017). In research using content analysis, the focal point is on spoken or written language as communication where the context, content and structure is emphasized.

Types of data coding include inductive and deductive coding. A predefined list of codes is created prior to coding for the deductive coding. This approach helps fixate the coding on concerns that are deemed important in existing literature, and are mostly related to theory refinement or theory testing (Linneberg and Korsgaard, 2019). In inductive coding the researcher uses the data to develop codes from the terms or phrases used by the participants (Linneberg and Korsgaard, 2019). In this approach the code mirrors what is in the data and allows the researcher to make credible interpretations. This approach is often referred to as grounded theory. The researcher will draw from techniques of grounded theory and use coding to interpret the data. This approach uses three levels of coding namely open coding, selective coding, and theoretical coding. Open coding is the initial step of coding, however the coding steps can overlap since the essence of coding is continuous comparison (Akkari, 2015). In grounded theory, researchers are prompted to hypothesize in close and direct contact with their experimental data, shifting from notions to the theoretical statements (Marvasti, 2019).

In this study, in analysing the questionnaire responses, the results would be sorted under common themes relating to the key concepts from the theoretical framework and the key/broad research issues/concepts. Content analysis does not only analyse the data content, it also extricates the main concepts or themes. Data from interactions with the business analysts are transcribed and analysed to surface themes that will govern changes to the framework. To evolve the framework, content analysis is applied on the material that emanated from the focus groups and questionnaires. Whilst rich data is obtained during DSR, an additional questionnaire is sent to participants to obtain final feedback closing off the feedback loop for the research.

3.7.2 Cross impact analysis (CIM)

The intention of the framework is for it to be utilized by BAs in municipal environments. As working environments present their own individual organizational characteristics, an

organization may wish to alter the framework to better suit them. It is thus beneficial to understand the impacts of changing the framework as components of the framework are linked. Subsequent to modifying the framework following the DS sessions, participants are requested to evaluate the components of the framework.

A cross impact analysis will be done to establish the direct and indirect relationships among components, the impact of components on each other and how they impact the framework as a whole. This also allows insight to be gained into challenges being faced and what decision making strategies may be worth exploring.

The application of cross-impact analysis unveils intricate insights into the complex interactions between components (Linss and Fried, 2009) which makes it ideal for evaluating the components comprising the business analysis framework. Post evaluation, the analysis will clearly show the most influential and influenced components in the business analysis framework as well as those components deemed most *critical*. Critical components refers to components that have a strong impact on other components and are also greatly affected by other components. The strength of the approach lies in the ability of the chosen method to identify the components that play a vital role in the system evolution (Guertler and Spinler, 2015).

Cross-impact analysis is described as an "*analytical technique for studying a system, and particularly interaction within it, consisting of several components, states, events and forces that are partially dependent on each other and therefore have influence on each other*" Panula-Ontto and Piirainen, 2018, p. 90). The original cross-impact approach was developed in 1966 by Theodore Gordon and Olaf Helmer, with its first application in a card game called *'Future'*. This approach has been an immense inspiration to more contemporary approaches and has since been applied to a variety of contexts. The approach aims to elicit information on the direct and indirect interactions between the components with the direct impacts forming the precursor to the analysis applied. The direct impacts between components are usually derived from expert participants. The cross-impact approach can also be viewed as a way to systematically and formally process expert opinions and views. System elements, also known as 'impact factors' (IF), are used to derive conclusions as to which IFs' are most crucial and most influential in the system.

Impact analysis follows the procedure of (a) IF identification, (b) scoring of IFs' mutual and direct impact strength by participants, (c) calculation of direct and indirect interdependencies, and (d) classification of the IFs as per the many criteria that can be used for future decisions and activities regarding the organisation (Linss and Fried, 2009). One method used for impact analysis is to arrange the IFs in a cross impact matrix (Bedinelli Rossi

et al., 2014) or simply in an impact matrix (IM). The matrix size is the number of IFs squared, where each cell contains the strength that an IF has on another IF. This matrix is advocated for the use of cross impact analysis (CIA). Figure 9 shows an example of a CIM.

A CIM with the various components was given to participants (This is shown in appendix B). Participants had to score the impact of the components against each other using the scale of 0 to 3. Frequently used impact strength 0,1, 2 and 3 can be used in ADVIAN, however other finer scales such as 0 to 5 can be used for impact strengths (Linss and Fried, 2009). For this study the impact scores are numerically based on a scale from 0-3 (0 = no impact; 1 = low impact; 2 = medium impact; 3 = high impact). The median, mode or mean of the responses can be used for cross impact analysis (Panula-Ontto, 2016). The statistical *mode* formula was applied to obtain the CIM for the business analysis framework.

	IF1	IF2	IF3	IF4	IF5	IF6	IF7	IF8	IF9	IF10	AS
IF1	x	3	1	3	0	0	2	2	0	1	12
IF2	1	x	3	0	2	1	0	1	0	0	8
IF3	0	2	x	0	3	2	0	0	0	0	7
IF4	0	3	3	x	0	0	2	0	0	0	8
IF5	0	0	0	0	x	0	0	2	0	0	2
IF6	3	0	0	0	1	x	2	1	0	0	7
IF7	1	1	1	1	0	2	x	1	0	2	9
IF8	0	0	1	1	0	0	0	x	0	1	3
IF9	1	3	0	3	0	0	0	0	x	2	9
IF10	3	3	3	2	0	1	3	3	1	x	19
PS	9	15	12	10	6	6	9	10	1	6	

Figure 9: Example of a cross impact matrix (automotive industry)

(Source: Linss and Fried, 2010)

The calculation for the interdependencies include mathematical formulae that are applied to the matrix. The most important technique used in this method is the summation of the row elements known as *active sum (AS),* and summation of the column elements of the impact matrix known as *passive sum (PS)* as shown in figure 9. The active sum of an impact factor reveals the strength of the factors' direct impact on other factors. The degree to which an impact factor is directly affected by other factors is shown by the passive sum of that impact factor. This summation however does not take into account the indirect impacts hence requiring an improvement on the present method. Impact analysis also does not reveal the system's current state as criticality, stability or integration are not established.

3.7.3 Application of ADVIAN for data analysis

Using calculations for integration, stability and criticality, ADVIAN allows researchers to categorize factors which are imperative in determining the repercussions of changes to a

system (Linss and Fried, 2009). Applying this classification method to the business analysis framework, allows for the identification of components with influential interrelationships, components which control, are controlled, or affected by framework changes, and those most heavily impacted by changes made to the framework. It will also provide insight into which components contribute most to the stability of the framework. Organizations differ and may attempt to alter the business analysis framework to better suit their environment. By having insight into the various classifications of the framework components, a better understanding can be gained as to the impact that components have on each other and the result that changes to individual components can have on other components as well as on the framework as a whole. The classifications can also unveil those components which when changed would have the most positive influence on the framework.

Developed in 2005, ADVanced Impact ANalysis (ADVIAN) is a registered classification approach for the rating of impact factors. The inaugural implementation of the method occurred in 2006 for a project in the software industry (Linss and Fried, 2009). This classification approach allows impacts, impact intensity and relationships amongst factors involved in a system to be examined. Impact factor values are presented in a table format (as in figure 9) (Bedinelli Rossi et al., 2014) which are then used to facilitate analysis of the system's most influenced factors, factors that highly influence other factors, and relationships of influence amidst the factors (Özçürümez and Hamer, 2018).

The factor that exerts most influence on the system is determined by the highest score on the active axis (active sum). The factor that is most influenced by the system has the highest score on the passive axis (passive sum). Figure 9 shows an example of active and passive sums of IFs. The active sum for each IF is obtained by summing the active values. The passive sum for each IF is obtained via summation of the passive values.

ADVIAN relies on the fundamental concept that the strength of indirect relations as well as the strength of direct relations must be considered during analysis (Adeyelure, Kalema and Bwalya, 2018). Hence, different orders of 'activity' and 'passivity' are calculated so that the indirect strengths of factors are determined. The 1st order which is used to derive the active and passive sums is calculated using the summation of all impact strengths of the IFs, with subsequent orders of activity being calculated using the prior order as well as the direct impacts (Linss and Fried, 2010). For example, a system with 5 IFs (IF1, IF2, IF3, IF4, IF5) has a 1st order activity and passivity using a summation of the strengths. The 1st order of activity for IF1 sums up strengths of IF1→IF2, IF1→IF3, IF1→IF4 and IF1→IF5. Each factor will be given a score for the impact that it has on another factor. These scores are summed to obtain the active and passive sums. The 2nd order activity or passivity takes the 1st order activity or passivity as well as the indirect impacts into account. Thereafter the 3rd order activity takes

into account the 2nd order activity or passivity and the indirect impacts. Further orders of impact are then built accordingly. The number of orders is determined by the number of impact factors minus 1 (Linss and Fried, 2009). This will ensure all possible indirect impacts are considered.

ADVIAN is a tool that can be used to determine direct and indirect impacts, relative values, establish the state of the system and finally reveal perspectives. While the steps are not prescribed for a specific order, figure 10 depicts the steps followed by the researcher for this study. Each of the steps are further explained in detail with the formulae used to achieve the end results. For this study, impact factors will be referred to as components as the seven components make up the business analysis framework (derived in section 2.8 figure 7). The analysis of the data aims to illustrate the role of each component within the business analysis framework. The method brings to the fore the most influential components of the framework hence highlighting where changes for improvements will have the most effect.

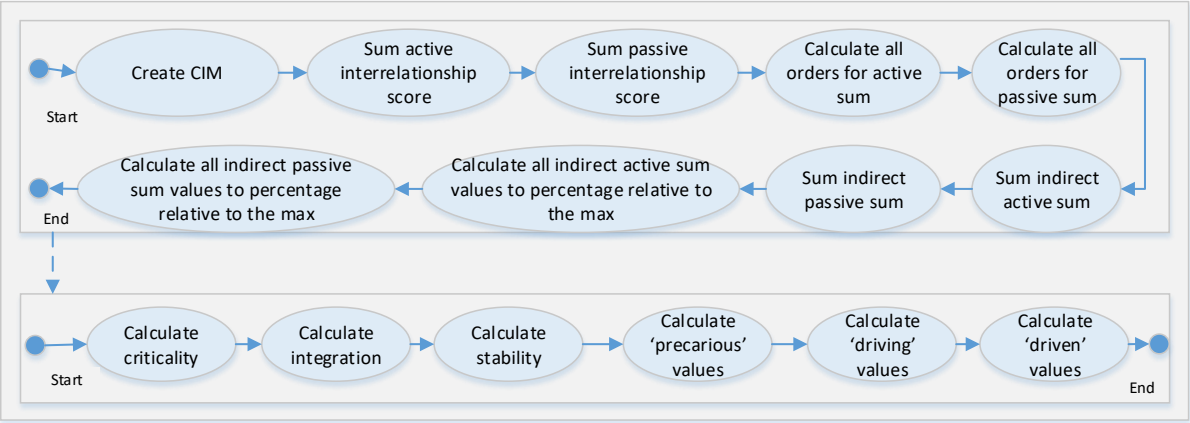


Figure 10: Researcher's steps using ADVIAN

(Source: Constructed by the Researcher)

3.7.3.1 Direct active sum (dAS)

The number of IFs (also referred to as the business analysis components) is *n* in the CIM. The intersecting relation between an influencing component *i* and an affected component *a* is shown as *C*ia. The direct active sum of a component *c* exhibits the strength of that component's direct impact on all other components in the framework (Adeyelure et al., 2018). Presented as *dAS(c)*, the calculation is a summation of all impact strengths (Linss and Fried, 2010) in a row of the CIM.

$$dAS(c) = \sum_{a=1}^{n} \left(C_{c,a} \right) \quad (3.1)$$

3.7.3.2 Direct passive sum (dPS)

dPS(c) represented in equation 3.2 (Guertler and Spinler, 2015) calculates the direct passive sum of a component *c*. This shows the degree to which the component is directly affected by all other components. The direct passive sum is a summation of the component's column strengths in the CIM.

$$dPS(c) = \sum_{i=1}^{n}(C_{i,c}) \quad (3.2)$$

3.7.3.3 Active sum orders and passive sum orders

The second order of the direct active sum (*dAS*) is required to compute the indirect relationships. Order 2 is computed using direct active sum of a factor multiplied by each factor it has an interrelationship with (Guertler and Spinler, 2015). Passive sum orders follow the similar logic as the active sum orders to obtain order 2 values. However this calculation multiplies the direct passive sum by each impacting factor. For all possible interrelationships to be included the process is repeated for n-1 orders. In the formula that follows *k = n – 1 where k* represents the order and *n* being the number of components.

$$dAS_k(c) = \sum_{a=1}^{n}\left(C_{c,a} * dAS_{k-1}(a)\right) \quad (3.3)$$

$$dPS_k(c) = \sum_{a=1}^{n}\left(C_{i,c} * dPS_{k-1}(i)\right) \quad (3.4)$$

3.7.3.4 Indirect active sum (iAS) and indirect passive sum (iPS)

From order 1 to order *k*, all direct active sum values for the corresponding factor are added to derive the indirect active sum *iAS(c). iPS(c)* is calculated by summing all direct passive sums of the specific factor (Thompson, Olugbara and Singh, 2018).

$$iAS(c) = \sum_{k=1}^{n}(dAS_k(c)) \quad (3.5)$$

$$iPS(c) = \sum_{k=1}^{n}(dPS_k(c)) \quad (3.6)$$

3.7.3.5 Relative direct active sum and relative direct passive sum

The active and passive sums for all IFs are converted to relative values to enable the application of the ADVIAN classification to any system (Linss and Fried, 2010). In equation 3.7 all active sum values are calculated relative to the maximum active value. Calculation of the passive sum value relative to the maximum passive sum is calculated in equation 3.8. This will result in all values being in the '0 to 100' range.

$$dAS'(c) = \frac{dAS(c)}{max_{c=1}^{n}\{dAS(c);dPS(c)\}} * 100 \quad (3.7)$$

$$dPS'(c) = \frac{dPS(c)}{max_{c=1}^{n}\{dAS(c);dPS(c)\}} * 100 \quad (3.8)$$

3.7.3.6 Relative indirect active sum and relative indirect passive sum

The relative indirect active and relative indirect passive sum are calculated according to the same logic as the relative direct active and relative direct passive sum. In equation 3.9 all indirect active sum values are calculated relative to the maximum indirect active value.

Calculation of the indirect passive sum value relative to the maximum indirect passive sum is calculated in equation 3.8. The resulting value will be in the range 0 to 100 (Linss and Fried, 2010).

$$iAS'(c) = \frac{iAS(c)}{max_{c=1}^{n}\{iAS(c); iPS(c)\}} * 100 \quad (3.9)$$

$$iPS'(c) = \frac{iPS(c)}{max_{c=1}^{n}\{iAS(c); iPS(c)\}} * 100 \quad (3.10)$$

3.7.3.7 Integration, stability and criticality

The state of a system can be determined by 'integration', 'stability' and 'criticality' (Linss and Fried, 2010). Influential resources are commonly referred to as key values, drivers or key success factors in organizations. To improve results, the organization will need to know which resources are to be influenced with intervening activities. Linss and Fried (2010) stress that '*drivers'* are not the only classification and other criteria such as integration, stability and criticality are also essential. Drivers have a forceful influence on the system but are not powerfully influenced by the system.

'*Integration'* refers to the strength of the interrelationship of an IF amongst other IFs. A factor's integration is calculated by deriving the arithmetic average of the IF's relative active sum and the relative passive sum. This value will always be within the '0 to 100' range as the relative active sum and the relative passive sum have similarly been converted to ranges of '0 to 100' as discussed above.

$$I(c) = \frac{iAS'(c) + iPS'(c)}{2} \quad (3.11)$$

When IFs present themselves close to the active sum axis and the passive sum axis, the system of factors is considered very stable. This implies that IFs which are very close to the active sum axis (low passive sum), control the system. Likewise, IFs that are very close to the passive sum axis (low active sum), are controlled by the system.

The stability value of each IF is calculated using the harmonic mean of the relative active sum and relative passive sum (Guertler and Spinler, 2015).

$$S(c) = 100 - \frac{2}{\frac{1}{(iAS'(c)} + \frac{1}{iPS'(c))}} \quad (3.12)$$

'*Criticality'* identifies factors that have a strong impact on the system and at the same time are also strongly impacted on by the system (Guertler and Spinler, 2015). The most critical factor in the system is that factor with the highest combined active and passive scores. Changes to critical factors are not advisable as holistic system reaction is unpredictable. This factor when altered can induce an amassed change in the system.

$$C(c) = \sqrt{iAS^{'}(c) * iPS'(c)} \quad (3.13)$$

3.7.3.8 Ranking of precarious, driving and driven

Component ranking is achieved using three important measures viz. precarious, driving and driven. Factors with a high *precarious* value indicate that the factors are unaffected by external elements, however they do exert the greatest influence on the system (Thompson et al., 2018). The harmonic mean of the relative indirect active sum and criticality is used to obtain the precarious value of a component.

$$P(c) = \sqrt{C(c) * iAS'(c)} \quad (3.14)$$

The *driving* ranking can be used to identify those factors that do not generate any strong feedback and have a high influence on other factors. Highly ranked driving factors can be used to improve systems as they have a high influence on other factors. The geometric mean of the active sum and 100-criticality is used to derive the driving value of a component (Thompson et al., 2018).

$$D(c) = \sqrt{(100 - C(c)) * iAS'(c)} \quad (3.15)$$

It is the non-critical factors that demonstrate high passive sums which are more reactive in nature, these are known as *driven* factors. The impact of external interventions on a system can be determined by driven factors. Factors with high driven scores are most affected by changes made externally. To obtain the driven value of a component, the formula used the geometric mean of the passive sum and 100-criticality.

$$T(c) = \sqrt{\big(100 - C(c)\big) * iPS'(c)} \quad (3.16)$$

To establish the interrelationship and impacts between the framework components, ADVIAN is used. ADVIAN affords researchers the opportunity to classify components according to measures of integration, stability and criticality. This is paramount for identifying which of the framework components have the strongest interrelationships, which are controlled components, which are controlling components, which of the components are affected by

changes in the system and which are most affected by changes that may be implemented in the system. ADVIAN is an appropriate tool for this study as it considers indirect factors and the strength of a factor, hence providing a valuable perspective into the framework components.

3.8 Data reliability and validity

A key element of qualitative research is identifying themes to shape meaningful analysis without compromising the substance of the responses from data collected. The researcher must ensure consistency in the chosen methodology in order to ensure reliability. Soundness of research is referred to as reliability, specifically in relation to the suitable methods chosen and the manner in which those methods were used and implemented in a qualitative research study (Rose and Johnson, 2020). Reliability of a study increases when the methods utilized are justified and lucidity in the analytical procedures is provided. Reliability raises the question of 'consistency', ascertaining if the research could be replicated and if similar results could be derived.

Validity refers to the degree to which the investigated concepts or ideas are meticulously reflected or evaluated for a study (Noble and Heale, 2019; Rose and Johnson, 2020). Validity can be achieved by comparing data obtained from one method with data sourced from another. It involves the process of establishing accuracy of the findings from the viewpoint of the researcher, participants and/or users of the research.

Prior to data collection, the reliability and validity of a research instrument must be tested and found to be adequate (Shelestak and Voshall, 2014). In this study, a pilot was used to test the instruments. This was to ensure there was no ambiguity in the questions and that they were well understood. To avoid bias, the researcher ensured that all research questions were clear and unambiguous. This research study uses triangulation as data is received from both the focus groups and questionnaires. This approach assists with evaluating validity and reliability by ratifying that the collected data is not as a result of circumstances or chance. Findings from one dataset are confirmed with findings from the 2nd dataset. Data confidence is achieved when the data from differing sources gravitates towards similar results. Reliability is gained by following a systematic process for the data analysis.

3.9 Chapter summary

This chapter elaborated the study's research design. The research philosophy is pragmatism and the circumscription process is selected for theory formulation. The study adopts a qualitative approach as its research strategy. The design science research method will be applied to achieve research objective 3 (*to develop a framework of practice guidelines for business analysis of eservice systems).*

Using the stringency of the DSR process the initial artefact design will be evolved and tested by establishing a set of focus groups with the business analyst participants selected through purposive sampling. In addition, a questionnaire will be administered to the same participants.

Content analysis and cross impact analysis are selected as the data analysis methodologies for this study. The application of ADVIAN with the formulae to accommodate the indirect dependencies is discussed in detail in this chapter. Moreover, experts' feedback will be analysed and thereafter evaluated using ADVIAN to obtain valuable insights into the constituents of the framework. Content analysis will be performed using rich data gathered from the focus group and the follow up questionnaire. This data will contribute to the confirmation of the required components that will comprise the business analysis framework. Once the framework is firmly established, ADVIAN will be used to determine direct and indirect impacts as well as classification of the framework components. The next chapter presents the outcomes of the design science sessions and ADVIAN data analysis.

Chapter 4: Framework implementation and evaluation

This chapter details the application of DSR in the evolution from the conceptual to the eventual eservices business analysis framework. This is followed by a discussion of cross impact analysis performed on the components and the effect of the various components on each other and the framework in its entirety. The initial business analysis framework which was conceptualized earlier (in chapter 2) is taken through the DSR process where required modifications for improvement were identified and implemented at the appropriate stage. The cross impact matrix is then presented with the factors comprising the components of the framework. The selected impact analysis technique, ADVIAN allows for an in-depth analysis of the impact of the framework components on each other and on the framework. In other words, the interface in the form of the strength of the relationship between components was measured. This is seen as an important contribution in that not only are individual components scrutinized but, the resultant impact on the rest of the framework should one component be modified or removed.

This chapter is structured as follows: Section 4.1 discusses the setup of the DSR sessions. The sub sections describe the astute participant selection, the case site description, the alignment of DSR to the study and section 4.2 and 4.3 provides a quick recap of the DSR stages and how they map to the framework, as well as quick recap of the initial framework. Section 4.4 focusses on the evaluation and evolution of the components across the DSR increments and section 4.5 focuses on refinement of the framework .The cross impact matrix with the cross impact analysis value between the components is presented in section 4.5. Section 4.6 reveals the ADVIAN analysis results followed by a discussion of the impacts that components have on each other and on the framework. Lastly, section 4.7 deliberates on participant's responses to the questionnaire.

4.1 Setting up the DSR environment

To legitimize the framework, expert participants that comprise the focus group utilized and evaluated it and their feedback evolved the framework. This is a prominent part of DSR. The following sub sections provide further details of the criteria and manner in which the DSR sessions were conducted.

4.1.1 Selection of participants using purposive sampling

The researcher identified 15 business analysts as experts to participate in this study. Two participants declined during the study due to work commitments and a further 2 declined

due to the logistic challenges of having to leave KZN during the time of the DSR sessions being conducted.

The opinions of 11 participants were then utilized to provide feedback and the data in this study. The data accumulated from all participants was usable.

The demographic details collected include gender, position, number of years of business analysis experience, number of years of IT experience and involvement in municipal IT projects. The data shows that all participants are currently involved with business analysis in municipal IT projects. All participants hold either a graduate or post graduate IT qualification. It can be seen that 64% of the participants have between 6 to 15 years IT experience, with 36% of the participants having less than 5 years of IT experience. The participant's IT experience is relevant as eservices projects are in essence IT projects. The data also shows 55% of participants having between 7 and 14 years of business analysis experience, with 45% of participants having less than 5 years of business analysis experience. The data gathered from this demographic information endorses these participants as experts.

4.1.2 A description of the eservices project

The eservices project selected for the study is an actual project in the 'application and projects' department at the time of writing. The project was 'IRCAM' (Interim Rates Clearance Application Management) which involves the application for rates clearances certificates for properties being sold to new owners. This system will be used by conveyancing attorneys that apply for a rates clearance certificate (RCC) on behalf of a customer. The staff of the rates clearance department will also use the system to approve these applications and handle queries. The business analysis framework was applied for the business analysis aspect to this project.

4.2 A quick recap of the DSR stages and mapping to this research

The journey of DSR is to design and prescribe solutions to real problems. DSR uses the 'build' and 'evaluate' of artefacts to resolve identified business problems. Due to insufficient creative improvements in domains where current theory is inadequate, contriving useful artefacts is complicated (Hevner et al., 2004).

DSR provides 7 guidelines (Hevner et al., 2004, Peffers et al., 2007, Gregor and Hevner, 2013, Barafort et al., 2018) shown in table 3 (column 2). Postulated on the DSR principles, this research maps onto the guidelines as shown in table 3.

Table 3: DSR guidelines mapped to the research

(Source: Constructed by the Researcher)

No.	DSR guideline	Research step in this study
1.	Create an innovative, purposeful artefact	A theoretical business analysis framework is created from a critical review of recent literature
2.	The artefact is purposeful so it must yield utility for the specified problem in a specific domain	The framework aims to resolve issues experienced in performing business analysis, giving it utility and purposefulness
3.	Evaluation of the artefact is crucial	The focus group evaluates the framework
4.	Novelty is equivalently crucial since the artefact must be innovative, solving a heretofore unsolved problem or resolving a known problem in a more effectively or efficiently	The framework is put to use using a municipal eservices project to validate if it is effective in resolving the problem. It is innovative as it created to resolve known business analysis problems
5.	The artefact itself must be rigorously defined, formally represented, coherent, and internally consistent	The framework is rigorously evolved through iterations with suggestions from the focus group
6.	The process by which the artefact is developed, and frequently the artefact itself, includes or enables a search process by which a problem space is created and a mechanism posed or enacted to find an effective solution	A plethora of research sources together with data retrieved from participants was used which enabled a search process to achieve the desired outcome
7.	DSR results must be disseminated effectively both to a technical audience and to a managerial audience	The researcher currently has a published article on the framework developed in this study and its preliminary prototype disseminated in a conference proceeding

4.3 A quick recap of the framework in its initial form

The initial business analysis framework was designed based on the business analysis challenges identified in literature presented in Chapter 2. The initial framework comprised seven components, namely: project committee, BA plan, requirements analysis, business collaboration, requirements changes, solution and deliverables. The components of the framework are designed to resolve the identified problems. The knowledge areas in Babok and the VoC element from QFD was largely consulted to derive the architecture and some of the components that constitute the framework. Each component of the framework was supplemented with the purpose, tools and techniques categories. The aim of the '*purpose*' category is to provide clarity on the exact purpose of a particular component. This provides the BA with a brief explanation of the intention of the component, eliminating any misunderstandings. The purpose includes tasks to help the component achieve its intention

and adds clarity for the business analyst to execute the step. The '*tools*' category provides suggested tools for each component that a BA could utilize during business analysis. Finally the '*techniques*' category proposes techniques for each component that can be used during business analysis activities. The initial framework designed in chapter 2 (figure 7) is depicted again in figure 11. It was put to rigorous use during the DSR sessions resulting in the evolution into its most improved version. The tools and techniques for each component respectively has been discussed in section 2.8.1 to 2.8.7. In figure 11, the dotted line around 'Requirements Analysis', 'Business Collaboration' and 'Requirements Changes' indicate an iteration as changes to any of these steps allows the BA to go back and rework the other steps if necessary. Due to the size of the framework (inclusive of components, tasks, tools and techniques), the framework is shown with the seven components only (figure 11 to figure 15) and the tasks, tools and techniques for each component are shown separately in tables (table 5 to table 12) for readability.

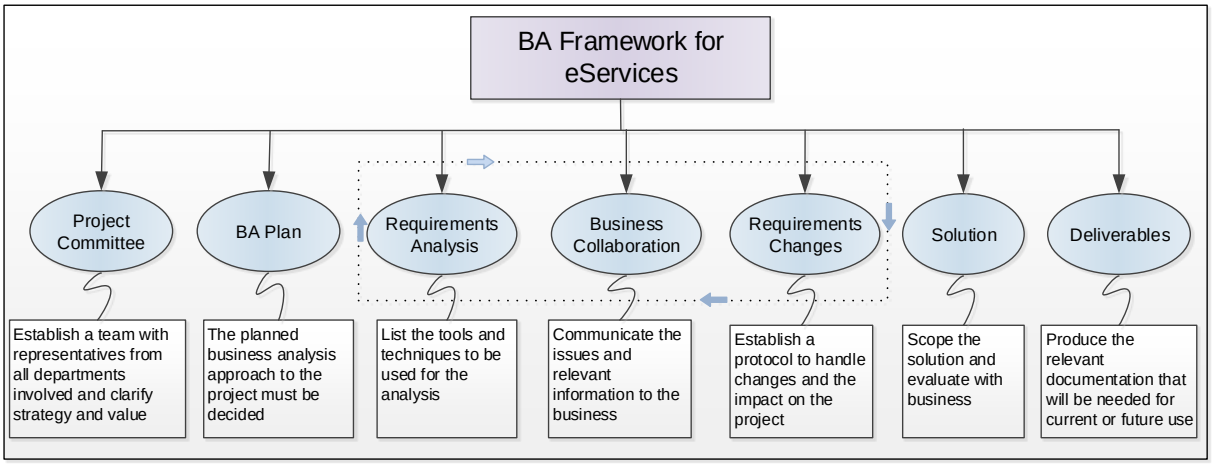


Figure 11: Initial business analysis framework

(Source: Constructed by the researcher)

4.4 The evaluation and evolution of the framework

A focus group consisting of expert participants was brought together in a boardroom for the DSR sessions. The DSR sessions setting was similar to a collaborative workshop with the participants and facilitator present to guide the sessions. The focus group was given the conceptual framework accompanied by an e-services project to which to apply the framework. Prior to the 1st DSR session, all participants were engaged with individually to brief them on the process and expectations of the forthcoming sessions. These one-on-one interactions proved beneficial as it allowed the participants to voice their individual concerns or request clarity on areas where they were unclear.

There were 3 DSR sessions with the focus group conducted approximately a week apart. These sessions were highly interactive with participants sharing their knowledge and experience, as well as suggesting modifications for each and every step of the process. Due to the technical hands on experience of the individuals, rich information was gathered from the sessions and this was sometimes not limited to the case study. Insightful information was derived from participants' working experience which sparked invaluable debates which, in turn, prompted changes and justifications for each change to the framework. During each session, participants deliberated over the framework, proposed ideas for improvement and reviewed their disagreements. Both positive and negative feedback contributed towards advancing the framework. All DSR sessions were recorded and transcribed. Content analysis was then performed on these transcriptions to derive themes for the changes to be effected following an iteration.

The majority of the required modifications were carried out in the first session, with minimal changes during the second session and no changes in the third. Each component of the framework was extensively analysed using the three categories (purpose, techniques and tools). All categories underwent modification during increment 1 and 2. The 'purpose' category underwent the most number of changes as participants highlighted the importance of including the relevant activities that are vital for the component to fulfil its intended purpose. The techniques and tools category was subjective as participants had options as more than one technique or tool could be used to achieve the same end result. It must be noted that while the names of the remaining components after modifications have not been changed, the activities in each component did change.

Table 4 below is a template used to exhibit the metamorphosis of each framework component. The rows show the categories and the columns present the overall changes to each component during each iteration. The sections following will show the alterations to each framework component together with the categories using the template in table 4 below.

Table 4: Component modification template

(Source: Created by the researcher)

	Conceptual	Increment 1	Increment 2
Purpose	The purpose/intent together with the tasks of the component outlined in the conceptual framework	*Added/Modified:* • Shows any addition/modification to the purpose in Increment 1 *Removed:* • Shows any deletions to the purpose in Increment 1	*Added/Modified:* • Shows any addition//modification to the purpose in Increment 2 *Removed:* • Shows any deletions to the purpose in Increment 2

Technique	Techniques suggested in the conceptual framework	*Added:* • Shows any addition to the techniques in Increment 1 *Removed:* • Shows any deletions to the techniques in Increment 1	*Added:* • Shows any addition to the techniques in Increment 2 *Removed:* • Shows any deletions to the techniques in Increment 2
Tool/s	Tools suggested in the conceptual framework	*Added:* • Shows any addition to the tools in Increment 1 *Removed:* • Shows any deletions to the tools in Increment 1	*Added:* • Shows any addition to the tools in Increment 2 *Removed:* • Shows any deletions to the tools in Increment 2

On finalization of the framework in each DSR session, the focus group evaluated the impact of the framework components on each other. A CIM was presented to the focus group who then scored the impact of each component against each other. ADVIAN was then applied to the CIM to establish direct and indirect impacts and findings for the aggregated indicators.

4.4.1 Component critique/evaluation

The initial framework comprised seven components, namely: *project committee, BA plan, requirements analysis, business collaboration, requirements changes, solution* and *deliverables*. The framework components were augmented during the DSR sessions following rigorous use and critique. The components of the framework were meticulously analysed during their use and have been transformed to create an *enhanced* framework. This was achieved using the themes derived from content analysis of the DSR session transcriptions. The data was condensed, coded and organised into themes. There was only change to the purpose of the BA Review in increment 3 - hence it has been omitted from the tables in the following sub-sections that summarize the component changes. The following sub sections cover the 2 increments of each framework component using the template provided in table 4 (component modification template).

4.4.1.1 Project committee

Additional activities were included to supplement this step and add clarity not only for BAs but other project role players. That said, the essence of the project committee to establish all stakeholders and key role players remained. Table 5 shows the enhancements made to the project committee component during the increments of DSR.

Table 5: Project committee modifications

(Source: created by the researcher)

	Conceptual	Increment 1	Increment 2
Purpose	Establish a team with relevant representatives from all departments. Tasks: • Who are the key role players to make decisions? • Who authorizes changes? • What is the process?	*Removed:* • What is the process? *Added:* • High level discussion to contextualize project • Identify scope of work at high level • Define role players responsibilities • What are the reporting lines? • Ensure access to the right people	*Added:* • Request commitment from key people required during the business analysis processes
	Conceptual	**Increment 1**	**Increment 2**
Technique	• Stakeholder analysis • Scope modelling • Interview • Mind Mapping	*Added:* • Kick Off Meeting	*Added:* • Item Tracking
Tool/s	• Visio	*Added:* • Teams • Sharepoint chat • MS Project • Excel • One Note	*Added:* • Trello

Emerging from the content analysis, BAs experience problems around stakeholders, key role players, accountability, reporting lines and project details. This led to the additions to the 'purpose' category in increment 1 and 2. As can be seen from Table 5, during iteration 1 the new task 'high level discussion to conceptualize project' was added. The reason for the addition was to contextualize the project. BAs are of the opinion that while stakeholders are defined, it is vitally important that project context be given in their presence as this allows relevant issues to surface at an early stage of the project. One of the BAs affirmed this, noting:

> *"…the Project Committee and BA Plan do add strength to the foundation of the Analysis and more so if the stakeholders are all willing to work with you. It will still be a struggle if you know who is involved in the project but they are not willing to give the information required*."

Often BAs are assigned projects with timelines where the context of the project is not given. This generally presents the challenge of having to commence business analysis work with zero background to the project. During iteration 1 'a high level identification of the scope of work' was included as an important aspect that needs to be discussed with the committee

as this impacts the 'BA Plan' in the subsequent step. Having a high level scope defined assists the BA with the tasks they may have to include in their plan. Responsibilities are often unclear and BAs have the difficulty of resolving this with individuals. This led to the addition of having roles and responsibilities clearly defined in the project committee, so the BA is clear on which key individuals to contact for the various tasks. The reporting lines are vitally important and these authorities are called upon for assistance when needed, hence this addition was required. On requirements elicitation or input into crucial decisions, the precious commodity of time is required from key people in the business units. During this step, it is important for management to confirm access to key people. Often due to work commitments, key individuals cannot afford time to the BA.

Managers on the project committee need to ensure access to these key people as their absence makes the BAs' job extremely difficult during requirements elicitation. Commitment is also important and a lack thereof once again may impact on timelines and the quality of requirements given to the BA. The activity of defining processes was removed and added to the 'BA Plan' component. This change was effected due to standard operating procedures already being defined within the business units involved. To reiterate the processes, the 'BA Plan' will make reference if and when needed. The technique of 'item tracking' has been added as issues are constantly arising and require being tracked. Unknowns should always be tracked and it becomes very easy to lose sight of this as the project progresses. The theme of collaboration tools emerged as BAs confirmed their use of the added tools. Added tools used by BAs' include Teams, Sharepoint chat, Excel, One Note, MS Project and Trello.

4.4.1.2 BA plan

Modifications to the BA plan were done to add clarity in this step. Table 6 summarizes these changes.

Table 6: BA plan modifications

(Source: Created by the researcher)

	Conceptual	Increment 1	Increment 2
Purpose	• The planned business analysis approach to the project must be decided • Select an approach to how to conduct the analysis • Define mandatory documentation • Manage information and specify how changes will be handled from requisition to authorisation	*Added:* • Create a communication plan • Share plan with relevant stakeholders • Confirm policies, acts, regulations etc that the BU adheres to • Specify the governance that is prescribed for organization	*Added:* • Note the unknowns from the high level scope in previous step

	• Specify the breakdown of tasks and the timing of each • Specify formality of documentation required for each stakeholder	*Modified:* • Identify the possible breakdown of activities and the possible timing of each • Depending on methodology will documentation be formal or informal • Define where all documentation must reside • Prepare stakeholders for techniques to be used	
	Conceptual	**Increment 1**	**Increment 2**
Technique	• Workshop • Item Tracking • Stakeholder engagement	*No changes*	*No changes*
Tool/s	• Excel • Word • Visio	*Added:* • Teams • Sharepoint • Sharepoint Chat	*Added:* • Powerpoint

The theme of 'communication' was prominent for the BA plan. The importance of the communication plan was highlighted as different roles require differing levels of information. The communication plan not only defines the individuals that need to be informed but also the method of communication; for example, heads and deputy heads require high level information and emails as communication as opposed to meetings as their time is restricted. This plan needs to be shared with all involved as it clarifies the method and form of communication to all stakeholders. Business units are governed by regulations, acts and policies. It is therefore imperative that these regulations, acts and policies be included in the BA plan. The BA requires knowledge of this at this step as they need to be cognizant of this in all proceeding steps. Losing sight of this will be detrimental to later stages of the project. The organization's governance must be highlighted in this step. The governance must be adhered to and included in the business analysis activities and the project in its entirety. The breakdown of activities is crucial as this gives the BA a good view of priorities in their analysis tasks. The 'BA Plan' allows the BA to plan their tasks accordingly and work in a systematic manner which also highlights certain task dependencies.

The use of methodology was another emergent theme. Depending on the methodology used, documentation will either take on a formal or informal approach. Documentation should be stored according to the document management defined by the organization. This should be

clearly defined and kept standard throughout the project. BAs expressed their frustration when stakeholders are not fully aware and prepared for techniques that a BA may use to elicit requirements. "*Some people have never worked on projects and also have not worked with BAs. This is a new process for them*" was one of the statements made during the session. Similar statements to this led to the 'preparation of stakeholders' theme. This was then included to prepare stakeholders for the techniques the BA intends using; for example stakeholders may be familiar with the interview process but have never been a part of a JAD session. Planning to prepare the stakeholder gives them a good idea of what to expect and what is expected of them.

The theme of collaboration tools once again emerged, hence Teams, Sharepoint and Sharepoint chat were the additional tools added as they are often utilized by BAs.

4.4.1.3 Requirements analysis

The core activities of requirements analysis remained. Additional tools for this step were added. Table 7 below presents the changes implemented.

Table 7: Requirements analysis modifications

(Source: Created by the researcher)

	Conceptual	Increment 1	Increment 2
Purpose	• Perform requirements analysis. • List the tools and techniques to be used for the analysis • Use tools and techniques to establish requirements • Prepare stakeholders for the technique being used, explain how it works.	*Added:* • Ensure organization strategy is considered for requirements at all levels	*Added:* • Added different communication channels to strategy eg. Social media
Technique	• Document analysis • JAD session • Interviews • Focus groups • Process analysis • Process modelling • Interface analysis • Prototype • Scope Modelling	*Added:* • Item Tracking	*No changes*
Tool/s	• Visio • Nimbus • Excel	*Added:* • Visual Studio • Powerpoint • Mock Up • Teams • Sharepoint Chat	*Added:* • Balsamic • Wireframe

The theme of 'organizational strategy' surfaced for this component. The organization's strategy is an overarching road map that is considered throughout the project. However it is imperative that the strategy be carefully considered in this step as this stage has a major impact on the elicited detail requirements. For example a digital strategy will require customer notifications to be sent via sms and emails. Often the business units and BAs focus on the system being developed and lose sight of alternate communication channels (e.g. social media which may be a part of the organization's digital strategy). This must be factored in as these channels can enhance the communication aspects in the requirements.

During this step, many unknowns surface where issues are 'parked off' until further requirements gathering is done. The added technique of item tracking is essential as BAs expressed their concern with losing tracks of issues that arise as the project progresses. Using item tracking allows for these issues to be picked up at a later stage and not forgotten. This ensures that issues do not 'fall through the cracks' which often occurs during the project lifecycle. Tools added include Visual Studio, Powerpoint, Teams, Sharepoint Chat, Mock Up, Balsamic and Wireframe. These tools help in documenting requirements, at the same time providing a good visual to the business.

4.4.1.4 Business collaboration

Business collaboration underwent minimal changes with its main purpose being to interact with the business. Changes in this step are shown in table 8 below.

Table 8: Business collaboration modifications

(Source: Created by the researcher)

	Conceptual	Increment 1	Increment 2
Purpose	• Communicate the issues and relevant information to the business • Interact with business to get business unit perspective and user perspective • Engage stakeholders to ensure they understand the information • Gain confirmation on requirements • Present design options	*Added:* • Design options of screens (and not system design)	*No changes*
Technique	• Reviews • Workshop • Interviews	*Added:* • Item Tracking	*Added:* • Focus Group

		• Review Workshop Prototype	
Tool/s	• Excel • Word	*Added:* • Powerpoint • Visual Studio • Balsamic	*Added:* • Mock Up • Teams

The data analysis revealed 'solution confirmation' as an emergent theme. The BAs stressed that they do not create various system designs with detailed requirements. Whilst this may be a common practice in some organizations, it was not a norm in the case study environment. The overall system design is agreed upon during the requirements analysis step with the detailed requirements being built according to the agreed upon design.

During this step, various screen designs are presented to the business department (that initiated the project) as many have differing preferences on how certain information should be presented. A 'Review workshop' technique was added as it is aimed to specifically review all requirements presented by the BA. This serves to review all processes and business rules from the requirements analysis that are presented by the BA. The 'prototype' technique was added as it assists in clarifying the requirements and rules with the role players in the business department that requested the project. Visuals enable the business to have a clearer picture of their requested requirements.

The technique of 'Item tracking' was added as BAs emphasize the importance of tracking and following up on outstanding issues as they arise. Focus groups was brought to the fore as it is important to focus on certain groups with specialized requirements. This allows the BA to focus on a specific group's needs and verify that their requirements have been adequately met. Business units often have representatives from their different areas of business, hence focus groups become imperative when verifying that a particular business area is satisfied with their business requirements. Added visuals such as using mock up screens enhance the business's experience with verifying requirements. Tools added include Powerpoint, Balsamic, Visual Studio, Mock Up and Teams.

4.4.1.5 Requirements changes

The core functions of the requirements changes step remained unchanged with additions to the tools only. The additions to this step are shown in table 9 below.

Table 9: Requirements changes modifications

(Source: Created by the researcher)

	Conceptual	**Increment 1**	**Increment 2**
Purpose	• Establish changes, impacts and risks of changes on the project • Manage changes with impacts/risks and authorisations • Ensure requirements still fit for a function and its relationship to other requirements	*No changes*	*No changes*
Technique	• Change request log • Impact/risk analysis • Requirements prioritization • Change request approval	*No changes*	*No changes*
	Conceptual	**Increment 1**	**Increment 2**
Tool/s	• Excel • Visio	*Added:* • Word • Teams • Visual Studio • Powerpoint • Mock Up • Sharepoint Chat	*Added:* • CA system

BAs iterated the importance of defining and clarifying changes that are received for a project. Requirements changes can be received after a business requirements document is signed off and changes may also be received during the 'Business Collaboration' phase. It is imperative that during the 'Project Committee' step clarity is sought on how changes at the different stages will be handled. Changes after 'sign off' are often seen as change requests while changes during 'Business Collaboration' are seen as 'scope creep'. Scope creep refers to changes that emerge that were not initially a part of the project scope. The change control procedures for handling changes are often project and organization dependent. A BA affirmed the need for change requests as *"...requirement changes must be documented as change request document to be used as point of reference in tracing the requirements during implementation and to manage project scope."* What also emerged was the need to clarify the authorizations required for changes. Whilst business often authorizes which changes must be implemented, certain decisions require IT authorizations. For example if a project requires a payment gateway for all online payments, IT will authorize the best suitable solution for this

purpose. This is done due to issues of integration, platforms and architecture of current systems being maintained and developed by the IT department. This highlighted the issue that authorizations were business driven and specialized technical expertise is needed in conjunction with business to approve certain requirements. Tools added to this step include CA, Word, Teams, Visual Studio, Sharepoint Chat, Powerpoint and Mock Up.

4.4.1.6 Solution

The Solution step underwent minimal modification as shown in table 10 below.

Table 10: Solution modifications

(Source: Created by the researcher)

	Conceptual	Increment 1	Increment 2
Purpose	• Evaluate the solution and collaborate with business • Validate if the solution is successful and take corrective actions • Check if it meets business requirements	*Modified:* • Validate a pilot/beta release • Assess performance • Assess limitations • Take corrective actions	*Added:* • Added this component to the iteration in the framework
	Conceptual	**Increment 1**	**Increment 2**
Technique	• Observation • Stakeholder engagement • Decision analysis • Interview	*Added:* • Focus Group	*No changes*
Tool/s	• Word • Excel	*Added:* • Teams	*No changes*

Clarity is seen as essential in this step as it will distinguish the testing aspects from overall beta release validation. Prerequisite testing is carried out as required, however validation of the beta release is the final test before the product is implemented.

Content analysis revealed ‘pilot release validation’ as a prominent theme. Assessing performance of a system is important and it is a good indication of what users will experience using the product. Limitations of the system also need to be determined as these issues need to be addressed before the system is taken to a live environment.

Once problems have been detected, corrective action must be taken by both the technical and business teams. This step was initially not included, however following detailed

discussions, it was determined that the solution needs to be iterated as changes requested may or may not affect the solution.

Changes, be they direct or indirect, will have to be tested in the solution. The focus group technique was added as certain groups may be concerned with only certain aspects of the system. This group will be consulted for decisions and observations. Teams was the only tool added to this step.

4.4.1.7 Deliverables

Following increment 1 this component was removed from the framework. Table 11 below shows the conceptual component, however, there are no changes as it was no longer required in the framework. BAs felt strongly about eliminating the deliverables component from the framework. This was firmly justified with the reasons that follow. Documentation is ongoing throughout the project with documents being created, updated and distributed as and when required. Documents such as meeting minutes, business requirements specification, change requests, issue documents, email communication etc, must be kept for reference in a location decided upon in the Project Committee. These documents can be accessed as and when needed by stakeholders. There is no step at a particular point where this activity is carried out. The general consensus was to remove this step from the framework as it is performed at every step of business analysis during the entire project life cycle.

Table 11: Deliverables modifications

(Source: Created by the researcher)

	Conceptual	**Increment 1**	**Increment 2**
Purpose	• Distribution and storage of the relevant documentation • Documentation must be shared and stored	***Removed:*** • This component was removed	N/A
Technique	• Storing on document management system e.g. • Business requirements specification • Change request logs • Meeting minutes • Workshop documentation • Email communication	N/A	N/A
Tool/s	• Sharepoint-cloud • Premise	N/A	N/A

4.4.1.8 BA Review

The BA Review component was added during increment 1. Table 12 below presents the changes for increment 1 and increment 2 of this step.

Table 12: Addition of the BA review component

(Source: Created by the researcher)

	Conceptual	Increment 1	Increment 2
Purpose	• This component did not exist in the conceptual framework	• Added: • Review challenges, changes and successes for future projects • Identify changes needed to business analysis activities • Identify successes that can be taken to future projects • Recommendations for future projects	*Added:* • Include all parties so lessons can passed to everyone involved
Technique	N/A	*Added:* • Interview • Focus Group • Workshop	N/A
Tool/s	N/A	*Added:* • Sharepoint Chat • Word • Teams • Excel	N/A

Themes of 'success continuity, 'failure acknowledgement' and 'stakeholder participation' were derived from the data analysis. Many different business analysis activities, techniques and tools are used, based on the context of a project. The general consensus was that it is essential to look at what was used for a project and identify the challenges and successes. Successes can be taken forward to the next project as the BA acknowledges the triumphs of business analysis activities. Likewise the failures/challenges should be acknowledged as the BA can make changes for the following project going forward.

The retrospective on the business analysis provides valuable information for the BA and also others involved. Via recommendations for future projects, the challenges can be reduced if not eliminated entirely. BAs argued that involving various stakeholders in this step is vital as their experience during the business analysis activities provides invaluable information. It is vital to include all involved as lessons learnt can be passed on for more fruitful

engagements going forward. Lessons are not always restricted to BAs but are also meant for other role players in a project. The techniques added include interviews, workshops and focus groups. Sharepoint chat, Teams, Word and Excel were the additional tools to be used in this step.

4.5 Towards a finalized framework of practice guidelines

During the experiment the framework underwent alterations as a result of stringent use and appraisal. A holistic view of the transition is discussed in the 'increment 1', 'increment 2' and 'increment 3' sections that follow. As it will assist the reader in easily identifying the alterations, the initial framework (illustrated in Figure 7) is provided again here:

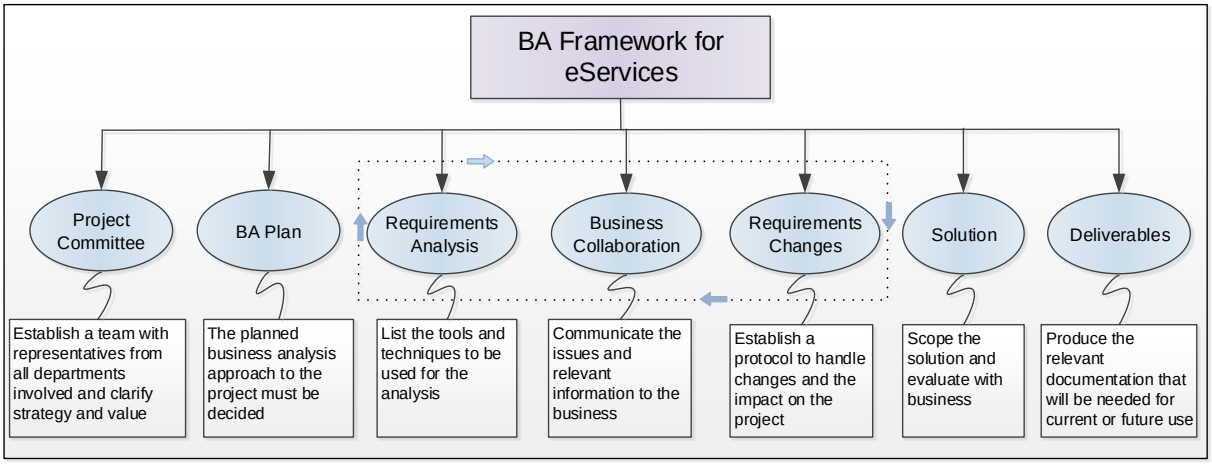


Figure 12: Initial framework as initially designed in chapter 2

(Source: Constructed by the researcher. Note this is the same as figure 7 and is provided again here for ease of comparison)

4.5.1 Increment 1

Accountability emerged as being of paramount importance to BAs, therefore this aspect was brought into the framework in the form of an activity in the Project Committee step for increment 1. Having knowledge of the people assigned to a project was initially included, however getting access to these key individuals together with their commitment was raised as vital in the first increment. BAs are challenged by assignees not bestowing the required amount of time for analysis of a given project, and gaining the attention of key role players due to their daily work commitment is sometimes difficult. The added change ensures that management's directive to BAs to access staff members and ensure their time commitment to the BA will alleviate if not eliminate the problem. Table 13 is an example of the content analysis done for the DSR sessions conducted. This example shows the data analysis done for the Project Committee component of the framework following the first DSR session. Data analysis for the remaining components followed similar analysis as shown in table 13.

Table 13: Example of content analysis from DSR session

(Source: Created by the researcher)

Project Committee		
Increment 1		
Data Condensation	**Code**	**Theme**
Stakeholders not known	Stakeholder	Project stakeholder identification
Do not know who makes decisions	Role players	key role players and responsibilites identification
Stakeholders not decision makers	Role players	
What is process' not needed	Remove 'process'	Remove activity
Do not know what project is about	Context	High level project definition required
Do not know what is included in project and whats not	Scope	
Do not get feedback for queries etc	Accountability	Role players accountability defined
Whom can escalations go to	Reporting Lines	Reporting lines Identification
people involved in project must be together to understand way forward	Meeting	Kick Off meeting needed
collaboration tool also needed	collaboration	MS teams, sharepoint toold needed
People have full work loads and cant always assist	Commitment	Role players commitment

Contextualizing the project at the early stages assists the BA with planning. When context is added, the BA derives very high level activities for the forthcoming events of their business analysis. Stakeholders are also more prepared as BAs prepare them for techniques that will be used for requirements elicitation. They are better prepared for the techniques that will be used. It makes the requirements process easier when people know what to expect and what is expected of them. Increment 1 therefore brought policies, acts and regulations to the fore at any early stage in the BA Plan step, allowing these important policies to be considered upfront before delving into the details.

BAs' agreed that a point of reference is always easier to work with and in turn makes requirements gathering easier. Business has a clearer view of how changes are handled and follow the required protocol for their requests. A retrospective is invaluable as important lessons are learnt. These positives and negatives can be taken to new projects. As a result, the 'Solution' was added to the iteration (dotted line) in increment 1 as this step is affected when changes are made to the 'Requirements Analysis', 'Business Collaboration' and 'Requirements Changes' steps. While techniques and tools are added, BAs may choose the most suitable tools based on the project and their own preference. Increment 1 also actualized a few prominent changes, namely: removal of the 'Deliverable component' and the addition of the 'BA Review' to review challenges, changes and successes for future projects. Reasons for this have been justified in sections 4.4.1.7 and 4.4.1.8 respectively. Figure 13 below presents the framework following increment 1. Once again due to the framework size, only components

and the iterations (dotted lines) are shown in the figures, the tasks, tools and techniques are shown in the relevant tables.

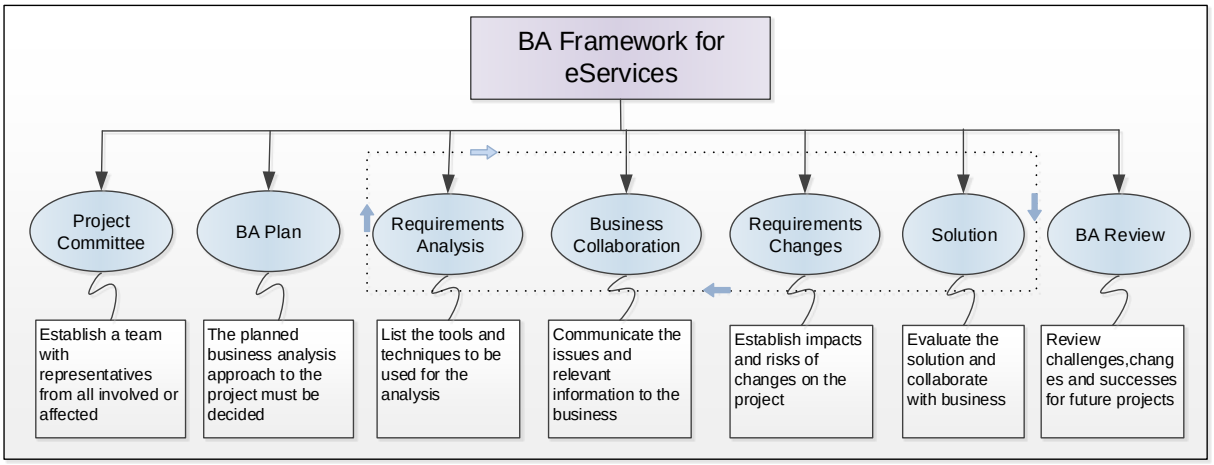


Figure 13: Framework following increment 1

(Source: Created by the researcher)

4.5.2 Increment 2

Having to cater for both agile and waterfall projects, the importance of iterations stirred immense discussion. Increment 2 allowed for the 'Project Committee' and 'BA Plan' to be included in the iteration. It also brought to the fore the observation that stakeholders are sometimes discovered at much later stages in analysis. These new role players were added to the project committee and in turn may impact the 'BA plan'. The 'BA Review' is the only step outside the iteration as this is the final review where lessons learnt is emphasized to improve business analysis in future projects. Participants were of the opinion that 'Requirements Changes' are better monitored using the CA (Computer Associates) system.

This increment also generated discussion on the importance of considering different communication channels for example the social media platforms that the organization utilizes. It was found that social media streams such as Facebook and Twitter are often used to channel information to the municipality even though the traditional helpdesk/call centers are in place. The BA must be cognizant of this, as it becomes an additional input mechanism into their correspondence systems.

This increment stressed that the 'BA Plan' includes the details of communication. This communication must be altered according to the levels of designation of the people involved. The seasoned project managers or business unit managers may not require intricate levels of details in their communication.

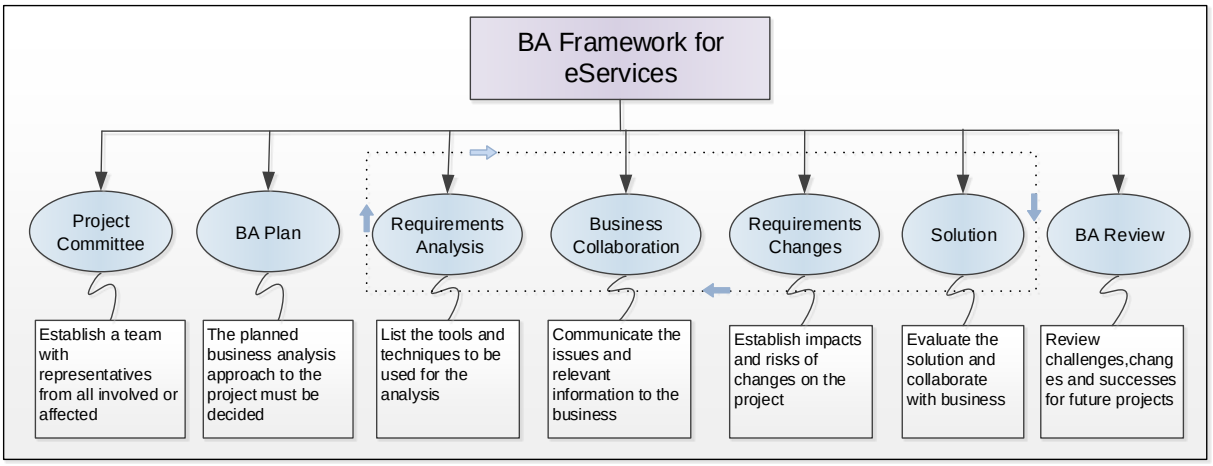


Figure 14: Framework following increment 2

(Source: Created by the researcher)

4.5.3 Increment 3

Although the structure of the framework remained unchanged in increment 3, BAs added to the purpose of the BA Review. It was stressed that BAs could use this step to standardize processes. During the review exercise common issues may surface from various role players. This may present an opportunity to standardize a particular process that is commonly used across various business departments.

4.5.4 Final Framework

During increment 2, the project committee and BA plan was added to the iteration represented by the dotted line. The result is that in the final framework six of the seven components form part of the iterative process, allowing the BA to access any component as and when needed during their business analysis.

'Standardization of processes' was added onto for the purpose of the BA review in increment 3. Following increment 3, the final framework is presented in figure 15, followed by the purpose/tasks, tools and techniques presented in table 14.

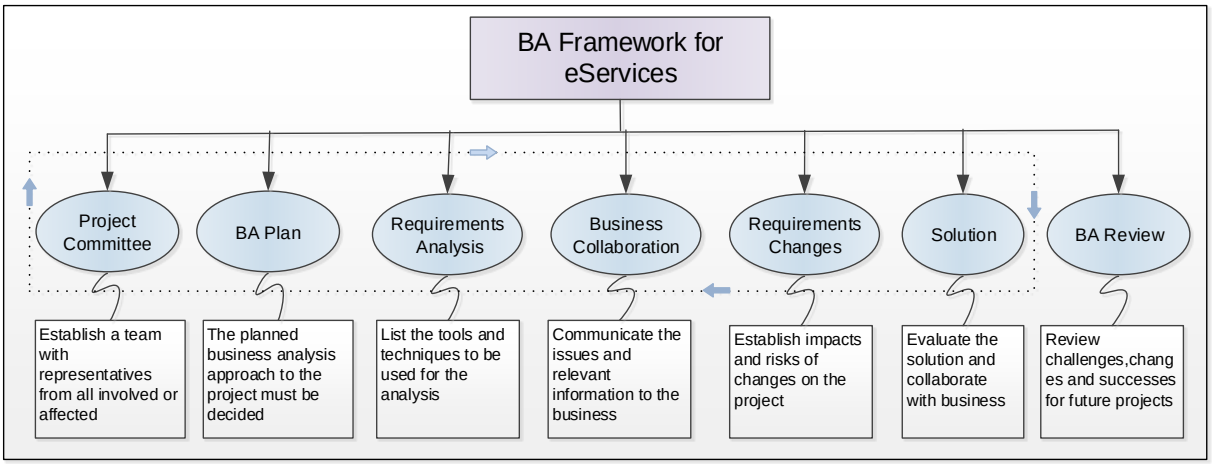


Figure 15: Final framework

(Source: created by the researcher)

Table 14 presents the purpose, techniques and tools of the business analysis framework, as constructed by the researcher.

Table 14: Purpose, techniques and tools of the business analysis framework

Component	Purpose	Technique	Tool/s
Project Committee	Establish a team with relevant representatives from all departments. • Who are the key role players to make decisions? • Who authorizes changes? • High level discussion to contextualize project • Identify scope of work at high level • Define role players responsibilities • What are the reporting lines? • Ensure access to the right people • Request commitment from key people required during the business analysis processes	• Stakeholder analysis • Mind Mapping • Kick Off Meeting • Scope Modelling • Interview • Item Tracking	• Visio • Excel • One Note • Trello • Teams • Sharepoint chat • MS Project
BA Plan	The planned business analysis approach to the project must be decided • Create a communication plan • Share plan with relevant stakeholders • Confirm policies, acts, regulations etc that the BU adheres to • Specify the governance that is prescribed for organization • Select an approach to how to conduct the analysis • Define mandatory documentation • Depending on methodology will documentation be formal or informal • Define where all documentation must reside • Manage information and specify how changes will be handled from requisition to authorisation • Identify the possible breakdown of activities and the possible timing of each • Prepare stakeholders for techniques to be used	• Workshop • Item Tracking • Stakeholder engagement	• Excel • Word • Visio • Teams • Sharepoint • Sharepoint Chat • Powerpoint
Requirements Analysis	Perform requirements analysis. List the tools and techniques to be used for the analysis • Use tools and techniques to establish requirements • Prepare stakeholders for the technique being used, explain how it works • Ensure organization strategy is considered for requirements at all levels • Added different communication channels to strategy eg. Social media	• JAD session & Interviews • Document analysis • Process modelling • Process analysis • Interface analysis • Prototype • Scope Modelling • Item Tracking • Focus groups	• Visio • Nimbus • Excel • Visual Studio • Powerpoint • Mock Up • Teams • Sharepoint Chat • Balsamic • Wireframe

Component	Purpose	Technique	Tools
Business Collaboration	Communicate the issues and relevant information to the business • Interact with business from business unit perspective and user perspective • Engage stakeholders to ensure they understand the information • Gain confirmation on requirement • Present design options • Design options of screens (and not system design)	• Reviews • Workshop • Interviews • Review Workshop Prototype • Item Tracking • Focus Group	• Excel • Word • Powerpoint • Balsamic • Visual Studio • Mock Up • Teams
Requirements Changes	Establish changes, impacts and risks of changes on the project • Manage changes with impacts/risks and authorizations • Ensure requirements still fit for a function and its relationship to other requirements	• Change Request Log • Impact/risk analysis • Requirements prioritization • Change Request approval	• Excel • Visio & Word • Teams • Visual Studio • Sharepoint Chat • Powerpoint • Mock Up • CA system
Solution	Evaluate the solution and collaborate with busines • Check if it meet business requirements • Validate a Pilot/Beta release • Assess Performance • Assess Limitations • Take corrective actions	• Observation • Stakeholder engagement • Interview • Focus Group • Decision Analysis	• Word • Excel • Teams
BA Review	Review challenges, changes and successes for future projects and standardize common processes • Identify changes needed to business analysis activities • Identify successes that can be taken to future projects • Recommendations for future projects • Include all parties so lessons can passed to everyone involved •	• Interview • Workshop • Focus Group	• Sharepoint Chat • Teams • Word • Excel

4.6 Cross impact analysis using ADVIAN

Following the DSR sessions, the complexity of the framework was established and the components represented using a cross impact matrix (Bedinelli Rossi et al., 2014) as shown in table 15 below.

Table 15: Cross impact analysis

(Source: Created by the researcher)

Cross Impact Matrix - Business Anaysis Framework							
	C1	C2	C3	C4	C5	C6	C7
C1	0	3	1	3	3	3	1
C2	2	0	3	2	3	3	2
C3	1	3	0	2	3	3	3
C4	3	2	2	0	3	3	2
C5	3	2	3	3	0	3	1
C6	3	2	3	2	3	0	1
C7	1	2	3	1	2	1	0

Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

The 7 X 7 CIM represents the components of the framework as C1 to C7. To discover the relationships between the components (often referred to as impact factors in literature) and to determine the components that are critical for optimization of the framework, impact analysis techniques are applied (Linss and Fried, 2009). These techniques aim to uncover the interdependencies of the elements of a system and determine the role that each element plays in the system. To assess the complexity of the framework design, the ADVIAN classification method was used (Linss and Fried, 2009, Linss and Fried, 2010, Guertler and Spinler, 2015).

The rationale for this additional data analysis lies in the fact that software projects differ. Therefore, unveiling these interdependencies is essential as the results will assist with estimating future alternative developments to the business analysis framework. This is imperative due to the '*no one-size-fits all*' nature of software projects. Organizations may wish to change one or many components of the framework to better suit their needs. Using the results from the ADVIAN, a municipality will know the impacts of changing the components of the framework when tailoring it to suit their environment. Having this foresight will provide a good indication of the impacts of their intended changes. The various combinations of alternative developments of the components will reveal the possible impacts that each component has on the others.

During data collection, participants completed the CIM for the final framework by entering the impact value strength that each component has on the other 6 components. A simple strength evaluation scheme was used i.e. 0 for 'no impact', 1 for 'low impact', 2 for 'medium impact' and 3 for 'high impact' (Linss and Fried, 2010). The final CIM was obtained using the mode formula as it keeps results close to the "real" value (Panula-Ontto, 2016). Table 4.9 illustrates the final CIM.

4.6.1 Direct relationships of framework components

A classification of the direct relationships between framework components is done by calculating each components active sum (AS) as per equation 3.1 and passive sum (Thompson et al., 2018) as per equation 3.2. The AS demonstrates the degree to which a component directly impacts the framework while the PS indicates the degree to which a component is directly impacted on by the framework. A component with a high AS therefore has a strong impact on other components in the framework and on the framework.

Table 16 presents active and passive sums together with the conversion to relative values.

Table 16: Direct passive sum

(Source: created by the researcher)

Components	*Direct Active Sum*	*Relative Direct Active Sum*	*Direct Passive Sum*	*Relative Direct Passive Sum*
C1	14.00	82.35	13.00	76.47
C2	15.00	88.24	14.00	82.35
C3	15.00	88.24	15.00	88.24
C4	15.00	88.24	13.00	76.47
C5	15.00	88.24	17.00	100.00
C6	14.00	82.35	16.00	94.12
C7	10.00	58.82	10.00	58.82

Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

Equation 3.1 was used to calculate the active sums. The passive sum was obtained using equation 3.2. The conversion of direct active sums to relative values was derived using equation 3.7. As can be seen in table 4.9, the components C2, C3, C4 and C5 with the strongest impacts all have an AS score of 88.24. Both C1 and C6 scored a marginally lower AS with 82.35. The lowest active sum was scored by C7 suggesting that this component has the least impact on others.

The passive sum shows the extent to which a component is *directly* affected by other components. Equation 3.2 was used to calculate the PS of each component. The relative direct passive sums was derived using equation 3.8. Component C5 scored highest with a value of 100 hence is the most affected of all other components in the framework. Component C6 with a passive score of 94.12 is the second most affected component. The least affected component is C7.

4.6.2 Indirect interrelationships of framework components

ADVIAN allowed for the identification of indirect relationships that exist between components. To consider these indirect impacts, the orders of 'activity' and 'passivity' must be calculated. Using the equation (3.3) $dAS_k(c) = \sum_{a=1}^{n}\left(C_{c,a} * dAS_{k-1}(a)\right)$ the AS orders were calculated. These various orders of activity were calculated and presented in table 17. The relative indirect active sum was then established using equation (3.9) $iAS'(c) = \frac{iAS(c)}{max_{c=1}^{n}\{iAS(c);iPS(c)\}} * 100$. Component C5 ('Requirements changes') emerges with the highest score of 91.08 suggesting that this component has the highest indirect influence on all other components in the framework. C2 and C4 scores are significantly close to the high score of C5 indicating that they also have a high indirect influence on the framework. All components except C7 show a high score of over 80 indicating these are active components and affect other components. The 'BA Review' (C7) emerged as having the least indirect impact.

Table 17: Indirect active sum

(Source: Created by the researcher)

Components	Direct Active Sum Order 1	Direct Active Sum Order 2	Direct Active Sum Order 3	Direct Active Sum Order 4	Direct Active Sum Order 5	Direct Active Sum Order 6	Indirect Active Sum	Relative Indirect Active Sum
C1	14.00	202	2859.00	40550.00	575048.00	8154361.00	8773034.00	86.01
C2	15.00	210	2984.00	42297.00	599862.00	8506250.00	9151618.00	89.73
C3	15.00	206	2942.00	41643.00	590811.00	8377039.00	9012656.00	88.36
C4	15.00	209	2982.00	42218.00	598927.00	8492357.00	9136708.00	89.58
C5	15.00	214	3025.00	42952.00	608831.00	8634772.00	9289809.00	91.08
C6	14.00	202	2852.00	40489.00	574002.00	8140332.00	8757891.00	85.87
C7	10.00	148	2079.00	29537.00	418684.00	5937796.00	6388254.00	62.63

Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

The PS orders were obtained using equation (3.4) $dPS_k(c) = \sum_{a=1}^{n}\left(C_{i,c} * dPS_{k-1}(i)\right)$. Table 18 below presents the 'passivity' for order 2 to order 6. Using equation (3.10) $iPS'(c) = \frac{iPS(c)}{max_{c=1}^{n}\{iAS(c);iPS(c)\}} * 100$, the relative indirect passive sum was then derived.

According to these 'passivities', C5 ('Requirements changes') is the most indirectly influenced component having the highest value of 100, while Component 6 also proves to be a very indirectly influenced component with a score of 96.41. It is worth noting that components C1, C2, C3 and C4 are all influenced by other components as all scores are above 80. The component with the lowest score is the BA Review (C7) showing it as the least indirectly influenced component of the framework.

Table 18: Indirect passive sum

(Source: Created by the researcher)

Components	Direct Passive Sum Order 1	Direct Passive Sum Order 2	Direct Passive Sum Order 3	Direct Passive Sum Order 4	Direct Passive Sum Order 5	Direct Passive Sum Order 6	Indirect Passive Sum	Relative Indirect Passive Sum
C1	13.00	191.00	2694.00	38250.00	542235.00	7690037.00	8273420.00	81.12
C2	14.00	196.00	2791.00	39529.00	560751.00	7951005.00	8554286.00	83.87
C3	15.00	210.00	2971.00	42187.00	597942.00	8480642.00	9123967.00	89.46
C4	13.00	190.00	2681.00	38055.00	539557.00	7651475.00	8231971.00	80.71
C5	17.00	233.00	3329.00	47130.00	668583.00	9480187.00	10199479.00	100.00
C6	16.00	226.00	3205.00	45450.00	644538.00	9139763.00	9833198.00	96.41
C7	10.00	145.00	2052.00	29085.00	412559.00	5849798.00	6293649.00	61.71

Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

4.6.3 Classification of framework components using ADVIAN

These supplementary measures are used to determine the condition state of a system and provides perspectives for intervening activities (Linss and Fried, 2010; Guertler and Spinler, 2015). This provides perspective to the framework when these measures are obtained for each framework component. Table 19 presents all framework components classified according to the criticality, integration, stability, precarious, driving and driven criteria. All component's active and passive relative values are used in the criteria calculations as discussed in chapter 3 (3.5.2.1).

Table 19: Direct passive sum

(Source: Created by the researcher)

Components	Rel dAS	Rel Ind AS	Rel d PS	Rel Ind PS	Criticality	Integration	Stability	Precarious	Driving	Driven
C1	82.35	86.01	76.47	81.12	83.53	83.57	16.51	84.76	37.64	36.55
C2	88.24	89.73	82.35	83.87	86.75	86.80	13.30	88.22	34.48	33.34
C3	88.24	88.36	88.24	89.46	88.91	88.91	11.09	88.64	31.31	31.50
C4	88.24	89.58	76.47	80.71	85.03	85.14	15.09	87.28	36.62	34.76
C5	88.24	91.08	100.00	100.00	95.44	95.54	4.67	93.23	20.39	21.36
C6	82.35	85.87	94.12	96.41	90.98	91.14	9.17	88.39	27.82	29.48
C7	58.82	62.63	58.82	61.71	62.17	62.17	37.83	62.40	48.68	48.32

Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

4.6.3.1 Aggregated Indicators: Integration, Criticality and Stability

The conditional state of the framework of components was determined by using the criteria of integration, stability and criticality. Using excel the calculated values are shown in Table 4.13. The integration, stability and criticality are also illustrated using graphs created in excel. The equations to obtain these criteria must be articulated in terms of the relative direct AS (x axis) or the relative indirect PS (y axis) in order to plot the graphs.

Integration

The Integration scores were achieved using equation (3.11) $I(c) = \frac{iAS'(c)+iPS'(c)}{2}$.

Component C5 emerges with the highest integration score of 95.54 (as seen in Table 4.13). Figure 16 shows the integration in the framework. C5, with the highest active sum, has the highest integration. This affirms the notion that C5 ('Requirements changes') has strongest connection with other components in the framework. It must be noted that components with high integration values could present feedback loops. Components C1, C2, C3, C4 and C6 also display high integration scored showing strong connections to other components. The lowest integration and lowest active sum is shown by component 7 with an integration value of 62.17.

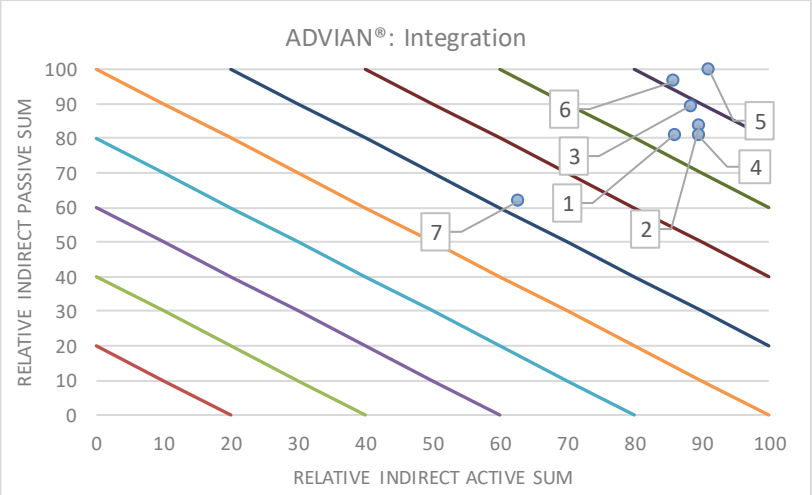


Figure 16: Integration

(Source: Created by the researcher)
Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

Criticality

To establish criticality, equation (3.13) $C(c) = \sqrt{iAS'(c) * iPS'(c)}$ was applied. As far as criticality is concerned, once again Component 5 ('Requirements changes') presents the highest value with a score of 95.44, revealing that it greatly influences the framework while at the same time it is greatly influenced by other components in the framework. The contour lines for criticality resemble the stability contour lines, however with reverse dependence on the relative active and passive sum.

While C5 shows the highest criticality, it has low stability in the framework. All components except C7 ('BA review') show high active and passive sums implying high criticality. Vigilance must be observed with changes to C5 as it arduously affects and is affected by other components with a small change having a higher magnitude change to the framework. While C6 ('Solution') scores the 2nd highest on criticality with 90.98, C1, C2, C3 and C4 scores are also relatively high with scores over 80 indicating high criticality shown in figure 17. With a score of 62.17, C7 shows the lowest criticality indicating that it has neither a major effect on other components nor is it easily affected by other components. Changes made to this component will not have a notable effect on the framework.

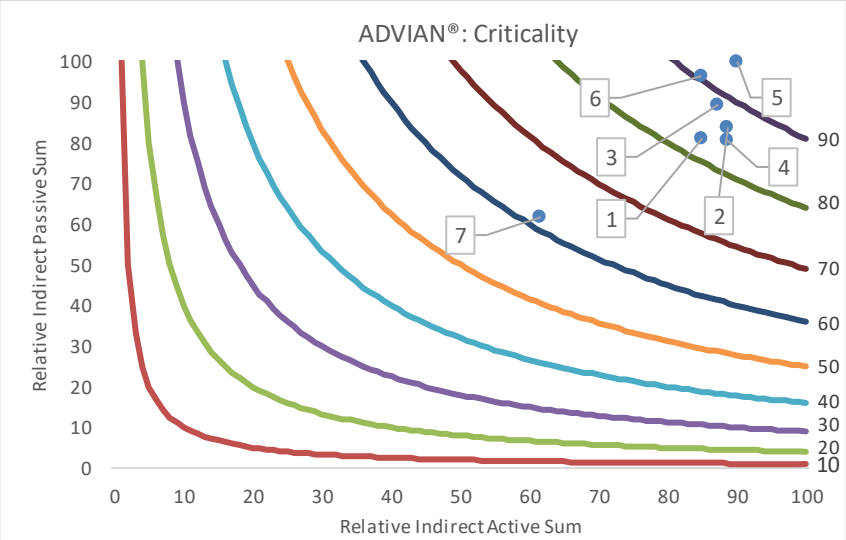


Figure 17: Criticality

(Source: Created by the researcher)
Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

Stability

Stability of the components were inferred using equation (3.12) $S(c) = 100 - \frac{2}{\frac{1}{(iAS'(c)} + \frac{1}{iPS'(c))}}$. Although component C7 has the maximum contribution to stability with 37.83, this is still a fairly low score indicating minimal stability to the entire framework. Components C5 and C6 show the lowest stability scores, however C1, C2, C3 and C4 have scores relatively close to the lowest scores demonstrating the instability of the framework. This is due to the framework components being highly integrated from the high activity, passivity and criticality. The arithmetic mean value for the stability values of all components is used to calculate the average system stability (Linss and Fried, 2010). The overall average stability was calculated to be 15.38. If factors are distributed very close to the active sum axis and the passive sum axis, the system of factors is considered stable (Linss and Fried, 2010).

Figure 18 shows the components situated considerably away from both axis indicating the framework instability. This is due to most factors emerging as highly active and equally reactive causing instability. A change to one component has a major ripple effect causing the framework to be highly volatile and instable.

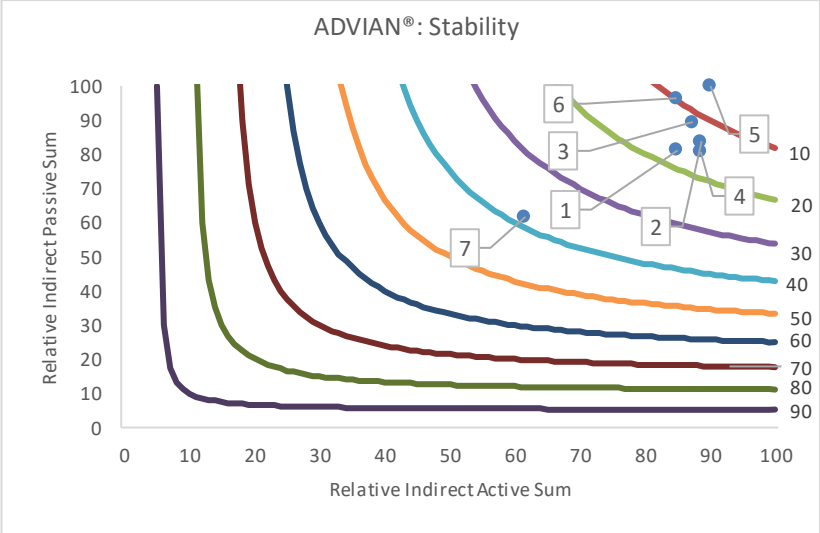


Figure 18: Stability

(Source: Created by the researcher)

Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

4.6.3.2 Aggregated ranking indicators: Precarious, driving and driven

The most suitable components can be selected for improvements in the framework once the ranking of the components is completed. The precarious, driving and driven factors demonstrate which components can most effectively be used for improvements in the framework. Using excel, graphs were plotted to show these indicators.

Precarious

Critical components with a high activity are presented by a high precarious score. This implies that these components are not appropriately influenced by extrinsic actions, however they have a strong influence within the framework and on the framework.

The most precarious component is C5 ('Requirements changes') with a score of 93.23, as is shown in table 19 and graphically presented in figure 19. Components C1, C2, C3, C4 and C6 have significantly high values indicating that most components can be utilized for intervention in the framework, but this must be implemented with caution as they have proved to cause instability in the framework.

The lowest precarious classification is component C7 ('BA review'). Precarious values were obtained using equation (3.14) $P(c) = \sqrt{C(c) * iAS'(c)}$.

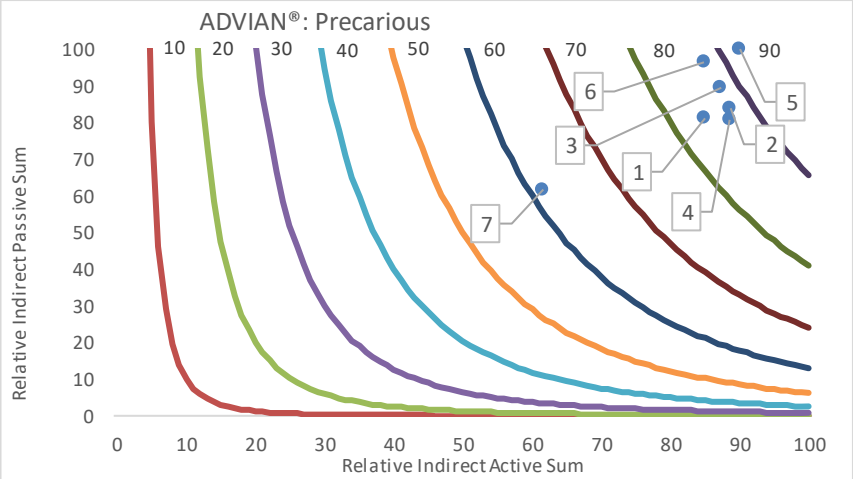


Figure 19: Precarious

(Source: Created by the researcher)
Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

Driving

To obtain the driving scores, equation (3.15) $D(c) = \sqrt{(100 - C(c)) * iAS'(c)}$ was used. Non-critical components with high active sum presents the driving components. Intervening activities are best introduced by these components.

Component C7 ('BA review') with the highest value of 48.68 as shown in table 19, is also the only non-critical component as illustrated in figure 20. This C7 is the highest from all components, but it still maintains a relatively low score. The step (C7) is performed post business analysis as it serves as a review exercise hence will not serve as an effective driving component for the framework.

Once again six of the seven components have shown as highly critical. There are no clear driving components as the framework emerges as having low stability. Changes to any component must be done with extreme caution as there appears to be numerous interdependencies and connections between components as well as a number of feedback loops.

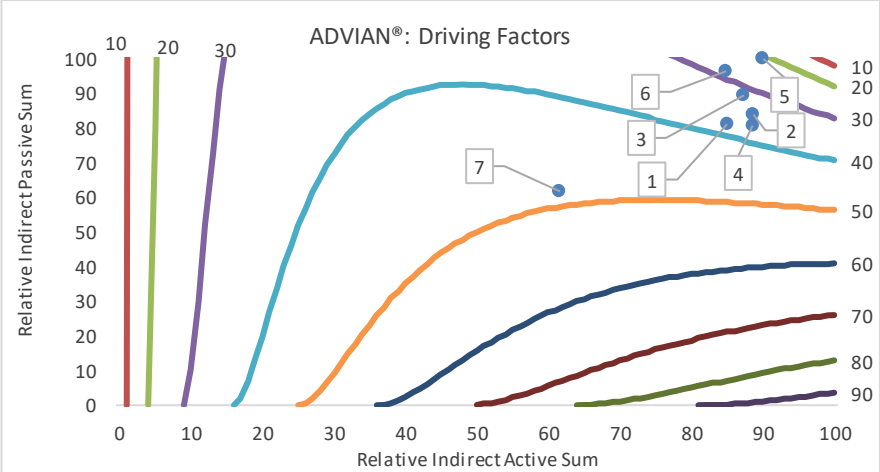


Figure 20: Driving factors

(Source: Created by the researcher)
Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

Driven

In contrast to *driving* factors, *driven* factors are non-critical factors with a high passive sum. Components with the highest driven values are indicators for the success of their use in intervening activities. Table 19 and figure 21 show components C7 with 48.32 as the most driven component of the framework. C7 is carried out after the six components are completed in the framework, hence this does not make a favourable driven component for the framework as C7 being the review step is post business analysis. Table 19 together with figures 16 to 21 show most of the framework components as highly critical. Due to the framework emerging with low stability, there are no clear *driven* components. Extreme caution must be exercised when modifying the components as they are *tightly* connected with interdependencies among them.

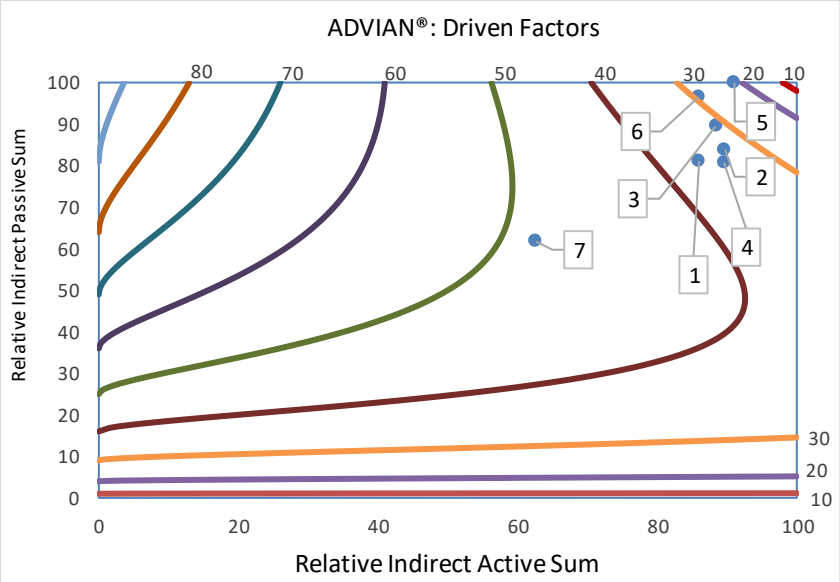


Figure 21: Driven factors

(Source: created by the researcher)
Components: (1) Project Committee; (2) BA Plan; (3) Requirements Analysis; (4) Business Collaboration; (5) Requirements Changes; (6) Solution; (7) BA Review

The above findings are extremely significant as it clearly illustrates how changing a component will impact the framework in its entirety. Software projects differ in their context and in the environments for which they are developed. BAs wanting to alter the framework to better suit their environment need to be mindful of the critical, non-critical, influential and influenced components. The stability and connectedness of the entire framework is revealed with the results above. A summary of the findings from the ADVIAN analysis will be discussed in chapter 5.

4.6.4 Framework evaluation

During the DSR sessions, questions regarding the framework were raised and discussed. This data from the DSR sessions was analysed in section 4.4.1. To close off the loop on the framework analysis, a questionnaire was completed by the participants. The questionnaire consisted of open and close ended questions referring to the various aspects of the framework. Once again, content analysis and open coding was utilized to identify themes in participant responses.

Responses from participants were aligned, as revealed in table 20. All participants agreed that the framework addresses the problems experienced in business analysis. Results unanimously indicate that the tools and techniques suggested are appropriate. Tools and techniques were both added during the first and second DSR sessions. 90% of participants were in agreement that the framework is suitable for the municipal environment while 10% remained unsure. The 'Project Committee' and 'BA Plan' added strength to the business

analysis foundation as agreed by all participants. With only 10% unsure about improved business analysis leading to better quality eservices systems, 90% were in full agreement on this point.

Table 20: Score of closed ended questions

No.	Question	Yes	No	Maybe
1	Does the framework addresses problems in business analysis	100%		
2	Are the Tools and Techniques are suitable for each component	100%		
3	Will framework achieve its intended purpose	100%		
4	Will framework work in the environment	90%		10%
5	Does the project Committee and BA Plan add strength to the foundation of business analysis	100%		
6	Is business analysis quality enhanced using the framework	90%	10%	
7	Will improved business analysis lead to better quality eservices systems	90%		10%
8	Can Requirements Changes help with requirements traceability	100%		

Table 21 lists the open ended questions from the questionnaire.

Table 20: Open ended questions

No.	Question
1	How do you feel about the usability of the framework
2	The BA Review component was added. Why is this important for future projects
3	What is your feeling on this framework as a whole in this environment

Content analysis was applied to the participants' responses. Using coding, various themes emerged from the data. On question 1 from table 21, some of the emerging themes included *framework as a guideline, framework usability* and *flexibility of the framework.* Table 22 shows the content analysis for question 1 in table 21.

Table 21: Content analysis for question 1 (in table 21)

Q5: How do you feel about the usability of the framework		
Condensed data	**Codes**	**Themes**
At first it was a bit confusing but after explanation it became better. It is a perfect Guideline to follow when doing projects.	guideline follow	Serves as guideline
Simple to read and follow	simple	
It is a good thing to use the framework as it guides how to approach each deliverable of the project	guides	
Being familiar with Business analysis and the theory behind it, it is very usable and flexible with the tools and techniques	usable flexible	Framework is usable
It is achievable in this environment	usable	Framework is flexible
The steps and components are clear and have been clearly stipulated	clear	
It is user friendly and informative about the expectations on business requirements and outcome of the final product.	friendly informative	Informative framework
I strongly believe the framework can be used to achieve the objective.	usable	
The framework aligns well to current work practices, it is simple to read and follow	aligns work practises	Alignment to work practises
The framework is clear flexible and covers all the important aspects of the project	flexible clear	
Good to use framework as a guide on how to approach, organize and control milestones of each deliverable in a project	guide	

Responses aligned to the framework serving as a good guideline for business analysis. The participants believe that the framework assists with the approach required, organization and more control of milestones for each deliverable. 64% of responses indicated that the framework was easy to use for business analysis. Responses on the framework usability included: "*the steps and components is clear, flexible and covers all the important aspects of the project*". The flexibility of the framework surfaced with respondents agreeing that the framework is flexible to accommodate some of their individual preferences, for example selecting their preferred tools or techniques to be used during the business analysis process.

The themes *identification* of *strengths/weakness, future projects recommendations* and *delivery of expectations* emanated from question 2 of table 20. A few participants were initially skeptical regarding the addition of the new component (BA review) during the first DSR session. However all participants agreed on its significance in the latter session and responded positively to this question.

An important point evident from responses was that business analysts will be able to acknowledge challenges or mistakes. This helps them to identify steps to be taken to alleviate these challenges or mistakes in future projects. Answers also included the importance of noting the successes that are experienced in a project which can also be implemented in future endeavors. Due to the collaborative nature of the BA review, respondents highlighted the tremendous value of receiving recommendations from role players for future projects. Respondents also indicated that the review helps establish if the expected deliverables have indeed been delivered as per expectation. Noteworthy was that when similar patterns emerge within various project, it opens the discussion to standardize processes. This then assists with future projects where a standard process can be followed.

Analysis of data for question 3 of table 20 revealed the themes on *step by step guide, suitability for simple and complex project* and *improvement of quality of work*. Responses align to the framework providing a step by step guide to performing business analysis on eservices projects. Responses exhibited that the framework assists to ensure that all steps of the analysis is followed by providing structure and guidance.

The suitability of the framework for both simple and complex projects was extricated from the data analysis. There was a strong response around the improvement of business analysis. Responses showed that the framework will enhance the quality of the business analysis process by providing a formal structure to guide the process. There was a general consensus that the framework is a realistic artefact that can easily be implemented knowing the challenges experienced in the current environment.

4.7 Chapter summary

This chapter explained the evolution of the business analysis framework during the DSR sessions. The modifications of each component was highlighted in tables in section 4.2. The transformation of the entire framework through the sessions is shown in detail through tables 4.1 to 4.8. The complexity of the framework and its components was evaluated using a CIM. The active and passive sums of components were calculated so that the direct and indirect impacts of components were identified in relation to each other. An advanced impact analysis technique (ADVIAN) was applied to establish the state of the framework (criticality, stability and integration) and the components most suitable for interventions (precarious, driving and driven). These measures were used to identify the components that are highly stable in the framework, those that influence other components in the framework and those that are influenced by others. It is necessary to identify these and report on these so that BAs are aware of the complex interrelations that exist within the framework and are aware which components can be changed and manipulated without destabilizing the framework. It is also necessary for BAs to be aware of those components that are highly integrated within the framework such that a change to that component has the ability to destabilize the framework.

This final two research objectives of the study were satisfied in this chapter: RO3: ***to develop a framework of practice guidelines for business analysis of eservice systems*** and RO4: ***to validate the components and to determine the nature of the interfaces between components in the framework.***

The purpose of this research was to develop and theoretically evaluate a framework. Widespread fit-for-purpose requires a different research approach, one that is more quantitative and confirmatory in nature. This will be explored in future research post Masters.

Chapter 5: Interpretation of the Results

This chapter presents the interpretation of findings by examining the evolution of the framework, followed by the results of applying ADVIAN to uncover relationships among the components of the framework.

Section 5.1 presents the findings of the DSR sessions with the refinements of each component of the artefact discussed. Having applied ADVIAN to uncover relationships among the finalized components of the framework, the results on the framework's complexity are presented in section 5.2. Following the DSR and ADVIAN assessment, the results of the framework evaluation are discussed in section 5.3. The validation of the results is presented in section 5.4.

5.1 The artefact in motion

The DSR sessions were well planned and the focus group applied the framework to a given eservices case study, a municipality. The focus group allowed for rich discussions, direct contact with the BAs and the opportunity to clarify any uncertainties as confirmed by Tremblay et al. (2010). Alterations to the framework emanated from the rigorous use of the framework followed by intense discussions. The framework saw the majority of the enhancements emanating from the focus group in the 1st session, followed by fewer adjustments in subsequent sessions. The results of each framework component effected by the focus group are discussed in detail below.

5.1.1 Project committee

This component was identified as playing an integral part in the business analysis process as major role players with roles and responsibilities are defined. This area set the scene for business analysts to contextualize the project and identify stakeholders going forward. The focus group brought to the fore the significant issue of accountability on any project. The group stressed the struggle BAs generally experience with not having access to the right people for their analysis tasks. This component was modified to overcome this challenge by defining role players and reporting lines for the added benefit of accountability.

5.1.2 BA plan

The importance of incorporating policies, regulations, governance and acts into business analysis was identified by the focus group as being crucial at the early planning stages. BAs repeatedly emphasized the adverse consequences of this aspect only surfacing in later stages during business analysis.

The final solution for a software project may possibly be impacted if policies, regulations, governance and acts are not incorporated into the analysis and therefore inadvertently affect the solution.

The importance of a communication plan is often underestimated but is imperative so that personnel know with whom they should communicate and how communication will be carried out during business analysis. This step also saw the addition of the preparation of stakeholders for techniques to be used during the analysis. The group discussed the frequency of walking into workshops or JAD sessions where participants are unaware of the techniques the BA is using resulting in confusion or reserved behaviour.

5.1.3 Requirements analysis

Inclusion of the organization's strategy was emphasized at this stage. The focus group used the example of digital strategy in the organization to exemplify this point. They illustrated how the use of emails, sms's etc. must be incorporated into their analysis and eventual solution to align with the strategy. If a digital strategy (using the example raised by the focus group) is not considered, perhaps the route of mail or telephone calls to customers will be considered in the solution as opposed to more digitized options. The group unanimously agreed on the technique of 'item tracking' to be used as issues raised along the way often 'fall into the cracks'. This technique better aids tracking of the issues raised for the duration of the project.

5.1.4 Business collaboration

The core purpose of confirming requirements for this component was agreed upon. However the group emphasized the need to ensure that the different areas of business each have their requirements met. This may require specialized focus groups within the business departments. BAs often found that confirming requirements with the entire business departments saw 'louder voices' get more attention, hence focus groups are sometimes necessary and will allow all members a chance to share their point of view. For this reason the focus group technique was added to this component. The group also added additional tools viz. teams and mock up. Teams is currently being used across many business departments making communication easy using this tool. Mock up is a valuable tool that can assist business visualize their requirements, hence the addition of this tool.

5.1.5 Requirements changes

The function of defining and clarifying changes remained the primary purpose of this component.

BAs emphasized the importance of the ‘Project committee’ component in relation to this component. They argued that change control protocol which is defined at the ‘Project committee’ stage has to be effected during ‘Requirements changes’. Changes to requirements require meticulous management and approval structures from the project committee. The focus group felt strongly about protocol being enforced as requirements changes often, but not always, affects the ‘solution’ to the project. The tool ‘Teams’ was added as this aids communication amongst all stakeholders of the project.

5.1.6 Solution

The focus group found that a performance assessment of the developed system is imperative at this step. The group advised that testing the beta release is a good indication of what users will experience using the product. This component will also highlight the limitations or problems of the system which must be addressed before the system is taken to a live environment. This component saw the addition of the ‘focus group’ technique. This will allow for the confirmation of specific requirements of the system being met for the different focus groups in the business department.

5.1.7 BA Review and Deliverable

During the application of the framework, it was unanimously decided that the new ‘BA review’ component should be added to the framework. The focus group saw tremendous value in the ‘BA review’ as retrospection surfaces invaluable lessons for projects going forward. Whilst the working group added this component, the initial ‘Deliverable’ component was removed. Eliminating the ‘Deliverable’ component was due to the fact that deliverables are created and distributed throughout the business analysis process and not only at a particular stage.

The focus group justified the addition of this component as they highlighted the benefits of using outcomes from this step in their future endeavours. Lessons learnt adds value and is a trigger for improvement to many, if not all, stages of the business analysis process. There are many lessons to be learnt following the completion of a task, process or project. When business analysis is completed on a project, successes and failures should be discussed. This often assists with projects going forward as successes can be applied and downfalls can be avoided to projects going forward. As project constituents differ, the business analysis approach may require revisions accordingly. This component allows for a retrospect on challenges experienced during the business analysis process, preventing repetition of approaches that didn’t prove successful in the completed project. The BA should engage with role players to gain insight to their experience during the business analysis process.

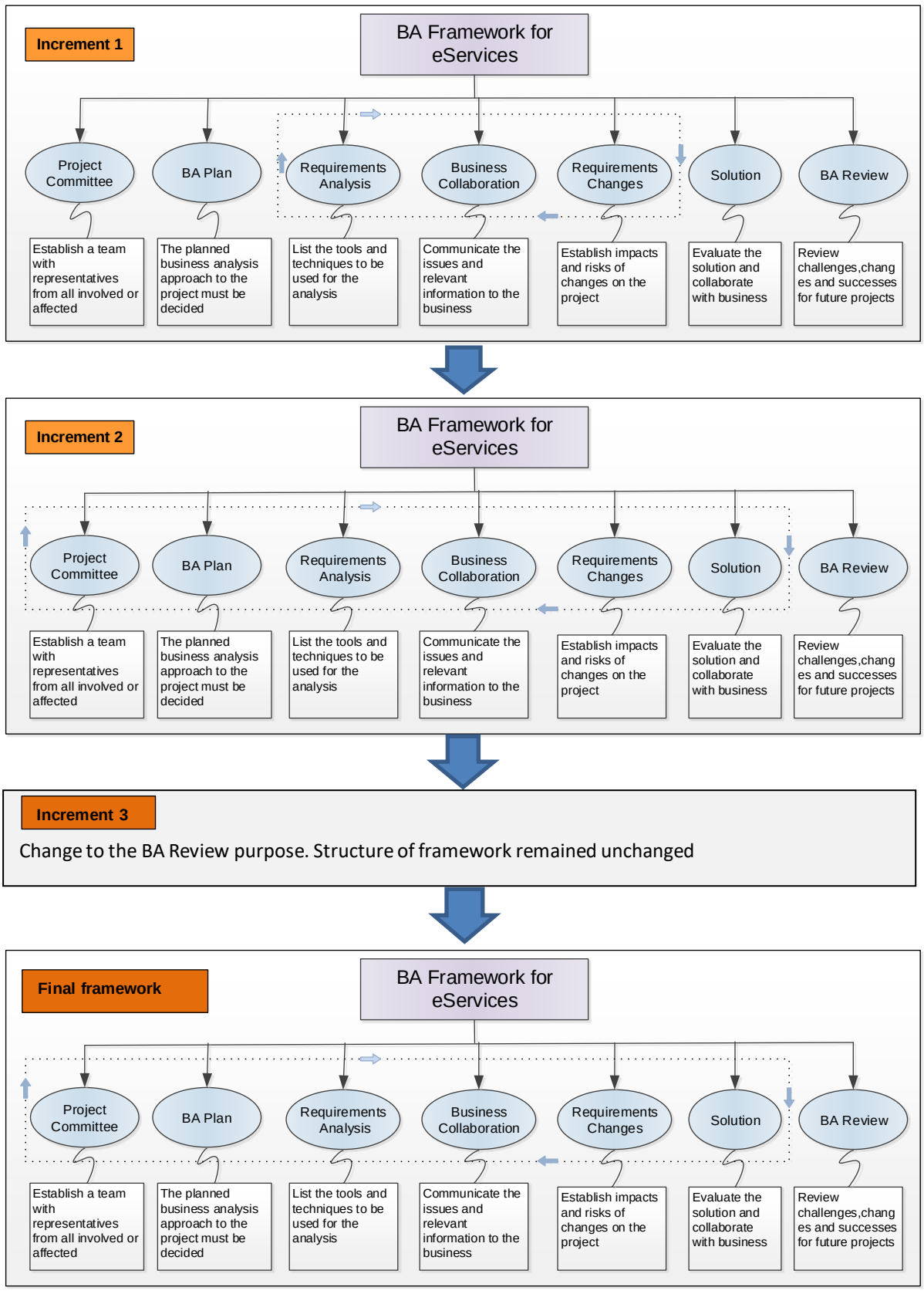
Valuable feedback is often received from stakeholders which BAs can draw from and improve for future projects. Using comments and criticism, BAs can identify changes needed for their business analysis process and activities. A similar concept is 'lessons learned' which is technique used in BABOK to recognize suggested changes to business analysis deliverables, processes and templates that can be included into current or future initiatives (BABOK, 2015).

5.1.8 Final DSR Artefact

During the use of the artefact, modifications were made to the purpose, techniques and tools of all seven components of the framework. The focus group utilized the framework rigorously using an eservices case study project in a municipality. Sections 5.1.1 to 5.1.7 discuss the findings of each components. A noteworthy point to mention is the components that were initially included in the iterations in figure 13 (Increment 1) are 'Requirements analysis', 'Business collaboration' and 'Solution'. The focus group felt strongly on all components except the 'BA review' being included in the iteration. Due to the components being closely linked to each other, activities in a component have a ripple effects on other business analysis tasks. This ties in closely with the ADVIAN analysis which is discussed in greater detail in section 5.2. This resulted in the artefact in figure 14 (Increment 2). All components can be accessed at any given time that the BA sees fit. The 'BA review' is excluded from the iterative process. This is due to the 'BA review' being done subsequent to the business analysis on a project. The working group felt strongly that positive outcomes can be carried forward to future projects and negative outcomes should highlight areas for improvements. The group was adamant that the 'BA review' should not be obscured as it brings a wealth of information to future projects which can be detrimental to project success. The final framework was created in figure 15. It shows a progressive version of the framework as the iterative nature of the framework becomes more pronounced. Figure 22 illustrates the evolution of the framework from its pioneer to final stage, however the advancements to the purpose, techniques and tools are discussed in section 5.1.1 to 5.1.7. Following the DSR session, the focus group was then recalled to evaluate the impact of the final components to each other. The following section presents the results of the evaluation.

Figure 22: Framework evolution

(Source: Created by the researcher)



5.2 Evaluation of the framework complexity

For the purpose of evaluating the design complexity of the framework and interrelations amongst components and how those components affect the framework in its entirety, the ADVIAN method (Linss and Fried, 2009, Linss and Fried, 2010) was applied. Whilst applied and evolved, the business analysis framework is intended to be utilized by municipal environments to aid business analysis for eservices projects. Due to dynamics being diverse across public sectors, organizations may want to tweak components to better suit their environment. Direct and indirect impacts become crucial when altering components as they have been created to function together. By knowing how these components impact each other, cognizance can be taken when altering components. By establishing classifications and identifying intervening activities, components for changes are identified as well as those components that will result in adverse effects.

5.2.1 Findings on the direct impacts

The degree to which a component directly impacts the framework is determined by the active sum. Excluding the 'BA review' component, all other components of the framework presented high AS. It is evident that the 'Project committee', 'BA plan, 'Requirements analysis, 'Business collaboration' and 'Solution' heavily impact other framework components. These components have high AS with an average score of 86. These components have strong impacts on all other components of the framework. Changes to these components strongly affect other framework components.

The degree to which a component is impacted on by the framework is established using the passive sum. Except for the 'BA review' component, the remaining 6 components are highly impacted by other framework components. When changes are applied to components, these 6 components are strongly affected by the changes. "Requirements changes' is the most impacted component of the framework. The 'Solution' is the 2nd most reactive component. The remaining components have scores > 76 revealing them as highly reactive as well.

5.2.2 Findings on the aggregated indicators: Integration, criticality and stability

Whilst 'Requirements changes' emerges as having the highest integration with a score of 95.54, 6 of the 7 components have scores greater than 83 indicating that strong interrelations exist with other components. This confirms the notion that has already been expressed that indicates that components in the framework are highly interconnected.

This causes feedback loops where a change to one component ultimately affects other components in a cyclic fashion so that the changes come back and re-affect the changed component.

'Requirements changes' also present as being the most critical component of the framework indicating that changes to this component has the potential of having a high impact on other components and in turn is highly affected by alterations to other components (Guertler and Spinler, 2015). It is important to note as far as criticality is concerned that the criticality values of all other components except that of the 'BA review' are all extremely high, indicating that changes implemented in any of the components has the potential of having significant effects on the framework as a whole. This makes these components unsuitable for systematic extrinsic changes due to the uncertainty of the reaction of the framework as a whole. The 'BA review' being a subsequent business analysis step concurs with the results of having the least impact and impacting other components the least. Although the 'Requirements changes' and 'Solution' are the biggest contributors to the instability of the framework, none of the components contribute significantly to the stability of the framework. When looking at the graphic representation of stability in figure 18, components distributed closely to the active sum and passive sum axes are considered most stable and are those components that will ensure stability of the framework. Figure 18 clears illustrates that none of the components are close to the active sum and passive sum axes indicating that the framework is not stable. The average stability was calculated to be low at 15.38 confirming the framework's volatility. The 'BA review' proves to be the most stable component compared to all other components and this component lies outside the iterations of the remaining components.

5.2.3 Findings on aggregated indicators: Precarious, driven and driving

All components except the 'BA review' present high precarious scores. High values on this aggregated indicator suggest that extrinsic actions cannot suitably influence the system but they are strongly influenced by the system (Linss and Fried, 2010). Hence if major changes are made to the six remaining components, they would interfere with other parts of the framework and could destabilize the framework in its entirety. This suggests that these six components should not be used for intervening activities. The framework is highly volatile and this could be due to the iterative nature of the framework as the only component that is different from the others is the 'BA review'. This affirms that all the framework components except the 'BA review' should not be used for intervening activities.

The highest score on the driving indicator was the 'BA review',' Project committee' and 'Business collaboration'. This indicator is used to identify which components are most suitable for intervening activities as they influence components without having strong feedback.

‘Project Committee’ and ‘Business collaboration’ *driving* values are only marginally higher than the other components however they have high precarious values > 84 deeming these componects unsuitable for intervening activities. Due to lower values of the remaining components, it is clear that none of the components are suitable for extrinsic action to positively affect the framework. The ‘BA review’ with the highest precarious value and lowest criticality has the least impact and impacts other components minimally hence making it unsuitable for intervening activities. The ‘BA review’ proved to be the highest driven components. Intervening activities cannot reasonably change these components as system-internal impact mainly guide them. The condition of these components is a good indicator for the success of extrinsic actions taken on driving components. Due to the low values for *driving* and *driven* together with their high precarious scores, none to the components qualify as driving or driven components. Despite the ‘BA review’ having the highest *driving* and *driven* score, this component has a low critical value and does not impact the framework. The ‘BA review’ is not a part of the iteration in the framework as it is done post business analysis which is the reason for it not being highly active. All other components showed as highly critical however the results reveal that the business analysis process can continue without the ‘BA review’.

Arising from the analysis it is clear that the framework is highly volatile. With the exception of the ‘BA review’, the other 6 components exhibited high integration, high criticality and low stability. This implies that changes to any of the 6 components can have major impacts on other components as well as the framework in its entirety. The ‘Requirements changes’ component has the strongest influence within the framework and on the framework however it should be noted that it is not appropriately influenced by extrinsic actions. There are no clear driven and driving components because the framework emerges as having low stability. Changes to any component must be done with extreme caution as there appear to be numerous interdependencies and connections between components as well as a number of feedback loops.

Following the rankings, the researcher believes that being aware of the component impacts and interdependencies is vital when altering the framework. Components have also been identified where one should be guarded as they present high impacts and feedback loops into the framework.

5.3 Results of framework evaluation

The final stage of the focus group participation involved the completion of a questionnaire by participants. This was done to ascertain their view on the final framework after the DSR sessions and impact evaluation.

Responses to the questions indicated that all respondents were in agreement that components on the framework address problems experienced in business analysis. Ten participants agreed that the framework is suitable for the municipal environment with one being unsure. All participants agreed with the ease of use of the framework and its suitability to current work practices. The quality of business analysis being enhanced with the framework revealed 10 participants in agreement with one participant disagreeing. Having a review subsequent to business analysis was seen as fundamental for the improvement of all steps in the business analysis process. This was a dominant point accentuated by the participants. There was an overarching consensus that the framework was a realistic artefact worthy of implementation to aid in current business analysis challenges.

5.4 Validation of results

Poor instrumentation is one of the several threats to validity (Shelestak and Voshall, 2014). A pilot study was conducted to test the instruments. This valuable exercise allowed the researcher to reword questions that were misleading or ambiguous. These enhancements produced more comprehensive and accurate research instruments. Glitches in the overall process were highlighted and hence rectified prior to the 1st DSR session. The pilot study was conducted which assisted to reduce interviewer bias making the findings more trustworthy.

The use of triangulation allowed the researcher to approach different facets of the same research questions adding depth to the research project. Using focus groups and questionnaires added to the reliability and validity of the data. The researcher followed meticulous procedures to administer instruments, collect data and facilitate the DS sessions. These findings are founded from a rationally developed sampling strategy and data collection plan. Validation was also aided having conducted multiple DS sessions.

The focal point of the research cannot be resolved by BAs of one municipality, an alliance approach was taken. As such, responses were also obtained from business analysts outside the study site. These participants were currently working on eservices projects at the same municipality during the research. This approach was chosen to overcome bias which may been experienced had the researcher chosen participants (BAs) from the research study project site only.

5.5 Chapter summary

Chapter 5 described the results obtained for the study. Section 5.1 discussed the refinement of the framework detailing each component's evolution together with the justifications for their changes.

A visual of the framework increments was presented in figure 22. A discussion of the ADVIAN assessments revealed the degree of impact that would exist if changes were made to components of the framework and the possible framework instability that would occur. ADVIAN analysis highlighted the need to make changes with extreme caution due to the instability of the framework with the only component having a slight effect on the stability being the Review. Sections 5.3 concluded the results of the framework evaluation. Chapter 6 will provide the research conclusions, limitations of the study and recommendations for future work.

Chapter 6: Conclusion, limitations and future research

This chapter reflects upon the study in its entirety by providing a summary of the study and answering the research questions cited at the inception of the study. It begins with a brief reminder of the research aims, question and objectives in section 6.1, before discussing how these were realized in section 6.2. Section 6.3 presents the limitations of the study, followed by the contribution and future work in section 6.4 and 6.5 respectively.

6.1 Overview

Eservices is one of the most significant aspects of ICT investment in the public sector and yet many challenges are experienced in eservices projects (Anthopoulos et al., 2016; Mawela et al., 2017). These projects can be complex, hence require more robust analysis. A critical stance must be taken to requirements analysis during government transitions to eservices systems (Alexandrova, 2012). One of the underlying factors for a well-developed functional application is thorough analysis on business requirements, as discovered in literature. Uncovering the challenges led to the main research question of the study.

The main research question: *"What is an effective framework for improved business analysis of public eservice systems?"* led to the following objectives of the study:

a) To evaluate existing business analysis approaches adopted for public eservices systems projects (RO1)
b) To determine the key knowledge areas, process flows and activities in business analysis for public eservice systems (RO2)
c) To develop a framework of practice guidelines for business analysis of eservice systems (RO3)
d) To validate the components and to determine the nature of the interfaces between components in the framework (RO4)

6.2 Realizing the study objectives

This study has realized all its study objectives. The comprehensive review of literature in chapter 2 delineated the business analysis approaches adopted for public eservices. This review revealed that BABOK is the body of knowledge used by many analysts as a guide to business analysis, as well as QFD. The first objective (a) above was achieved mostly in sections 2.1 to 2.4 of chapter 2.

The KAs, process flows and tasks for business analysis on public eservices systems was identified to satisfy the second objective (b) of the study. This set the background to create a framework of practice guidelines to overcome the inferred challenges in business analysis.

Chapter 3 showcased the research approach to the study. The overarching methodology of Design Science was used for the iterative development of the framework allowing for new additions to, or deletion from, the framework components. A business analysis framework has been successfully developed, refined and evaluated satisfying objective (c).

The framework was evaluated rigorously by a focus group which led to modifications and resulted in the final artefact in figure 15. Objective (d) was accomplished using an advanced impact analysis technique (ADVIAN) to uncover relations amongst the framework components. Components for intervening activities were identified through the interpretation of the ADVIAN analysis calculations.

6.3 Contributions

The distinct contribution of the study lies in the development of a framework to address problems affecting business analysis for municipal eservices. With the limited literature on business analysis in the public eservices sector, this study contributes by providing theory for this largely undeveloped area. This study has an overarching contribution to the government sector as eservices is a constituent of egovernance.

The developed framework provides major knowledge areas to be considered when conducting BA in public eservice systems which are pragmatically co-developed and validated. The intention was to develop a framework of practice guidelines. The developed framework was arduously utilized, evaluated and refined to produce an improved product. The framework provides business analysts with components each comprising of tools and techniques to guide their business analysis process. The purpose of each framework component is outlined which aids the BA in ensuring they accomplish the objective of a particular step. The tools and techniques are provided to assist BAs to achieve the end goal of each step. Analysis and exploration of requirements has a lesser degree of focus as opposed to the representation of requirements (Özdağoğlu and Salum, 2009). By utilizing the framework, BAs can focus on the analysis of requirements and also be guided with issues surrounding the analysis process. The framework provides a frame of reference for BAs with added flexibility to choose as more than one tool or technique is suggested for each step.

Frameworks provide a wireframe for a domain it is intended for. This research was conducted at one municipality, however other municipalities may wish to implement changes to suit their environment. Cross impact analysis is useful when changes are foreseen and more importantly the impacts are to be acknowledged. The use of cross impact analysis provides a view of how components in this framework influence each other, hence providing a more robust tool for BAs. Cross impact analysis has been described to "*provide deep insights into the operating logic of a system with complex interactions between its elements*" (Panula-Ontto, 2018, p. 89). Using ADVIAN, all components of the framework have been assessed for their direct and indirect impacts on each other. The use of ADVIAN adds a level of rigour otherwise largely missing in existing static frameworks. This advanced impact analysis technique enabled the identification of impacts for each framework component highlighting the consequences if they are altered. The aggregated indicators serve to assist BAs with tailoring the framework to better fit project environment and constraints. This is the hallmark of developments in the greater software engineering discourse with agile and adaptable process models and organizing approaches. A further vital contribution is the presentation of a platform that could serve as a basis for further research and development of tailorable frameworks in other areas of the software engineering discourse.

The evaluation results show that the framework addresses problems experienced in business analysis, is easy to use, enhances business analysis quality and is a realistic framework worthy of implementation.

6.4 Limitations

This study is confined to one municipality in Kwa-Zulu Natal. Given that these are eservices projects of one municipality, the results cannot readily be generalized to Kwa-Zulu Natal region and other municipalities in South Africa. Software projects are unique to their environments, thus the framework must be altered accordingly when applied to another municipality. This factor also contributed to the small sample size of 15 business analysts, which is a borderline number in a qualitative study. Of the selected sample size, there were 11 of the 15 business analysts participating in the focus group, evaluation session and questionnaires. The sample would increase if this study was carried out on more than one municipality.

6.5 Recommendations for future work

There are always confines to using a single site for a study of this nature. Future research should include more municipalities across the country to test the developed business

analysis framework. The framework being used across different municipalities embarking on eservices software development projects will bring in dynamics of the different working environments and as such advance the framework. Knowledge attained in this study can aid decision makers when setting guidelines with regard to business analysis in municipalities. Findings from the study may also assist to place emphasis on stakeholder roles, responsibilities and accountability as these people are crucial in providing vital information for system development. Future work includes applying the blueprint for a tailorable framework of practice to other areas to test its ingenuity and allow for further developments.

6.6 Conclusion

The findings of this study led to the creation of a business analysis framework of practice guidelines specifically for eservices. This was achieved by uncovering challenges experienced in business analysis for eservices software developments projects. Using the framework, business analysts are better positioned to perform business analysis in their eservices projects. The frameworks' seven components cater for the various aspects of business analysis and, it is argued, would materialize into enhanced business analysis in a municipal environment. The purpose, tools and techniques of the components will encourage sound business analysis and steer eservices projects in the right direction from a business analysis perspective. Evaluations of the framework allows for impacts of changes to be known upfront and catered for accordingly. This field-based study engaged a focus group to refine the artefact, establish component impacts and evaluate the artefact, and generated rich and insightful qualitative findings. It can be concluded that municipalities need guidelines and frameworks around business analysis to assist eservices projects which are a constituent of their egovernance strategy. The study results obtained has proven the easy use and adoption of the framework. Such a framework can be deployed and taken to different municipalities within South Africa and globally and adjusted with the ADVIAN results in mind.

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Appendix A

Questions on your experience/views on using the Framework

- Would you say the framework addresses business analysis problems such as quality, complexity changes, customer satisfaction and issues around requirements?
- Tools and techniques have been suggested for each component if the framework. Do you feel these are suitable for the purpose of the component? If no, what is your suggestion?
- Will the 7 components in the framework achieve each of its intended purpose as described to you?
- Knowing the workings of this environment, will the suggested framework work for projects? If no, please elaborate.
- How do you feel about the usability of the framework?

Framework components

- Before requirements analysis is tackled, does the Project Committee and BA Plan components add strength to the foundation of the analysis by knowing who is involved, who are the decision makers, getting commitment from key people and the communication required for each member?
- Can the Requirements Changes component help with traceability regarding requirements?
- Do you think the framework enhances the quality of different steps in business analysis?
- If yes to the question above, do you think improved business analysis will lead to better quality eservices systems? Please elaborate.
- The 'BA Review' component was added to reflect on challenges and successes during business analysis. Do you think this is important to take forward for future projects? Why
- What is your feeling on the use of the framework as a whole in this environment?

Appendix B

Framework Impact Name:

_____

0 = No Impact

1 = Low Impact

2 = Medium Impact

3 – High Impact

	Project Committee	BA Plan	Requirements Analysis	Business Collaboration	Requirements Changes	Solution	BA Review
Project Committee	X						
BA Plan		X					
Requirements Analysis			X				
Business Collaboration				X			
Requirements Changes					X		
Solution						X	
BA Review							X