A Business Analysis Methodology

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Synopsis

Business analysis is defined as the process in which business needs are identified and solutions proposed. This process is regarded as one of the most important parts of systems development because no other part is more difficult to rectify later. However, current business analysis methodologies are inadequate because they are at a too high level and only address portions of the complete business analysis process. In particular, the lack of clear objectives, relevance and outcomes of the phases make business analysis methodologies inadequate. Moreover, activities, techniques and tools not mapped to those phases are also problematic.

The aim of this research was to develop a business analysis methodology for business analysts in the South African financial services environment. The intentions were to identify the phases, as well as objectives, relevance and outcomes for each of these phases. Furthermore, this research intended to identify appropriate activities, techniques and tools to address the objectives of each phase of a methodology.

This was done by presenting a literature review of previous research relating to business analysis methodologies. For information gathering, 45 participants (comprising of business analysts, project managers, IS managers and CIOs) contributed to this research, 22 of whom were interviewed individually while 23 participated in focus group interviews. The data from each of these methods was analysed independently and did not influence or feed into any of the other methods. Once the individual interviews and focus group interviews had been transcribed, content analysis and analysis within and between interviews (Merriam, 1998; Strauss, 1987) was used to analyse the information gathered independently.

The phases of a business analysis methodology identified by the research are the:

- feasibility phase;
- business case phase;
- analysis and design phase; and
- post-implementation evaluation phase.

Objectives, relevance and outcomes of these phases were also identified. In addition, activities, techniques and tools were mapped to each of these phases.

Key words: Business analysis, Methodology, Activities, Techniques, Tools, Solutions, Business, Technology.

Declaration

I declare that this research report is my own unaided work. It is being submitted for the degree of Master of Commerce in Information Systems at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

_____

Avsharn Bachoo

Signed this _____day of _____2006 in Johannesburg

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Chapter 1
Introduction to a Business Analysis Methodology

1.1 Introduction

Almost two decades ago, Fred Brooks wrote in No Silver Bullet:

> "The hardest single part of building a system is deciding precisely what to build. No other part of the conceptual work is so difficult as establishing the detailed requirements.... No other part of the work so cripples the resulting system if done wrong. No other part is more difficult to rectify later" (Brooks, 1987, p10).

Business analysis is defined as the process in which business needs are identified and solutions proposed (American Supplier Institute, 2003; Avison and Fitzgerald, 1995). This process is regarded as one of the most important parts of systems development because no other part is more difficult to rectify later (Brooks, 1987; Lubars, Potts and Richter, 1993; SEIREP, 2004). However, no adequate business analysis methodology exists (Hofmann and Lehner, 2001; Pfleeger, 2001; Robertson and Robertson, 1999).

In order to establish a common understanding of the terminology, as well as enable the reader to easily comprehend this report, a few of the necessary terms relevant to a business analysis methodology will now be listed.

- Methodology - A methodology is defined as a collection of phases, activities, techniques and tools that help users/developers implement a new system or solution (Avison and Fitzgerald, 1995).
- Phases - Researchers (Avison and Fitzgerald, 1995; Davis, 1993b) describe phases as the unique stages or components of a methodology. However, activities, techniques and tools may be unique to a phase or may feature in a number of different phases (Avison and Fitzgerald, 1995; Davis, 1993b).
- Activities - According to Davis (1993b), activities are the tasks of a phase.
- Techniques - Techniques are understood as specific approaches to performing activities (Avison and Fitzgerald, 1995; Davis, 1993b).
- Tools - Literature (Avison and Fitzgerald, 1995; Davis, 1993b; Pfleeger, 2001) describes tools as automated computer software tools.

- Systems analysis - As business analysis is an emerging field, there is some confusion between business analysis and systems analysis. Evans (2004) states that systems analysis is more concerned with the technical aspect of information systems. This includes the design of the system, technical specifications, as well as examining existing systems to understand them better, and to determine and choose between alternatives for system improvement and employment.

The above definitions will be used throughout this report as there is inconsistency in the literature relating to the definition of phases, activities, techniques and tools (Davis, 1993b; Kotonya and Sommerville, 2000). The following section presents a background to the study followed by the statement of the problem.

1.2 Background

In recent years, much research (Hofmann and Lehner, 2001; IEEE, 2004; Kotonya and Sommerville, 2000) has been conducted in an effort to improve the different activities making up the systems development process. However, business analysis still remains one of the least explored areas and has the least satisfactory scientific foundations (Ashworth, 1999; IEEE, 2004; Leffingwell and Widrig, 2000; Sommerville, 2005).

Dutoit and Paech (2000) state that a system is developed primarily to meet business needs. However, without a clear understanding of the business problem, developers do not know what to build, and clients/users do not know what to expect. Dutoit and Paech (2000) further show that poor business analysis results in inadequate solutions to business problems, which ultimately results in solution failure and the clients/users losing confidence in the development team as well as in business analysis. Standish (2004) shows that 80% of project failures are related to business analysis problems. Good business analysis can obviate many of the problems associated with systems development, particularly during the maintenance phase (Bailin, 1999; Boehm and Papaccio, 1998; Jarke, 1998; Jeffery, 1992). In response to these problems, organisations are exhibiting an increased interest in business analysis and the benefits it yields (Jordan, Keller, Tucker and Vogel, 1989; Standish, 2004; Williams, 1998).

Successful systems are unlikely without adequate business analysis (Hofmann and Lehner, 2001; Pfleeger, 2001; Robertson and Robertson, 1999). Yet, no adequate business analysis methodology exists. For these reasons business analysis is a promising area for research effort.

1.3 Statement of the problem

The literature describes business analysis methodologies as being composed of high level phases such as analysis and specification (Bubenko, 1995; Davis, 2003a; Jordan et al., 1989; You, 2001). However, these phases are at such a high level that it is difficult to apply them to real project scenarios (Bubenko, 1995; Davis, 2003a; You, 2001). These phases lack clear objectives, outcomes and precise details which results in uncertainty about which activities to use for conducting business analysis (Bubenko, 1995; Curtis, Krasner and Iscoe, 1988; Davis, 2003a; Jordan et al., 1989).

Another problem is that many business analysis methodologies address only portions of the complete business analysis process (Gottesdeiner, 2002; Richards, 2000; Sawyer, Sommerville, and Viller, 1999). For example, the requirements engineering process methodology provides a set of guidelines for the elicitation and analysis phases, but fails to address any other phase of business analysis (Gottesdeiner, 2002; Richards, 2000).

Methodologies such as soft systems methodology (SSM) and agile methodologies are also available for business analysts, but they do not show the business analyst how to approach a problem in a logical manner, and what phases to follow in order to find the best solution to that problem (Lubars et al., 1993; Potts, 1991; SEI, 2004; Siponen, Baskerville and Kuivalainen, 2005; Zucconi, 1999). Avison and Fitzgerald (1995) state that neither SSM nor agile methodologies are appropriate for business analysis because:

- SSM does not determine whether a project is a success or a failure, and produces models of system activity that are largely informal and therefore subject to misunderstanding; and
- agile methodologies give an analyst too much leeway and do not suit non-technical projects.

An additional problem with business analysis methodologies relates to the selection of appropriate activities, techniques and tools to address the objectives and outcomes of the different phases of business analysis (Davis, 2003a; Lobo, 2004). Currently there are a large number of activities, techniques and tools for business analysis. Nevertheless these are not mapped to the appropriate phases (Davis, 2003a; Lobo, 2004). Lobo (2004) states that business analysts often perform activities and select techniques and tools in an ad hoc fashion, which results in an output which inadequately addresses the objectives of that phase. It is therefore important to map business analysis activities, techniques and tools to phase objectives.

These literature findings reveal the lack of a practical and integrated business analysis methodology. The next section introduces the aim, objectives, research questions and the research model for this study.

1.4 Aim, objectives, research questions and research model

The aim of this research was to develop a business analysis methodology for business analysts in the South African financial services environment[1]. The intentions were to identify the phases, as well as objectives, relevance and outcomes for each of these phases. Moreover, this research intended to identify appropriate activities, techniques and tools to address the objectives of each phase of a methodology. To satisfy the aim and objectives of the research, the following research questions set out below were formulated:

> *Research question 1 (RQ 1): What are the phases of a business analysis methodology and why are they relevant?*
> *Research question 2 (RQ 2): What are the objectives and outcomes for each of these phases?*
> *Research question 3 (RQ 3): Which activities, techniques and tools are appropriate to each phase of business analysis?*

Based on the above research questions, a research model, illustrated in Figure 1.1, was adapted. This research model represents the structure of a business analysis methodology and the corresponding research questions that will be explored in this research.

[1] This setting was selected for the study due to the researcher's background in financial services. Section 3.4 describes the sample selection, characteristics of participants and research settings.

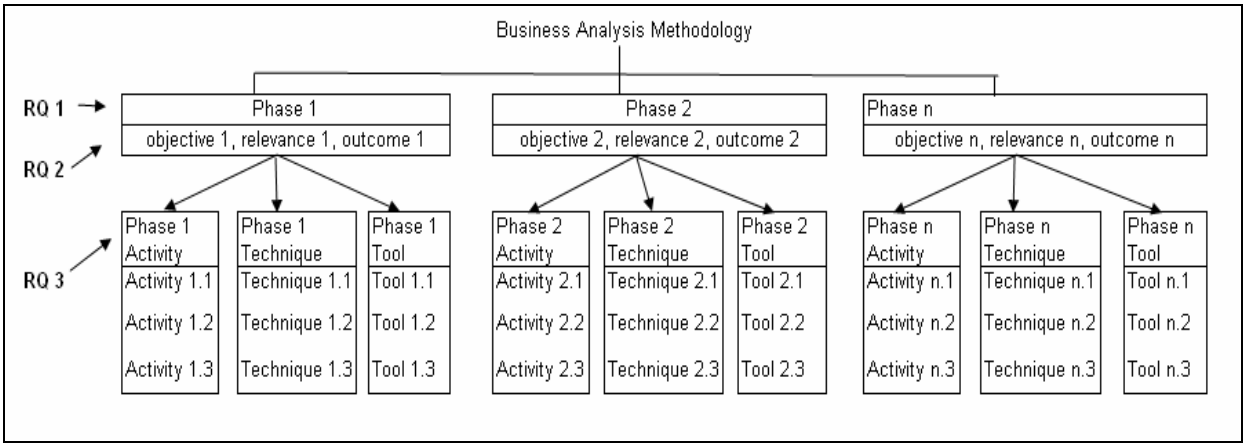

Figure 1.1: Research model for a business analysis methodology

Source: Adapted from Avison and Fitzgerald (1995)

This research model provides a base to build an appropriate methodology that reflects the phases, activities, techniques and tools that will be investigated. The research approach adopted for this study is introduced in the next section.

1.5 Research Approach

A qualitative approach, consisting of individual semi-structured interviews and focus group interviews, was selected for this research because it allowed for in-depth probing of issues and a greater detail in responses (Denzin and Lincoln, 1994; Merriam, 1998).

1.5.1 Sample selection, characteristics of participants and research settings

A pre-test was scheduled prior to the initial data collection phase to validate the data gathering methods and ensure they were free from errors (Compeau and Higgins, 1995; Dixon, Bouma and Atkinson, 1988). Thereafter, a snowball approach with non-randomised purposive sampling (Creswell, 1994) was used to select the final 45 participants, made up of CIOs, business analysts, project managers and IS managers from Bank A and Bank B. Twenty two of these participants were interviewed individually and 23 participated in 2 focus group interviews. The data analysis strategy adopted follows in the next section.

1.5.2 Data analysis strategy

As data was gathered through multiple data gathering methods (semi-structured individual interviews and focus group interviews) the criteria for triangulation was satisfied (Creswell 1994; Yin 1994; Merriam 1998). Content analysis and analysis within and between interviews (Merriam, 1998; Neuendorf, 2002), was used to name and identify categories and subcategories through a detailed examination of the data. After data coding and category construction, the results from each these methods were cross-checked against each other by selecting high frequency mentions and eliminating low frequency mentions (Silverman, 2000). This strategy allowed the comparison of one result against another to check for patterns, contradictions and examine overlapping facets, to increase the reliability of the final results (Baskerville, 1999). These cross-checked results were also compared to the features of present business methodologies to see if the results overcame the shortcomings found. To ensure these results were trustworthy, an assessment of trustworthiness was also conducted.

1.5.3 Trustworthiness, reliability and validity of this study

The criteria used to increase the trustworthiness of this research were a thick description, prolonged engagement, peer debriefing and referential adequacy (Lincoln and Guba, 1985). Moreover, Yin's (1994) criteria for reliability (diachronic, synchronic and inter-judge reliabilities) and validity (instrument, internal, construct and generalisability) were also applied. Permission to interview, anonymity and confidentiality, informed consent as well as researcher integrity were the ethical considerations adhered to, to the best of the researcher's ability (Neuman, 1994).

The following section demonstrates the importance of this research.

1.6 Importance of the research

Business analysis is an emerging practice and an even younger area of research compared to other information system (IS) disciplines. This research is therefore important to researchers and practitioners in that it enhances the current understanding of business analysis. In so doing the research identifies the relevant phases of a business analysis methodology, with appropriate activities, techniques and tools, applicable to financial services. Moreover, this study critically analyses literature on the topic, and so illuminates the deficiencies in the research.

A practical and integrated business analysis methodology is of particular importance to practitioners because 80% of project failures are related to business analysis problems (Standish, 2004). Further, it is beneficial to practitioners because it ensures a repeatable process, measurable deliverables, accurate requirements and less confusion. These benefits are set out below.

- A repeatable process: having a clearly defined methodology ensures a standardised approach towards business analysis and promotes consistency in software development. (Avison and Fitzgerald, 1995; SEIREP, 2004).
- Measurable deliverables: according to researchers, (Avison and Fitzgerald, 1995; Standish, 2004), a methodology consists of phases which can be broken down into measurable deliverables. This results in a higher probability of project success, as the phases can be better managed and monitored.
- Accurate requirements: Avison and Fitzgerald (1995) suggest that a methodology can help users specify their requirements better and help business analysts investigate and analyse user requirements more precisely.
- Less confusion: business analysts lack the necessary guidance when selecting the appropriate activities, techniques and tools for the different phases of business analysis. When activities, techniques and tools are mapped to phases, the result is less confusion for business analysts and improved planning and control. A business analysis methodology also promotes consistent terminology and conventions which results in less confusion for organisations (Avison and Fitzgerald, 1995; Standish, 2004).

Business analysis has attracted little interest in the academic literature (Lobo, 2004). This study provides an exploration of this emerging discipline and provides direction to literary material for academics wishing to research business analysis further. It also presents a basis for developing a comprehensive conceptual background from which hypotheses can be proposed for later testing, and offers several suggestions to researchers wanting to build on its contribution.

The next section concludes this chapter, and is followed with the structure for the remainder of this research report.

1.7 Conclusion

This chapter introduced the topic of business analysis by investigating business analysis problems and motivating the need for a business analysis methodology. It examined the problems with current business analysis methodologies and revealed the lack of a practical and

integrated business analysis methodology. Further, it showed that business analysis activities, techniques and tools not mapped to appropriate phases result in incorrect outputs to those phases. The aim of this research, as well as the objectives, research questions and research model were presented. Furthermore, the research approach adopted for this study was established. Finally, this chapter showed that a business analysis methodology would be beneficial to both practitioners and researchers.

1.8 Structure of the report

The next chapter will present previous studies that relate to business analysis methodologies and build a conceptual framework for this study. More importantly, chapter 2 will present the contributions and shortcomings of the methodologies, techniques and tools. After introducing the underlying literature pertaining to business analysis methodologies, the research methodology used to carry out this study will follow.

Chapter 3 will justify the qualitative approach selected for this study that allows for in-depth probing and detailed responses. The pre-test and pilot study, conducted to validate the data gathering methods comprising of individual interviews and focus group interviews, will also be illustrated. The sample selection, characteristics of participants and settings for each of the data gathering methods used for this study will be further demonstrated. The data analysis strategy including the data management strategy, content analysis and analysis within and between interviews will also be presented. Importantly, this chapter will introduce the data coding and category construction procedure selected for the research. The assessment of trustworthiness, criteria for reliability and validity, as well as ethical considerations of the researcher will also be covered.

Chapter 4 will derive the categories and subcategories from the data. The content analysis and analysis within and between interviews will be demonstrated. This chapter will then present the findings from the individual interviews and focus group interviews. The consolidation and interpretation of these findings will follow. This chapter will conclude by linking the findings to the literature review and a discussion of the results.

Finally, chapter 5 will conclude this research by presenting an overview of this report followed by the main findings of this study. The implications and contributions of this study will then be then assessed, followed by a discussion of the biasness, the limitations as well as recommendations for further research.

Chapter 2
Literature Review

2.1 Introduction

Chapter 1 established the topic of business analysis by examining business analysis problems, motivating the need for a business analysis methodology, and investigating problems with current methodologies. The aim of this research, as well as the objectives, research questions and research model were established. Furthermore, the research approach adopted for this study was introduced.

This chapter provides a literature review of previous research undertakings that relate to business analysis methodologies, and covers the following topics:

2.2 background to literature review;
2.3 research on business analysis methodologies and their activities;
2.4 research on business analysis techniques and tools;
2.5 contributions and shortcomings of methodologies, techniques and tools; and
2.6 conclusion of the literature review.

In the subsequent section, a background to the literature review is presented.

2.2 Background to literature review

Remenyi and Williams (1995) state:

> "An extensive literature review is an essential prerequisite for research…the literature review should assist the researcher to identify the unsolved problem (Leedy, 1993) in the field being studied that will become the focus of the research project".

Business analysis has attracted little interest in academic literature, despite the fact that Brooks (1987) and Lubars et al., (1993) have stated it is one of the most important parts of systems development. Much has been written on parts of business analysis (Davis, Fairley and Yourdon, 1999; Richards, 2000), on individual activities, techniques and tools (Potts, 1991; Zucconi, 1999) as well as on closely related subjects such as systems analysis, project management and software engineering (Sommerville, 2005). However, the subject of business analysis itself has

been discussed extensively in the popular press. **Appendix A** presents a list of popular press articles, to illustrate the volume of interest in this subject and show that this is a field in need of academic research.

Like most research that is close to exploitation in practice, economic factors have driven the development of business analysis (Lobo, 2004). Traditionally business analysis was regarded as a fuzzy stage of software development where a specification was generated from possibly vague and informally expressed ideas (Evans, 2004). Early research (Boehm, 1981; Boehm, 1988) in information systems showed that it is economically convenient and effective to fix faults as early as possible in the development process. However, over the years the realisation of the importance of business analysis has resulted in a better understanding of the business analysis process. The following section subsequently introduces current business analysis methodologies and their activities found in the literature.

2.3 Recent research on business analysis methodologies and their activities

This section presents a review of six different business analysis methodologies and their activities from literature. Most of these methodologies were not specifically developed for business analysis, but were originally intended for related disciplines such as systems analysis and project management (Hofmann and Lehner, 2001; Pfleeger, 2001; Robertson and Robertson, 1999). However, due to the lack of an adequate business analysis methodology, they have been adopted by business analysts (Hofmann and Lehner, 2001; Pfleeger, 2001; Robertson and Robertson, 1999). The requirements engineering process methodology is firstly considered.

2.3.1 Requirements engineering process methodology

The requirements engineering process methodology is an engineering methodology frequently used by business analysts (Iyer and Richards, 2004; Richards, 2003; Richards, 2000). As illustrated in Figure 2.1, this methodology is comprised of five phases (Iyer and Richards, 2004; Richards, 2003; Richards, 2000):

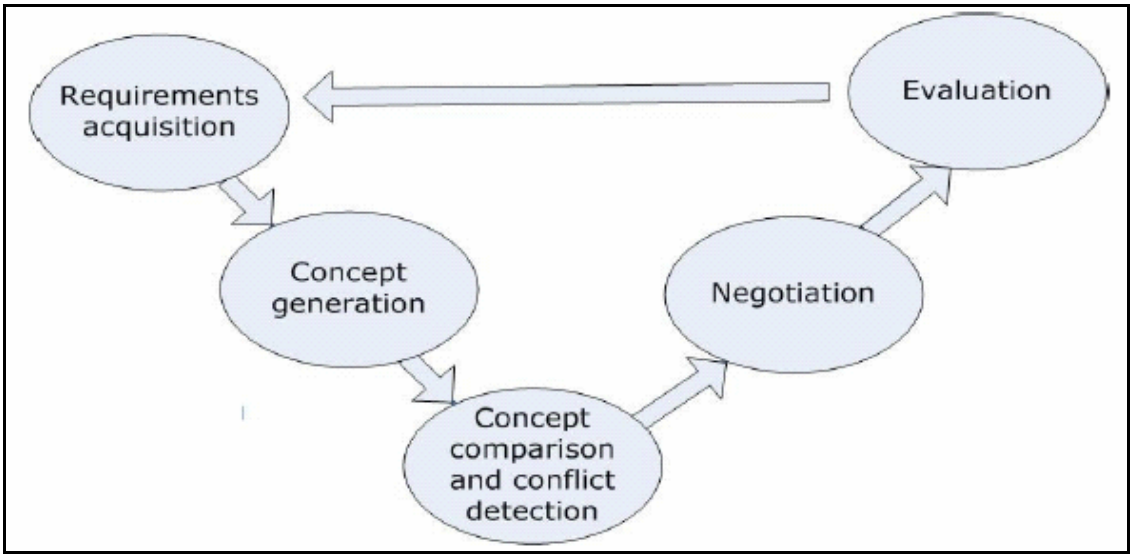

Figure 2.1: Requirements engineering process methodology

Source: Iyer and Richards (2004)

The following section defines the phases and activities of this methodology as illustrated in the above figure.

- *Phase 1 - Requirements acquisition*: requirements acquisition involves capturing stakeholder requirements. This phase uses interviews as a technique to extract the requirements. This phase results in the gathering of requirements in formats such as use case descriptions and interview transcripts.

- *Phase 2 - Concept generation*: concept generation is the second phase of this methodology and involves representing the requirements of different stakeholders in the form of a table. This table comprises of requirement objects as rows and object attributes as columns. The visual representation of the viewpoints of different stakeholders helps to ensure an easier understanding and comparison of the viewpoints.

- *Phase 3 - Concept comparison and conflict resolution*: once the table representations of the requirements have been generated, the tables are compared for conflicts. Requirements which appear in the tables are classified as being in one of the four states (Gaines and Rappaport, 1988).
  - *Consensus* is the situation where the same requirement is described using the same terminology.
  - *Correspondence* occurs when the same requirement is described using different terminology.

- *Conflict* is where different requirements are being described, but the same terms are used.
- *Contrast* is where there is no similarity between requirements or the terminology used.

- *Phase 4 - Negotiation:* on detecting the conflicts, the next phase is to resolve them through different negotiation techniques. This methodology adopts the five strategies of conflict resolution, set out below, proposed by Easterbook and Nuseibeh (1996).
  - *Resolving* entails removing inconsistencies.
  - *Ignoring* involves taking no action.
  - *Circumventing* involves avoiding or not including a conflict.
  - *Delaying* entails putting a conflict on hold.
  - *Ameliorating* involves reducing the degree of inconsistency.

- *Phase 5 - Evaluation:* this is the last phase of the methodology and determines if another iteration of the methodology is necessary. The methodology uses the number of conflicts to decide whether to go through another cycle of the model.

This methodology is at a very high level and fails to identify all the phases of business analysis (Lobo, 2004; Wallace, Keil and Rai, 2004). It only provides an overview of the phases and does not clearly identify the objectives and outcomes of the phases (Lobo, 2004; Wallace, et al., 2004). The methodology only covers the early stages of business analysis, and overlooks the latter portion of business analysis (Lobo, 2004; Wallace et al., 2004). Techniques such as joint application design (JAD) are specified for each phase but, these are limited to only one or two for each phase, which restricts the application of the methodology (Lobo, 2004; Wallace et al., 2004). Furthermore, tools are not specified (Lobo, 2004; Wallace et al., 2004).

After reviewing the requirements engineering process methodology, an assessment of the requirements triage methodology was conducted.

2.3.2 Requirements triage methodology

Requirements triage methodology is also an engineering methodology frequently used by business analysts. The goal of this methodology is to create a set of features, which can be developed using available resources within acceptable levels of risk (Ruhe and Momoh, 2005; Yourdon, Davis and Zweig, 1999). These features must be sold at an acceptable price to a known market in sufficient quantities to achieve satisfactory levels of profit and thus achieve a reasonable return on investment (Ruhe and Momoh, 2005; Yourdon et al., 1999). It comprises a

process of deciding what features a product should include in its implementation (Davis, 2003b; Davis et al., 1999; Davis, 1993a; Ruhe and Momoh, 2005). For this methodology, the time and effort needed to develop the features of a system are compared with the project budget and schedule. If there is incompatibility between these project parameters (time, effort, schedule, cost), then the features are removed so that the project parameters synergise. The requirements triage also regard marketing, financial and development factors as addition phases (Davis, 2003b; Davis et al., 1999; Davis, 1993a; Ruhe and Momoh, 2005).

The methodology is comprised of five phases illustrated in Figure 2.2 (Davis, 1993a; Davis et al., 1999; Davis, 2003b):

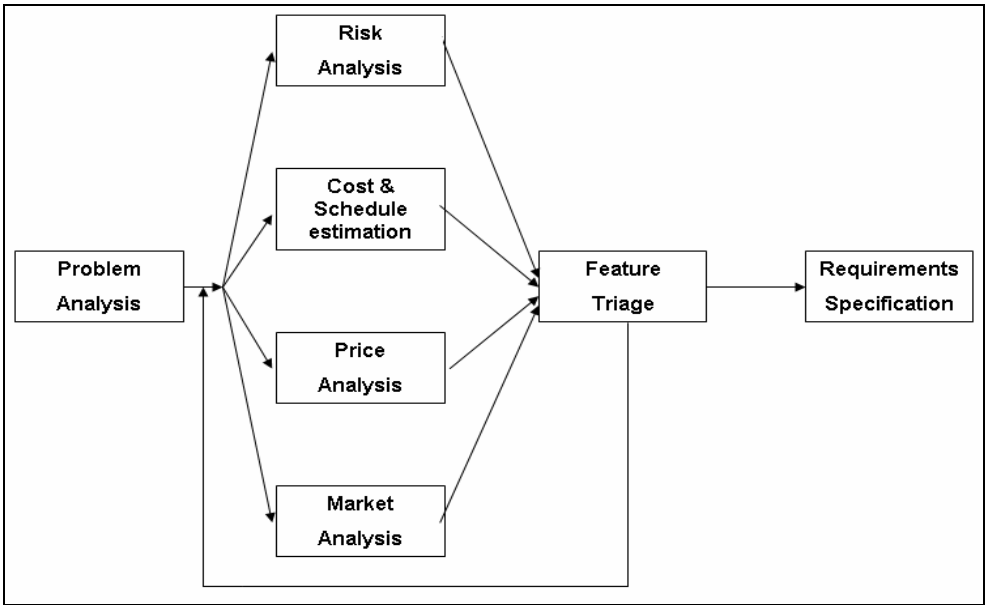

Figure 2.2: Requirements triage methodology

Source: Davis (2003b)

As indicated in Figure 2.2, the following phases of the methodology are specified (Davis, 2003b).

- *Phase 1 - Risk analysis*: this phase determines acceptable levels of risk for the requirements.
- *Phase 2 - Cost and schedule estimation*: this phase determines the effort and time required to implement potential features of the system.
- *Phase 3 - Price analysis*: the price analysis phase determines the optimal price to charge customers.
- *Phase 4 - Market analysis*: the market analysis phase determines the types of customers, their numbers, their buying power/capability, and the urgency for a particular feature.

- *Phase 5 - Feature triage*: feature triage is the process that determines the correct features to be developed.

Commercial tools such as Omni-Vista SP[2], Primavera Monte Carlo[3] and QSS TechPlan [4] have been developed to support the requirements triage methodology (Sud, 2004). These tools allow a business analyst to visualise the effects of various factors like cost, schedule and price on the development of the project (Sud, 2004).

However, this methodology fails to describe the outcomes, as well as the activities of each phase of business analysis (Karlsson, Berander, Regnell and Wohlin, 2004; Sud, 2004). The requirements triage methodology also only focuses on the middle portion of business analysis after the requirements have been specified (Karlsson et al., 2004; Sud, 2004). As a consequence of this, its applicability is restricted as this methodology has to be plugged into other methodologies for effective usage (Karlsson et al., 2004; Sud, 2004).

Thereafter, an investigation of the knowledge level process methodology was conducted.

2.3.3 Knowledge level process methodology

The knowledge level process methodology is a scenario-based methodology that comprises of different phases, as shown in Figure 2.3 (Abbink, Van Dijk, Dobos, Hoogendoorn, Jonker, Konur, Van Maanen, Popova, Sharpanskykh, Van Tooren, Treur, Valk, Xu and Yolum, 2004; Albers, Jonker, Karami and Treur, 2004; Bragge, Merisalo-Rantanen and Hallikainen, 2005; Herlea, Jonker, Treur and Wijngaards, 1999). Researchers define a scenario as an assumed sequence of possible events (Abbink et al., 2004; Herlea et al., 1999).

[2] http://www.omni-vista.com/products
[3] http://www.primavera.com/products/monte.html
[4] http://www.qssinc.com/products/visiontools/techplan.html

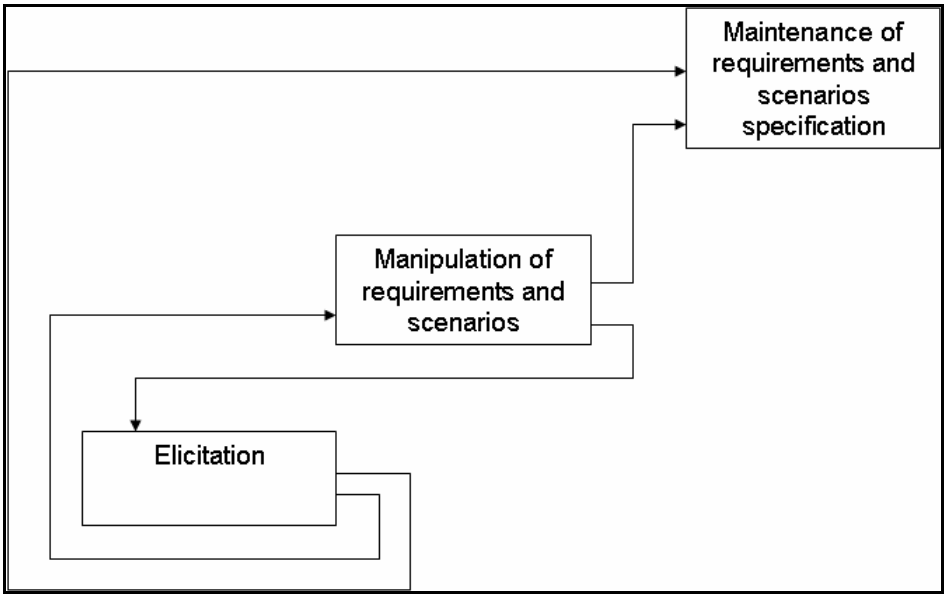

Figure 2.3: Knowledge level process methodology

Source: Abbink et al., (2004)

As illustrated in Figure 2.3, the knowledge level process methodology consists of three phases (Abbink et al., 2004; Albers et al., 2004; Bragge et al., 2005a; Herlea et al., 1999) which are set out below.

- *Phase 1 - Elicitation*: the elicitation phase involves the identification of problems, elicitation of requirements and scenarios from the stakeholders, and documentation of the domain knowledge.

- *Phase 2 - Manipulation of requirements and scenarios*: this phase entails resolving the ambiguity and inconsistency among the requirements and scenarios. In addition, this phase reformulates the informal requirements to semi-formal and formal requirements and establishes the relationships between the requirements and the scenarios.

- *Phase 3 - Maintenance of requirements and scenario specification*: this phase involves the configuration control of traceability information and documents containing the requirements and scenarios.

Nevertheless, the level of detail in the knowledge level process methodology is inconsistent, as phase 1 and phase 2 are at a low level of detail, i.e., a very detailed description of activities within the phases (Lobo and Arthur, 2005). However, phase 3 is highly abstract, i.e., a high level description of activities for this phase (Lobo and Arthur, 2005). Also, since the methodology is

scenario-based with the requirements and scenario phases intertwined, it is difficult to incorporate changes into the methodology (Bragge et al., 2005a). Another drawback is that although the methodology identifies high level phases, the literature does not provide adequate information about their details (Bragge et al., 2005a; Lobo and Arthur, 2005). Furthermore, this methodology does not provide techniques and tools for conducting the phases identified (Bragge et al., 2005a; Lobo and Arthur, 2005).

After reviewing the knowledge level process methodology, the win-win spiral methodology was evaluated.

2.3.4 Win-win spiral methodology

The win-win spiral methodology, shown in Figure 2.4, combines the waterfall and prototyping approaches with elements of risk analysis and customer negotiation (Boehm, Bose, Horowitz and Lee, 1994; Bragge, Martin and Tuunanen, 2005).

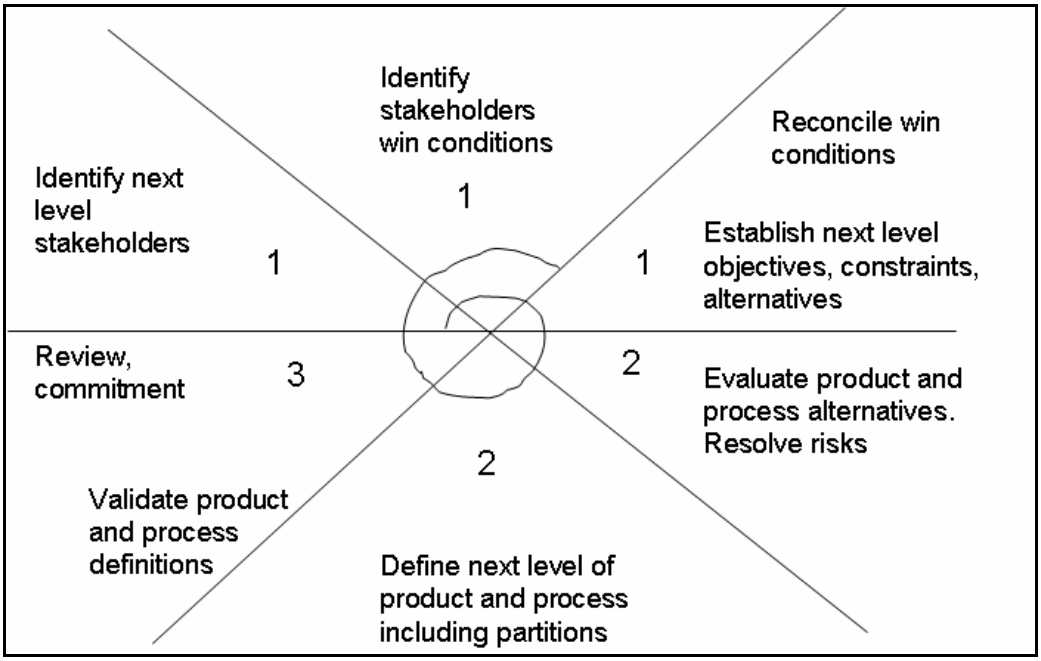

Figure 2.4: Win-win spiral methodology

Source: Boehm et al., (1994)

As illustrated in Figure 2.4, the win-win spiral methodology comprises of the phases listed below (Boehm et al., 1994).

- *Phase 1*: this phase identifies next-level stakeholders, and their win conditions. Thereafter, this phase involves reconciling stakeholders' win conditions, and establishing the next-level objectives, constraints, and alternatives.
- *Phase 2*: the next phase of the spiral involves evaluating product and process alternatives and resolving risks. Thereafter, the next-level product and process, including system-wide partitions are defined.
- *Phase 3*: the final phase involves validating the product and process definitions and reviewing the results.

The above mentioned phases are repeated until a complete and well defined business analysis document is obtained (Bragge et al., 2005b).

The win-win spiral methodology presents a general framework for business analysis that is easy to use (Boehm et al., 1994). However, it lacks adequate detail for the phases (Bragge et al., 2005b; Parets-Llorca and Grunbacher, 1999). Moreover, all the phases are briefly explained on a high level, with their activities also stated on a high level. Furthermore, outcomes, techniques and tools are not specified for the phases (Bragge et al., 2005b; Parets-Llorca and Grunbacher, 1999).

After reviewing the win-win spiral methodology, an assessment of the process framework methodology was conducted.

2.3.5 Process framework methodology

The process framework methodology provides a general framework for business analysis. Illustrated in Figure 2.5, this methodology consists of four phases, which are executed iteratively until a precise and complete business analysis specification is obtained (Alcazar and Monzon, 2000).

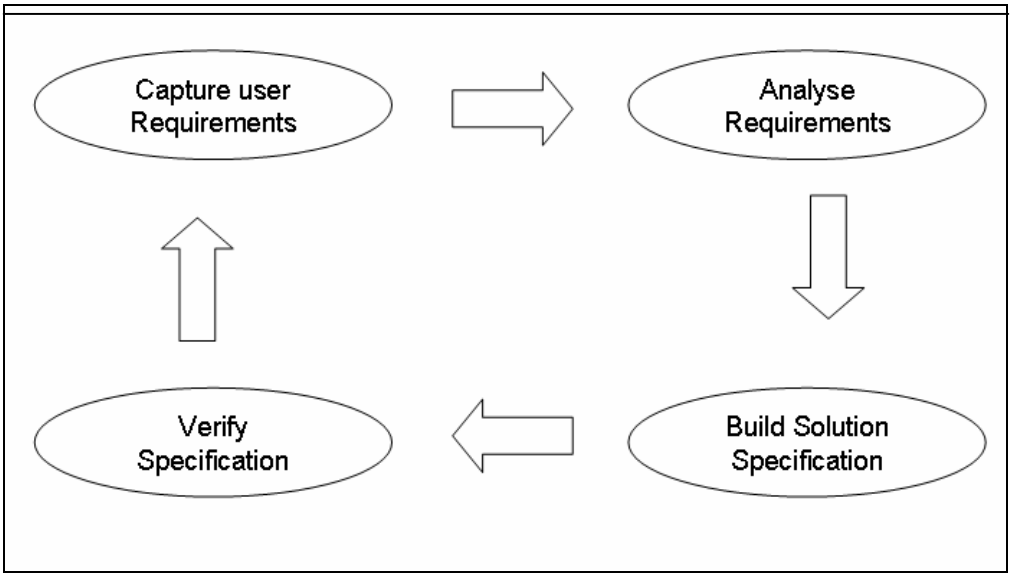

Figure 2.5: Process framework methodology

Source: Alcazar and Monzon (2000)

The phases of this methodology are set out below (Alcazar and Monzon, 2000).

- *Phase 1 - Capture user requirements*: this phase involves the elicitation of information such as business processes, organisation descriptions and stakeholder profiles. The methodology recommends the use of techniques such as requirements lists, graphs, and free texts for the representation of requirements.

- *Phase 2 - Analyse requirements*: this phase focuses on building a common understanding of the requirements, problem domain, vocabulary and other relevant information. To capture this information, unified modelling language (UML) and entity relationship diagrams (ERDs) are prescribed as techniques to business analysts. A second objective of this phase is to classify the requirements in a hierarchical order and to identify the relationship between the requirements.

- *Phase 3 - Build solution specification*: this phase represents the system objectives in a common format for the business analyst and the customer. This phase advocates the use of use cases (Jacobson, 1992) for the presentation of requirements to the customer. A use case is a technique for capturing the potential requirements of a new system. Each use case provides one or more scenarios that convey how the system should interact with the end user or another system to achieve a specific business goal (Jacobson, 1992).

- *Phase 4 - Verify specification*: this phase requires the business analyst to confirm that all the requirements have been captured and recorded. In addition, the requirements are checked for adherence to the quality characteristics such as correctness, preciseness and verifiability.

The process framework methodology identifies the main phases of the business analysis, but fails to provide the details of these phases (Lobo and Arthur, 2005; Ranky and Chamyvelumani, 2003). In addition, the activities such as stakeholder profiles are specified at a very high level. This methodology focuses on presentation and representation of the phases, rather than on the activities of the phases (Lobo and Arthur, 2005; Ranky and Chamyvelumani, 2003).

Finally, an investigation of the requirements generation methodology was conducted.

2.3.6 Requirements generation methodology (RGM)

The requirements generation methodology (RGM), shown in Figure 2.6, provides a general structured framework for business analysis (Arthur and Groener, 2005; Lobo, 2004).

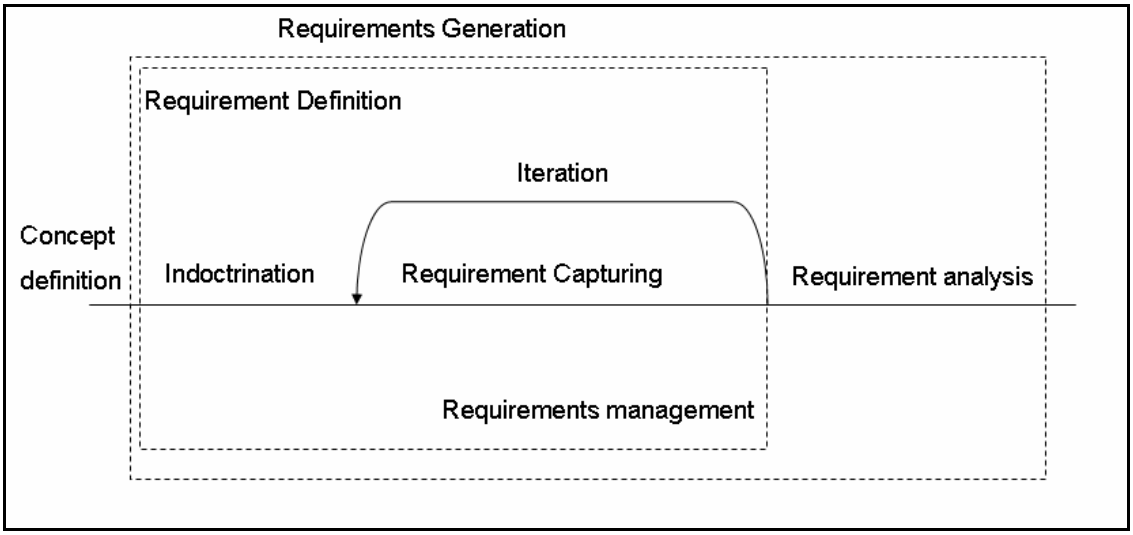

Figure 2.6: Requirements generation methodology
Source: Arthur and Groener (2005)

Illustrated in Figure 2.6, this methodology divides business analysis into two phases (Arthur and Groener 2005; Lobo, 2004).

- *Phase 1 - Requirements definition*: in this phase, the requirements are elicited and evaluated iteratively until the exit criteria is satisfied. This phase consists of the 'indoctrination' and

'requirements capturing' sub-phases. Indoctrination is concerned with familiarising the customer about the RGM, educating the business analyst about the problem domain, and specifying the customer's responsibilities. The requirements capturing phase is further refined into sub-phases, which focus on obtaining requirements from the customer and refining them in an iterative manner, until the complete set of requirements is collected. The RGM also provides protocols and guidelines to structure the phases identified. Protocols define boundaries for the RGM within which the customer and the business analyst must operate, whereas guidelines are recommendations or suggestions that are optional for the requirements engineer or the customer.

- *Phase 2 - Requirements analysis*: this is where the complete set of requirements is analysed, documented, verified and validated.

The RGM identifies phases for business analysis. Furthermore, the RGM specifies constraining and guiding components in the form of protocols and guidelines, which help in effectively conducting business analysis. The drawback of the RGM is that the activities such as requirement capturing are stated at a high very level (Nance and Arthur, 2006). Another shortcoming of the RGM is that the outcomes, techniques and tools that are required for the phases are not identified (Nance and Arthur, 2006).

This section concludes the review of the business analysis methodologies and their activities from literature. The subsequent section introduces a review of techniques and tools from literature.

2.4 Research on business analysis techniques and tools

As discussed in the previous section, one of the drawbacks of the business analysis methodologies is that they fail to specify the techniques and tools for the phases. The literature reveals hundreds of individual techniques and tools independent of any methodologies that are available for business analysts.

The problem is that business analysts choose techniques and tools in an ad hoc manner. Since the use of different techniques and tools result in different outputs, incorrect selection may inadequately address the objective of a phase, and ultimately have a negative impact on the quality of a product (Davis, 2003a; Lobo, 2004). Due to the large number of individual tools and techniques, only a few are examined in this section (See **Appendix B** for additional tools and techniques). Joint application design (JAD) is the first technique considered.

2.4.1 Joint application design (JAD)

Joint application design (JAD) is a soft technique by which a group attempts to find a solution to a specific problem by gathering spontaneous ideas by its members (Duggan and Thachenkary, 2004; Goguen and Linde, 1993; Jennex, 2005). This technique has been employed successfully by many industrial and research organisations studying business, engineering, scientific, and management problems (Goguen and Linde, 1993; Jennex, 2005).

According to Lewis and Thomas (2003), during a JAD session the subsequent steps as set out below are followed.

- The business analyst writes the problem for which solutions are sought on a blackboard or conference pad. The problem should be brief, specific and stimulating.
- The reasoning and background information for the problem are conveyed to the group.
- The ground rules for the JAD are clearly explained. These are set out below.
    - Every idea is acceptable.
    - Neither verbal evaluation nor nonverbal expressions of approval or disapproval is permitted during the JAD session.
    - The quantity of ideas is the main goal of JAD. This concept is called "freewheeling."
    - Building on the ideas of others, referred to as "hitchhiking," is encouraged.
    - A time limit for the JAD session should be set.

The JAD session usually begins with a surge of ideas and then slows down as the meeting progresses. The business analyst lists each idea on a board or pad as soon as it is mentioned and should not hesitate in recording ideas, as this can give the impression of disapproval. Furthermore, the ideas are written exactly as spoken by the group member. The JAD session continues till all ideas have been exhausted. The drawback of this technique is that it needs to be followed up by some additional effort to filter out the unrealistic ideas. In addition, the effectiveness of the technique depends largely on the knowledge and management skills of the business analyst (Duggan and Thachenkary, 2004). Interview techniques are discussed in the following section.

2.4.2 Interviews

Interviews are perhaps the most common technique for business analysis and have been effectively employed in a large number of domains (Bragge et al., 2005a; Quek and Shah, 2004; Goguen and Linde, 1993). If stakeholders are asked the right questions, the interview technique can provide valuable information about the system and its problems. While the questions play a

critical role in the success of an interview, the social aspects of dealing with the stakeholders are also equally important (Quek and Shah, 2004; Zucconi, 1999).

The interview technique begins by asking broad questions known as context-free questions, which do not suggest a particular response from the stakeholder (Bragge et al., 2005a; Gause and Weinberg, 1989). Context-free questions pertain to day-to-day work, day-to-day problems, critical tasks, and so forth. For example, who is the client for this system? What is the real reason for wanting to solve this problem? What environment is this product likely to encounter? What kind of product precision is required? These questions enable the identification of critical issues, which are probed further through detailed questions at a later time.

Interviews can be conducted on an individual or group basis. The advantage of interviewing a group of people is that they can inspire each participant to remember critical issues and describe day-to-day work (Bragge et al., 2005a; Gause and Weinberg, 1989). As a consequence, the business analyst can obtain more information about the system and its problems. However, it is important that a balance in participation is maintained so that no one person dominates the interaction process. With individual interviews, the time taken is considerable because the business analyst has to interview the participant on an individual basis. Furthermore, this technique assumes that the interviewee has access to conscious accurate knowledge (Bragge et al., 2005a; Quek and Shah, 2004).

The next section introduces the observation technique, also frequently used by business analysts (Bragge et al., 2005a).

2.4.3 Observation

Observation is useful in understanding the users' domain, tasks, priorities and work habits that the users themselves are sometimes unaware of, such as workarounds, failures, and exceptions (Gause and Weinberg, 1989). In addition, this technique helps in determining the context around the use of a particular system and the relationship of the system with the other systems in the environment (Bragge et al., 2005a; Gause and Weinberg, 1989).

An example of an observation is watching an unaware user finding a section in a manual. It would seem logical that people would use the index to find a particular section. However, observation shows that, in most cases, people skim through the book assuming that they know where the section is. Only when their efforts fail, do they actually refer the index for a particular section (Bragge et al., 2005a; Gause and Weinberg, 1989).

This technique is intended to obtain information by observing what actually transpires in the work environment. Hence, to conduct this technique, a business analyst visits the work site and takes notes about the environment (the problem being investigated) and its interactions. Furthermore, the technique does not require any special equipment and can be conducted by a single person. The use of technology such as a video camera is beneficial as it provides a better coverage of the environment and also allows the business analyst to examine the collected data later (Gause and Weinberg, 1989). The problem with the observation technique is that it usually cannot collect information about events / interactions that happen rarely, because the observer can spend only a specific amount of time in the work environment (Bragge et al., 2005a). Task demonstrates follow in the subsequent section.

2.4.4 Task demonstration

Task demonstration technique requires the users to perform tasks while describing what they are doing and why (Lindgaard, 1994; Kirwan, 1992). This technique is a variant of the interview and observation technique and involves the study of what a user is required to do, in terms of cognitive activities, to achieve a task objective (Aleotti, Caselli and Reggiani, 2003; Kirwan, 1992). In many situations, users cannot explain the knowledge that they posses, however, they are able to demonstrate how a particular task is performed. This enables the business analyst to gain a better understanding of the user's knowledge. Task demonstration can be applied to studying how users use existing products. Such an analysis helps in identifying the difficulties users face in using existing products, and improvements that might be needed (Aleotti et al., 2003; Kirwan, 1992).

The information collected by this technique is usually evaluated by the business analyst to obtain the initial set of requirements for the system. This technique typically produces the following information (Aleotti et al., 2003; Lindgaard, 1994):

- roles and related tasks;
- sequences of events and relationships between them;
- objects involved in tasks and their attributes;
- users' actions and resulting behaviour; and
- breakdowns and problems.

The main benefit of the task demonstration technique is a better understanding of the user's thoughts and the interaction with a product. Another advantage is that this technique takes less time to perform because the user usually performs all the tasks in one session. The drawback of this technique is that the success of the technique depends heavily on the tasks assigned to the

users. Hence, it is very important to create the right tasks for a particular application (Aleotti et al., 2003). Furthermore, the use of this technique is largely limited to eliciting requirements for interactive applications (Aleotti et al., 2003). Document studies, is introduced in the next section.

2.4.5 Document studies

Business analysis often involves the study of documents such as business plans, market studies, contracts, requests for proposals, statements of work, existing guidelines, analyses of existing systems, and procedures (Jansen, Ballintijn and Brinkkemper, 2005; Hofmann and Lehner, 2001). Hence, document studies are essential in providing a complete coverage of the requirements for the system under development.

Documents provide information about the current system and its functionalities. In addition, the documents also explicate the need for a particular feature and the arguments against a rejected / delayed functionality. Furthermore, domain information such as the relationship and interaction of the system with the other components, and organisational work procedures are outlined in documents (Jansen et al., 2005; Hofmann and Lehner, 2001). Thus, the business analyst can obtain considerable amounts of useful information from the study of documents. The drawback of the document studies technique is that the communication is one sided and impedes the clarification of, and questioning about, the information presented (Jansen et al., 2005; Hofmann and Lehner, 2001). The next technique, questionnaires, is reviewed in the subsequent section.

2.4.6 Questionnaires

Questionnaires are written lists of questions that are distributed to a large number of people. Depending on the information that needs to be elicited, the business analyst formulates the questions as either open-ended or closed-ended. Questionnaires with closed-ended questions can be statistically analysed, whereas open-ended questionnaires could be analysed using qualitative methods (Jansen et al., 2005; Lauesen, 2002).

Closed-ended question questionnaires are suited to situations where it is necessary to obtain statistical evidence for assumptions (Jansen et al., 2005; Lauesen, 2002). The questions could provide participants with a set of alternatives as answers, and hence, the results are easier to evaluate statistically. An example of a closed-ended question is: “Is the length of time the most important problem at work: Yes / No”. However, because the questions are closed-ended, the participants have no latitude in explaining their choices. It is also possible that the participants could misunderstand the question and make a wrong selection. Questionnaires with open-ended

questions give the participant the freedom to answer in any way that he/she chooses. This type of questionnaire is best suited for eliciting opinions and suggestions. Such questionnaires enable the participants to convey their reasoning for the choice they make for a particular question (Jansen et al., 2005; Lauesen, 2002). However, in this case there is not only the risk that the participants may misunderstand the questions, but also that the business analyst may misinterpret the answers (Jansen et al., 2005; Lauesen, 2002). Prototyping, another business analysis technique is introduced in the next section.

2.4.7 Prototyping

Prototyping involves creating a partial implementation of the system in order to help the developers, users, and customers understand the requirements (White and Dhillon, 2005; Leffingwell and Widrig, 2000). This technique is used to gain a better understanding of poorly defined and fuzzy requirements of a system (Cameron, 1989).

Once the prototype is built, the users of the system should 'play' with the prototype in an environment which closely simulates the target setting of the final system (Cameron, 1989). This enables observation of the influence of environmental and other external factors that affect the system (White and Dhillon, 2005; Leffingwell and Widrig, 2000). Furthermore, for the results to be reliable, it is recommended that various types of users be selected for exercising the prototype. After using the prototype, the users should give a "Yes, But" response, which reveals the unknown user needs. After "playing" with a prototype, users and the business analyst should have a better picture of what the system requirements are (Leffingwell and Widrig, 2000).

The result of prototyping can be two kinds of requirements (Lauesen, 2002):

- product-level requirements: these are requirements for the product functionalities, which have been shown to be realistic and useful by the prototype; and
- design-level requirements: these are requirements which specify that the real product should have interfaces the same as, or similar to, that of the prototype.

The main drawback of this technique is the high demands of cost and time (White and Dhillon, 2005; Cameron, 1989). I-Time, another business analysis technique is explored in the next section.

2.4.8 I-Time

I-Time is commonly used for determining the rationale of the requirements and is referred to as individual time or introvert time. In this technique, the participants spend a few moments reflecting on the question and problems. This technique involves a group session that is usually non-interactive (Alur and Chandrashekharapuram, 2005).

I-Time is conducted according to the following procedure (Lauesen, 2002):

- give a brief introduction of the topic / issue (requirements whose rationale is to be determined);
- instruct team members either to sit quietly or leave the room briefly to find space where they can concentrate and focus;
- establish a time limit, depending on the topic or question the team is considering;
- repeat the question or instructions, or display them on a slide or overhead projector during the break; and
- the participants present their ideas after the break and this process is repeated in subsequent rounds.

This technique is easy to perform and is inexpensive. However, the success of this technique depends heavily on the questions posed and the skills of the business analyst (Alur and Chandrashekharapuram, 2005). Analytic hierarchy process (AHP) is considered in the subsequent section.

2.4.9 Analytic hierarchy process (AHP)

Analytic hierarchy process (AHP) is used for prioritising requirements, however only if the complete set of requirements can be obtained in one session (Shih and Liu, 2005; Lauesen, 2002). It involves comparing all unique pairs of requirements to determine which of each pair is of higher priority. Therefore, if a software project consists of n requirements, the business analyst must make n(n-1)/2 pair wise comparisons to rank the requirements.

This technique consists of the steps set out below (Shih and Liu, 2005; Lauesen, 2002).

- Outline all unique pairs of requirements.
- Compare the pairs. The comparison results in a hierarchy structure.
- Estimate the relative priority of each requirement on the basis of the hierarchy.

The advantage of this technique is that it provides the priorities of each requirement relative to every other requirement. The disadvantage is that it is time consuming and expensive (Shih and Liu, 2005). This is feasible for small projects, but as n becomes large, the effort required dramatically increases. However, the resultant ranking is trustworthy and can be helpful to the management in deciding which features to implement first. The following section introduces scenarios, a technique used by business analysts.

2.4.10 Scenarios

Scenarios are descriptions of how users can interact with a system in different situations (Siponen et al., 2005; Sawyer and Sommerville, 1997). A scenario provides the sequence of steps in the interaction between the system and the user (Sawyer and Sommerville, 1997). Scenarios can be generated in different formats, but should at least have the following information (Sawyer and Sommerville, 1997):

- a description of the state of the system before entering the scenario;
- the normal flow of events in the scenario;
- exceptions to the normal flow of events;
- information about other activities which might be going on at the same time; and
- a description of the state of the system after completion of the scenario.

The main advantage of scenarios is that it enables users to understand the product (system / requirements) better. As a consequence, the users provide better feedback about the product and this reduces the incidence of change requests in future. The drawback of the scenarios technique is that it is time consuming and cost intensive because of the large amount of effort involved in creating the scenarios (Siponen et al., 2005). Storyboarding is explored in the following section.

2.4.11 Storyboarding

Storyboarding involves a visual representation of a scenario (Leffingwell and Widrig, 2000). It entails creating drawings depicting a set of user activities that occur in a particular system (Maiden, Manning, Robertson and Greenwood, 2004; Leffingwell and Widrig, 2000). The storyboarding technique involves representing requirements through dialogues, toolbars and pictures for better user comprehension and feedback.

Storyboards are grouped into three types listed below based on the mode of interaction with the user (Maiden et al., 2004; Leffingwell and Widrig, 2000).

- Passive storyboard: in this kind of storyboard, the business analyst simply walks the user through the interactions, with a “when you do this, this happens” explanation.
- Active storyboard: these provide an automated description of the way the system interacts in a typical usage scenario.
- Interactive storyboard: this allows the user to experience the system interactions, similar to a throwaway prototype.

Storyboarding is a simple and effective technique that enhances user understanding of the requirements (Leffingwell and Widrig, 2000). Storyboarding also helps to identify features that have been missed by the business analyst. The problem with this technique is the time and cost involved (Leffingwell and Widrig, 2000). The next section introduces the technique of criticality analysis.

2.4.12 Criticality analysis

Criticality analysis is a technique which ranks requirements according to the combined influence of the severity and probability of occurrence of the risk factors (Arthur and Groener, 2005; Hayes, Dekhtyar, Sundaram and Howard, 2004).

Arthur and Groener (2005) describe two types of criticality analysis: quantitative and qualitative. The activities involved in using the quantitative criticality analysis technique are listed below.

- Define the reliability/unreliability for each item.
- Determine the portion of the item’s unreliability that can be attributed to each risk factor.
- Rate the probability of loss that will result from each risk factor occurring.
- Calculate the criticality for each risk factor by:
    - Risk factor criticality = Item unreliability x Ratio of unreliability associated with the risk factor x Probability of loss.
- Calculate the criticality of each item by obtaining the sum of criticalities for each risk factor that has been identified for the item:
    - Item Criticality = SUM of risk factor criticalities.

The activities involved for the qualitative criticality analysis are:

- rate the severity of the potential risk factors;
- rate the likelihood of occurrence of each risk factor; and
- compare the risk factors with a matrix, which identifies the severity on the horizontal axis and occurrence on the vertical axis.

Upon completion of this technique, the risk involved in the development of the requirements elicited is determined and the high risk requirements are identified (Hayes et al., 2004; Lauesen, 2002). The advantage of this technique is that it is easy to perform and time efficient. A drawback of criticality analysis is that it relies heavily on the expertise of the business analyst to provide suitable values for the risk factors and it assumes that all the risk sources / factors have been identified. Work breakdown structure is reviewed in the next section.

2.4.13 Work breakdown structure

The work breakdown structure is an expertise-based technique which organises the project components into a hierarchy for budget estimation and control. If cost is associated with each component in the hierarchy, an overall cost estimate for the project development can be determined traversing the tree bottom up (Baird, 1989; Jiang, Klein, Hwang, Huang and Hung, 2004). Expertise is used in this technique when identifying the components of the hierarchy and determining the estimates of the individual elements.

A work breakdown structure consists of two hierarchies, one representing the product and the other illustrating the activities needed to develop the product (Boehm, 1981; Jiang et al., 2004). The product hierarchy identifies the components in the software product and describes the basic structure of the overall system. An activity hierarchy shows the various activities that may be associated with a given software component. An advantage of work breakdown structure technique is that it provides a good schedule estimate and excellent cost estimates (Boehm, 1981; Jiang et al., 2004). The drawback of this technique is that it is costly and fails to identify factors which guide the business analyst in his/her estimations (Jiang et al., 2004).

2.4.14 Decision analysis under uncertainty

Decision analysis under uncertainty comprises of an organised structure within which various options can be laid out and investigated (Jakob, Lars and Peter, 2004; Howard, 1988). Hence, given an impracticable project, a business analyst can utilise the decision analysis technique to choose the right alternative that is economically and practically viable.

Decision analysis begins with the construction of the decision tree, which consists of solution alternatives represented as lines (Clemen, 1996), as illustrated in Figure 2.7 below.

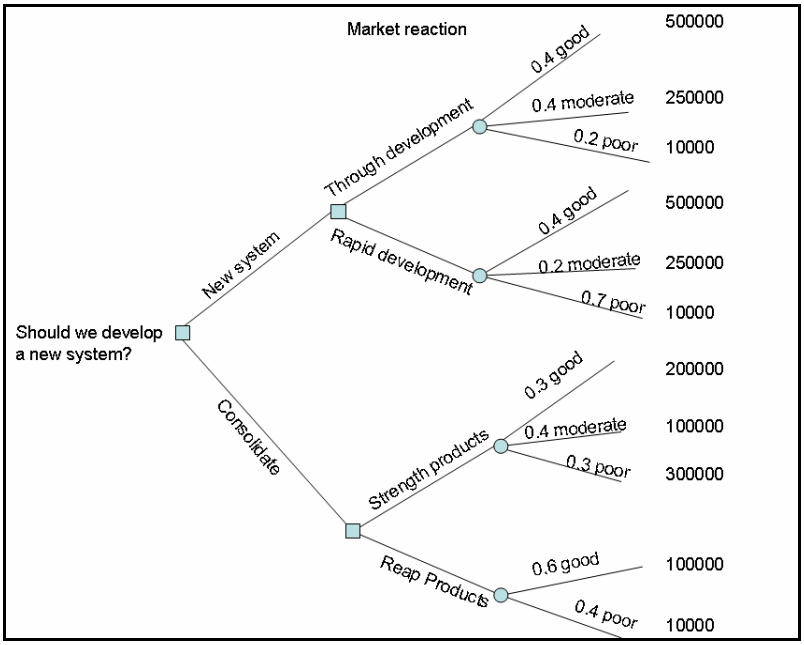

Figure 2.7: Decision analysis under uncertainty

Source: Clemen (1996)

If the result of taking a decision / alternative is uncertain, a small circle is drawn. If the result is another decision that is to be taken, then a square is drawn as illustrated in Figure 2.7. At each circle, possible outcomes are drawn and the probability / cash value of each outcome is estimated.

The decision analysis technique is advantageous because it clearly lays out the problem so that all options are challenged and allows the analysis of all possible consequences of the decision. Furthermore, this technique provides guidance to a business analyst for taking the best decision (Clemen, 1996). The disadvantage of this technique is that it costly and relies on the business analyst for identifying the consequences of the decisions and the associated probabilities (Clemen, 1996). Plus minus implications (PMI) are explored in the subsequent section.

2.4.15 Plus minus implications (PMI)

Plus minus implications (PMI) is a decision making technique which helps evaluate the pros and cons of a problem under consideration (Lauesen, 2002; Wallace et al., 2004). Research (Lauesen, 2002; Wallace et al., 2004) found it to be the most commonly used technique for feasibility analysis.

The PMI technique starts with the drawing of a table with the headings: Plus, Minus and Implications. In the column underneath 'Plus' all the positive aspects of the project are included. For example, the business analyst may list all points which make the project technically, operationally and economically feasible (Frame, 2002; Wallace et al., 2004). Under the column 'Minus', the negative aspects of the project are listed. The last column, 'Implications', records the effects (either positive or negative) which are expected to occur when the project is completed and delivered. Examples of project implications could be: capturing a large percentage of the market share or the necessity to include localisation features (Wallace et al., 2004).

The PMI technique is simple, cost effective and time efficient. However, this technique is unclear about the weighting of points and relies heavily on the experience of the business analyst. As a consequence, the results obtained can be misleading if this technique is performed by inexperienced business analysts. The subsequent section reviews affinity analysis technique.

2.4.16 Affinity analysis

Affinity analysis involves writing a concept on a note and sticking it on a wall or board. A team then moves the notes around to form groups based on how they feel the concept relates to the others (Rygielski, Wang and Yen, 2002). Essentially, this technique is a categorisation technique where users sort various concepts into several groups (Goguen and Linde, 1993). The activities involved in affinity analysis are listed below (Goguen and Linde, 1993).

- Form a team of four to six people so that there is good mix of experience and perspectives.
- Clearly state what the team is trying to accomplish and what the end result of the exercise should be.
- Use notes to record concepts (requirements) in whole sentences and not just as a single word.
- Tack cards to wall or whiteboard in no particular order.
- The team members sort the cards into groups based on their intuition. No person should influence the other person's decision.
- For each group, create header cards which concisely describe what each group represents. The header cards should be single word titles and meaningful. Write sub-header cards for subgroups, if necessary.
- Connect the related headers and sub-headers with lines to generate an affinity diagram.

Affinity analysis is an effective technique for classifying requirements so that they are easy to comprehend. This technique is very effective to use when there is a large amount of data that

needs to be classified. Moreover, it is a simple technique which can be performed in a short time frame. The drawback of affinity analysis is that for large amount of data, a huge canvas is necessary to conduct this technique. In addition, this technique is fairly expensive because it involves approximately six people and a business analyst, who manages the proceedings of the meeting. The subsequent section introduces a review of tools from literature, commencing with Rational rose.

2.4.17 Rational rose

Rational rose[5] is a tool intended for analysis, modelling and construction of software applications (Cossentino and Potts, 2002). Business analysts use Rational rose to model solutions with classes, actors (stick figures), use case elements (ovals), objects (rectangles) and messages/relationships (arrows) in the form of sequence diagrams (Cossentino and Potts, 2002). Rational rose is able to document solutions and generate code in programming language such as C++, Visual Basic or Java (Damm, Hansen, Thomsen and Tyrsted, 2000).

The benefit of Rational rose is the ability to provide for iterative development, as new requirements can be developed in phases (Cossentino and Potts, 2002; Damm et al., 2000). However problems with Rational rose relate to integration with other systems or interfaces (Faraj, Alshawi, Aouad, Child and Underwood, 1999). After reviewing Rational rose, an examination of Viso was conducted, and follows in the next section.

2.4.18 Visio

Visio[6] is a drawing and diagramming tool that is primarily used to convert business and technical documents into visual diagrams (Reilly and Bendiab, 2002). Visio is mainly intended for enterprise-level projects and is used to document and communicate information (Reilly and Bendiab, 2002).

The benefits of Visio include easily creating and documenting diagrams, as well as using the tool as a communicate mechanism to visualise and ideas more effectively (Auer, Tschurtschenthaler and Biffl, 2003). However a disadvantage of this tool relates to problems managing large diagrams on a computer screen (Graaf, Lormans and Toetenel, 2002). After examining Visio, a review of ARIS was conducted, and follows in the subsequent section.

[5] http://www.rational.com
[6] http://www.microsoft.com

2.4.19 ARIS

ARIS[7] is a modelling tool, which is primarily used to convert business requirements into process flow diagrams. ARIS further contains features for remodelling and analysis of business processes (Stutz, Siedersleben, Kretschmer and Krug, 2002).

However, it was found that analysts who are not trained to use ARIS have difficulty understanding the complex functionality of this tool (Toh and Harding, 1999).

This section concludes the review of the business analysis techniques and tools. The contributions and shortcomings of business analysis methodologies, techniques and tools are presented in the following section.

2.5 Contributions and shortcomings of business analysis methodologies, techniques and tools

Table 2.1 summarises the contributions and shortcomings of the methodologies which were identified in section 2.3. The major problems with the business analysis methodologies are that the phases are at too high a level and the objectives, relevance and outcomes of these phases are not clearly defined. The second problem is that the activities, techniques and tools are not specified for the phases.

Table 2.1: Business analysis methodologies - contributions and shortcomings

Methodology	Contributions	Shortcomings
Requirements engineering process methodology	• Techniques specified for each phase	• Phase objectives not clearly defined • Single techniques specified for each phase • Phase outcome not defined • Only covers early stages • Inadequate level of detail • Tools not specified
Requirements triage methodology	• Adequate level of detail	• Phase objectives not clearly defined • Phase outcome not defined

[7] http://www.ids-scheer.com

		• Activities and techniques not specified for the phases • Only addresses middle portion of business analysis
Knowledge level process methodology	• Identifies phases	• Inconsistent level of detail • Phase objectives not clearly defined • Phase outcome not defined • Techniques and tools not specified for the phases • Complex, difficult to change • Not general in nature (scenario-based)
Win-win spiral methodology	• Ease of use	• Inadequate level of detail • Phase objectives not clearly defined • Phase outcome not defined • Activities, techniques and tools not specified for the phases
Process framework methodology	• Focuses on documents produced	• Inadequate level of detail • Phase objectives not clearly defined • Phase outcome not defined • Activities and tools not specified for the phases
Requirements generation methodology	• Identifies phases	• Inadequate level of detail • Activities at a high level • Techniques and tools not specified for the phases

Table 2.2 and Table 2.3 summarise the contributions and shortcoming of the techniques and tools identified in section 2.4. Highlighting the contributions and shortcomings of techniques and tools shows that incorrect selection could hamper the outcome of a phase of business analysis.

Table 2.2: Business analysis techniques - contributions and shortcomings

Techniques	Contributions	Shortcomings
Joint Application Design (JAD)	• Elicits news ideas, cost effective, simple • Promotes creativity, team spirit	• Business analyst has to have strong people management skills. • This technique should be followed by idea reduction techniques
Interviews	• Cost effective • Provides opportunity to explore topics in depth	• Time consuming • Interview questions are critical for success • Assumes interviewee has access to accurate information
Observation	• Simple and cost effective	• Cannot collect information about events that rarely happen because of limited time
Task Demonstration	• Suited for interactive applications • Time efficient	• Success dependent on tasks assigned to the user
Document Studies	• Provides comprehensive information	• Involves one-way communication • Business analyst may get frustrated • Takes a long time to read the documents
Questionnaires	• Large user coverage • Cost effective, simple	• Success dependent on the questions
Prototyping	• Provides good user feedback • Helps user in comprehending the requirements	• Cost and time intensive
I-Time	• Cost effective, simple	• Questions posed to user are critical to success • Needs to be followed by a discussion

Analytic Hierarchy Process (AHP)	• Provides relative priorities	• Time consuming, cost intensive • Applicable if requirements obtained in a single iteration
Scenarios	• Easy to comprehend • Better feedback from users	• Cost and time intensive
Storyboarding	• Easy to comprehend • Better feedback from users	• Cost and time intensive
Criticality Analysis	• Simple, cost effective, time efficient	• Assumes all risk factors are known before analysis • Single estimate for risk factors
Work Breakdown Structure	• Good schedule cost estimates	• Time consuming and large effort required
Decision Analysis Under Uncertainty	• Clear problem definition	• Relies on the business analyst for identifying the consequences of the decisions and the associated probabilities
PMI	• Cost effective, simple	• Weighing of points is not clear
Affinity Analysis	• Simple, fosters team spirit • Can be conducted in a short time frame	• Difficult to manage for large amount of data • Cost intensive

Table 2.3: Business analysis tools- contributions and shortcomings

Tools	**Contributions**	**Shortcomings**
Rational rose	• Iterative development functionality	• Problems integrating with other systems or interfaces
Visio	• Easy to create and document requirements	• Problems managing large diagrams on a computer screen
ARIS	• Good features for modelling and analysis	• Difficult for untrained users

It is thus evident that, although prior research has made important advances, business analysis methodologies are inadequate for business analysis. In particular, the lack of clear objectives, relevance and outcomes of the phases, as well as activities, techniques and tools not mapped to those phases, make business analysis methodologies inadequate. The following section presents a conclusion of the literature review.

2.6 Conclusion of the literature review

This chapter introduced a literature review by presenting recent studies pertaining to business analysis methodologies. Thereafter, research relevant to business analysis techniques and tools were presented. Moreover, the contributions and shortcomings of methodologies, techniques and tools were examined. The lack of clear objectives, relevance and outcomes of the phases were presented as shortcomings to the methodologies from literature. The literature review also illustrated that techniques and tools were not mapped to the relevant phases of a methodology. As discussed in chapter 1, section 1.4, this research attempts to overcome these problems by developing a business analysis methodology with phases that have objectives, relevance and outcomes, as well as appropriate activities, techniques and tools for those phases. The following chapter details the research methodology used for this study.

Chapter 3
Research Methodology

3.1 Introduction

The literature review in chapter 2 introduced the underlying conceptual framework pertaining to business analysis methodologies.

This chapter establishes the research methodology used to carry out this study, and justifies the qualitative approach that allows for in-depth probing and detailed responses. The pre-test and pilot studies conducted are also illustrated. Importantly, the data gathering methods comprising of individual interviews and focus group interviews are demonstrated. Moreover, the sample selection, characteristics of participants and settings for each of these data gathering methods that are used for this study are further introduced. The data analysis strategy including the data management strategy, content analysis and analysis within and between interviews are presented in detail. This chapter further introduces the data coding and category construction procedure used for this research. Moreover, the assessment of trustworthiness, criteria for reliability and validity, as well as ethical considerations of the researcher are also covered. The following section introduces the qualitative research design used in this study.

3.2 Qualitative research design

Leedy (1993) defines a research design as an operation framework within which facts are placed to make their meaning clearer. The aim of a research design is to describe and analyse methods used, hence clarify their presuppositions and consequences, and highlight their limitations (Leedy, 1993). Creswell (1994) suggests that qualitative research is a free-form research methodology that is used to gain insight into underlying issues surrounding a research problem by gathering non-statistical feedback and opinions rooted in people's feelings, attitudes, motivations, values and perceptions, often from small samples.

A qualitative design was selected for this research because it allowed for in-depth probing of issues and greater detail in responses (Denzin and Lincoln, 1994). It also allowed for interaction with the participants whereby probing questions could be asked based on previous responses. Further, it allowed for interaction between group members in the focus group interviews, which often stimulated discussion and uncovered issues unanticipated by the researcher (Dixon et al*.,* 1988; Hussey and Hussey, 1997).

The qualitative research design used for this study is illustrated in Figure 3.1.

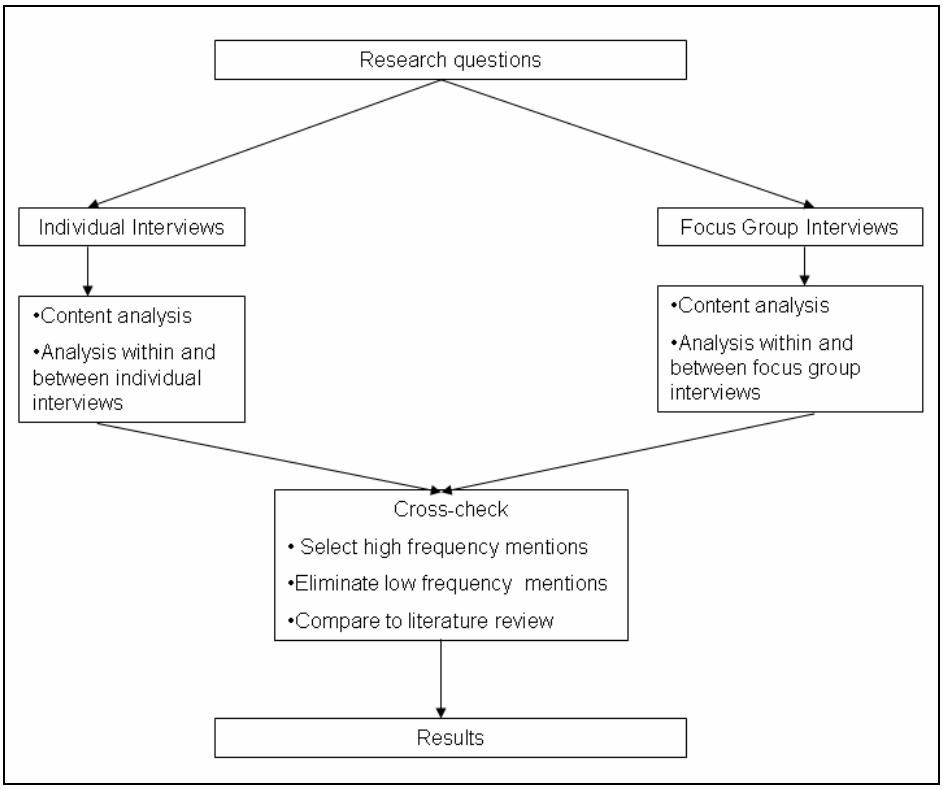

Figure 3.1: Overview of the qualitative research design

Source: Adapted from Baskerville (1999)

Qualitative data gathering methods consisting of individual interviews and focus group interviews were used for this study. The criteria for triangulation, the application of different data gathering methods to study the same phenomenon, was used to test the consistency of findings obtained through the individual interviews and focus group interviews because it has been argued that triangulation increases the reliability and validity of a final result (Baskerville, 1999; Dixon et al*.,* 1988). It is based on the assumption that any bias inherent in a particular method can be neutralised when used together with other methods, i.e. the weakness from one method can be overcome with another method (Hussey and Hussey, 1997; Yin, 1994). Illustrated in Figure 3.1, content analysis, as well as analysis within and between interviews was then independently conducted on the data from the individual and focus group interviews. The results from each of these data gathering methods were then cross-checked against each other.

In order to improve the reliability and validity of the data gathering methods, a pre-test and pilot study was conducted, and follows in the next section.

3.3 Pre-test and pilot study of data gathering methods

A pre-test refers to a small-scale trial of particular research components while a pilot study is the process of carrying out a preliminary study, going through the entire research procedure with a small sample (Mathison, 1988; Maxwell, 1992; Patton, 2001). Compeau and Higgins (1995) recommend that both a pre-test and a pilot test be conducted prior to the initial data collection phase in order to validate the data gathering methods and ensure that they are free from errors. Further, a pre-test and pilot study serves as a trial run and enables a researcher to revise the methods and logistics of data collection before starting the actual fieldwork (Mathison, 1988; Maxwell, 1992; Kvale, 1995).

As a result of the pre-test and pilot study, the reliability and validity of the research is improved; time, effort and money can be saved in the long run (Mathison, 1988; Maxwell, 1992; Patton, 2001). A pre-test and pilot study of individual and focus group interviews was therefore conducted for this study to improve the reliability and validity of the results. See section 3.5.2 for the individual interview pre-test and pilot study, as well as section 3.6.2 for the focus group interview pre-test and pilot study.

The following section introduces the sample selection, characteristics of the participants and the research settings.

3.4 Sample selection, characteristics of participants and research settings

Initially, the individual and focus group interviews were conducted with the researcher's colleagues and former work colleagues from Bank A and Bank B. These participants then suggested further participants within those organisations, and so the process continued. This method of sample selection is known as the snowball approach, and is widely accepted in the field of research (Sutherland, 1994).

From this snowball sample, non-randomised purposive sampling was conducted to add reliability to the data (Maxwell, 1992). Non-randomised purposive sampling is a sampling method based on the judgement of the researcher, where participants are chosen, based on their knowledge of the phenomenon the researcher is studying (Leedy, 1993). The following criteria were used to select the non-randomised purposive sample (Maxwell, 1992):

- participants who had experience and knowledge in business analysis; and
- participants that were verbally fluent and able to freely communicate their feelings, thoughts and perceptions to the research.

The final sample of participants represented different types of IS professionals, made up of CIOs, business analysts, project managers and IS managers from Bank A and Bank B. The characteristics of the participants were as follows. The CIOs were individuals that were responsible for the strategic planning of information systems and technology within each bank. Business analysts were accountable for identifying business needs and proposing solutions. Project managers, on the other hand, were involved with the implementation of solutions and systems. Finally, IS managers were responsible for the management of information systems and technology within each bank.

In total, 45 participants contributed to this research. Twenty two of these participants were interviewed individually and 23 participated in 2 focus group interviews. Tables 3.1 and 3.2 represent the sample for the individual interviews and the focus group interviews respectively.

Furthermore, participants in this study were only involved with one data gathering method, i.e., if a participant was interviewed individually, then that candidate did not participate in the focus group interviews. Further, most of the participants asked not to be named and are therefore not identified in this research.

The following sections present the data gathering methods consisting of individual interviews and focus group interviews, used for this research.

3.5 Individual interviews

The purpose of the individual interviews was to gather data in order to develop the business analysis methodology. Interviews offer researchers the chance to explore topics in depth and to gain appreciation of the subject area (Campbell, 1996; Goguen and Linde, 1993). Questions that were asked during the interviews were semi-structured. Individual interviews were used for this study because these allowed for the collection and recording of complex responses (Hussey and Hussey, 1997). Individual interviews also allowed the researcher and participant to have full discussions and explanations of the questions and answers (Yin, 1994). Moreover, individual interviews allowed the same questions (see Appendix C) to be posed to each participant which made interviewing of a number of individuals more systematic and comprehensive (Silverman, 2000).

However, the researcher is also aware that individual interviews limit the use of alternative lines of questioning. Alternative lines of questioning refers to the posing of different questions to different people, depending on their particular experiences (Dixon et al*.,* 1988; Hussey and

Hussey, 1997), for example, senior business analysts could be interviewed in more detail than junior business analysts. However, the benefit of the researcher and participant to have full discussions outweighed this limitation (Creswell, 1994).

3.5.1 Individual Interview protocols

The individual interview protocol, presented in **Appendix C**, was designed to probe key questions around the central theme of this research. It consisted of 5 questions, most of which the interviewees were encouraged to answer at length. The design of the individual interview protocol was influenced by the need to elicit qualitative information to develop a business analysis methodology (Goguen and Linde, 1993). The major issues covered in each interview were:

- phases of a business analysis methodology;
- objectives, relevance and outcomes of these phases;
- activities of a business analysis methodology;
- techniques of a business analysis methodology; and
- tools of a business analysis methodology.

3.5.2 Pre-test and pilot study of individual interview protocol

Pre-test interviews were conducted with 2 candidates from Bank A. The pre-test revealed the need to make changes to some of the questions (Fowler, 1995). Changes were made to the wording of the questions in order to personalise them as follows. For example, question 3, “for each phase described above, list the activities that you perform?” was modified to “now, for each phase mentioned above, please tell me about the activities you perform when conducting business analysis. Shall we begin with phase 1?”. Question 4, “for each phase described above list the techniques that you utilise?” was changed to “for each phase mentioned above, please tell me about the techniques you utilise when conducting business analysis?”.

After these changes to the individual interview protocol, a pilot study was then conducted (Fowler, 1995). For the pilot study the modified interview protocol was used to conduct individual interviews with 3 different candidates from Bank B. The data from these 3 interviews were analysed using the data analysis strategy described in section 3.7 (Mathison, 1988; Maxwell, 1992; Kvale, 1995). Adequate results were obtained, and no further changes were made to the interview protocol (Mathison, 1988; Maxwell, 1992; Kvale, 1995).

3.5.3 Individual interview sample selection, characteristics of participants and settings

In total, 69 people were identified for the individual interviews. Of these, 30 candidates said they were too busy to be interviewed, and 17 did not respond to the invitation. Twenty two individual interviews were carried out. These individual interviews were conducted in June 2005. The time duration of these interviews was approximately half an hour. Table 3.1 presents the participants identified and those who participated in the individual interviews.

Table 3.1: Sample table for individual interviews

	Bank A		Bank B		Total	
	Identified	**Participated**	Identified	**Participated**	Identified	**Participated**
Business analysts	15	**8**	12	**5**	27	**13**
CIOs	1	**1**	1	**1**	2	**2**
Project Managers	10	**3**	10	**2**	20	**5**
IS managers	10	**1**	10	**1**	20	**2**
Total	36	**13**	33	**9**	69	**22**

Thirteen business analysts, 2 CIOs, 5 project managers and 2 IS managers were interviewed from Bank A and Bank B.

3.5.4 Conducting individual interviews

Each interview was conducted by the researcher on the work premises of the participant, usually in the interviewee's office. All interviewees agreed to allow the interview to be recorded using a tape recorder.

The individual interviews commenced with an introduction, followed by the first question from the interview protocol related to their understanding of business analysis. The specific questions relating to a business analysis methodology followed. The specific questions were asked to make sure that the interviewee had covered all the areas deemed important by the objectives of this research. Interviewees were permitted freedom to digress from the theme of a particular question, as long as the information given was useful to the research topic (Creswell, 1994).

Where answers were unclear or ambiguous, clarification was requested by using a mirroring or reflecting probe such as, “What you seem to be saying….” Explanatory probes such as, “What did you mean by that?” or “What makes you say that?” and focused probes such as, “What sort of systems/measure/etc.?” were used when necessary (Creswell, 1994). Silent probes also proved to be effective (the interviewer remains quite and, in so doing draws out further response from the interviewee). Drawing out probes, where the interviewer repeats the last few words of the participant, helped to draw out further information. This helped obtain information from the interviewee that might not have emerged naturally (Mathison, 1988; Maxwell, 1992). Care was taken to avoid influencing responses by agreeing or disagreeing with statements, or even by the use of body language or facial expressions (Creswell, 1994).

To ensure that the interview was complete, the interviewees were asked at the end of the interview what important issues they thought had not been covered by the interview (Creswell, 1994). Participants said that the interview had covered the important issues. In order to test the consistency and increase the reliability of the findings for the business analysis methodology, focus group interviews were held (Baskerville, 1999; Dixon et al*.,* 1988).

3.6 Focus group interviews

The purpose of the focus group interviews was to gather data in order to develop a business analysis methodology. According to Silverman (2000), in the applied social sciences focus group interviews are among the most widely used research tool. A focus group takes advantage of the interaction between small groups of people. Participants respond to, and build on, what others in the group have said. Focus group interviews allowed the researcher to elicit ideas, insights and experiences from a small group of participants in a limited period of time (Lincoln and Guba, 1985), to develop a business analysis methodology.

However, the researcher is also aware that only a limited number of questions can be covered and that unexpected diversions can occur in a focus group such as power struggles among participants (Patton, 2002, Silverman, 2000). Nevertheless, the benefits of participant interaction as stated above of a focus group interview outweigh these limitations (Creswell, 1994).

3.6.1 Focus group interview protocols

The focus group interview protocol, presented in **Appendix D**, consisted of 5 questions, most of which the interviewees were encouraged to answer at length (Goguen and Linde, 1993). The design of the focus group interview protocol was influenced by the need to find qualitative

information and identify the relevant phases, activities, techniques and tools of business analysis methodology.

3.6.2 Pre-test and pilot study of focus interview protocol

A pre-test of the focus group interview protocol was conducted with 2 candidates from Bank B. However, no changes were made to the any wording of the questions as satisfactory responses were received.

As the data analysis strategy was already tested with the individual interview pilot study, another pilot study for the focus group interviews was not deemed necessary. The reason is that the same data analysis strategy, described in section 3.7, was being used for both data gathering methods (Mathison, 1988; Maxwell, 1992; Kvale, 1995).

3.6.3 Focus group interview sample selection, characteristics of participants and settings

Two focus sessions, each made up of 12 and 11 participants respectively, were held at Bank A and Bank B. These focus group interviews were held in August 2005. Table 3.2 lists the candidates who participated in the focus group sessions.

Table 3.2: Sample table for focus group interviews

	Focus Group 1 Bank A	Focus Group 2 Bank B	**Total**
Business analysts	5	4	**9**
Project Managers	3	4	**7**
IS managers	4	3	**7**
Total	**12**	**11**	**23**

The duration of these sessions varied between half an hour and one hour, the average session time being about 45 minutes. Nine business analysts, 7 project managers and 7 IS managers participated in the focus group interviews.

3.6.4 Conducting focus group interviews

The focus group interviews were conducted by the researcher on the work premises of the participants, i.e., one focus group interview at Bank A, and one focus group interview at Bank B. All interviewees agreed to allow the sessions to be recorded using a tape recorder.

The focus group interviews started with an introduction, a question related to their understanding of business analysis, followed by the more specific questions (see Appendix D). Freedom to digress from the theme of a particular question was permitted as long as the information given by the participants was useful to the research topic (Silverman, 2000). Moreover, participants were allowed to build on the responses of other participants, as well as to debate any concerns (Mathison, 1988; Maxwell, 1992). As suggested by Creswell (1994), the researcher avoided influencing responses by agreeing or disagreeing with statements.

In the closing stages of the focus group interview, the participants were asked if all the issues they deemed relevant were considered (Creswell, 1994). Participants said that the focus group interview had covered the important issues.

After the participants had completed the individual interviews and focus group interviews, data analysis was conducted with the data collected. The data analysis strategy used for this research follows.

3.7 Data analysis strategy

According to Strauss (1987), a data analysis strategy is a process of systematically applying logical techniques to describe, summarise, and compare data. The following strategy was applied to the analysis of individual interviews and focus group interviews independently.

3.7.1 Data management

Data management was designed to maintain as much of the participants' ideas as possible from the individual and focus group interviews, as well as to permit ongoing analysis (Patton, 2001; Strauss, 1987). As previously stated, individual and focus group interviews were recorded using a tape recorder, with permission from the participants (Mathison, 1988; Maxwell, 1992). Further, the researcher wrote abbreviated notes in a section of the interview protocol (Maxwell, 1992) called "interview comments" (see Appendices C and D). These are referred to as "raw" field notes gathered from individual and focus group interviews (Patton, 2001).

After each individual and focus group interview, the recordings and "raw" field notes were transcribed by the researcher into a notebook, and are referred to as "expanded" field notes (Morse, 1994). These "expanded" field notes were written as full sentences, with the researcher adding commentary as well as anything relevant which he remembered, but had not had time to write down (Mathison, 1988; Maxwell, 1992; Patton, 2001). The individual and focus group interviews were analysed separately. The technique used to analyse this data follows in the next section.

3.7.2 Content analysis and analysis within and between interviews

Content analysis is a procedure for organising non-structural information into a standardised format that allows a researcher to make inferences about the characteristics and meaning of written or recorded material (Merriam, 1998). Analysis within and between interviews was used to analyse the "expanded" field notes (Merriam, 1998). Strauss (1987) suggests that content analysis be used in the reduction of qualitative data to develop a larger, more consolidated picture:

> "Content analysis is necessary to systematically and objectively derive categories of responses that represent homogenous thoughts or opinions. This is done to facilitate interpretation of the large volume of lengthy and detailed responses. This form of content analysis is known as open coding or context-sensitive scheme coding. This form of analysis involves a researcher firstly coding, and then naming categories through a detailed examination of the data. A pre-determined framework of possible responses is not used, but the actual text provided by participants is used to generate the categories as well as to summarise the data. This involves an iterative interpretation process of first reading responses, then rereading to establish meaningful categories, and finally rereading select responses to refining the number and meaning of categories in a manner deemed most representative of the participants' text" (p106).

The "expanded" field notes from the individual and focus group interviews were analysed independently using the content analysis procedure above. The "expanded" field notes from each data gathering method did not influence or feed into each other. Analysis within and between interviews was also conducted to increase the reliability of the data (Merriam, 1998). The data coding approach follows in the next section.

3.7.3 Data coding

Strauss (1987) suggests that for open coding, codes may emerge from a preliminary examination of the data. He suggests a researcher "breaks down the contents of the data into meaningful and pertinent units of information", (p108). He states codes may be based upon *words* or *themes* that identify text or premises that relate to the research objectives. Using this process, codes were assigned by the researcher, to responses received from the individual interviews and focus group interviews. Codes were written in the margins of the notebook containing the expanded field notes (Morse, 1994; Strauss, 1987). In an effort to reduce potential coding error, responses deemed "incomprehensible" within the context of the question were not coded (Silverman, 2000). The category construction strategy follows in the next section.

3.7.4 Category construction

Category construction was performed using the following procedure, recommended by Strauss (1987):

> "The researcher gives each response a label known as a code. The researcher assigns these labels (codes) to units or sections of interview transcripts, notes or other sources of data. Then the researcher defines conceptual categories - i.e. clusters of concepts or ideas that may be suggested by the research questions" (p109).

After the data coding, categories for a business analysis methodology were defined. Based on the research questions, categories and subcategories such as phases, activities, techniques and tools were represented in the form of tables (Merriam, 1998; Strauss, 1987). Responses were then summarised into the tables for each question, and the number of times each response was mentioned was counted (Merriam, 1998; Strauss, 1987). Each question's response was then ordered in descending number of mentions, causing the most popular responses to be at the top of each table (Merriam, 1998; Strauss, 1987). These tables can found in Appendices E and F. The cross-checking strategy follows in the next section.

3.7.5 Cross-checking of results

After the data coding and category construction were performed on the individual and focus group interviews, the data from each these methods were cross-checked against each other. Silverman (2000) suggests a researcher should "cross-check data by selecting high frequency mentions and

eliminating low frequency mentions" (p188). Therefore, the data from the individual interviews was cross-checked against the data from the focus group interviews by selecting the most frequently mentioned responses for each category and eliminating responses with a low frequency of mentions. This strategy allowed the comparison of one data set against another to check for patterns, contradictions and examine overlapping facets, to increase the reliability of the final result (Baskerville, 1999).

This cross-checked data was then compared to the business analysis methodologies which were identified in the literature review to see if the results overcame the shortcomings found. To ensure these results were trustworthy, an assessment of trustworthiness was conducted, and follows in the next section.

3.8 Assessment of trustworthiness

Lincoln and Guba (1985) suggest that trustworthy qualitative research needs to be based on "systematic collection of data, using acceptable research procedures, and allowing the procedures and findings to be open to systematic critical analysis from others" (p53). The criteria used to increase the trustworthiness of this research are set out below (Lincoln and Guba, 1985).

- *Thick description:* this entails having a detailed description of the research process showing how the researcher reached the conclusions. This assists other researchers replicate the study and arrive at the same general scheme (Lincoln and Guba, 1985). This study presented a literature review, a description of the research methodology, the qualitative research design, as well as a description of the data analysis strategy. The semi-structured interview protocols were also presented (Mathison, 1988; Maxwell, 1992; Patton, 2001).

- *Prolonged engagement*: prolonged engagement involves the researcher investing sufficient time to learn about the culture to be studied, detecting and minimising distortions that may slowly shape the data, and building trust with the participants (Lincoln and Guba, 1985). The researcher of this study has over eight years of experience in business analysis. Also, time was spent with the participants exchanging introductions prior to the interviews to build up trust with them (Lincoln and Guba, 1985).

- *Persistent observation*: this means identifying characteristics and elements relevant to the research (Lincoln and Guba, 1985). Persistent observation was demonstrated in this study through the diligent note taking in the form of "raw" field notes and recording of the individual and focus group interviews (Lincoln and Guba, 1985).

- *Peer debriefing:* this involves exposing oneself to peers in a manner similar to that of an analytic session, to explore aspects that may be implicit in the researcher's mind (Creswell and Miller, 2000; Lincoln and Guba, 1985). This was achieved with the assistance of the researcher's colleague, of a similar status, who reviewed the research process and as well as the results of this study (Creswell and Miller, 2000).

- *Referential adequacy*: referential adequacy is the use of mechanically recorded data such as tape recorders, videotapes, photographs (Lincoln and Guba, 1985). This study recorded all the individual and focus group interviews using a tape recorder.

Researchers (Creswell and Miller, 2000; Merriam, 1998; Lincoln and Guba, 1985; Yin, 1994) further suggest that the trustworthiness of a qualitative study is related to the reliability and validity of the research, and a discussion of these follows.

3.8.1 Reliability and validity of the research

There are multiple views of reliability and validity in qualitative literature. A few of these views are set out below.

- Researchers may view reliability and validity from a quantitative perspective to find equivalents (LeCompte and Goetz, 1982; Andrews, 1984).
- The employment of descriptive language can be used by scholars to provide legitimacy for reliability and validity (Lincoln and Guba, 1985; Eisner, 1991).
- Researchers may re-conceptualise reliability and validity within a framework (Lather, 1993).
- Some literature suggests that reliability and validity is not relevant to qualitative research (Wolcott, 1994).

Moreover, within a qualitative research framework, there are no statistical techniques to establish the reliability and validity of research findings (Terre Blanche and Kelly, 1999; Andrews, 1984).

Therefore, for this research, Yin's (1994) criteria for reliability (diachronic, synchronic and inter-judge reliabilities) and validity (instrument, internal, construct and generalisability) are adapted. Yin (1994) also suggests that if similar patterns are established in data collection from different sources, the reliability and validity of the interpretations is enhanced. The research satisfied these criteria by comparing the content analysis data from the individual interviews and focus group interviews, where similar patterns were demonstrated (Creswell and Miller, 2000; Merriam, 1998; Silverman, 2000).

All of Yin's (1994), criteria for determining reliability and validity of qualitative research, adapted in the next section, were adopted in this research.

3.8.1.1 Reliability of the research

Reliability refers to the extent to which a measure yields the same results after repeated trials (Carmines and Zeller, 1979; Yin, 1994). This research supports the *diachronic, synchronic and inter-judge* criteria for reliability.

- **Diachronic reliability** refers to the stability of observed outcomes (Kirk and Miller, 1986). Content analysis showed consistent patterns in the identification of phases, activities, techniques and tools, from the business analysts, project managers and IS managers from the 2 banks.
- **Synchronic reliability** refers to the similarity of outcomes determined from multiple sources of different measures (Yin, 1994). For this research, standardised instruments were used in the form of protocols for the individual interviews and focus group interviews, whereby similar patterns of results were produced.
- **Inter-judge reliability** is achieved by determining the degree of agreement between participants (De Vellis, 1991). This research compared the interview responses from the individual and focus group interview responses (Yin, 1994). Consistent patterns in the responses from each method indicated the degree of consistent agreement in the responses analysed.

Validity of this research was achieved as follows.

3.8.1.2 Validity of the research

Lincoln and Guba (1985) state that validity "determines whether the research truly measures that which it was intended to measure and how truthful the research results are" (p57). The criteria of validity which apply to this research appear below.

- **Instrumental validity** addresses whether or not generated observations from one instrument match those from an alternative measure (Kirk and Miller, 1986; Nunally, 1978). In this research, data from semi-structured interviews and focus group interviews were compared. Similar patterns in the results from each method showed the validity of instruments used in this research (Ragin, 1990; Trochim, 1989). Further, a pre-test and pilot study of the instruments improved the validity of the instruments (Mathison, 1988; Maxwell, 1992; Patton, 2001).

- **Internal validity** occurs by "applying pattern-seeking and matching methods across cases" (Yin, 1994). For this research, internal validity was achieved through *pattern matching*, during the content analysis which revealed similarities in outcomes from different data collection methods and different participants (Yin, 1994; Glaser and Strauss, 1967). Analysis within and between interviews, recommended by Merriam (1998), was conducted to increase the internal validity of the results. Finally, the "convergence of multiple sources of evidence" (Patton, 2001, p83) from the individual interviews and focus group interviews contributed to the internal validity of this research.
- **Construct validity** is accomplished by the establishment of correctly defined and consistently applied operational measures for the concepts being studied (Kirk and Miller, 1986). This was achieved with standardised protocols for individual as well as focus group interviews. Kirk and Miller (1986) suggest multiple sources of evidence encourage convergent lines of inquiry and this was accomplished by a diverse sample of participants consisting of business analysts, project managers IS managers and CIOs. Finally, construct validity was also achieved by handing over the draft of the interview data to the participants to examine whether they agreed with the way the researcher presented the information (Patton, 2001; Yin, 1994). This method, called re-negotiation, was utilised in this research. After the individual interviews and focus group interviews, the transcripts were discussed with the participants for their approval (Patton, 2001).
- **Generalisability**, also referred to as *external validity* (Kirk and Miller, 1986; Patton, 2001), was achieved in this study through the use of multiple participants with different characteristics and the observed similarities within the outcomes. These outcomes lent themselves to generalisability across cases (Kirk and Miller, 1986; Patton, 2001; Yin, 1994).

Lincoln and Guba (1985) suggest that sustaining the trustworthiness of research depends on reliability and validity. If the reliability, validity and trustworthiness can be tested then a more "credible and defensible result" (Johnson, 1997, p283) may lead to *generalisability* which is one of the concepts suggested by Stenbacka (2001) as the structure for both doing and documenting high quality qualitative research. Therefore, the quality of a research is related to generalisability of the result and consequently to the testing and increasing the validity or trustworthiness of the research (Patton, 2001).

As stated above, all of these criteria have been adopted by this research. Also, the reliability and validity criteria of this research contributed to the robustness of the design, and are in line with other criteria recommended by Lincoln and Guba (1985) that relate to *credibility, transferability, dependability,* and *conformability* of qualitative research. Ethical considerations for this research are discussed in the next section.

3.8.2 Ethical considerations

Neuman (1994) suggests that ethics begin and end with the researcher, and that the researcher's personal moral code is the strongest defence against unethical behaviour. A discussion concerning ethical considerations in this study follows.

- *Permission* to interview IS professionals was first obtained from the directors of the divisions of the 2 banks were the research took place. Permission was also obtained from the participants prior to individual and focus group interviews.

- *Anonymity and confidentiality* refers to the principle that the identity of an individual is kept secret (Mouton, 2001). Under no circumstances was the research discussed in the contexts of the identity of the participants, and all data gathered was treated confidentiality. No information was presented in any way that permitted linking certain individuals to specific responses. Information was also presented in an aggregate form.

- *Informed consent* was obtained from all the participants. The researcher also communicated the aims of the study to the participants. The participants were further informed about the steps taken to maintain the anonymity of responses, the researcher's contact details and the process for receiving a copy of the results.

- *Researcher integrity* was respected as the researcher strove at all times during the investigation to maintain integrity as suggested by Mouton (2001).
  - Adherence to the highest technical standards for research and practice is essential.
  - Since individual researchers vary in their research modes, skills and experience, they should always indicate the limits of their finding and the methodological constraints that determine the validity of such findings in the conclusions of a research study.
  - In presenting their work, researchers are always obliged to report their findings fully and not to misrepresent their results in any manner. To the best of their ability, researchers should also disclose details of their methods and research designs that might be relevant to interpretations of research findings.

These ethical considerations were adhered to, to the best of the researcher's ability. The following section presents a conclusion of the research methodology used for this study.

3.9 Conclusion

This chapter introduced the qualitative methodology that allowed for in-depth probing and detailed responses to carry out this study. The pre-test and pilot studies conducted were also illustrated. Importantly, the data gathering methods comprising of individual interviews and focus group interviews were demonstrated. The sample selection, characteristics of participants and settings for each of the data gathering methods used for this study were further demonstrated. The data analysis strategy including the data management strategy, content analysis and analysis within and between interviews were presented in detail. Chapter 3 further introduced the data coding procedure and category construction used for the research. The assessment of trustworthiness, criteria for reliability and validity, as well as ethical considerations of the researcher were also covered. The interpretation of the data is set out in the following chapter, Presentation and Interpretation of the Evidence Collected.

Chapter 4

Presentation and Interpretation of the Evidence Collected

4.1 Introduction

The qualitative research methodology used for this research was presented in the previous chapter. This chapter presents the findings from the individual interviews and focus group interviews. Moreover, the content analysis done on these findings and the categories and subcategories derived are presented. The consolidation and interpretation of these findings with the literature review are also introduced. Chapter 4 concludes by reviewing the research questions with a discussion of the results. Figure 4.1 below presents the structure of chapter 4.

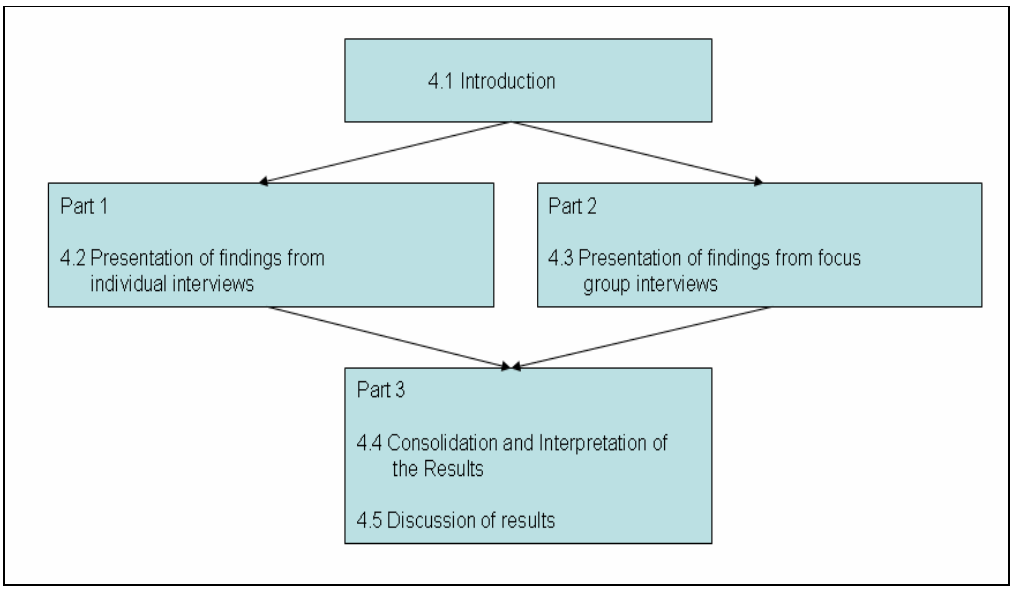

Figure 4.1: Structure of Chapter 4

The structure for this chapter, illustrated in Figure 4.1, is as follows:

4.2 findings and presentation from individual interview (Part 1);

4.3 findings and presentation from focus group interviews (Part 2);

4.4 consolidation and interpretation of the results (Part 3); and

4.5 discussion of the results.

The next section provides an overview of the findings, followed by the construction of conceptual categories and subcategories for the phases, activities, techniques and tools of a business analysis methodology.

4.1.1 Overview of findings

Recalling chapter 1, Figure 1.1 illustrated the research model explored in this research. Figure 4.2 fulfils that model by identifying phases, objectives, relevance and outcomes for each of those phases, as well as activities, techniques and tools. These elements of the business analysis methodology were derived from the individual interviews and focus group interviews. To assist with clarity, Figure 4.2 also includes the label abbreviations used during the coding of the data (Merriam, 1998; Strauss, 1987).

In order to justify these findings, an understanding of the conceptual category construction is required. Using the process described in section 3.7.4 for the category construction, conceptual main categories called 'phases' were derived from the data (Merriam, 1998; Strauss, 1987). Recalling this section:

> "First the researcher then gives each response a label known as a code. The researcher assigns these labels (codes) to units or sections of interview transcripts, notes or other sources of data, and assigns them into the categories. Then the researcher defines conceptual categories - i.e. clusters of concepts or ideas that may be suggested by the research questions" (Strauss, 1987, p109).

Using this process for category construction, main categories such as a **feasibility phase (PH1FE), business case phase (PH2BC), analysis and design phase (PH3AD)** and **post-implementation evaluation phase (PH4PI)**, as illustrated in Figure 4.2, were derived from the data. After deriving these main categories, subcategories and sub-subcategories composed of activities, techniques and tools were similarly derived from the data.

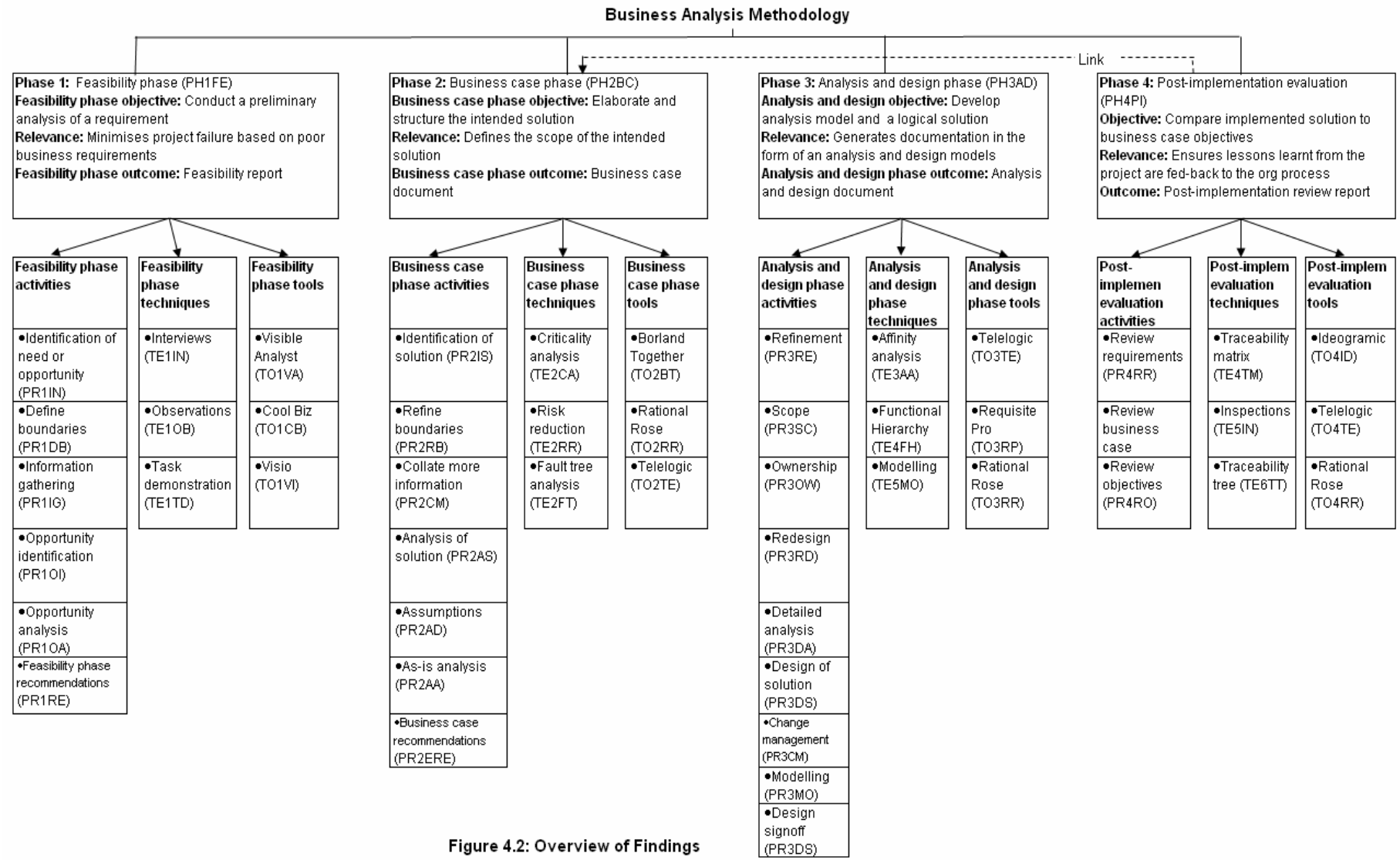

Figure 4.2: Overview of Findings

Shown in Figure 4.2, the first phase of a business analysis methodology was the **feasibility phase (PH1FE)**, the objective of this phase being a preliminary analysis of a business requirement. The deliverable outcome of this phase was found to be a feasibility report. A feasibility phase was deemed to be relevant because it minimised project failure based on poor business requirements and consequently avoided financial losses. The feasibility phase included:

- feasibility phase activities – identifying a need or opportunity (PR1IN), defining boundaries (PR1DB), information gathering (PR1IG), opportunity identification (PR1OI), opportunity analysis (PR1OA) and recommendations (PR1RE) were activities derived from the data;
- feasibility phase techniques – techniques included interviews (TE1IN), observations (TE1OB) and task demonstrations (TE1TD); and
- feasibility phase tools – the tools including Visible Analyst (TO1VA), Cool Biz (TO1CB) and Visio (TO1VI) were derived from the data.

Once the feasibility phase had been established, the **business case phase (PH2BC)** was derived. This research indicated that the objective of a business case phase was to elaborate on the intended solution from the feasibility phase. The outcome from this phase was a business case document. This phase was judged to be relevant because it defined the scope of the intended solution. As seen in Figure 4.2, the activities consisted of identifying a solution (PR2IS), refining boundaries (PR2RB), collating more information (PR2CM), analysing a solution (PR2AS), assumptions and dependencies (PR2AD), as-is analysis (PR2AA) and recommendations (PR2ERE). Techniques included criticality analysis (TE2CA), risk reduction leverage (TE2RR) and fault tree analysis (TE2FT). Finally, tools such as Borland Together (TO2BT), Rational Rose (TO2RR) and Telelogic (TO2TE) were derived from the data. Thereafter, the identification of activities, techniques and tools, for the analysis and design phase was perused.

Analysis and design phase (PH3AD) was found to be the third phase of a business analysis methodology. It emerged that the analysis component of this phase entailed an analysis model representing the business case solution and the design component entailed transforming that model into a logical design solution capable of being implemented. This phase was deemed to be relevant because it generated documentation in the form of an analysis and design model. Refinement (PR3RE), scope (PR3SC), ownership (PR3OW), redesign (PR3RD), detailed analysis (PR3DA), design of solution (PR3DS), change management (PR3CM), modelling (PR3MO) and design signoff (PR3DS) were activities identified for this phase, illustrated in Figure 4.2. Techniques were affinity analysis (TE3AA), functional hierarchy decomposition (TE4FH) and modelling (TE5MO). Telelogic (TO3TE), Requisite Pro (TO3RP) and Rational Rose (TO3RR) were the tools identified.

The findings from this study indicated that a **post-implementation evaluation phase (PH4PI)** was the final phase of a business analysis methodology. Individual and focus group interview data suggested that the post-implementation evaluation phase evaluated the implemented solution by comparing it to the business case objectives. The deliverable from this phase was a post-implementation review report. This phase ensured lessons learnt from the project are re-integrated into the organisation, to benefit future projects. For this phase, reviewing of requirements (PR4RR), reviewing the business case (PR4RB) and reviewing the objectives (PR4RO) were derived from the data for the activities as shown in Figure 4.2. Traceability matrix (TE4TM), inspections (TE5IN) and traceability tree (TE6TT) were the techniques identified. The tools included Ideogramic (TO4ID), Telelogic (TO4TE) and Rational Rose (TO4RR).

A link was also found between the post-implementation evaluation phase and business case phase. It was found that the business case phase provides a baseline for determining success or failure at the end of the project.

These findings are discussed in greater detail in subsequent sections and are consolidated with the literature finding in part 3 of this chapter. The presentation of evidence derived from the individual interviews follow in the next section.

Part 1

4.2 Presentation of findings from individual interviews

As mentioned in chapter 3, section 3.5.3, 69 people were invited to participate in the individual interviews. Section 3.5.3, highlighted the interview sample selection as well as the characteristics of participants and settings. Twenty two people accepted and participated in the individual interviews, representing an acceptance rate of 31%.

This section presents the findings from individual interviews and is structured as follows:

- understanding of business analysis;
- phases, objectives, relevance and outcomes of a business analysis methodology; and
- activities, techniques and tools for the phases of a business analysis methodology.

It must be noted the most significant evidence (Mathison, 1988; Maxwell, 1992) from Bank A and Bank B participants will be presented in a single section.

Without being specifically asked, 12 participants commented on the relevance of the research. Their comments give a clear indication of the importance and timely nature of this project. The opinion of most of the participants on the research initiative is reflected by the words of a project manager from Bank A:

"I think research of this sort is long overdue. Organisations very often do not fully grasp the importance of business analysis. They need to plan more effectively and efficiently up front to ensure a successful implementation. Business analysts desperately need a proper methodology to ensure a standard process is followed for successful project implementation".

Comments from other participants on the relevance of this research can be found in Appendix E, Figure E1. The researcher then proceeded to investigate participants understanding of business analysis, since this is an emerging field and there is some confusion with systems analysis, as discussed in chapter 1, section 1.1.

4.2.1 Understanding of business analysis

This section presents the participants' understanding of business analysis. One participant, a senior business analyst from Bank B, captured the essence of the understanding of business analysis as follows. He said *"Business analysis is about understanding business requirements, and finding solutions to these requirements. These business requirements can be needs, wants, problems or opportunities"*.

Another IS manager from Bank A was outspoken concerning her understanding of business analysis. It was her opinion that business analysis comprised of analysing current business practices as well as analysing problems. In her words *"Business analysis is about analysing current business processes, and understanding your business environment".*

The CIO from Bank B commented *"Business analysis is the process of understanding and defining business requirements"*. Furthermore, he commented that business analysis comprises of *"understanding and interpreting a business need or requirement, identifying requirements for improvements and consulting users".* More evidence to support these findings from individual interview participants are included in Appendix E, Figure E2.

To summarise, participants from the individual interviews viewed business analysis as the process of understanding business requirements and solving business problems. Once an understanding of business analysis was established, participants were probed to explain the

phases of a business analysis methodology, which follows in the next section. The most time was spent on the identification of the phases, because this was the problematic area, as discussed in the literature review in section 2.5. The next section introduces the first phase of a business analysis methodology identified by the individual interview participants.

4.2.2 Feasibility phase (PH1FE) - phase 1 of a business analysis methodology

This section intended to derive the first phase of a business analysis methodology from the individual interviews. Interviewees were asked to name and describe the objective, relevance and outcome of the first phase that they follow when conducting business analysis (see Appendix C, individual interview protocol).

A sampling of participants' comments reveals some interesting insights into their thinking of the first phase of a methodology. During probing about the objective and relevance of this phase, the CIO from Bank B said, *"The first phase should provide a good foundation to allow pre analysis and design activities to commence in a focused manner. This phase should highlight the advantages and disadvantages associated with each option and cover issues such as cost, revenue and strategic considerations. It should provide management with a firm basis to determine whether the solution has sufficient merit to continue into more detailed phases".* This CIO elaborated on the outcome of this phase by stating *"The end product of this phase should be a clear, concise feasibility report to management, which presents solution options with objectives, conclusions and recommendations".*

A project manager from Bank B made a witty remark about this phase: *"Although an unsuccessful feasibility study may appear to be a failure, it's not. The real failure would have been if you had invested your organisation's money in a project and then lost it due to barriers you failed to research in advance".*

Additional evidence from participants can be found in Appendix E, Figure E3.

To summarise, the responses from the individual interviews suggest that the objective of the first phase of a business analysis methodology involves a preliminary study of business problems, opportunities or requirements. Further, these responses imply that relevance of the first phase involves a detailed analysis of a business requirement to understand the practicability of implementing it. Individual interview data suggested that the outcome of this phase should be a feasibility report to management. The most frequently mentioned name for phase 1 of a methodology was a **feasibility phase (PH1FE)**, with 15 mentions (25.8% of all mentions). The

classification of all responses can be found in Appendix E, Table E1. It is important to remember that frequency of mentions is an indicator of the *intensity* of meaning (Neuman, 1994; Neuendorf, 2002; Newbold, Boyd-Barrett and Van Den Bulck, 2002). Intensity emphasises words or phrases that cannot be experimentally examined or measured (Denzin and Lincoln, 1994; Neuendorf, 2002). A closer look at Table E1 shows that this mention elicited the strongest response, and the first phase should be a feasibility phase.

Once the first phase had been defined, the next step was to identify the activities for this phase and thus follows in the next section.

4.2.2.1 Activities for feasibility phase

This section intended to identify the activities used by business analysts for the first phase of business analysis. Recalling chapter 1, activities were defined as steps or sub-events of a phase. Below are examples of comments from the individual interviews. Participants identified the following activities of the first phase of a business analysis methodology.

- Identification of a need or opportunity (PR1IN) – During an interview, a business analyst from Bank A said, *"Identifying a need or opportunity involves a background investigation of the problem, understanding the need or opportunity and then linking this to the organisations strategy objective".*
- Defining boundaries (PR1DB) – A project manager from Bank A stated, *"Defining boundaries requires putting the requirement into business context, exclusions and feedback from stakeholders".*
- Information gathering (PR1IG) – *"Information gathering"* according to another project manager from Bank B *"includes competitor analysis, market analysis, product analysis and process analysis".*
- Opportunity identification (PR1OI) – Another business analyst from Bank B suggested, *"Opportunity identification consists of analysing information and identifying opportunities".*
- Opportunity analysis (PR1OA) – With regard to this activity, an IS manager from Bank A stated, *"Opportunity analysis entails customer implication, stakeholder impact, partnership requirements, organisational impact and financial viability".*
- Recommendations (PR1RE) – For the last activity, another IS manager from Bank A suggested, *"Recommendations include understanding the viable opportunities, pro's and con's and finally a go or no-go proposal".*

A classification of these responses including the number and percentage of the mentions is found in Appendix E, Table E2. Participants were further probed to explain ***why*** these activities should be used for the first phase of business analysis.

A project manager from Bank B said, *"These activities can help business narrow the range of options, assess each of the remaining options and propose solutions …these activities also help management analyse and understand the impact of new projects before they commit people and financial resources".*

According to another IS manager from Bank B, *"These activities reduce the risk of over-engineering a solution. They help reduce the number of changes in the development process and reduce costs by building quality early in the process as well as promoting a more focused development approach. Further, these activities help identify requirement priorities, and support more accurate project planning*"

In summary, this section identified the activities for the first phase of business analysis. A closer examination of these responses suggest that these activities assist business analysts in understanding and narrowing a range of options, assessing each of the remaining options and then proposing solutions. Further, these activities help identify requirement priorities, and support more accurate project planning.

Once the activities had been extracted, the next step was to identify the techniques used for this phase.

4.2.2.2 Techniques for feasibility phase

This section identifies the techniques used by business analysts for the first phase of a business analysis methodology. Interviewees were asked to name and briefly describe the techniques that they employed for this phase. The most frequently referenced techniques for the first phase of a business analysis methodology were *"interviews"* (TE1IN)*, "observations"* (TE1OB) and *"task demonstrations"* (TE1TD). These techniques are classified in Table E3.

Participants were further probed to explain ***why*** these techniques should be used for the first phase of business analysis. A sample of explanations from participants is recorded below.

- Interviews (TE1IN) – A business analyst from Bank A said, *"If a business analyst asks the right questions, this technique can provide valuable information about the system and its problems"*.

- Observations (TE1OB) - According to one project manager from Bank B, *"Observations help develop a better understanding of the requirements, and to represent them in a clear and comprehensible manner. In addition, observations provide an effective technique for validating requirements with the users"*. This participant further elaborated, *"Users are often vague in their description of requirements, and observations are valuable because they provide a more precise view of the requirements, their dependencies and their interactions".*
- Task demonstrations (TE1TD) - An IS manager from Bank B said, *"Task demonstrations assist in providing a better understanding of the requirements; they support validation, assist with business concerns, and aid in design of the software system*". This IS manager further stated, *"Besides being cost effective, task demonstrations provide a better focus on distinct functions because they are analysed one at a time. In addition, it is also easier to measure progress and validate requirements piece by piece"*.

In summary, individual interview data suggest interviews, observations and task demonstrations to be the techniques for the first phase of business analysis. A closer inspection of these responses to understand why they are appropriate to this phase reveals that these techniques help a business analyst understand requirements better and clearly represent them. Furthermore, these techniques support validation and help break down complex problems that result in easier measures of progress. Identification of the tools for the feasibility phase of business analysis was conducted next.

4.2.2.3 Tools for feasibility phase

The tools used for the first phase of business analysis were extracted from the individual interviews in this section. Interviewees were asked to name and briefly describe the tools that they use for this phases of business analysis. Participants said that the following tools were used for the first phase of a business analysis: *"Visible Analyst*[8]*"* (TO1VA), *"Cool Biz*[9]*"* (TO1CB) and *"Visio"* (TO1VI). These responses can be found in Table E4. A sample of comments from participants is recorded below.

- Visible Analyst (TO1VA) - During probing, a business analyst from Bank B said, *"Various graphical representations are produced by visible analyst that assist a business analyst in the understanding and formulation of requirements for the first phase".* The benefit of this tool for this phase according to him was that *"this tool helps to elicit and capture requirements*

[8] http://www.visible.com
[9] http://www.ca.com

adequately, so that a business analyst can develop, modify, structure, and present business requirements appropriately".

- Cool Biz (TO1CB) - Another IS manager from Bank A said *"Cool Biz produce models which can be used to specify a solution. The models produced can also be checked for completeness and consistency"*. She added, *"This tool can be used to group and prioritise requirements, and check for consistency of requirements".*
- Visio (TO1VI) – *"The simplicity, flexibility and advanced functionality make this tool ideal for this phase",* was the view of another business analyst from Bank B.

Visible Analyst, Cool Biz and Visio were the tools appropriate to this phase because of the simplicity, advanced functionality, as well as the visual depictions produced by them that help business analysts understand business requirements. Individual interview data suggests that these tools can also be use to prioritise as well as check for consistency of requirements, for this phase.

Once the first phase of business analysis with objectives, relevance, outcomes, as well as appropriate activities, techniques and tools had been identified, the next step was to identify the second phase of business analysis. This follows in the next section.

4.2.3 Business case phase (PH2BC) - phase 2 of a business analysis methodology

For the second phase, participants were asked to name and briefly describe the objective, relevance and outcome when conducting business analysis. A sample of comments from participants is presented below.

"The business case phase objective" according to a Bank B project manager*, "formally presents the business problem, identifies project options, benefits, costs, risks and defines the scope. Overall the objective of this phase is to help gain approval from management for a project to proceed to address the problem and to obtain common agreement on exactly what the project will deliver".*

A business analyst from Bank A remarked on the relevance of this phase, *"When an organisation has a number of proposed initiative projects, the business case phase is used to assist in prioritising the various projects. This prioritisation may be achieved by comparing the projects based upon their benefits, costs and risks".*

Another participant, an IS manager from Bank A, captured the essence of a business case phase as follows, *"This phase provides a description of the intended solution with the anticipated costs and benefits"*. According to him, the outcome of this phase *"is a start-up document used by management to assess the pros and cons of a proposed solution and to assess options like resources and finances for this solution"*.

More evidence to support these findings from participants can be found in Appendix E, Figure E4.

Summarising these responses, the indication is that this phase objective involves an elaboration of the proposed solution from the previous phase. Moreover, the relevance of this phase encompasses the scope, risks, costs and benefits of the proposed solution. The responses suggest that the outcome is a business case document. The most commonly mentioned name for phase 2 of a methodology was a **business case phase (PH2BC)**, with 13 mentions (25.4% of all mentions). The classification of the responses can be found in Appendix E, Table E5. Activities for this phase are described in the next section.

4.2.3.1 Activities for business case phase

This section intended to derive the activities for the second phase of business analysis from the individual interviews. Participants identified the following activities for this phase.

- Identify solution (PR2IS) – According to the CIO from Bank A, *"This entails revisiting the feasibility findings".*
- Refine boundaries (PR2RB) – The same CIO elaborated, *"Refining boundaries comprises of the scope and exclusions of a solution as well as the costs and benefits".*
- Collate more information (PR2CM) – A business analyst from Bank B suggested this activity entails *"additional information including the business architecture, process requirements and dependencies need to be collated".*
- Analysis of solution (PR2AS) – *"Examining the proposed solution in detail"* was the response of an IS manager from Bank B relating to this activity.
- Assumptions and dependencies (PR2AD) – *"Assumptions and dependencies"* according to a business analyst from Bank B includes *"analysing all speculations and reliances".*
- 'As-is' analysis (PR2AA) – Describing this activity, a business analyst from Bank A said *"Examine the current scenario including the process gaps, and conceptual 'to-be', organisational change requirements and system expectations, as well as analyse alternatives".*

- Make recommendation (PR2ERE) – According to an IS manager from Bank A, *"This phase concludes with a formal business case as well as a degree of confidence in costs, benefits and assumptions".*

The responses for the activities of this phase are classified in Table E6. Participants were further asked to explain ***why*** these activities should be used for the second phase of business analysis.

An IS manager from Bank A said, *"These activities capture the business ramifications of a project in an appropriate format for business analysts and decision-makers. When writing a business case, these activities establish direction, by providing business analysts with an outline of the steps that are necessary to complete the project…….these activities also minimise risk, by identifying the financial impacts, risks and rewards of a project".*

Another participant, a business analyst from Bank A said, *"These activities provide control, by providing a benchmark for monitoring project performance and quickly identifying problems…these activities create discipline, by providing an opportunity to identify and consider ideas and issues before an option is implemented".*

Another Bank B business analyst remarked, *"These activities can help define the project's resource requirements, investment costs and revenue projections when writing a business case".*

This section identified the activities for the second phase of business analysis. A closer inspection of these responses reveals that these activities support the business outcome of a project in an appropriate format for decision-makers. These responses also suggest that these activities establish direction with cost, benefit and risk assumptions. Studying these responses in more detail reveals that these activities can provide a benchmark for monitoring performance of the completed project. The next step was to identify the techniques used for this phase, having extracted the activities.

4.2.2.2 Techniques for a business case phase

Participants were asked to name and briefly describe the techniques that they followed for the second phase of business analysis in this section. Techniques for the second phase of a business analysis methodology were "*criticality analysis"* (TE2CA)*, "risk reduction leverage"* (TE2RR) and *"fault tree analysis"* (TE2FT). These techniques are classified in Table E7.

Participants were asked to explain ***why*** such techniques should be used for the second phase of business analysis. The following sample of responses was revealed from participants.

- Criticality analysis (TE2CA) - *"Criticality analysis"* according to a Bank B business analyst *"focuses on business concerns by assisting in the evaluation of requirements from a financial perspective*". This business analyst further elaborated, *"This technique helps maintain focus on information related to business, organisational and management constraints".*
- Risk reduction leverage (TE2RR) – Another participant, an IS manager, from Bank A said *"Risk reduction leverage facilitates better decisions during a business case phase because the requirements are established prior to detailed analysis. Also, projected estimates will tend to have less deviation from their accruals. Thus, business analysts can make better informed decisions, and thereby increase the probability of project success".*
- Fault tree analysis (TE2FT) - This IS manager concluded by saying, *"Fault tree analysis is a simple, cost effective technique and provides good estimates when writing a business case"*.

These responses suggest that these techniques are beneficial to this phase because they are financially orientated. Further, these responses imply they can help business analysts make better financial decisions. Criticality analysis, risk reduction leverage and fault tree analysis were also found to be simple as well cost effective for this phase. Moreover, these techniques help to establish the requirements prior to detailed analysis. Once the techniques had been identified, the tools for this phase of business analysis were pursued.

4.2.2.3 Tools for a business case phase

The tools used by business analysts for the second phase of a business analysis methodology are identified in this section. According to the participants, *"Borland Together[10]"* (TO2BT), *"Softeam Objecteering Project[11]"* (TO2SO) and *"Telelogic[12]"* (TO2TE) were tools that should be used for this phase of business analysis. These tools are classified in Table E8. A sample of comments from participants is presented below.

- Borland Together (TO2BT) – An IS manager from Bank A commented during probing, *"Borland Together helps a business analyst create a business case, by employing software templates and scorecards based on best practice criteria that help judge how the business case will be received"*.

[10] http://www.borland.com
[11] http://www.objecteering.com
[12] http://www.telelogic.com

- Softeam Objecteering Project (TO2SO) - Another participant, a project manager from Bank B said, *"This tool consists of fill-in-the-blank templates with the potential to produce a complete business case. Some features are complete management programmes that produce financial models for business cases as only one of many possible outputs. They are able to deal with real-world situations in a pragmatic way, not just on a theoretical or abstract level. This tool is sufficiently easy to learn".*
- Telelogic (TO2TE) - Finally, another project manager from Bank B commented *"Telelogic contains features for preparing business cases, project descriptions, critical assumptions, risk assessments, conclusions and recommendations"*.

These responses suggest that these tools are useful to this phase, because they contain features and templates that assess the financial impacts of a project. Features such as risk assessments were found to be practical and simple for this phase. Also, the tools ease of use for developing business cases was another implied outcome.

The next step, which is now discussed, was to identify the third phase, having identified the second phase of business analysis.

4.2.4 Analysis and design phase (PH3AD) - phase 3 of a business analysis methodology

This section intended to derive the third phase of a business analysis methodology. Some comments from participants are presented below.

A business analyst from Bank A fittingly described the objective of the analysis and design phase as *"consisting of refining agreeing the expectations from the business case".* She further said that analysis and design "*consisted of designing solutions and producing models for the solution"*.

An IS manager, also from Bank A commented on the relevance of this phase, *"during the previous phases a business analyst identified what the proposed new system is required to do. In this phase, a business analyst looks at how the new system will fulfil these objectives".* According to her, *"This phase is more focused on the specification of the detailed solution. This phase focuses on the logical, implementation-independent aspects of a system like the requirements, as well as dealing with the physical implementation-dependent aspects of a system such as the system's technical specifications".*

One outspoken project manager from Bank B said that this phase entails *"transforming all of the information from the business case into the design for the new system. This phase should include the system's functionality, hardware and software platform and methods for acquisition"*.

A Bank B business analyst described the outcome of analysis and design as *"a detailed specification of all system elements, including the data, processes, impulse, and outputs in the form of a model"*.

More evidence to support this phase can be found in Appendix E, Figure E5.

In summary, the responses from the individual interviews suggest that the third phase of a business analysis methodology involves presenting the business case in the form of an analysis and design model, and then transforming that model into a logical solution that can be implemented. This phase focuses on the technical aspects such as systems functionality, hardware, software, data and process specifications. The outcome of this phase is an analysis and design model. The most frequently cited name for phase 3 of a business analysis methodology was an **analysis and design phase (PH3AD)**, with 13 mentions. These responses are classified in Appendix E, Table E9. After extracting the third phase, the next step was to identify the activities. This is reviewed in the subsequent section.

4.2.4.1 Activities for analysis and design phase

Feedback from participants identified the activities of the third phase of a business analysis methodology as those listed below.

- Refinement (PR3RE) – *"Refinement"* in the view of a project manager from Bank A *"entails streamlining the goals and expectations from the business case".*
- Scope (PR3SC) – A Bank B business analyst commented, *"This activity comprises of the exclusions and constraints of the solution".*
- Ownership (PR3OW) – *"Ownership"* exclaimed a business analyst Bank A *"can be achieved with a project champion, a steering committee and management buy-in".*
- Redesign (PR3RD) – An IS manager from Bank A remarked, *"This activity includes 'to be' design, 'to be' viability analysis, process gaps, deficiencies and simulations".*
- Detailed analysis (PR3DA) – A Bank B project manager suggested, *"This activity must include context analysis, risk assessments, customer impact and training".*

- Design of solution (PR3DS) –In the opinion of a business analyst from Bank A, *"Designing a solution should include the current architecture of technology and business interface requirements".*
- Change management (PR3CM) – *"People issues like training should be reviewed at this stage"* was the view of the CIO from Bank A.
- Modelling (PR3MO) – A business analyst from Bank B viewed this activity as *"producing the actual model".*
- Design signoff (PR3DS) – *"Design signoff"* suggested a project manager from Bank A *"should ensure the models are approved and the solution is again compared to the actual requirement".*

These activities are classified in Table E10.

Probing took place whereby participants were asked to explain ***why*** these activities should be used for the third phase of business analysis. A business analyst said, *"The business case solution is at a high level, and these activities give structure and focus to the solution and speed up the development process".*

Another participant, a project manager from Bank A remarked, *"These activities can help a business analyst by ensuring consistency across projects and enables comparative evaluation and priorities….these activities also provide a logical and consistent approach".*

Another IS manager from Bank B commented, *"These activities assist business analysts by ensuring methodical thinking and systematic problem solving during analysis and design".* She further elaborated, *"These activities assist a business analyst and customer obtain a mutual understanding of the requirements".*

A closer examination of these responses suggests that these activities are beneficial to this phase because they add structure to the development process, and as a consequence speed up the development process. These activities help business analysts maintain consistency across projects, and ensure a methodical and systematic approach is adopted. Moreover, these activities ensure a business analyst and customer have a mutual understanding of the requirements. The next step was to identify the techniques used for this phase, having identified the activities.

4.2.4.1 Techniques for analysis and design phase

Participants mentioned "*affinity analysis"* (TE3AA)*, "functional hierarchy decomposition"* (TE4FH) and *"modelling"* (TE5MO)*,* as techniques for the third phase of a business analysis methodology. These techniques are classified in Table E11. The following sample of responses was revealed from participants.

- Affinity analysis (TE3AA) - A project manager from Bank B said, *"Analysis and design phase involves creating a formal model of the problem to be solved. Affinity analysis guides a business analyst by creating standardisation for this phase. It helps a business analyst to assess user needs in order to understand the complete problem being solved".*
- Functional hierarchy decomposition (TE4FH) - Another Bank B project manager said, *"Functional hierarchy decomposition can help a business analyst understand the current system as well as the system that is being developed. This technique further makes a formal representation of the system being designed"*.
- Modelling (TE5MO) - A business analyst from Bank A suggested, *"Modelling gives structure during this phase by creating a blue print of a system solution to a given problem"*.

An examination of these responses suggests that, because these techniques develop formal models of a solution, they are advantageous to this phase. Looking more closely at the responses, it can be seen that these techniques help a business analyst develop standardisation and structure by formally representing the solution being designed. Once the techniques were identified, the tools for this phase of business analysis were investigated.

4.2.4.3 Tools for analysis and design phase

"Rational Rose" (TO3RR)*, "Visio"* (TO3VI) and *"Cool Biz"* (TO3CB) were tools that participants suggested be used for the third phase of business analysis. These tools are classified in Table E12. A sample of comments from participants is recorded below.

- Rational Rose (TO3RR) - A business analyst from Bank B commented, *"Rational rose enables users to see and feel the system during analysis and design. Further, this tool is appropriate because it speeds up the processes of systems development and gives support for management of projects, and also enables business analysts to build prototypes more easily".*
- Visio (TO3VI) - A project manager from Bank A remarked, *"Visio improves the readability of complex formal specifications. It contributes to a reduction in development time and costs*

during analysis and design. Visio ensures easier maintenance of systems developed and improves communications between the business analysts, programmers, and the end users".

- Cool Biz (TO3CB) - Finally, a Bank A business analyst said, *"During analysis and design, Cool Biz speeds up the development process by ensuring consistency, completeness and conformance to standards".*

These responses suggest that these tools speed up development process by ensuring consistency and completeness. These tools further improve communications between the business analysts, programmers, and end users. Moreover, for business analysts, these tools improve readability of complex formal specifications as well as help reduce time and costs. Also, the responses imply that theses tools enable business analysts to build models more easily. Once the third phase of business analysis had been identified, the next step was to identify the last phase of business analysis, which is discussed in the next section.

4.2.5 Post-implementation evaluation phase (PH4PI) - phase 4 of a business analysis methodology

Participants were asked to name and briefly describe the objective, relevance and outcomes for the the last phase that they follow when conducting business analysis. A business analyst from Bank A, referring to the objective of this phase said, *"A post-implementation evaluation is conducted after the project has finished and usually after the project team has been disbanded. It typically examines how well the project conformed to the original requirements as well as the running costs as predicted and if users like the system".*

An IS manager from Bank B remarked on the relevance, of this phase *"this phase evaluates the solution to determine whether the anticipated return on investment was achieved and decide whether continuation or modification of the solution is necessary to meet business requirements".*

A Bank B project manager, referring to the outcome of this phase said, *"From a project perspective, this phase should document the timeline of the project and how it adapted over the course of the project, analyse the reasons why particular project tasks were difficult and understand whether a different process might have made them easier".* Finally, he said a post-implementation evaluation phase should *"document and make recommendations for future projects in the organisation".*

However ten participants said that the post-implementation evaluation phase should be repeated after an extend period of time, for example, after 6 months and then again after 1 year. One of

them, an IS manager from Bank B commented, *"A post-implementation evaluation should take place after a relatively stable operating environment has been established, about six to twelve months after implementation*".

Notably, 15 participants also said that there was a relationship between a business case phase and a post-implementation evaluation phase. A business analyst from Bank A said, *"Compare the post-implementation review to the business case to see if the project met the expectations that it was intended to meet".* Another participant, an IS manager, also from Bank A suggested *"a post-implementation evaluation phase is conducted after system implementation to enable an organisation to measure the value gained through the new system against the business case".*

In summary, these findings suggest that the objective of this phase entails a review of the implemented solution including the cost and benefits against the requirements in the business case. This phase was found relevant because it compares the solution to see how well it conformed to the original requirements. Moreover, based on the project learning's, this phase makes recommendations for future projects in the organisation. The outcome was found to be a post-implementation phase review report. The most commonly referenced name for phase 4 of a business analysis methodology was **post-implementation evaluation phase (PH4PI)**, with 18 mentions (35.2% of all mentions). The responses are classified in Appendix E, Table E13. Furthermore, it was found that this phase should be repeated after an extend period of time. Individual interview data further suggested that this phase be compared to the business case phase to see if the project met the deliverables that it was intended to meet. More evidence to support these findings can be found in Appendix E, Figure E6. After defining the last phase, the next step was to identify the activities and this follows in the next section.

4.2.5.1 Activities for post-implementation evaluation phase

Opinions concerning the activities of the fourth phase of a business analysis methodology are set out below.

- Review the requirements (PR4RR) – The Bank B CIO remarked, *"The business analyst should review the original business problem or opportunity".*
- Review the business case (PR4RB) – The view of a business analyst from Bank A was, *"The business case should be the benchmark for the review".*
- Review the objectives (PR4RO) – According to a Bank B project manager, *"The objectives stated in the business case should be used as a point of reference".*

More responses are classified in Table E14. Participants were asked to explain ***why*** these activities should be used for the last phase of business analysis.

A project manager from Bank A said, *"The post-implementation evaluation phase is conducted to scrutinise the implementation of a project against the plans and requirements originally established for the project. These activities create a systematic approach by helping a business analyst to compare the actual performance of the live project against the requirements. Also, these activities assess the extent to which the original requirements and objectives were achieved".*

A business analyst from Bank A said, *"A post-implementation evaluation is the last phase in the project process and represents closure of the feedback loop….these activities help provide the lessons learnt and are fed back into the organisation, to the benefit of future projects….these activities help a business analyst identify ways to improve the value of a project and increase user morale through the continuous improvement of the solution created".*

Another participant, an IS manager from Bank B said, *"These activities help establish benchmarks and key performance areas".* She elaborated, *"These activities help avoid user frustration by identifying operational issues before they become problems".* She further added, *"The activities can also compare actual costs of the project to those initially projected".*

A closer inspection of these responses suggests that these activities develop a systematic approach for this phase by comparing the implemented solution against the original requirements. Furthermore, these activities ensure that lessons learnt are re-integrated into the organisation. Individual interview data suggests that benchmarks and key performance areas can be developed with these activities. The next step was to identify the techniques used for this phase, having identified the activities.

4.2.5.2 Techniques for post-implementation evaluation phase

Responses from participants for the fourth phase of a business analysis methodology were "*traceability matrix"* (TE4TM)*, "inspections"* (TE5IN) and *"traceability tree"* (TE6TT). Appendix E, Table E15 classifies the techniques given by interviewees. Probing revealed the following responses from participants.

- Traceability matrix (TE4TM) - "*This technique"* according to a business analyst from Bank B *"helps a business analyst trace the original project expectations from the business case as well*

as performance, investment and operating costs, schedules, benefits, and technical capability to the actual project". He further added, *"This technique also permits a business analyst to estimate cost and schedule deviations".*

- Inspections (TE5IN) - Another participant, also a business analyst from Bank A suggested, *"This technique helps a business analyst gather information at the end of a project by comparing the original business case assumptions and justifications to the outcome".* This participant further elaborated, *"Inspections assist a business analyst to draw conclusions, learned lessons and make recommendations to management".*
- Traceability tree (TE6TT) - A Bank B project manager said, *"This technique focuses on helping a business analyst trace the solution to the original requirements by gathering feedback relevant to the project".*

In summary, these responses suggestion is that these techniques help a business relate the business case to the implemented solution. Expectations such as performance, investment and operating costs, benefits, and technical capability could be traced back to the original requirements. Furthermore, these techniques could assist a business analysts draw conclusions, and make recommendations to management. The next step was to identify the tools used for this phase, having extracted the techniques.

4.2.5.3 Tools for post-implementation evaluation phase

Participants said that *"Ideogramic*[13]*"* (TO4ID), "*Rational Rose"* (TO4RR) and *"Telelogic"* (TO4TE) were tools that should be used for the fourth phase of business analysis. These tools are classified in Table E16.

A project manager from Bank A said, *"Ideogramic contains the documentation required to close out a project formally. There are templates that help a business analyst hand over all deliverables and documentation to the end user including termination contracts. There are also guidelines to that help a business analyst determine the level of project success and identify lessons learned for future projects".*

Another participant, an IS manager from Bank A said, *"Tools like Rational Rose and Telelogic contain templates for post-implementation reviews. These tools help a business analyst obtain a complete picture, by capturing all viewpoints".*

[13] http://www.ideogramic.com

A Bank B project manager said, *"Tools like Ideogramic and Rational Rose help a business analyst by listing all outstanding tasks and issues, by creating a plan to hand over the deliverables for reviewing project performance. Also, these tools help a business analyst trace the outcome to the original requirements".*

However, there were mixed responses for the tools relating to the last phase of business analysis. Eleven participants stated that there were no tools for the last phase of business analysis. An IS manager from bank B said, *"I'm not familiar with any tools for the last phase of business analysis".*

Overall however, the responses suggest that these tools are appropriate to this phase because they contain features and templates that can compare the outcome of a project to the original requirements, as well as formally close out a project. Moreover, these tools assist a business analyst by listing all outstanding tasks and issues. Furthermore a plan to hand over the deliverables for reviewing project performance could be created. The identification of tools for the last phase of the methodology concluded the findings from the individual interviews.

Part 1 introduced the findings from the individual interviews by establishing the phases, objectives, relevance and outcomes, as well as the activities, techniques and tools of a business analysis methodology. The findings and presentation from the focus groups interviews follow in the next section.

Part 2

4.3 Presentation of findings from focus group interviews

A total of 23 people participated in 2 focus group sessions. Recall that focus group 1, made up of 12 participants was held at Bank A, and focus group 2, comprising of 11 participants was held at Bank B. Section 3.6.3 presented the detailed focus group sample selection, characteristics of participants and settings.

This section presents the findings from focus group interviews and is structured as follows:

- understanding of business analysis;
- phases, objectives, relevance and outcomes of a business analysis methodology; and
- activities, techniques and tools for the phases of a business analysis methodology.

Moreover, the most significant evidence (Mathison, 1988; Maxwell, 1992) in terms of the research objectives from both focus group 1 and focus group 2 will be presented in a single section.

The following section explains the understanding of business analysis derived from the focus group interviews. It is worth remembering that the reason for this question (see Appendix D, question 1) was due to the confusion with systems analysis, as discussed in chapter 1, section 1.1.

4.3.1 Understanding of business analysis

This section presents a synopsis of the understanding of business analysis derived from the 2 focus groups. A participant from focus group 1, a senior project manager said, *"Business analysis is about the understanding business needs and solving these needs with technology. It involves liaising with business to understand and extract the needs by asking questions like 'what' and 'how'".*

Another participant in this group, a business analyst interjected, *"Business analysis is a process of defining a problem clearly and then specifying a solution to this problem. Contrary to belief, this solution does not necessarily have to be a technical solution….the solution to a problem could be a non-technical solution like introducing training to a process"*.

In the second focus group, an IS manager, stated, *"A business analyst should provide the most effective solution for the user. In addition a business analyst should help find better ways of doing things, by providing the BEST solution to the user's requirement that has a minimal impacting on time and money".*

Another IS manager from focus group 2 said, *"Business analysis is about determining and documenting the information needs, as well as the business and technical requirements the proposed system must meet. It entails all the activities that go into the investigation, scoping and definition of a new system. Business analysis is an important part of the system development process whereby a business analyst identifies the needs and requirements of a user; having identified these requirements he/she is then in a position to design a solution".*

More evidence to support these findings can be found in Appendix F, Figure F1.

A closer look at the responses reveals that business analysis was viewed as the process of understanding business needs and then providing solutions to these needs. Focus group data

show that the resolution to a problem could be a business or technical solution. The focus group data also suggest that business analysis entails documenting the business needs and the solution. Once an understanding of business analysis had been established, the focus groups were asked to explain the phases of a business analysis methodology. This is discussed below.

4.3.2 Feasibility phase (PH1FE) - phase 1 of a business analysis methodology

This section intended to derive the phases of a business analysis methodology from the focus group interviews. The groups were asked to name and describe the objective, relevance and outcomes of the phases that they follow when conducting business analysis. A sample of comments from participants is presented below.

In focus group 1, a project manager commented on the objective, *"A feasibility study is designed to provide an overview of the primary issues related to a business idea. The purpose is to identify any 'make or break' issues that would prevent the business from being successful in the marketplace. In other words, a feasibility study determines whether the business idea makes sense".*

In the second focus group, referring to the relevance of this phase, a business analyst said, *"a feasibility study leads to a business case by examining the range of possible options and potential issues, and forms a basis for its development".* The outcome of this phase, continued this business analyst *"is a feasibility study document presenting issues that could influence the success of a potential project and assess the advantages and disadvantages of each option so they can be ranked".* Addition comments from participants in the focus groups can be found in Appendix F, Figure F2.

A closer examination of the focus group responses reveals that the objective of first phase of a business analysis methodology involves a preliminary study of user needs, wants or requirements. These responses imply that the relevance of this phase involves a detailed analysis of the business requirements to understand the practicability of implementing them. The outcome was found to be a feasibility phase document. Overall, the first phase identified by the focus groups was a **feasibility phase (PH1FE)**, with 26 mentions (60.4% of all mentions), shown in Table F1. The next step of this research was to identify the activities for the first phase of business analysis.

4.3.21 Activities for the feasibility phase

This section presents the activities for the first phase of business analysis. Participants identified the following activities of the first phase of a business analysis methodology.

- Identifying a need or opportunity (PR1IN) - *"Identifying a business requirement necessitates a background investigation and understanding of the requirement and linking this to the organisations strategic objectives"* was the view of a project manager from focus group 1.
- Defining boundaries (PR1DB) – Concerning this activity, a business analyst from focus group 2 suggested, *"This entails the scope of the business requirement".*
- Information gathering (PR1IG) – *"Information gathering"* in the opinion of an IS manager from focus group 1 *"consists of industry best practice, in-house gaps and improvement opportunities".*
- Opportunity identification (PR1OI) - *"Opportunity identification"* suggested another IS manager from focus group 1 *"simply consists of identifying viable opportunities".*
- Opportunity analysis (PR1OA) – A business analyst from focus group 1 remarked, *"Opportunity analysis entails risk analysis, strategic vs. tactical position, assumptions and process implications".*
- Recommendations (PR1RE) - *"Recommendations include a go or no-go proposal"* remarked a business analyst from focus group 2.

A classification of these activities, including the number and percentage of the mentions is found in Table F2. Focus groups were asked to explain ***why*** these activities should be used for the first phase of business analysis.

An IS manager from the first group said, *"During this phase, these activities help a business minimise losses based on a poor business idea and help them avoid financial mistakes. These activities can help a business analyst determine whether or not to implement a particular project or system".*

Another participant in this group, an IS manager said, *"These activities help a business analyst plan in advance as well as evaluate alternative solutions. These activities also provide a business analyst with an understanding of the user requirements for a new system".*

In the second focus group, a project manager said, *"These activities help identify the business and technical feasibility of a project. These activities also help management make better*

investment decisions by providing management with enough information to know whether the project can be done, and if the final product will benefit its intended users".

To summarise, the responses suggest that these activities help a business analyst understand user requirements. Moreover, these activities help the business analyst to analyse alternative options and then recommend a solution. As a result, these activities help an organisation minimise losses based on poor business ideas aw well as assist them to avoid financial mistakes. After identifying the activities, the next step was to identify the techniques used for this phase.

4.3.2.2 Techniques for the feasibility phase

The techniques used by business analysts for the first phase of a business analysis methodology are identified in this section. Focus groups were asked to name the techniques that they adopted for this phase. Examples of the most frequently mentioned techniques for the first phase are listed below.

- Interviews (TE1IN) - Probing of the first focus group revealed the following. An IS manager said, *"Interviews help with the identification of the business requirements. As there is no single catch-all technique applicable to all types of requirements, business analysts need to know about a range of different techniques intended for the early phase. Tried and tested techniques such as interviews are ideal".*
- Observations (TE1OB) - Another participant from this group, a business analyst added, *"This technique can help a business analyst gather, analyse and document project requirements. Observations are a realistic practical technique, not a theoretical technique. Business, user, functional, and non-functional requirements are all addressed with this technique".*
- Task demonstrations (TE1TD) - *"They help a business analyst to be agile by assisting him/her to choose the tool for the level of requirements he/she needs for fast results",* was the opinion of a project manager from the second focus group.

Table F3 shows a classification of these techniques.

To summarise, interviews, observations and task demonstrations assist a business analyst with the identification, understanding and representation of business requirements. Once the techniques for this phase had been extracted, the identification of the tools for this phase of business analysis took place.

4.3.2.3 Tools for the feasibility phase

For this section participants were asked to identify the tools that they use for the first phase of business analysis. The most frequently mentioned tools for the first phase of a business analysis methodology are set out below.

- Visible Analyst (TO1VA) - During probing, a project manager from the second focus group commented, *"During the early stages of a project, visible analyst helps a business analyst to assemble a working preview of the proposed system. This tool also provides integrated configuration management to simplify the development process. It allows simulations during early stages of a project to let business, end users and developers interact with critical business systems before development. The visual representation of the application looks and behaves like the real thing, including data interactions and business logic, so everyone literally gets on the same page".*
- Cool Biz (TO1CB) - Another project manger from the second group said, *"This tool targets the initial stages of project, even before the project framework has been established. It enables business requirements to be gathered and synchronised efficiently".*
- Visio (TO1VI) - *"Visio allows the creation, description, modification and tracking of business requirements in the early phases of a project"* was the opinion of a business analyst from the second group.

These tools are classified in Table F4.

These responses show that these tools are appropriate for this phase because of the visual graphics produced that assist business analysts to identify business requirements. These tools also permit simulations during early stages of a project to allow users to interact with the proposed solution before development. Once appropriate activities, techniques and tools had been identified for the first phase of business analysis, the next step was to identify the second phase of business analysis. This is reviewed in the next section.

4.3.3 Business case phase (PH2BC) - phase 2 of a business analysis methodology

For this section, participants were asked to name and briefly describe the objective, relevance and outcomes of the second phase that they follow when conducting business analysis. A sampling of participants' comments adds some insight into their thinking of the second phase of a methodology.

According to a project manager from the first focus group *"'The objective of the business case phase is to verify if the solution meets the needs of the business, and is a mechanism for receiving funding and approval to move forward. The business case document brings everything together in one document, simplifies the development of the financial justification, and will usually list the advantages and disadvantages of the solution. Moreover, management can use the business case document as a way to measure success of the project. Finally, the business case phase is useful for management to prioritise the project against any other projects in the business that may require capital investment".*

In the second focus group, an outspoken participant, an IS manager remarked on the relevance, *"This phase justifies the resources and capital investment to implement a solution. It should cover why the project is needed and how the project will solve the issues or opportunities facing the organisation".*

Referring to the outcome of this phase, a project manager in this group added, *"The business case phase presents a comprehensive view of the solution and provides the financial justification and ROI for project implementation. It is used to communicate the project to other stakeholders, establish a method for measuring success and to receive funding approval for the project".*

More evidence from focus group participants can be found in Appendix F, Figure F3.

Summarising these responses from the focus groups, a business case phase can be understood as consisting of a description and understanding of the intended solution with the anticipated costs and benefits and the output being a formal business case document. The most frequently referenced name for phase 2 of a methodology was a **business case phase (PH2BC)**, with 27 mentions (41.5% of all mentions). These responses are classified in Table F5. Having identified the second phase, the activities for this phase were pursued. These can be found in the next section.

4.3.3.1 Activities for the business case phase

The most commonly mentioned names for the activities of the second phase of a business analysis methodology are listed below.

- Identify solution (PR2IS) – *"This activity"* remarked a business analyst from focus group 1 *"entails reviewing the feasibility findings".*

- Refine boundaries (PR2RB) – In the opinion of a project manager from the first focus group this activity includes *"the constraints, costs and benefit that need to be established".*
- Collate more information (PR2CM) – *"Process requirements including key interfaces such as customers, users, systems need to be explored"* was suggested by an IS manager in focus group 2.
- Analysis of solution (PR2AS) – A business analyst from the second focus group remarked, *"This activity entails an in-depth examination of the proposed option including the assumptions and dependencies".*
- 'As-is' analysis (PR2AA) – In the view of a project manager from focus group 1, *"The current environment, including the systems, resources, current projects and core business processes, needs to be established".*
- Make recommendation (PR2ERE) – *"The recommendation"* according to an IS manager from focus group 2 *"should include a comprehensive suggestion motivating the intended solution".*

These activities are classified in Table F6. Probing revealed the following. A focus group participant said, *"These activities are beneficial to this phase because they can be used to identify opportunities for business improvement. These activities help define a project's resource requirements, investment costs, revenue projections and market acceptance".*

Another participant, a business analyst in this group added, *"This approach combines business activities with technical activities. Further, they justify investing in technology and help to find right business solutions to problems as well as to identify critical stakeholders. They further define the scope of the project".*

According to another focus group participant, an IS manager *"These activities are helpful for this phase because they help create the basis for a project by describing the business problem or opportunity, by listing the alternative solutions and including a cost / benefit analysis selection".*

These responses imply that these activities summarise the business implication of a project. Scrutiny of these responses shows that these activities establish structure to the intended solution, as well as provide the financial component of the project. Furthermore, these activities can be used to define a project's resource requirements, investment costs, revenue projections and market acceptance. The next step was to identify the techniques used for this phase, having identified the activities.

4.3.3.2 Techniques for the business case phase

This section intended to identify the techniques for the second phase of business analysis from the focus group interviews. The most frequently recommended techniques for the second phase of a business analysis methodology are listed below.

- Criticality analysis (TE2CA) - During the first focus group, a project manager said, *"Criticality analysis helps a business analyst identify the financial components of a business case. It helps him/her to present a clear, concise, fact-based business case. This technique helps a business analyst measure the full range of business benefits including intangible and qualitative benefits".*
- Risk reduction leverage (TE2RR) – Referring to risk reduction leverage, this same participant commented, *"This technique helps a business analyst present the financial aspect of the business case for maximum impact".*
- Fault tree analysis (TE2FT) - An IS manager from the second group said, *"Fault tree analysis help establish baseline measurements and benchmarks for a business case. It also helps a business analyst adhere to a variety of regulations for justifying and tracking projects"*.

These techniques are classified in Table F7.

Scrutinising these responses, it can be seen that these techniques are favourable to this phase because of the financial orientation. This financial orientation includes costs and benefits of the intended solution. Moreover, these techniques help a business analyst determine baseline measurements and benchmarks for a business case, which assist with the tracking of a project. Having identified the techniques for the second phase, the tools for this phase of business analysis were considered next.

4.3.3.3 Tools for the business case phase

This section intended to identify the tools used for the second phase of business analysis from the focus group interviews. The most repeatedly mentioned tools for the second phase of a business analysis methodology are set out below.

- Borland Together (TO2BT) - A business analyst in the first focus group said, *"For a business case, this tool enables a business analyst to communicate the proposed features, functions, and specifications of a product or system with greater clarity, so that the developers can fully understand, build, and test the intended product or system".*

- Rational Rose (TO2RR) - In this group, a business analyst mentioned, *"Rational Rose provides a flexible combination of modelling and simulation features for developing a business case. It is suitable for generating, structuring and managing requirements for complex business problems. Rational Rose has comprehensive templates that are available for business case construction"*.
- Telelogic (TO2TE) - A business analyst from the second group said, *"Telelogic contains software templates that help write a business case that concisely presents the benefits of change, and assess the financial impacts of a solution, including calculating Net Present Value (NPV) and ROI that can help secure funding for a project".*

These tools are classified in Table F8.

A closer inspection of these responses suggests that these tools are helpful to this phase because they contain features or modules that address the financial impacts of a project. Also, the ease of use in developing business cases was another implied outcome. Furthermore, these tools help a business analyst communicate the proposed features with developers more clearly, so that they can fully understand the intended solution. Once the second phase of business analysis with appropriate activities, techniques and tools had been identified, the next step was to identify the third phase of business analysis, which is discussed in the next section.

4.3.4 Analysis and design phase (PH3AD) - phase 3 of a business analysis methodology

This section was intended to identify the third phase of a business analysis methodology. A sample of comments from participants is presented below.

According to the opinion of a business analyst from the second group, *"Analysis continues from the business case. It involves a more detailed study of a current business system and its problems as well as an understanding of business needs and information requirements. Design is the detailed specification of that solution that meets the requirements determined during the analysis".*

Another participant from this group, an IS manager remarked, *"Analysis and design involves producing a viable blueprint that satisfies the requirements in the business case. This phase also involves converting the business strategies and tactics into the blueprint for a system. It could entail system functions, processing, size and scope, structure, hardware and software details".*

More comments from participants can be found in Appendix F, Figure F4.

The responses from the focus group participants suggest the analysis and design phase entails a model of the system that will meet the needs of end users. A closer examination of the responses suggests this phase should include logical and physical design elements. The most repeatedly mentioned name for phase 3 of a methodology was an **analysis and design phase (PH3AD)**, with 26 mentions and are classified in Appendix F, Table F9. After extracting the third phase, the next step was to identify the activities, which are described in the following section.

4.3.4.1 Activities for the analysis and design phase

The most frequently mentioned activities for the third phase of a business analysis methodology, as well as a sample of comments from participants are listed below.

- Refinement (PR3RE) – According to a project manager from focus group 1, *"This involves refining the intended solution proposed in the business case".*
- Scope (PR3SC) – In the view of a business analyst from this group, *"Scope consists of the inclusion and exclusions the solution".*
- Ownership (PR3OW) – Regarding this activity, a business analyst, from the second focus group remarked, *"Accountability of the project is essential for success".*
- Redesign (PR3RD) – *"Redesign"* in the opinion of an IS manager from the first focus group *"entails the design of the intended solution".*
- Detailed analysis (PR3DA) – According to a project manager from the second focus group, *"This activity must include a detailed context analysis".*
- Design of solution (PR3DS) – *"This activity entails the actual design including the business and technology components"* was the view of an IS manager from the second focus group.
- Change management (PR3CM) – *"The impact of people issues needs to be taken into account"* was a view expressed by a project manager from focus group 1.
- Modelling (PR3MO) – An IS manager, also from focus group 1 commented, *"The actual analysis model identity is produced in this activity".*
- Design signoff (PR3DS) – For the last activity, a business analyst from the second focus group suggested, *"Analysis and design is formally signed off by all stakeholders".*

The responses mentioned by focus group participants are classified in Table F10. During probing a participant from the first focus group, a project manager, commented, *"These activities improve the quality of the analysis and design phase. The ability of business analysts to implement high-quality solutions depends on the quality of the analysis and the design, and the ability of the maintenance programmers to make changes to the system after it has been put into operation. These activities contribute to the quality of analysis and design".*

In this group, an IS manager added, *"The complexity of analysis and design makes it difficult to anticipate all the issues that will eventually be of importance in the final design. It is inevitable that business analysts may overlook important issues. These activities provide structure for them"*.

In the second group, an IS manager commented, *"These activities are dynamic and can adapt to changing needs*" This IS manager elaborated, *"A result of these activities is reduced development time".*

These responses suggest that these activities are beneficial to this phase because they improve the quality, add structure to the development process and as a consequence speed up the development process. Once the activities had been established, the next step was to identify the techniques used for this phase.

4.3.4.2 Techniques for the analysis and design phase

The most frequently mentioned techniques for the third phase of a business analysis methodology, as well as examples of evidence, are presented below.

- Affinity analysis (TE3AA) - A business analyst from the first focus group said, *"Affinity analysis is a practical technique focused on the analysis and design of systems. It assists when communicating with users, assessing their requirements and developing systems that meets those requirements".*
- Functional hierarchy decomposition (TE4FH) - A project manager from the second group said, *"This technique allows a business analyst to divide complex processes into simple processes. It also allows a business analyst to specify what the new system will accomplish, based on the user requirements from the business case".*
- Modelling (TE5MO) - An IS manager in this second group said added, *"Modelling helps a business analyst analyse business processes by developing process models and data models for a system. It also helps a business analyst work successfully with a group of peers on a common problem"*. She elaborated, *"Modelling makes it easy for a business analyst to draw the exact boundary of the new system under consideration by keeping in view the problems and new requirements as well as working out the pros and cons, including new areas of the system".*

These techniques are classified in Table F11.

To summarise, these techniques develop formal models of a solution and are therefore useful to this phase. These techniques further assist a business analyst to communicate with users as well as assess their requirements. Furthermore, it was found that these techniques help a business analyst divide complex processes into simple processes. After the techniques for this phase had been identified, the tools for this phase of business analysis were noted.

4.3.4.3 Tools for the analysis and design phase

The most frequently cited tools for the third phase of a business analysis methodology were *"Telelogic", "Requisite Pro[14]" and "DOORS[15]".* These tools are classified in Table F12. A sample of comments from participants is presented below.

- Telelogic (TO3TE) – *"This is a powerful, yet simple tool for, modelling and sharing requirements during analysis and design*", said a business analyst from the first focus group. *"Telelogic can be used by business analysts who want to improve the communication aspects of a project, enhance collaborative development, reduce project risk and increase the quality of systems before implementation".*
- Requisite Pro (TO3RP) - Another focus group participant from focus group 1, a business analyst said, *"This tool integrates modelling and development functionalities to allow business analysts to model functionality more accurately during analysis and deign".*
- DOORS (TO3DO) – *"This tool's flexibility for modelling makes it adequate for this phase"*, was the view of an IS manager from focus group 2.

Examining these responses, the implication is that these tools improve quality and speed up the development process by ensuring consistency and completeness. Moreover, these responses imply that theses tools help business analysts build models easily. These tools were further found to be simple, flexible and powerful for this phase. After identifying the tools, the next step was to identify the last phase of business analysis, and this follows in the next section.

[14] http://www.ibm.com

4.3.5 Post-implementation evaluation phase (PH4PI) - phase 4 of a business analysis methodology

Participants were asked to name and briefly describe the objective, relevance and outcomes of the last phase that they follow when conducting business analysis.

A sampling of participant comments reveals some insights into their thinking of the last phase of a methodology. *"The objective of a post-implementation evaluation"* according to one outspoken business analyst from focus group 2 *"is to assess the overall success of the project. This phase",* according to her, *"should include a review of how the project performed against the objectives, scope, benefits, expenses and deliverables from the business case".*

Another participant, an IS manager also from focus group 2 took this further. *"The relevance of the last phase is not only to assess the projects level of success but also to identify lessons learnt and make recommendations for future projects. The outcome is a post-implementation review report".*

However, from the 2 groups, 18 participants said that there was a relationship between a business case phase and a post-implementation evaluation phase. A project manger from the second focus group remarked *"the post-implementation confirms if the project was successful and justifies the investment made by comparing it to the business case".* She further elaborated *"a post-implementation evaluation phase should assess whether the project achieved the benefits set out in the business case, therefore there is a relationship".*

Another IS manager from this group added *"a post-implementation evaluation phase should compare the actual performance of a project to objectives in the business case".*

No other relationships were identified. Seventeen participants also said that the post-implementation evaluation phase should be repeated after a period of time. Other comments from participants can be found in Appendix F, Figure F5.

To summarise, findings from the focus groups indicate that the objective of this phase consists of an inspection and verification of the solution. Additionally, the relevance of this phase entails an assessment of the project against the objectives, scope, benefits, costs and deliverables from the business case. The outcome was found to be a post-implementation review report. Furthermore, a relationship between a business case phase and a post-implementation evaluation phase was established. The most commonly mentioned response for phase 4 of a methodology was a **post-**

implementation evaluation phase (PH4PI), with 28 mentions (53.8% of all mentions). These responses are classified in Appendix F, Table F13.

After defining the last phase, the next step was to identify the activities for this phase, and this is reviewed in the next section.

4.3.5.1 Activities for the post-implementation evaluation phase

The most frequently mentioned activities for the fourth phase of a business analysis methodology, as well as a sample of explanations from participants are recorded below.

- Review the requirements (PR4RR) – Relating to this activity, a project manager from the first focus group suggested, *"A business analyst should re-examine the original user want or need".*
- Review the business case (PR4RB) – *"The costs and benefits projected in the business case should be re-evaluated to see if they were met"* was the view of a business analyst, also from this group.
- Review the objectives (PR4RO) – An IS manager from the second focus group remarked, *"Any objective specified in the business case should be reviewed".*

The business analysis responses mentioned by interviewees relating to the activities for the fourth phase of a business analysis methodology are classified in Table F14.

Participants from the focus groups were asked to elaborate on these activities. A business analyst from the first group said, *"These activities help a business analyst ensure that the system is operating effectively as intended in the business case by identifying improvements in its operation. Based on this, an action plan can be prepared to implement these improvements"*.

An IS manager from this group interjected, *"These activities help a business analyst find out whether the expected benefits of the project have been realised and if lessons learned from the project will lead to recommendations for improvements".*

In the second focus group, a project manger said, *"These activities compare what was originally planned to what actually happened and assess whether the outcome added value to the organisation. These activities also assess unexpected benefits, unforeseen problems, user reaction and follow-on work recommendations, together with timescales".*

To summarise, these activities ensure the lessons learnt from the implementation are re-integrated into the organisation to benefit future projects. A closer examination of these responses suggests that these activities ensure a logical approach is adopted by comparing the solution to the original requirements. Furthermore, these activities help a business analyst identify improvements in the operation of a project, as well as formulate an action plan to implement these improvements. The next step was to identify the techniques used for this phase, having identified the activities.

4.3.5.2 Techniques for the post-implementation evaluation phase

The most frequently cited techniques for the fourth phase of a business analysis methodology were "*traceability matrix", "inspections"* and *"traceability tree"*. Other responses mentioned by interviewees relating to the techniques for the fourth phase of a business analysis methodology are classified in Table F15. A sample of comments from participants is presented below.

- Traceability matrix (TE4TM) - A business analyst from the second focus group said, *"This technique helps trace the end result to the original requirements. This technique can further be used to evaluate the effectiveness of the system development after the system has been in production for a period of time, maybe after six months".*
- Inspections (TE5IN) – *"This technique can help determine if the system does what it is designed to do. This technique assesses the system in terms of functionality, performance, and cost versus benefits, as well as measuring the effectiveness of the life-cycle development activities that produced the system. The review of results can be used to strengthen the system as well as system development procedures"*, was the view of a project manager from this group.
- Traceability tree (TE6TT) – *"The traceability tree helps trace the solution back to the requirements",* was the opinion of a business analyst from the second focus group.

In summary, these techniques help a business analyst to relate the business case to the implemented solution. Additionally, these techniques help a business analyst evaluate the effectiveness of the system development after the system has been in production for a period of time. Moreover, they can be used to assess functionality, performance, costs and benefits of the solution. The tools used for this phase were investigated next after having extracted the techniques.

4.3.5.3 Tools for the post-implementation evaluation phase

The most commonly mentioned tools for the fourth phase of a business analysis methodology were *"Ideogramic", "Telelogic"* and *"Rational Rose".* More tools relating to the fourth phase of a business analysis methodology are classified in Table F16. During probing, participants made the comments recorded below.

- Ideogramic (TO4ID) - A project manager from the first focus group suggested *"Ideogramic assesses the outcomes and success of a project. Depending on the input into the tool, it lists the expected outcomes as specified in the project plans, reports on variances from that plan and makes provisions for recommendations related to lessons learned".*
- Telelogic (TO4TE) - Another participant, a business analyst from the second focus group commented *"Telelogic compares the outcome, in terms of success or failure, costs and benefits of the implementation to the original specifications".*
- Rational Rose (TO4RR) – *"The ease of use of when reviewing projects makes this tool ideal for post-implementation evaluations",* was the opinion of an IS manager, also from the second focus group.

Summarising these responses, these tools are appropriate to this phase because they contain features that can help a business analyst compare the outcome to the original requirements. Moreover, these tools have the capability to assess the expected outcomes as specified in the project plans. The identification of tools for the last phase of the methodology concluded the findings from the focus group interviews. The consolidation and interpretation of the findings from the individual interviews and focus group interviews are presented in the next section.

Part 3

4.4 Consolidation and Interpretation of the Results

The previous sections, i.e. part 1 and part 2, presented the evidence that was collected during the data collection phase, which consisted of primary data from individual interviews and focus group interviews. The objective of part 3 is to consolidate these findings, as well as put the research objectives into perspective.

Subsequent sections of part 3 consolidate and interpret the findings from the individual interviews, focus groups and link them to the literature findings. Individual and focus group interview participants' understanding of business analysis follows in the next section.

4.4.1 Understanding of business analysis

Business analysis was defined as the process of business problem solving by 62% of the participants. Interpreting the responses, the indication is that business analysis is the understanding of business requirements. A closer examination of these responses suggests that these requirements could be business problems, opportunities, needs or wants. The responses also suggest that business analysis consists of finding business or technical solutions to these requirements and documenting these solutions in a clear and understandable way.

4.4.2 Feasibility phase (PH1FE) - phase 1 of a business analysis methodology

The first phase of a business analysis methodology was the **feasibility phase (PH1FE)**. Seventy six percent of all the participants identified the feasibility phase as the first phase of a business analysis methodology. Recall that the frequency of mentions is an indicator of the *intensity* of meaning and emphasises words or phrases that cannot be experimentally examined or measured (Denzin and Lincoln, 1994; Neuman, 1994; Neuendorf, 2002; Newbold, et al., 2002). Seventy six percent therefore reveals a strong indication of the intensity of this phase. The total number of mentions is presented in Appendix G, Table G1.

The researcher found that the ***objective*** of a feasibility phase is to conduct a preliminary analysis of a business requirement. The responses suggest that this requirement could be a problem, an opportunity, a need, or a want. A closer look at the responses suggests that this phase consists of understanding and analysing this requirement to determine the practicability of implementing it. Importantly, it was found that for this phase, an in-depth objective understanding of the business requirement is important. The responses also indicate that this phase should provide management with a firm basis for determining whether the business requirement has sufficient merit to continue into more detailed phases. The comments from participants suggest that the deliverable ***outcome*** of this phase should be a feasibility report to management. This feasibility report should present the proposed solutions to a business requirement, the advantages and disadvantages associated with each solution, objectives, conclusions and recommendations.

The reason ***why a feasibility phase is relevant*** is that it minimises project failure that could be based on poor business requirements and consequently prevents financial losses. The researcher found that this phase helps management decide between alternative solutions and promotes a more focused business approach. Individual and focus group interview findings indicated that the ***activities*** for a feasibility phase were to:

- identify a need or opportunity (PR1IN);

- define boundaries (PR1DB);
- perform information gathering (PR1IG);
- perform opportunity identification (PR1OI);
- conduct opportunity analysis (PR1OA); and
- make recommendations (PR1RE).

The activities mentioned by participants in response to the feasibility phase of a business analysis methodology are classified in Appendix G, Table G2. The findings suggest that these activities are appropriate to this phase because they help business analysts narrow a range of options, assess the remaining options and then propose solutions.

The ***techniques for a feasibility phase*** were interviews (TE1IN), observations (TE1OB) and task demonstrations (TE1TD). The techniques mentioned by participants in response to the feasibility phase are classified in Appendix G, Table G3. A closer look at the responses suggests that these techniques help a business analyst develop a better understanding of the requirements, and represent those requirements in a clear and comprehensible format for this phase.

The ***tools for a feasibility phase*** were Visible Analyst (TO1VA), Cool Biz (TO1CB) and Visio (TO1VI) and are classified in Appendix G, Table G4. Examining these responses, it can be seen that these tools are suitable to this phase because of the graphical representations produced that help business analysts to understand and formulate requirements. The next section identifies the second phase of a business analysis methodology.

4.4.3 Business case phase (PH2BC) - phase 2 of a business analysis methodology

Seventy five percent of participants identified the **business case phase (PH2BC)** as the second phase of a business analysis methodology. The total number of references is presented in the Appendix G, Table G5.

Individual and focus group interview findings indicated that the ***objective*** of a business case phase was to elaborate and structure the intended solution from the feasibility phase. A closer look at the responses suggests that this phase consists of the business requirement, the intended solution, scope of the intended solution, risks associated with that solution and the anticipated costs and benefits. Interpreting the responses further, the indication is that this phase can help justify including a project in an organisation's program of work, as organisations typically have several potential competing projects in its program of work. This phase could also help gain

approval from management to proceed with a project and to obtain common agreement on the project deliverables. The ***outcome*** from this phase is a business case document. The reason ***why the business case phase is relevant*** is that it defines the scope of the intended solution. Furthermore, this phase determines the project's resource requirements, costs and benefits. Importantly, this research identified a relationship between this phase and the final phase (post-implementation evaluation phase) of business analysis. Findings from the individual interviews and focus group interviews indicated that the objectives of the business analysis phase should be reviewed in the final phase of business analysis. Therefore, this phase provides an important baseline for determining success or failure at the end of the project.

The researcher found that the ***activities of a business case*** phase were to identify a solution (PR2IS), refine the boundaries of a solution (PR2RB), to collate more information (PR2CM), to analyse a solution (PR2AS), to determine the assumptions and dependencies (PR2AD), to conduct “as-is analysis” (PR2AA) and finally to make recommendations (PR2ERE). See Appendix G, Table G6 for all mentioned activities of a business case phase. These activities were found to be beneficial to this phase because they summarised the business ramifications of a project and established direction, by providing business analysts with the activities necessary to complete the project with minimal risk. Moreover, these activities were found to create structure to the intended solution and provide a benchmark for monitoring performance of the completed project.

The ***techniques for a business case phase*** were criticality analysis (TE2CA), risk reduction leverage (TE2RR) and fault tree analysis (TE2FT). Refer to Appendix G, Table G7 for all techniques mentioned by participants in response to the business case phase. These techniques were found to be advantageous to this phase because they were financially orientated to help business analysts make better financial decisions.

The ***tools for a business case phase*** were Borland Together (TO2BT), Rational Rose (TO2RR) and Telelogic (TO2TE). Appendix G, Table G8 presents all mentioned business case tools. These tools were found to be beneficial to this phase because they contained software features that assessed the financial impacts of a project. Further, the ease of financial computations was found to be another reason these tools were beneficial to this phase. The third phase of a business analysis methodology is discussed in the next section.

4.4.4 Analysis and design phase (PH3AD) - phase 3 of a business analysis methodology

Analysis and design (PH3AD) was found to be the third phase of a business analysis methodology according to 71% of the participants of this research. The total number of references is presented in Appendix G, Table G9.

Individual and focus group interview findings suggested that the analysis and design phase consists of an analysis component and a design component. The ***objective*** of the analysis component entails an in-depth study of the solution from the business case and producing an analysis model representing that solution. The researcher found that the ***objective*** of the design component was to transform that analysis model into a logical solution which is capable of being implemented. In summary, to quote a participant, *"analysis is about doing the right things and design is about doing the things right".* The ***outcome*** from this phase is an analysis model, in the form of an analysis and design document. The reason ***why the analysis and design phase is relevant*** is that it generates documentation in the form of an analysis model.

The ***activities for the analysis and design phase*** consisted of refining the solution (PR3RE), determining the scope (PR3SC), ownership (PR3OW), redesigning the solution from the business case (PR3RD), conducting detailed analysis (PR3DA), designing a solution (PR3DS), conducting change management (PR3CM), modelling (PR3MO), and finally signing-off the design (PR3DS). The analysis and design phase activities mentioned by participants in response to the analysis and design phase of a business analysis methodology are classified in Appendix G, Table G10. It was found that these activities are beneficial to this phase because they add structure to the solution and as a consequence speed up the development process.

The ***techniques for the analysis and design*** phase were affinity analysis (TE3AA), functional hierarchy decomposition (TE4FH) and modelling (TE5MO). See Appendix G, Table G11 for all mentioned analysis and design techniques. A closer look at the responses suggests that these techniques develop standardisation by making formal representations of the solution being designed, and are therefore beneficial.

The ***tools for the analysis and design phase*** were Telelogic (TO3TE), Requisite Pro (TO3RP) and Rational Rose (TO3RR). Appendix G, Table G12 presents all mentioned tools for this phase. The responses suggest that these tools speed up development process by enabling business analysts to build models more easily. A result of this was a reduction in development time and

costs during analysis and design. The last phase of business analysis is discussed in the next section.

4.4.5 Post-implementation evaluation phase (PH4PI) - phase 4 of a business analysis methodology

Eighty nine percent of the participants indicated that a **post-implementation evaluation (PH4PI)** was the final phase of a business analysis methodology. The total number of responses is presented in Appendix G, Table G13.

Individual and focus group interview data indicated that the ***objective*** of the post-implementation evaluation phase was to evaluate the implemented solution by comparing it to the business case objectives, the costs and benefits. The responses also suggest that this phase acts as a feedback mechanism to business analysts to optimise decision-making on future projects. The deliverable ***outcome*** from this phase is a post-implementation review report.

The reason ***why a post-implementation evaluation phase is relevant*** is that it ensures that lessons learnt from the project are re-integrated into the organisation, to benefit future projects. It was also found that the post-implementation evaluation phase should be conducted twice i.e., directly after the project is implemented and then repeated after a period of time, approximately 6 months, after the implementation. To quote an IS manager from the second focus group, *"a post-implementation evaluation should take place after a relatively stable operating environment has been established, about six to twelve months after implementation"*. A relationship was also found between the post-implementation evaluation phase and business case phase. Eighty one percent of all the participants said the post-implementation evaluation phase should be compared to the business case phase to see if the project met the deliverables that it was intended to meet. These participants said that a post-implementation evaluation phase checks whether the benefits, set out in the business case were achieved and identifies opportunities for further improvement.

The researcher found that the ***activities associated with the post-implementation evaluation*** were to review the requirements (PR4RR), review the business case (PR4RB) and to review the objectives (PR4RO). Appendix G, Table G14 presents all mentioned activities associated with the post-implementation evaluation phase. These activities were found to develop a systematic approach by comparing the actual solution to the original requirements. They also ensured the lessons learnt are re-integrated into the organisation to benefit future projects.

The ***techniques for the post-implementation evaluation*** phase found by this research were traceability matrix (TE4TM), inspections (TE5IN) and the traceability tree (TE6TT). See Appendix G, Table G15 for all mentioned techniques for this phase. The responses suggest that these techniques are appropriate to this phase because they help analyse information at the end of a project to the original business case requirements.

The ***tools for a post-implementation evaluation phase*** were Ideogramic (TO4ID), Telelogic (TO4TE) and Rational Rose (TO4RR). Appendix G, Table G16 shows all mentioned tools associated with this phase. Data from the individual interviews and focus group interviews indicated that these tools were appropriate to this phase because of the software features that could trace the outcome to the original requirements.

Thereafter, all the results were compared to the literature review conducted in chapter 2 to establish if the research objectives were achieved. A discussion of this follows in the next section.

4.5 Discussion of results

The literature review in chapter 2 revealed that although prior research made important advances in business analysis, business analysis methodologies are inadequate for business analysis. Table 2.1 summarised the short comings of the requirements engineering process methodology (Iyer and Richards, 2004), requirements triage methodology (Davis, 2003b), knowledge level process methodology (Abbink et al., 2004), win-win spiral methodology (Boehm et al., 1994), process framework methodology (Alcazar and Monzon, 2000) and requirements generation methodology (Arthur and Groener, 2005). In particular, the lack of clear objectives, relevance and outcomes of the phases made these business analysis methodologies inadequate. Furthermore, other problems were that the phases were at a high level and there was an inadequate and inconsistent level of detail in these phases (Bubenko, 1995; Curtis et al., 1988; Davis, 2003a; Jordan et al., 1989).

Moreover, the literature review, section 2.4, found that there are a large number of activities, techniques and tools for business analysis. However, because these were not mapped to the appropriate phases of business analysis, business analysts often perform activities and select techniques and tools in an ad hoc manner (Davis, 2003a; Lobo, 2004). This results in an output which inadequately addresses the objectives of that phase (Davis, 2003a; Lobo, 2004). The reason is that different activities, techniques and tools have different advantages and disadvantages, and incorrect selection could hamper the objective of a phase (Davis, 2003a; Lobo, 2004).

Findings from this study addressed the problems revealed in the literature review, by identifying phases of a methodology, with objectives, relevance and outcomes. Moreover, appropriate activities, techniques and tools to address the objectives of each of the phases were identified.

Importantly, a relationship was found between the post-implementation evaluation phase and business case phase. Individual and focus group interview findings indicated that the business case phase provides a baseline for determining success or failure at the end of the project. It was revealed that the objectives of the business case phase should be reviewed in the final phase of business analysis, and then compared to the project outcome to determine success or failure of the project.

Another interesting outcome was that a post-implementation evaluation phase should be conducted twice i.e., directly after the project is implemented and then repeated after a period of time, approximately six months, after the implementation. The reason for this is the time required to achieve a stable operating environment.

A closer examination of the results reveals that tools such as Rational Rose and Telelogic are appropriate to the business case phase, analysis and design phase and also the post-implementation evaluation phase. This is due to the ease of use, financial and traceability features of these tools.

Recall that a qualitative approach was selected for this research because it allowed for in-depth probing of issues, a greater detail in responses as well as for interaction with the participants (Denzin and Lincoln, 1994; Dixon et al*.,* 1988; Hussey and Hussey, 1997). Individual interviews and focus group interviews were selected for this study, based on the assumption that any weaknesses inherent in a one data gathering method (for example individual interviews) could be neutralised when used together with the other data gathering method (for example focus group interviews), and as a consequence, increase the reliability and validity of a final result (Baskerville, 1999; Dixon et al*.,* 1988; Hussey and Hussey, 1997; Yin, 1994).

However, comparing the evidence from the individual interviews in section 4.2 and focus group interview finding in section 4.3, no outstanding difference was found in the comments to make any strong conclusions. Nevertheless, 11 participants from the individual interviews stated that there were no tools for the post-implementation evaluation phase (i.e. 50% of individual interview participants). Notably, all focus group participants named tools for this phase. The reason all the focus group participants named tools for this phase could be attributed to prompting from other

focus group participants, an inherent weakness of focus group interviews (Hussey and Hussey, 1997; Yin, 1994).

According to researchers (Baskerville, 1999; Dixon et al*.,* 1988), meta-information such as participant seniority, skills, experience or age could influence research conclusions. Realising that participants' job characteristics could have influenced the outcome, the responses from the project managers, business analysts, IS managers and CIOs were cross-tabulated in Table G17. However, no strong difference was found in the results to make any strong conclusions.

Finally, this research defined business analysis as the process of business problem solving. Recall that the reason for obtaining this definition is because business analysis is an emerging field, and there is some confusion with systems analysis. The researcher found that business analysis was the understanding of business requirements that could be business problems, opportunities, needs or wants. Business analysis was found to consist of finding business or technical solutions to these requirements and documenting these solutions in a clear and understandable way. The following section presents a conclusion to this chapter.

4.6 Conclusion

This chapter presented the evidence that was collected during the data collection phase. It consisted of primary data from individual interviews and focus group interviews. The content analysis, analysis within and between interviews, as well as an interpretation of the data was presented. This chapter interpreted the data by identifying phases, activities, techniques and tools. The findings indicate that the phases of a business analysis methodology are a **feasibility phase**, **business case phase**, **analysis and design phase** and finally a **post-implementation evaluation phase**. Objectives, relevance and outcomes of these phases, as well as the activities, techniques and tools were also presented. Chapter 5 presents the conclusions of the study, discusses the limitations of the research and suggests possible areas for future research.

Chapter 5
Conclusions, Recommendations and Limitations of this study

5.1 Introduction

The preceding chapter presented and interpreted the findings from the individual interviews, focus group interviews and linked them to relevant literature.

This chapter concludes the research effort by presenting an overview of each chapter followed by the main findings of this study. The implications and contributions of the study are then assessed, followed by a discussion of the biasness, the limitations as well as recommendations for further research. An overview of chapters is presented in the following section.

5.2 Overview of chapters

Chapter 1, introduction to a business analysis methodology presented the topic of business analysis by investigating business analysis problems and motivating the need for a business analysis methodology. It described business analysis as one of the least explored areas with no adequate methodology. Chapter 1 described the problem of business analysis methodologies as being composed of high level phases with unclear objectives and outcomes that resulted in uncertainty about which procedures to use for conducting business analysis. An additional problem related to the mapping of appropriate activities, techniques and tools to address the objectives of each phase of a methodology. The aims, objectives as well as the research questions and a research model were established in chapter 1. After investigating problems with business analysis and motivating the need for a business analysis methodology a literature review was conducted.

This examination of previous research undertakings that related to business analysis methodologies was provided in **Chapter 2, literature review**. This chapter presented methodologies and their activities from literature, such as requirements engineering process methodology; requirements triage methodology; knowledge level process methodology; win-win spiral methodology; process framework methodology and requirements generation methodology. Further a review of different techniques and tools from literature was also investigated. More importantly, this chapter concluded with the contributions and shortcomings of these methodologies, techniques and tools. After establishing the underlying literature pertaining to business analysis methodologies, the research methodology used to carry out this study followed.

Chapter 3, research methodology clarified the methodology used to carry out the study and justified the qualitative approach that allowed for in-depth probing and detailed responses. The pre-test and pilot study, conducted to validate the data gathering methods to ensure that they were free from errors, and in order to increase the reliability of the results, was also illustrated. Importantly, the data gathering methods comprising of individual interviews and focus group interviews were demonstrated. The sample selection, characteristics of participants and settings for each of the data gathering methods used for this study were further demonstrated. The data analysis strategy including the data management strategy, content analysis and analysis within and between interviews were presented in detail. Chapter 3 further introduced the data coding and category construction procedure used for the research. The assessment of trustworthiness, criteria for reliability and validity, as well as ethical considerations of the researcher were also covered.

Chapter 4, presentation and interpretation of the evidence collected, derived the phases, activities, techniques and tools from the data. This chapter presented the findings from the individual interviews and focus group interviews. The consolidation and interpretation of these findings followed. This chapter concluded by linking the findings to the literature review and a discussion of the results. The main findings of this study follow in the next section.

5.3 Main findings

The objectives of this research included identifying the relevant phases of a business analysis methodology as well as the objectives, relevance and outcomes for each of those phases. It also included mapping appropriate activities, techniques and tools to the relevant phases of a methodology. The results from this study addressed those objectives as follows.

The first phase of a business analysis methodology was identified as the **feasibility phase**. Individual and focus group interview findings indicated that the *objective* of this phase was to conduct a preliminary analysis of a business requirement. The deliverable *outcome* was found to be a feasibility report. A feasibility phase was *relevant* because it minimised project failure based on poor business requirements. This research identified the *activities* as identifying a need or opportunity, defining boundaries, performing information gathering, performing opportunity identification, conducting opportunity analysis and finally making recommendations. The *techniques* for this phase were interviews, observations and task demonstrations, while the *tools* included Visible Analyst, Cool Biz and Visio.

This research identified the **business case phase** as the second phase of a business analysis methodology. The *objective* was to elaborate and structure the intended solution from the feasibility phase. The *outcome* was found to be a business case document. The business case phase was *relevant* because it defined the scope of the intended solution. The researcher further found that the *activities* were to identify a solution, refine the boundaries of a solution, to collate more information, to analyse a solution, to determine the assumptions and dependencies, to conduct "as-is analysis" and finally to make recommendations. The *techniques* were criticality analysis, risk reduction leverage and fault tree analysis, and the *tools* were Borland Together, Rational Rose and Telelogic.

Analysis and design was found to be the third phase of a business analysis methodology. The *objective* entailed conducting an in-depth study of the solution from the business case and producing an analysis model representing that solution. The *objective* further entailed transforming that analysis model into a logical solution capable of being implemented. The *outcome* was an analysis model, in the form of an analysis and design document. This phase was *relevant* because it generated documentation in the form of an analysis and design model. The *activities* consisted of refining the solution, determining the scope, ownership, redesigning the solution from the business case, conducting detailed analysis, designing a solution, conducting change management, modelling, and finally the signing off the design. The *techniques* were affinity analysis, functional hierarchy decomposition and modelling whereas the *tools* included Telelogic, Requisite Pro and Rational Rose.

This study indicated that a **post-implementation evaluation phase** was the final phase of a business analysis methodology. Findings from the individual interviews and focus group interviews showed that the *objective* was to evaluate the implemented solution by comparing it to the business case objectives. The deliverable *outcome* was a post-implementation review report. This phase was *relevant* because it ensured lessons learnt from the project are re-integrated into the organisation, to benefit future projects. The researcher found that the *activities* were to review the requirements, review the business case and to review the objectives. The *techniques* were traceability matrix, inspections and traceability tree and the *tools* were Ideogramic, Telelogic and Rational Rose.

A relationship was found between the post-implementation evaluation phase and business case phase. This relationship is important because the business case phase provides a baseline for determining success or failure at the end of the project. It was revealed that the objectives of the business case phase should be reviewed in the final phase of business analysis, and then compared to the project outcome to determine success or failure of the project.

In addition, it was further established that the post-implementation evaluation phase should be conducted twice, directly after a project is implemented, and then after a few months (approximately 6 months) after the implementation of a project. The reason for this is the time required to achieve a stable operating environment.

These findings therefore address the research aims and objectives identified in chapter 1, and have implications as well as contributions for academics and practitioners. These are discussed in the next section.

5.4 Implications and contributions of this study for academics and practitioners studying business analysis

The implications of this research include those of conceptual, methodological and practical consequences (Denzin and Lincoln, 1994; Whetten, 1989) for academics and practitioners. These implications are set out below.

- **Conceptual implications**

The most important conceptual implication of this research relates to the identification of the relevant phases of a business analysis methodology, with clear objectives and outcomes. This contribution addresses the problem with the methodologies which were identified in the literature review, chapter 2, section 2.5 that had high level phases with unclear objectives and outcomes. The other contribution has been the mapping of activities, techniques and tools for each of these phases. The literature review, section 2.4 illustrated the various techniques and tools, each with different criterion and the difficulty in selecting appropriate techniques and tools to meet the objectives of each phase. This study also contributed to our understanding related to the definition of business analysis, because this is an emerging field, and there is confusion between business analysis and systems analysis (Evans, 2004).

The other conceptual implication relates to this study providing direction to literary material for academics wishing to research business analysis further (Denzin and Lincoln, 1994; Whetten, 1989). The literature review and references used for this study direct researchers to academic publications relating to business analysis.

Finally, this study provides a basis for developing a comprehensive conceptual process for academics from which hypotheses could be proposed for later testing (Whetten, 1989).

- **Methodological implications**

The methodological implications of this study relate to the research methodology used for this project (Whetten, 1989). Information systems research is dominated by the use of quantitative methodologies, and researchers are encouraging qualitative methodologies for information system studies (Lee, Liebenau and DeGross, 1997; Reeves, 2000; Siregar and Tan, 2004). The application of primarily qualitative methods (individual interviews and focus group interviews) for this study has therefore been a methodological contribution (Lee et al., 1997; Reeves, 2000; Siregar and Tan, 2004).

Another methodological contribution lies in the presentation of the quotes and direct excerpts from the individual and focus group interviews presented in chapter 4 and the appendices (Dixon et al*.,* 1988; Whetten, 1989). These quotes and direct excerpts may be useful for other academics researching business analysis (Dixon et al*.,* 1988).

- **Practical implications**

The practical implication of this research also relates to the development of the business analysis methodology, with identification of the relevant phases with clear objectives and outcomes, as well as the appropriate activities, techniques and tools. The investigation in chapters 1 and 2 showed the lack of a practical and integrated business analysis methodology for business analysts. The findings of this study are beneficial to practitioners because having a clearly defined business analysis methodology standardises the approach towards business analysis, promotes consistency in software development and helps ensure a repeatable process (Avison and Fitzgerald, 1995; Standish, 2004; SEIREP, 2004). A standardised methodology results in measurable deliverables and improved productivity for practitioners (Avison and Fitzgerald, 1995; Standish, 2004; SEIREP, 2004).

The conceptual, methodological and practical implications of this study are therefore of importance to IS practitioners and academics involved in business analysis and research.

However, biasness exists in this research.

5.5 Biasness of this research

Leedy (1993) defines bias as any influence

> "…that may have disturbed that randomness by which the choices of a sample population has been selected, or any influence whereby the results were not obtained under the conditions of pure chance".

Care was taken to avoid bias as far as possible throughout the research. However, some biases exist in the individual interviews and focus group interviews.

Researchers (Leedy, 1993; Neuman, 1994) suggest that individual interviews rely heavily on the skill of the interviewer; and therefore the quality of the results is also heavily dependent on that factor. Furthermore, in essence, the interviewer becomes the measuring instrument and the accuracy is therefore questionable (Neuman, 1994). Researchers (Leedy, 1993; Neuman, 1994) suggest biasness exist with individual interviews due to its high level of subjectivity and low level of control. To reduce biasness, a semi-structured interview with a standard interview protocol was used for this study (Leedy, 1993; Neuman, 1994).

Silverman (2000) states biasness exists with focus group interviews because a focus group discourages the participation of introvert or unconfident participants. Also, the group nature of the method precludes confidentiality of responses. Further, separating an individual view from the collective response could be complex, as individual participants are influenced by group responses (Silverman, 2000). A standard interview protocol was also used for the focus group interviews to reduce biasness (Leedy, 1993; Neuman, 1994). Moreover, the focus group interviews were held in the participants work environment to ensure a comfortable setting (Silverman, 2000). However, this study is not without its limitations, which follow in the subsequent section.

5.6 Limitations of this study

The business analysis methodology derived from this study was derived by analysing qualitative responses from individual and focus group interview participants, and not developed concurrently with a live project (Baskerville, 1999; Dixon et al*.,* 1988). Further studies should take into account this research methodology used. To overcome this limitation, an action approach is recommended by researchers (Baskerville, 1999; Dixon et al*.,* 1988).

The other limitation relates to the settings and participants (Mathison, 1988; Maxwell, 1992; Patton, 2001). The research was conducted in 2 settings from the South African financial services sector, Bank A and Bank B. The outcome therefore represents results related to participants and initiatives of these 2 organisations and may not be entirely transferable to other types of organisations or sectors (Mathison, 1988; Maxwell, 1992; Patton, 2001). Thus, it would be interesting to expand this study to other organisations, sectors or industries involved in business analysis.

Another limitation, applicable to most research in information systems, is related to 'change', and the understanding that change an ongoing process (Bubenko, 1995; Campbell, 1996). During the process of compiling this research report, various new techniques and tools were introduced to industry. This can be substantiated by glancing at the popular press. Towards the end of writing this research report it was learnt that Bank A was considering introducing a new analysis and design tool called Protos[16], to be sourced from Holland. While it is agreed that some of these developments would have implications for the business analysis methodology, some form of closure has to take place in order to complete a research report within a time and scope limit. Suggestions for additional research follow in the subsequent section.

5.7 Recommendations for further research

This research presented a business analysis methodology for business analysts in the South African financial services environment. This research could be further expanded in the following ways.

This study found a relationship between the business case phase and the post-implementation evaluation phase, as the business case phase provides a baseline for determining success or failure at the end of the project. This relationship could be further explored by developing additional research questions or hypotheses to assess this relationship.

This study also showed that a post-implementation evaluation phase should be conducted directly after the project is implemented and then repeated after a stable operating environment has been achieved. This result establishes another possible direction for future studies and could be further explored with additional research questions or hypotheses to evaluate this outcome.

A limitation of this study related to the participants and the settings. Therefore, another possible direction for future research could be to replicate this study with different settings and

[16] http://www.pallas-athena.com

participants, to observe whether same results are obtained. Replicating the study would provide results to validate the business analysis methodology (Baskerville, 1999; Dixon et al*.,* 1988).

Finally, this study could be extended by conducting a detailed empirical evaluation. This would provide deeper insight into the implementation aspect of the business analysis methodology. In addition, an empirical study would highlight any problematic aspects of the methodology and would provide suggestions for further improvement. Such a study could provide results which could be used to prove the effectiveness of the business analysis methodology (Baskerville, 1999; Dixon et al*.,* 1988).

5.8 Closing remarks

Overall, this business analysis methodology seeks to make business analysis more logical, structured and standardised. There is “no silver bullet” (Brooks, 1987, p10) for business analysis, however research (Herbsleb, Carleton, Rozum, Siegel and Zubrow, 1994; Paulk, 1993; SEIREP, 2004) confirms that projects that adopt a logical and structured approach have a greater probability of success than projects that adopt a chaotic ad hoc approach. If business analysis is done well, the probability is that the rest of the development would also go well. The business analysis methodology derived from this research is already finding its application into the researcher’s work environment. Findings presented in this report will be explored further in future studies by the researcher.

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Appendix A: Popular Press and Internet References

The references in this section come from popular press and internet articles. Although many have limited academic value, they have been included to illustrate the extent of interest in business analysis.

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Appendix B: Additional Activities, Techniques and Tools

The purpose of this table is to illustrate the extensive number of techniques and tools that are available for business analysts. Incorrect selection of an activity, technique or tool could result in an incorrect output to a phase of business analysis.

Activity/ technique/ tool	**Source**
Requirements Elicitation Meeting	Joseph Goguen, Charlotte Linde, Techniques for Requirements Elicitation, IEEE Computer Society, pages152-164, 1993.
Brainstorming	Lauesen S., 2002, Software Requirements: Styles and Techniques, Addison- Wesley Publishing Co.
Focus Groups	Roman Soltys and Anthony Crawford. JAD for business plans and designs, http://www.thefacilitator.com/htdocs/article11.html., July 2005.
Requirements Workshops	Patrick H. Loy, A Comparison of Object-Oriented and Structured Development Methods, Pacific Northwest Software Quality Conference, 1989.
Rationalisation and Justification	Roman Soltys and Anthony Crawford. JAD for business plans and designs, http://www.thefacilitator.com/htdocs/article11.html., July 2005.
Task-oriented Discussion	Lauesen S., 2002, Software Requirements: Styles and Techniques, Addison- Wesley Publishing Co.
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Priority Groups	Roman Soltys and Anthony Crawford. JAD for business

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Verifying Quality Attributes	Roman Soltys and Anthony Crawford. JAD for business plans and designs, http://www.thefacilitator.com/htdocs/article11.html., July 2005.
Round-Robin Review	The National Computing Center Limited, Internal Quality Audits: What They Are and How To Carry Them Out?, 31 July, 1996.
Inspections	The National Computing Center Limited, Internal Quality Audits: What They Are and How To Carry Them Out?, 31 July, 1996.
Stakeholder Validation	Lauesen S., 2002, Software Requirements: Styles and Techniques, Addison- Wesley Publishing Co.
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Event Tree Analysis	Patrick H. Loy, A Comparison of Object-Oriented and Structured Development Methods, Pacific Northwest Software Quality Conference, 1989.
Monte Carlo Simulation	Lawrence Goldman, Risk Analysis and Monte Carlo Simulation, Decisioneering Inc., www.decisioneering.com, Denver, CO
Cost Schedule Estimation	Joseph Goguen, Charlotte Linde, Techniques for Requirements Elicitation, IEEE

	Computer Society, pages152-164, 1993.
Software Life Cycle Management (SLIM)	Nancy Merlo, Schett, 2002, COCOMO (Constructive Cost Model), Seminar on Software Cost Estimation WS 2002 / 2003, 2002.
Constructive Cost Model (COCOMO)	Nancy Merlo, Schett, 2002, COCOMO (Constructive Cost Model), Seminar on Software Cost Estimation WS 2002 / 2003, 2002.
COCOMO II	Nancy Merlo, Schett, 2002, COCOMO (Constructive Cost Model), Seminar on Software Cost Estimation WS 2002 / 2003, 2002.
Functions Points	Nancy Merlo, Schett, 2002, COCOMO (Constructive Cost Model), Seminar on Software Cost Estimation WS 2002 / 2003, 2002.
Work Breakdown Structure	Nancy Merlo, Schett, 2002, COCOMO (Constructive Cost Model), Seminar on Software Cost Estimation WS 2002 / 2003, 2002.
Gantt Chart	Lauesen S., 2002, Software Requirements: Styles and Techniques, Addison- Wesley Publishing Co.
Program Evaluation and Review Technique (PERT)	Joseph Goguen, Charlotte Linde, Techniques for Requirements Elicitation, IEEE Computer Society, pages152-164, 1993.
Critical Path Method (CPM)	Davis, A.M., Jordan, K. and Nakajima, T. (1997), Elements Underlying the Specification of Requirements, Annals of Software Engineering, Spec. Issue on Software Requirements Engineering, 3:63-100.
Price Analysis	Joseph Goguen, Charlotte Linde, Techniques for Requirements Elicitation, IEEE Computer Society, pages152-164, 1993.
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Value Analysis	Kononya G. and Sommerville I., (1998). Requirements Engineering – Processes and Techniques, Chichester. John Wiley and Sons.
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Net Present Value	Patrick H. Loy, A Comparison of Object-Oriented and Structured Development Methods, Pacific Northwest Software Quality Conference, 1989.
Internal Rate of Return	Joseph Goguen, Charlotte Linde, Techniques for Requirements Elicitation, IEEE Computer Society, pages152-164, 1993.
Pilot experiments	Joseph Goguen, Charlotte Linde, Techniques for Requirements Elicitation, IEEE Computer Society, pages152-164, 1993.
Interest Based Bargaining	Joseph Goguen, Charlotte Linde, Techniques for Requirements Elicitation, IEEE Computer Society, pages152-164, 1993.
Functional Hierarchy Decomposition	Joseph Goguen, Charlotte Linde, Techniques for Requirements Elicitation, IEEE Computer Society, pages152-164, 1993.

Appendix C: Individual Interview Protocol

Thank you for agreeing to participate in this research. I am currently busy with research towards an M.Comm (Information Systems) at the University of Witwatersrand.

Please be assured that any information provided will be held in the strictest confidence. With your permission, I will record the interview and will submit a transcript for your approval afterwards. If you request that the information you provide should not be attributed to you, your wishes will be respected. Data collected for the purpose of research will not be used for any other purpose without obtaining your permission for any alternative or additional use.

The aim of this project is to develop a business analysis methodology for business analysts in the South African financial services environment. This research proposes to identify phases, activities, tools and techniques for such a methodology.

General	
Please tell me your name. This is optional.	
What is your position in the organisation?	☐ Project Manager ; ☐ Business Analyst ☐ IS manager ; ☐ CIO ☐ Other, please specify
Organisation	☐ Bank A ☐ Bank B
Date	// //

1. Business analysis methodology **Time: 5 minutes**	Interview comments
Please tell me about your understanding of business analysis.	

2. Business Analysis Phases

Time: 10 minutes

Please tell me about the **phases** of the methodology that you use. Also, for each of these phases, please describe to me the objectives, relevance and outcomes.

Phase 1

Phase 2

Phase 3

Phase n

Tell me if there are any additional phases, other that the ones you just described?

Do you think there is any relationship between these phases that you just mentioned? Please tell me about this relationship?

Probes:

-Tell me your view on what the scopes of these phases are?

-Explain to me the purpose of each of these phases?

-Tell me if there are any constrains relating to the phases?

-Please give me more ideas or opinions to improve the phases?

3. Business Analysis Activities

Time: 10 minutes

Now, for each phase just mentioned, please tell me about the **activities you perform** when conducting business analysis. Shall we begin with phase 1…

Phase 1

Phase 2

Phase 3

Phase 4

Are there any additional activities other than the ones you have just mentioned? Please describe these additional activities to me.

Tell me if you think there is any relationship between these activities?

Probes:

-Please explain to me if these activities user friendly?

-What is your view on any constrains relating to these activities?

-Explain to me if you would change any activities of this methodology?

-How would you change these activities?

-Explain to me ideas or opinions to improve these activities?

4. Business Analysis techniques

Time: 10 minutes

For each phase mentioned above, please tell me about the **techniques** you utilise when conducting business analysis.

Phase 1

Phase 2

Phase 3

Phase n

Tell me if there are any additional techniques?

For these techniques that you mentioned, tell me if there any relationship between these techniques?

Probes:

-Explain to me if these techniques user friendly?

-Describe to me if there are any constrains relating to the techniques?

-Tell me if you would change any techniques of this methodology?

-How would you change these techniques?

-Please give me any ideas or opinions to improve the techniques?

5. Business Analysis Tools **Time: 10 minutes**	
For each phase described above please tell me about the **tools** that you utilise when conducting business analysis. Shall we begin with phase 1… Phase 1 Phase 2 Phase 3 Phase n Besides the tools that you just mentioned, tell me if there are any additional tools? Tell me, do you think there is any relationship between these tools mentioned? Probes: -Explain to me if these tools are user friendly? -Give me your opinion relating to any constrains of the tools? -Tell me if you would you change any tools of this methodology? - How would you change these tools? - Please give me any ideas or opinions to improve the tools?	
This question concludes the interview. Thank you for your participation. Please contact me should you be interested in viewing the results of this study	

Appendix D: Focus Group Interview Protocol

Good afternoon everyone and thank you for agreeing to participate in this research. I am currently busy with research towards an M.Comm (Information Systems) at the University of the Witwatersrand. This discussion will take about 45 minutes to complete.

The information you share today will be used for research purposes only. You will not be identified by name or recognisable in any way. Please note that we are not trying to achieve any kind of consensus within this group, but rather want to hear all different points of view. Please be respectful of your colleagues during this discussion, avoiding any side conversations and dominating the discussion.

Please be assured that any information provided will be held in the strictest confidence. With your permission, I will record the interview and will submit a transcript for your approval afterwards. If you request that the information you provide should not be attributed to you, your wishes will be respected. Data collected for the purpose of research will not be used for any other purpose without obtaining your permission for the alternative or additional use.

The aim of this project is to develop a business analysis methodology for business analysts in the South African financial services environment. This research proposes to identify phases, activities, tools and techniques for such a methodology.

General		
Organisation	☐ Bank A ☐ Bank B	
Date	// //	
Let's go around the table and introduce yourselves as well as your position in the organisation.		
Name	Name	Name
☐ Project Manager ;	☐ Project Manager ;	☐ Project Manager ;
☐ Business Analyst ;	☐ Business Analyst ;	☐ Business Analyst ;
☐ CIO ;	☐ CIO ;	☐ CIO ;
☐ IS manager ;	☐ IS manager ;	☐ IS manager ;
☐ Other, please specify	☐ Other, please specify	☐ Other, please specify

Name ☐ Project Manager ; ☐ Business Analyst ; ☐ CIO ; ☐ IS manager ; ☐ Other, please specify	Name ☐ Project Manager ; ☐ Business Analyst ; ☐ CIO ; ☐ IS manager ; ☐ Other, please specify	Name ☐ Project Manager ; ☐ Business Analyst ; ☐ CIO ; ☐ IS manager ; ☐ Other, please specify
Name ☐ Project Manager ; ☐ Business Analyst ; ☐ CIO ; ☐ IS manager ; ☐ Other, please specify	Name ☐ Project Manager ; ☐ Business Analyst ; ☐ CIO ; ☐ IS manager ; ☐ Other, please specify	Name ☐ Project Manager ; ☐ Business Analyst ; ☐ CIO ; ☐ IS manager ; ☐ Other, please specify
Name ☐ Project Manager ; ☐ Business Analyst ; ☐ CIO ; ☐ IS manager ; ☐ Other, please specify	Name ☐ Project Manager ; ☐ Business Analyst ; ☐ CIO ; ☐ IS manager ; ☐ Other, please specify	Name ☐ Project Manager ; ☐ Business Analyst ; ☐ CIO ; ☐ IS manager ; ☐ Other, please specify

1. Business analysis methodology **Time: 5 minutes**	Interview comments
Shall we begin with the first question? Traditionally business analysis was considered to be a fuzzy stage of software development where a specification was generated from possibly vague and informally expressed ideas. Please tell me about your understanding of business analysis.	

2. Business Analysis Phases

Time: 10 minutes

Shall we move on to the next question? A phase is defined as a stage or component of a methodology. Please tell me about the **phases** of the methodology that you use. Also please describe the objectives, relevance and outcomes of these phases.

Phase 1

Phase 2

Phase 3

Phase n

Tell me, are there any additional phases besides the ones you just mentioned?

Do you think there is any relationship between these phases mentioned?

Prompts:
Tell me, does anyone else have a comment on that question?
Anything else?
Do you have something to add?
Tell me more about that…
Are you referring to…?
And by that you mean…?

Probes:
Tell me more on the scope of these phases?
Explain the purpose of each of these phases?
What is your view on any constrains relating to the phases?
Please give me any ideas or opinions to improve the phases?

3. Business Analysis Activities

Time: 10 minutes

Activities are defined as steps, sub-events or tasks of a phase. Now, for each phase mentioned above, please tell me about the **activities you perform** when conducting business analysis. Shall we begin with phase 1…

Phase 1

Phase 2

Phase 3

Phase n

Do you think there are any additional activities?

Please tell, do you think there is any relationship between these activities mentioned?

Probes:

-Please give me your opinion on the user friendliness of these activities?

-What is your opinion on any constrains relating to these activities?

-Tell me if you would change any activities of this methodology?

-How would you change these activities?

-Please give me ideas or opinions to improve these activities?

4. Business Analysis techniques

Time: 10 minutes

A technique is defined as a specific approach towards performing an activity. For each phase mentioned above, please tell me about the **techniques** you utilise when conducting business analysis.

Phase 1

Phase 2

Phase 3

Phase n

Tell me, are there any additional techniques?

Do you think there is any relationship between these techniques mentioned?

Probes:

-Explain to me if these techniques are user friendly?

-Describe to me are any constrains relating to the techniques?

-Tell me if you would change any techniques of this methodology?

-How would you change these techniques?

-Please give me any ideas or opinions to improve the techniques?

5. Business Analysis Tools

Time: 10 minutes

Tools are defined as automated software tools designed to help in the development of an information system. For each phase described above please tell me about the **tools** that you utilise when conducting business analysis.

Phase 1

Phase 2

Phase 3

Phase n

Are there any additional tools besides the ones you just mentioned?

Tell me, do you think there is any relationship between these tools mentioned?

Probes:

-Give me your view on whether these tools are user friendly?

-Explain your opinion relating to constrains of the tools?

-Tell me if you would you change any tools of this methodology?

- How would you change these tools?

- Give me any ideas or opinions to improve the tools?

Thank you for your participation. That question concludes the focus group interview. Please contact me should you be interested in viewing the results of this study

Appendix E: Data from Individual Interviews

This appendix presents the findings from individual interviews and is structured as follows:

- E1 Supporting comments on relevance of this research and on understanding of business analysis;
- E2 Individual interview mentions, percentages and comments for phase 1;
- E3 Individual interview mentions, percentages and comments for phase 2;
- E4 Individual interview mentions, percentages and comments for phase 3; and
- E5 Individual interview mentions, percentages and comments for phase n.

E1 Supporting comments on relevance of this research and understanding of business analysis

- *"Well thought out".*
- *"I think that this survey is an excellent method to gather information on the perceptions of business analysts and also to become aware of the kind of people and skills that are available".*
- *"Look to be very relevant questions, and good that one can add comments along the way. I'm keen to see the results of this project".*
- *"Excellent layout, looking forward to results".*
- *"It's brilliantly formulated, well done to you for putting it together".*
- *"This is a very 'grey' area and we NEED all the help we can get. I really think that this is a great initiative. Please press this issue and make it work ".*
- *"Interesting research topic, would like to see results. Thanks ".*
- *"Curious to see the outcome and the way forward. Good luck!".*
- *"Absolutely essential…thanks!"*
- *"About time!"*
- *"Good research topic.…be interesting to see what the outcome is."*

The only negative comment that was received on the research was that *"The survey is a good start, but not exhaustive".*

Figure E1: Supporting comments from participants on the relevance of this research

- *"Business analysis is the missing link between business and IT".*
- *"Business analysis provides a common understanding to business people and technical people. It facilitates a compromise between various stakeholders*".
- *"Business analysis analyses business problems".*
- *"Analyse and define the business problems in terms of the systems and processes".*

- *"Analyse how business users do their work and how to increase their efficiency and resource utilisation such as labour, time and equipment".*
- *"Business analysis is the 'what' and 'how' of things".*
- *"Business analysis is about identifying all processes that add value to the organisation".*
- *"Analyse the current business processes and investigate/implement better solutions".*
- *"Define the business processes and define requirements for new processes".*
- *"Understand business, processes and systems that the business uses".*
- *"Understand the way a company operates and how it uses technology. It comprises all aspects of business performance, strategy, structures, technology, systems, HR".*
- *"Analyse what the user wants from the system".*
- *"Determine business requirements for purposes of feasibility, risk and impact analysis"*
- *"Identify requirements for improvements".*
- *"Analyse the requirements of the business".*
- *"Understand the client's requirements".*
- *"Analyse business requirements in terms of strategic objectives".*
- *"Design and maintain a requirement from business into the designated lines of delivery".*
- *"Eliciting business needs as embedded in existing processes or as needed extensions of existing processes".*
- *"Understand the business processes and requirements that drives the business".*
- *"Identify a business's requirements in terms of 'what' they need to function as a business logically".*

Figure E2: Supporting comments from participants on their understanding of business analysis

E2 Individual interview mentions, percentages and comments for phase 1

Table E1: Mentions and percentages from individual interviews for phase 1

Code	Response	Mentions	Percent
PH1FE	Feasibility phase	15	25.8%
PH1RE	Requirements phase	10	17.2%
PH1EL	Elicitation phase	9	15.5%
PH1CA	Capturing phase	9	15.5%
PH1AN	Analysis phase	8	13.7%
PH1SP	Specification phase	4	6.8%
PH1IN	Investigation phase	2	3.4%
PH1PR	Problem solving phase	1	1.7%
	Total	**58**	**100%**

- *"In many ways, a feasibility study is a mini-project in its own right, its outcome being a decision on how the larger project should be managed".*

- *"Because putting together a system a significant investment of time and money, you want to make sure that there are no major roadblocks facing your business idea before you make that investment. Identifying such roadblocks is the purpose of a feasibility study".*
- *"A feasibility study looks at market issues, organisational issues, technical issues and financial issues prior to commencing with business ideas".*
- *"The feasibility phase is a detailed investigation of a concept".*
- *"It is an initial study of a project".*
- *"A feasibility study is the first stage in a project lifecycle. It helps businesses decide if implementing a solution is going to be successful and worthwhile. A feasibility study gives a business the opportunity either to stop the new solution and stay with the current situation or continue developing a new system".*
- *"A feasibility study is a process which leads to a decision on whether or not to implement a project, and is performed by a business analyst".*
- *"The purpose of this phase is to decide if a business opportunity is practical and viable".*
- "*A description of what a system should do* ".

Figure E3: Supporting individual interview comments for phase 1

Table E2: Mentions and percentages from individual interviews for phase 1 activities

Code	Response	Mentions	Percent
PR1IN	Identify need or opportunity	27	25.9%
PR1DB	Define boundaries	20	19.2%
PR1IG	Information gathering	17	16.3%
PR1OI	Opportunity identification	16	15.3%
PR1OA	Opportunity analysis	14	13.4%
PR1RE	Recommendations	10	9.6%
	Total	**104**	**100%**

Table E3: Mentions and percentages from individual interviews for phase 1 techniques

Code	Response	Mentions	Percent
TE1IN	Interviews	28	10.9%
TE1OB	Observations	27	10.5%
TE1TD	Task demonstrations	25	9.7%
TE1DS	Document studies	22	8.5%
TE1QU	Questionnaires	20	7.8%
TE1JA	JAD sessions	20	7.8%
TE1WO	Workshops	19	7.4%
TE1PRO	Prototyping	19	7.4%
TE1IB	IBIS	17	6.6%
TE1SC	Scenarios	16	6.2%
TE1ST	Storyboarding	15	5.8%
TE1IN	Inspections	14	5.4%

TE1AI	Audits	14	5.4%
	Total	**256**	**100%**

Table E4: Mentions and percentages from individual interviews for phase 1 tools

Code	Response	Mentions	Percent
TO1VA	Visible Analyst	30	42.8%
TO1CB	Cool Biz	7	10.0%
TO1VI	Visio	9	12.8%
TO1TE	Telelogic	9	12.8%
TO1MW	MS word	8	11.4%
TO1RR	Rational Rose	4	5.7%
TO1SO	Softeam Objecteering Project	2	2.8%
TO1ER	ERWin	1	1.4%
	Total	**70**	**100%**

E3 Individual interview mentions, percentages and comments for phase 2

Table E5: Mentions and percentages from individual interviews for phase 2

Code	Response	Mentions	Percent
PH2BC	Business case phase	13	25.4%
PH2BA	Business analysis phase	10	19.6%
PH2SO	Solution specification phase	8	15.6%
PH2BI	Business investigation phase	7	13.7%
PH2RE	Refinement phase	7	13.7%
PH2CO	Costing phase	4	7.8%
PH2BU	Budget analysis phase	2	3.9%
	Total	**51**	**100%**

- *"Define the scope of the business issue".*
- *"Present options and make recommendations".*
- *"Seek approval so that the preferred option can be pursued as a project".*
- *"Obtain human and financial resources for a project".*
- *"Clarify the business issues and the ideal solution".*
- *"Explore options or possible solutions".*
- *"Recommend the preferred option".*
- *"Seek approval for resources of the preferred option".*
- *"Reach agreement on the scope of the project".*
- *"Seek authorisation to proceed to the next step of the project".*

Figure E4: Supporting individual interview comments for phase 2

Table E6: Mentions and percentages from individual interviews for phase 2 activities

Code	Response	Mentions	Percent
PR2IS	Identify solution	20	18.1%
PR2RB	Refine boundaries	18	16.3%
PR2CM	Collate more information	17	15.4%
PR2AS	Analysis of solution	17	15.4%
PR2AD	Assumptions and dependencies	15	13.6%
PR2AA	As-is analysis	12	10.9%
PR2ERE	Recommendations	11	10%
	Total	**110**	**100%**

Table E7: Mentions and percentages from individual interviews for phase 2 techniques

Code	Response	Mentions	Percent
TE2CA	Criticality analysis	26	13.8%
TE2RR	Risk reduction leverage	22	11.7%
TE2FT	Fault tree analysis	20	10.7%
TE2WB	Work breakdown structure	20	10.5%
TE2CB	Cost benefit analysis	19	10.1%
TE2CP	Comparative price analysis	19	10.1%
TE2VA	Value analysis	17	9.0%
TE2PP	Payback period	16	8.5%
TE2NP	Net present value	15	7.9%
TE2IR	Internal rate of return	14	7.4%
	Total	**188**	**100%**

Table E8: Mentions and percentages from individual interviews for phase 2 tools

Code	Response	Mentions	Percent
TO2BT	Borland Together	15	28.3%
TO2SO	Softeam Objecteering Project	10	18.8%
TO2TE	Telelogic	8	15.0%
TO2VA	Visible Analyst	7	13.2%
TO2UM	UModel	7	13.2%
TO2AV	Artiso Visual Case	3	5.6%
TO2MW	MS word	2	3.7%
TO2RR	Rational Rose	1	1.8%
	Total	**53**	**100%**

E4 Individual interview mentions, percentages and comments for phase 3

Table E9: Mentions and percentages from individual interviews for phase 3

Code	Response	Mentions	Percent
PH3AD	Analysis and design phase	13	30.2%
PH3AN	Analysis phase	8	18.6%
PH3RE	Requirements specification phase	7	16.2%
PH3RA	Requirements analysis phase	7	16.2%
PH3SD	Solution design phase	6	13.9%
PH3AD	Architectural design phase	2	4.6%
	Total	**43**	**100%**

- *"This phase involves refining goals and expectations from the business case".*
- *"Entails adapting or integrating business case requirements into technological solutions and determining how best to incorporate these changes to improve system across the organisation".*
- *"Understanding and specifying in detail what a system should do and then specifying in detail how the parts of a system should be implemented".*
- *"Entails context analysis, risk assessment, customer impact and producing models".*
- *"This phase investigates how the system will technically solve the business problem and this phase specifies the systems outputs, hardware, software, and user interface".*
- *"This phase involves a more detailed study of a business problem from the business case, and specifies of a technical, computer-based solution for the business requirements identified in the analysis".*

Figure E5: Supporting individual interview comments for phase 3

Table E10: Mentions and percentages from individual interviews for phase 3 activities

Code	Response	Mentions	Percent
PR3RE	Refinement	28	15.7%
PR3SC	Scope	27	15.1%
PR3OW	Ownership	25	14.0%
PR3RD	Redesign	19	10.6%
PR3DA	Detailed analysis	18	10.1%
PR3DS	Design of solution	18	10.1%
PR3CM	Change management	16	8.9%
PR3MO	Modelling	15	8.4%
PR3DS	Design signoff	12	6.7%
	Total	**178**	**100%**

Table E11: Mentions and percentages from individual interviews for phase 3 techniques

Code	Response	Mentions	Percent
TE3AA	Affinity analysis	27	19.5%
TE4FH	Functional Hierarchy decomposition	25	18.1%
TE5MO	Modelling	19	13.7%
TE6SI	Simulation	18	13.0%
TE7BE	Benchmarking	18	13.0%
TE8CO	Context analysis	16	11.5%
TE9JA	JAD	15	10.8%
	Total	**138**	**100%**

Table E12: Mentions and percentages from individual interviews for phase 3 tools

Code	Response	Mentions	Percent
TO3RR	Rational Rose	15	27.7%
TO3VI	Visio	10	18.5%
TO3CB	Cool Biz	8	14.8%
TO3MW	MS word	7	12.9%
TO3RP	Requisite Pro	7	12.9%
TO3DO	DOORS	4	7.4%
TO3UM	UModel	2	3.7%
TO3AV	Artiso Visual Case	1	1.8%
	Total	**54**	**100%**

E5 Individual interview mentions, percentages and comments for phase n

Table E13: Mentions and percentages from individual interviews for phase n

Code	Response	Mentions	Percent
PH4PI	Post-implementation evaluation phase	18	35.2%
PH4SE	Solution evaluation	13	25.4%
PH4PO	Post-implementation review	12	23.5%
PH4VA	Validation phase	4	7.8%
PH4VE	Verification phase	3	5.8%
PH4CO	Confirmation phase	1	1.9%
	Total	**51**	**100%**

- *"A rating of the project outcome against each of the specified project processes, including time, cost, quality, risk, procurement, communications and acceptance management".*
- *"A full list of the project achievements".*
- *"Lessons learnt and recommendations for future projects".*

- *"The purpose of this phase is to measure the effectiveness of the solution implemented, against the requirements and organisational business case. A business should also evaluate the efficiency and appropriateness of the solution and recommend and undertake any remedial action to address deficiencies".*
- *"This phase evaluates the project plan and analyses the reasons why a particular project tasks were difficult or intensive for the business analyst or project manager and to make recommendations for future projects in the organisation".*
- *"This phase takes place 3 to 6 months after the project has been completed to assess whether the business objectives were met and whether the outputs are working as expected. It also assesses the effectiveness of the project".*

Figure E6: Supporting individual interview comments for phase n

Table E14: Mentions and percentages from individual interviews for phase n activities

Code	Response	Mentions	Percent
PR4RR	Review requirements	19	42.2%
PR4RB	Review business case	14	31.1%
PR4RO	Review objectives	12	26.6%
	Total	**45**	**100%**

Table E15: Mentions and percentages from individual interviews for phase n techniques

Code	Response	Mentions	Percent
TE4TM	Traceability matrix	15	34.8%
TE5IN	Inspections	10	23.2%
TE6TT	Traceability tree	9	20.9%
TE7PR	Peer reviews	9	20.9%
	Total	**43**	**100%**

Table E16: Mentions and percentages from individual interviews for phase n tools

Code	Response	Mentions	Percent
TO4ID	Ideogramic	10	31.2%
TO4RR	Rational Rose	8	25.0%
TO4TE	Telelogic	7	21.8%
TO4MW	MS word	7	21.8%
	Total	**32**	**100%**

Appendix F: Data from Focus Group Interviews

This appendix presents the findings from the focus group interviews and is structured as follows:

- F1 Supporting comments on understanding of business analysis;
- F2 Individual interview mentions, percentages and comments for phase 1;
- F3 Individual interview mentions, percentages and comments for phase 2;
- F4 Individual interview mentions, percentages and comments for phase 3; and
- F5 Individual interview mentions, percentages and comments for phase n.

F1 Supporting comments on the understanding of business analysis

- *"Business analysis is about understanding and interpreting the needs of a business or requirements and then analysing and documenting the requirements".*
- *"The link between business and IT".*
- *"Define business requirements and produce structured documentation of these requirements"*
- *"Identify, analyse and document the business requirements in a clear and understandable way".*
- *"Convey the business needs into IT requirements".*
- *"Facilitate creative ideas for business solutions".*
- *"Provide the most effective solution, automated or not, to business".*
- *"Model new business processes".*
- *"Provide a common understanding to business people and technical people".*
- *"A definition of a business problem and a recommended solution".*
- *"Re-engineering of the inadequate business processes".*
- *"Finding the best BUSINESS solution".*
- *"Analysing and creating a solution that satisfies the users' need or requirement".*
- *"Review the business needs with the view to providing manual or automated solutions"*
- *"Gather requirements for a solution, verify that it is correct and communicate to developers"*
- *"The interface between business and technology to ensure user satisfaction".*

Figure F1: Supporting focus group comments for the understanding of business analysis

F2 Focus group mentions, percentages and comments for phase 1

Table F1: Mentions and percentages from focus group interviews for phase 1

Code	Response	Mentions	Percent
PH1FE	Feasibility phase	26	60.4%
PH1RE	Requirements phase	12	25.0%
PH1EL	Elicitation phase	5	10.4%
PH1CA	Capturing phase	1	2.0%

PH1AN	Analysis phase	1	2.0%
PH1SP	Specification phase	1	2.0%
PH1IN	Investigation phase	1	2.0%
PH1PR	Problem solving phase	1	2.0%
	Total	**48**	**100%**

- *"A thorough feasibility analysis provides the information necessary for a business case".*
- *"If a feasibility study is conducted after the project is being initiated, one of its outputs could be a preliminary business case. If it is conducted after the business case has already been developed, it can help refine the scope. In either case, it could help narrow the range of options, assess each of the remaining options and propose solutions to issues raised".*
- "An *initial study".*
- *"A preliminary study".*
- *"An examination of the practicality of implementing new system, processes, methods, or technologies".*
- *A feasibility study is a small project to identify the best options for a problem, including potential partners, potential costs, time frames and finances".*
- *"It evaluates a project's potential for success and reduces risk. It should show how a business can operate under a given set of assumptions, and show project sensitivity to the market place"*
- *"This phase should present enough information to determine whether or not a project should advance to further stages of analysis stage…this is a "go/no-go" decision point".*
- *"This phase is to find out if a project can be done, and if so, how. It should tell management whether the project can be done, and what the alternative solutions are, and a go/no-go decision".*

Figure F2: Supporting focus group comments for phase 1

Table F2: Mentions and percentages from focus group interviews for phase 1 activities

Code	Response	Mentions	Percent
PR1IN	Identify need or opportunity	31	26.7%
PR1DB	Define boundaries	22	18.9%
PR1IG	Information gathering	19	16.3%
PR1OI	Opportunity identification	17	14.6%
PR1OA	Opportunity analysis	16	13.7%
PR1RE	Recommendations	11	9.4%
	Total	**116**	**100%**

Table F3: Mentions and percentages from focus group interviews for phase 1 techniques

Code	Response	Mentions	Percent
TE1IN	Interviews	29	10.7%
TE1OB	Observations	28	10.4%
TE1TD	Task demonstration	26	9.6%
TE1DS	Document studies	23	8.5%

TE1QU	Questionnaires	21	7.8%
TE1JA	JAD sessions	21	7.8%
TE1WO	Workshops	20	7.4%
TE1PRO	Prototyping	20	7.4%
TE1IB	IBIS	18	6.6%
TE1SC	Scenarios	17	6.3%
TE1ST	Storyboarding	16	5.9%
TE1IN	Inspections	15	5.5%
TE1AI	Audits	15	5.5%
	Total	**269**	**100%**

Table F4: Mentions and percentages from focus group interviews for phase 1 tools

Code	Response	Mentions	Percent
TO1VA	Visible Analyst	29	59.1%
TO1CB	Cool Biz	10	20.4%
TO1VI	Visio	5	10.2%
TO1ER	ERWin	1	2.0%
TO1MW	MS word	1	2.0%
TO1RR	Rational Rose	1	2.0%
TO1SO	Softeam Objecteering Project	1	2.0%
TO1TE	Telelogic	1	2.0%
	Total	**49**	**100%**

F3 Focus group mentions, percentages and comments for phase 2

Table F5: Mentions and percentages from focus group interviews for phase 2

Code	Response	Mentions	Percent
PH2BC	Business case phase	27	41.5%
PH2BA	Business analysis phase	20	30.7%
PH2SO	Solution specification phase	6	9.2%
PH2BI	Business investigation phase	5	7.6%
PH2RE	Refinement phase	3	4.6%
PH2CO	Costing phase	3	4.6%
PH2BU	Budget analysis phase	1	1.5%
	Total	**65**	**100%**

- *"A phase where a business analyst seeks funding for a project and to document what the project will accomplish and what the benefits will be".*
- *"to justify the resources and capital investment necessary to bring a change project to fruition".*

- *"The business case is the one place where all relevant facts are documented and linked together into a cohesive story".*
- *"This phase describes why the project is needed and how much money, people, and time will be needed to deliver the solution and realise the benefits*".
- *"This phase seeks funding for a project and documents what the project will accomplish and what the benefits will be".*
- *"Confirm that the solution meets the requirements of the business, and is the vehicle for receiving funding and approval to move forward".*
- *"This phase also is useful for management to prioritise this project against the many other initiatives in the business that may require capital investment".*

Figure F3: Supporting focus group comments for phase 2

Table F6: Mentions and percentages from focus group interviews for phase 2 activities

Code	Response	Mentions	Percent
PR2IS	Identify solution	36	20.0%
PR2RB	Refine boundaries	29	16.1%
PR2CM	Collate more information	26	14.4%
PR2AS	Analysis of solution	25	13.8%
PR2AD	Assumptions and dependencies	25	13.8%
PR2AA	As-is analysis	20	11.1%
PR2ERE	Recommendations	19	10.5%
	Total	**180**	**100%**

Table F7: Mentions and percentages from focus group interviews for phase 2 techniques

Code	Response	Mentions	Percent
TE2CA	Criticality analysis	27	13.6%
TE2RR	Risk reduction leverage	23	11.6%
TE2FT	Fault tree analysis	21	10.6%
TE2WB	Work breakdown structure	21	10.6%
TE2CB	Cost benefit analysis	20	10.1%
TE2CP	Comparative price analysis	20	10.1%
TE2VA	Value analysis	18	9.0%
TE2PP	Payback period	17	8.5%
TE2NP	Net present value	16	8.0%
TE2IR	Internal rate of return	15	7.5%
	Total	**198**	**100%**

Table F8: Mentions and percentages from focus group interviews for phase 2 tools

Code	Response	Mentions	Percent
TO2BT	Borland Together	30	54.5%
TO2RR	Rational Rose	12	21.8%
TO2TE	Telelogic	5	9.0%
TO2VO	Visual Object Modelers	2	3.6%
TO2UM	UModel	2	3.6%
TO2AV	Artiso Visual Case	1	1.8%
TO2MW	MS word	1	1.8%
TO2SO	Softeam Objecteering Project	1	1.8%
TO2VA	Visible Analyst	1	1.8%
	Total	**55**	**100%**

F4 Focus group mentions, percentages and comments for phase 3

Table F9: Mentions and percentages from focus group interviews for phase 3

Code	Response	Mentions	Percent
PH3AD	Analysis and design phase	26	55.3%
PH3AN	Analysis phase	12	25.5%
PH3RE	Requirements specification phase	5	10.6%
PH3RA	Requirements analysis phase	1	2.1%
PH3SD	Solution design phase	1	2.1%
PH3AD	Architectural design phase	1	2.1%
PH3BM	Business modelling phase	1	2.1%
	Total	**47**	**100%**

- *"This phase involves understanding and specifying in detail what a system should do following a business case, and then specifying in detail how the parts of a system should be implemented".*
- *"Analysis entails understanding the business case requirements of a specific problem and then designing an appropriate solution for the problem domain based on the requirements from analysis"*
- *"Systems analysis and design phase is the study of the business system and its problems from the business case and the specification of a computer or human solution that meets the requirements determined during systems analysis".*
- *"This phase examines existing systems to understand them better. It entails modelling, optimisation, simulation, and decision-making".*
- *"This phase describes how the system will accomplish the tasks in the business case".*
- *"This phase makes the business case a reality".*
- *"It involves the creation of models and processes to build the solution".*

Figure F4: Supporting focus group comments for phase 3

Table F10: Mentions and percentages from focus group interviews for phase 3 activities

Code	Response	Mentions	Percent
PR3RE	Refinement	30	15.9%
PR3SC	Scope	27	14.3%
PR3OW	Ownership	26	13.8%
PR3RD	Redesign	22	11.7%
PR3DA	Detailed analysis	20	10.6%
PR3DS	Design of solution	19	10.1%
PR3CM	Change management	17	9.0%
PR3MO	Modelling	15	7.9%
PR3DS	Design signoff	12	6.3%
	Total	**188**	**100%**

Table F11: Mentions and percentages from focus group interviews for phase 3 techniques

Code	Response	Mentions	Percent
TE3AA	Affinity analysis	27	18.4%
TE4FH	Functional Hierarchy decomposition	26	17.8%
TE5MO	Modelling	22	15.0%
TE6SI	Simulation	20	13.6%
TE7BE	Benchmarking	19	13.0%
TE8CO	Context analysis	17	11.6%
TE9JA	JAD	15	10.2%
	Total	**146**	**100%**

Table F12: Mentions and percentages from focus group interviews for phase 3 tools

Code	Response	Mentions	Percent
TO3TE	Telelogic	30	50.0%
TO3RP	Requisite Pro	12	20.0%
TO3DO	DOORS	5	8.3%
TO3CB	Cool Biz	3	5.0%
TO3RR	Rational Rose	2	3.3%
TO3MW	MS word	2	3.3%
TO3UM	UModel	1	1.6%
TO3AV	Artiso Visual Case	1	1.6%
TO3BT	Borland Together	1	1.6%
TO3SO	Softeam Objecteering Project	1	1.6%
TO3VI	Visio	1	1.6%
TO3VO	Visual Object Modelers	1	1.6%
	Total	**60**	**100%**

F5 Focus group mentions, percentages and comments for phase n

Table F13: Mentions and percentages from focus group interviews for phase n

Code	Response	Mentions	Percent
PH4PI	Post-implementation evaluation phase	28	53.8%
PH4SE	Solution evaluation	15	28.8%
PH4PO	Post-implementation review	6	11.5%
PH4VA	Validation phase	1	1.9%
PH4VE	Verification phase	1	1.9%
PH4CO	Confirmation phase	1	1.9%
	Total	**52**	**100%**

- *"This phase is conducted by reviewing the project's performance against the original business case and project plans and conformance against these".*
- *"The post-implementation phase evaluates the results of the solution against baseline expectations from the requirements several months after deployment".*
- *"to validate project benefits and costs, and documents against the business case".*
- *"This phase is conducted after the project has finished and usually after the project team has been disbanded. It reviews the original business case to the project outcome and assesses if the running costs are as predicted and if the users like the system".*
- *"This phase is conducted after system implementation to enable an organisation to measure the value gained through the new system".*
- *"This phase makes recommendations for business analysis and project management procedures for future projects in the organisation".*

Figure F5: Supporting focus group comments for phase n

Table F14: Mentions and percentages from focus group interviews for phase n activities

Code	Response	Mentions	Percent
PR4RR	Review requirements	29	54.7%
PR4RB	Review business case	17	32.0%
PR4RO	Review objectives	7	13.2%
	Total	**53**	**100%**

Table F15: Mentions and percentages from focus group interviews for phase n techniques

Code	Response	Mentions	Percent
TE4TM	Traceability matrix	26	59.0%
TE5IN	Inspections	12	27.2%
TE6TT	Traceability tree	5	11.3%
TE7PR	Peer reviews	1	2.2%
	Total	**44**	**100%**

Table F16: Mentions and percentages from focus group interviews for phase n tools

Code	Response	Mentions	Percent
TO4ID	Ideogramic	12	54.5%
TO4TE	Telelogic	5	22.7%
TO4RR	Rational Rose	3	13.6%
TO4MW	MS word	2	9.0%
	Total	**22**	**100%**

Appendix G: Overall results from Individual Interviews and Focus group Interviews

This appendix presents the findings from both the focus group interviews and is structured as follows:

- G1 Overall mentions and percentages for phase 1
- G2 Overall mentions and percentages for phase 2;
- G3 Overall mentions and percentages for phase 3; and
- G4 Overall mentions and percentages for phase 4.

G1 Overall mentions and percentages for phase 1

Table G1: Mentions and percentages of phase 1

Code	Phase 1 response	Mentions	Percent
PH1FE	Feasibility phase	66	76%

Table G2: Mentions from feasibility phase activities

Code	Response	Mentions
PR1IN	Identify need or opportunity	88
PR1DB	Define boundaries	59
PR1IG	Information gathering	51
PR1OI	Opportunity identification	46
PR1OA	Opportunity analysis	42
PR1RE	Recommendations	29

Table G3: Mentions from feasibility phase techniques

Code	Response	Mentions
TE1IN	Interviews	88
TE1OB	Observations	85
TE1TD	Task demonstration	79
TE1DS	Document studies	70
TE1QU	Questionnaires	64
TE1JA	JAD sessions	65
TE1WO	Workshops	63
TE1PRO	Prototyping	61
TE1IB	IBIS	55
TE1SC	Scenarios	52
TE1ST	Storyboarding	49

TE1IN	Inspections	46
TE1AI	Audits	46

Table G4: Mentions from feasibility phase tools

Code	Response	Mentions
TO1VA	Visible Analyst	59
TO1CB	Cool Biz	17
TO1VI	Visio	14
TO1TE	Telelogic	10
TO1MW	MS word	9
TO1RR	Rational Rose	5
TO1SO	Softeam Objecteering Project	3
TO1ER	ERWin	2

G2 Overall mentions and percentages for phase 2

Table G5: Mentions and percentages of phase 2

Code	Phase 2 response	Mentions	Percent
PH2BC	Business case phase	62	75%

Table G6: Mentions from business case phase activities

Code	Response	Mentions
PR2IS	Identify solution	89
PR2RB	Refine boundaries	74
PR2CM	Collate more information	68
PR2AS	Analysis of solution	65
PR2AD	Assumptions and dependencies	63
PR2AA	As-is analysis	52
PR2ERE	Recommendations	49

Table G7: Mentions from business case phase techniques

Code	Response	Mentions
TE2CA	Criticality analysis	80
TE2RR	Risk reduction leverage	70
TE2FT	Fault tree analysis	64
TE2WB	Work breakdown structure	65
TE2CB	Cost benefit analysis	63
TE2CP	Comparative price analysis	61
TE2VA	Value analysis	55
TE2PP	Payback period	52

TE2NP	Net present value	49
TE2IR	Internal rate of return	46

Table G8: Mentions from business case phase tools

Code	Response	Mentions
TO2BT	Borland Together	45
TO2RR	Rational Rose	13
TO2TE	Telelogic	13
TO2SO	Softeam Objecteering Project	11
TO2UM	UModel	9
TO2VA	Visible Analyst	8
TO2AV	Artiso Visual Case	4
TO2MW	MS word	3
TO2VO	Visual Object Modelers	2

G3 Overall mentions and percentages for phase 3

Table G9: Mentions and percentages of phase 3

Code	Phase 3 response	Mentions	Percent
PH3AD	Analysis and design phase	59	71%

Table G10: Mentions from analysis and design phase activities

Code	Response	Mentions
PR3RE	Refinement	91
PR3SC	Scope	84
PR3OW	Ownership	78
PR3RD	Redesign	67
PR3DA	Detailed analysis	61
PR3DS	Design of solution	60
PR3CM	Change management	53
PR3MO	Modelling	49
PR3DS	Design signoff	41

Table G11: Mentions from analysis and design phase techniques

Code	Response	Mentions
TE3AA	Affinity analysis	84
TE4FH	Functional Hierarchy decomposition	78
TE5MO	Modelling	67
TE6SI	Simulation	61
TE7BE	Benchmarking	60

TE8CO	Context analysis	53
TE9JA	JAD	49

Table G12: Mentions from analysis and design phase tools

Code	Response	Mentions
TO3TE	Telelogic	30
TO3RP	Requisite Pro	19
TO3RR	Rational Rose	17
TO3CB	Cool Biz	11
TO3VI	Visio	11
TO3DO	DOORS	9
TO3MW	MS word	9
TO3UM	UModel	3
TO3AV	Artiso Visual Case	2
TO3BT	Borland Together	1
TO3SO	Softeam Objecteering Project	1
TO3VO	Visual Object Modelers	1

G4 Overall mentions and percentages for phase 4

Table G13: Mentions and percentages of phase 4

Code	Phase 4 response	Mentions	Percent
PH4PI	Post-implementation evaluation phase	73	89%

Table G14: Mentions from post-implementation evaluation phase activities

Code	Response	Mentions
PR4RR	Review requirements	78
PR4RB	Review business case	45
PR4RO	Review objectives	31

Table G15: Mentions from post-implementation evaluation phase techniques

Code	Response	Mentions
TE4TM	Traceability matrix	63
TE5IN	Inspections	36
TE6TT	Traceability tree	17
TE7PR	Peer reviews	13

Table G16: Mentions from post-implementation evaluation tools

Code	Response	Mentions
TO4ID	Ideogramic	22

TO4TE	Telelogic	12
TO4RR	Rational Rose	11
TO4MW	MS word	9

Table G17: Cross-tabulation of participants

Code	Response	Business analyst	Project manager	IS Manager	CIO
PH1FE	Feasibility phase	26%	27%	23%	24%
PH2BC	Business case phase	25%	25%	26%	24%
PH3AD	Analysis and design phase	24%	27%	27%	22%
PH4PI	Post-implementation evaluation phase	26%	23%	27%	24%