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A SERVICE-DOMINANT LOGIC APPROACH TO BUSINESS INTELLIGENCE

by

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ABSTRACT

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Although Business Intelligence (BI) is highly promoted and praised, organisations implementing a BI solution do not always achieve expected benefits. Instead, numerous reports of failed BI implementations and challenges prevail. Even organisations indicating they receive benefit from their BI solutions strive for improvement in BI. This highlights a need for BI to improve and for it to overcome its challenges. In response, this thesis proposes a paradigm shift for BI. It provides a literature and case study, representing an interpretive enquiry using a qualitative research approach.

The case study is set within a large South African bank, extending to BI vendors providing BI solutions to the bank. Two scenarios are used to compare the views of BI providers and BI customers. In one scenario, the bank's internal BI departments represent the BI provider view, providing BI to other departments within the bank as their BI customers. In the other scenario, the BI vendors represent the BI provider view and the BI customer view is represented by the bank's BI departments as well as other internal bank departments – who are also the BI customers of the BI departments.

The thesis starts by identifying BI's prevailing challenges, highlighting the restrictive tendency evident within BI literature and practice whereby typical Information System (IS) challenges are raised as BI challenges. Challenges are then examined to understand their BI-specific aspects and to identify a list of BI's prevailing challenges. The thesis then examines current measures proposed to address BI's challenges, establishing that these are largely ineffective. Rather than attempt to resolve BI's challenges in the same manner as previous attempts do, this thesis then analyses BI at a conceptual level to reveal a common worldview of BI held by BI practitioners and academics.

It is identified that this common worldview is predominantly based on a Goods-Dominant (G-D) Logic, resulting in many of BI's challenges. A suggestion is made to shift this worldview to a Service-Dominant (S-D) Logic. Although S-D Logic is not a new lens, it has not yet been explicitly applied to BI or a BI-related discipline at a conceptual level, offering the opportunity to examine BI from a new perspective wherein new insights to address BI's persistent challenges emerge.

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DECLARATION

I declare that

A Service-Dominant Logic Approach to Business Intelligence

is my own work and that all sources that I have used or quoted have been indicated and acknowledged by means of complete references.

Pamela Rose Clavier

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I dedicate this work to my husband Eric Clavier.

Eric, you have given me patient and endless support, inspired and encouraged me (and continue to do so), travelled with me for this work to the opposite side of the world and even let me use your Chambers! Thank you, I am deeply grateful.

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LIST OF ABBREVIATIONS AND ACRONYMS

Acronym/Abbreviation	Definition
ABSA	Amalgamated Bank of South Africa
AM	Anti-money Laundering
ANT	Actor Network Theory
AT	Activity Theory
BA	Business Analyst
BBBEE	Broad Based Black Economic Empowerment
BI	Business Intelligence
BI FP	Business Intelligence Foundational Premise
BI MM	Business Intelligence Maturity Model
BICC	Business Intelligence Competency
BIDM	BI Development Model
BITS	Business Intelligence Technology Solutions
BSC	Balanced Score Card
CAME	Computer-Aided Market Engineering
CCSF	Critical Contextual Success Factors
CI	Competitive Intelligence
CINT	Customer Intelligence
CIO	Chief Information Officer
CIPC	Companies and Intellectual Property Commission
CMIS	Corporate Management Information System
COBIT	Control Objectives for Information and Related Technology
COTS	Commercial off the Shelf
CPM	Corporate Performance Management
CRM	Customer Relationship management
CSF	Critical Success Factor
DFD	Data Flow Diagram
DIKW	Data Information Knowledge Wisdom
DSS	Decision Support system
EA	Enterprise Architecture
EDW	Enterprise Data Warehouse
EIS	Executive Information System
EMM	Enterprise Model Management
EP	Economic Profit
ERP	Enterprise Resource Planning
ES	Expert System
ETL	Extract Transform Load

Acronym/Abbreviation	Definition
FB	Fortune Bank
FBCBI	Fortune Bank Corporate Business Intelligence
FP	Foundational Premise
G-D	Goods-Dominant
GDP	Gross Domestic Product
GIGO	Garbage In Garbage Out
HNW	High Net Worth
HP	Hewlett-Packard
HR	Human Resources
IC	Information Centre
IM	Information Management
IP	Intellectual Property
IS	Information System
ISPAR	Interact Serve Propose Agree Realise
IT	Information Technology
ITIL	Information Technology Information Leadership
JAD	Joint Application Development
KPI	Key Performance Indicator
KRA	Key Result Area
KSF	Key Success Factor
LOBI	Ladder of BI
MI	Management Information
MIS	Management Information System
MM	Maturity Model
MOF	Microsoft Operations Framework
NCA	National Credit Act
NPV	Net Present Value
OECD	Organisation for Economic Co-operation and Development
OLAP	Online Analytical Processing
PhD	Doctor of Philosophy
PM	Performance Management
PMI	Project Management Institute
POPIA	Protection of Personal Information Act
PPI	Protection of Private Information
PRINCE	Projects In Controlled Environments
RFI	Request for Information
RFP	Request for Proposal
ROI	Return on Investment

Acronym/Abbreviation	Definition
RTBI	Real time Business Intelligence
SaaS	Software as a Service
SCM	Supply Chain Management
S-D	Service Dominant
SDLC	Systems Development Lifecycle
SLA	Service Level Agreement
SME	Subject Matter Expert
SOA	Service Oriented Architecture
SSM	Soft Systems Methodology
SSME	Service Science Management Engineering
SSMED	Service Science Management Engineering and Design
ST	Structuration Theory
SVOT	Single Version of the Truth
TDWI	The Data Warehouse Institute
UAT	User Acceptance Testing
UK	United Kingdom
UST	Unified Service Theory

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CHAPTER 1: INTRODUCTION AND BACKGROUND

Background, context, scope and foundation

1. Introduction

Business Intelligence (BI) is highly promoted and praised in the media, specifically in terms of the benefits that the organisation is described to gain after implementing a BI solution. However, by examining BI literature and practice, it is established that benefits are not consistently or fully achieved and not all organisations realise the benefits that are promised. Instead, numerous reports of BI failures and challenges prevail. Conversely, even organisations that state that they benefit from BI are on the lookout for opportunities to improve. This highlights the need for research within the discipline of BI to assist BI practice to overcome its challenges on the one hand and, on the other, the need to identify and act on opportunities to improve.

This thesis examines BI's challenges, identifying the persistent challenges that emerge within BI theory and practice. It identifies and compares current measures proposed to address BI's challenges. In doing this, it establishes that existing attempts to resolve BI's persistent challenges are largely ineffective and that a paradigm shift is needed. Rather than attempt to address BI's challenges in the same manner as previous attempts do, this thesis applies a new approach.

This thesis analyses BI at a conceptual level to identify the worldview that currently dominates BI, with a view to determine what contributes towards the occurrence of BI's challenges. It then examines the dominant worldview of BI that emerges in the literature and case study through philosophical lenses. In doing so, this thesis determines that there is an inherent underlying logic influencing BI theory and practice that can be associated with BI's persistent challenges. Based on this, this thesis proposes that a shift in this underlying logic in BI's worldview has the potential to introduce new ways to address many of BI's prevailing challenges, thus allowing for increased BI successes and achievement of anticipated benefits.

2. Background and context

This thesis offers an improved understanding of BI at a conceptual level through analysis of BI literature and practice. It analyses BI based on the conceptual understanding that BI is a series of exchange processes performed by role players operating within a BI landscape based on their own perceptions and accepted behaviour – i.e. their own worldview. Analysis of BI theory takes place through a literature study. A case study is used to analyse BI practice. The case study is set at a large bank in South Africa, using insights gained from BI customers, BI providers and their activities and interactions. Although context is provided on South Africa and the banking industry to facilitate understanding of the case study environment, this research identifies that there is not a clear distinction between South African and international BI markets or landscapes, or specifically between BI performed within the South African banking industry or BI performed in general.

Background and context are therefore provided on the conceptual understanding of BI as a series of exchange processes, the BI landscape, this thesis' specific case study context and considerations that may result from this, the concept of a worldview and the lenses through which this worldview is viewed and examined in this thesis.

2.1 The conceptual understanding of BI as a series of exchange processes

In the context of this thesis, BI is understood conceptually as the broad series of exchange activities performed with the ultimate purpose of providing actionable information and/or intelligence for use in decision-making. BI is contextualised in terms of exchange as it is identified that there are various exchange activities that take place throughout the BI process, e.g. the process whereby data is extracted, transformed, loaded, presented and used as information or intelligence for the purpose of decision-making. In addition, understanding BI as an exchange process offers opportunities to understand the various relationships, interactions, handovers, checkpoints and the end-to-end flow that takes place from when data is sourced until it is used – in another form (e.g. information or intelligence) – for decision-making.

With decision-making raised consistently as BI's foremost purpose (Bardoliwalla, 2009; Hočevar and Jaklič, 2010:95), it is apparent that BI is not a new phenomenon; BI is primarily aimed at addressing the age-old managerial issue of the need for actionable information for decision-making (Mendell, 1997:115-118; Pirttimäki, 2007b:4). Many solutions, methodologies, technologies and tools have been promoted – typically by BI vendors selling these – over the years as the solution to address this need. For example, Decision Support Systems (DSS), Executive Information Systems (EIS), Management Information Systems (MIS) and analytics. Further examples are even of solutions where the extent of impact on decision-making support is unclear, e.g. Customer Relationship Management (CRM), Information Management (IM), Corporate Performance Management (CPM), etc. (Payne and Frow, 2005:167). While it is recognised that there are various differentiations that can be made in terms of scope, type of data, type of decision support provided, audience and orientation of application (Frolick and Ariyachandra, 2006:42-43), there is still much debate on which of these types of solutions are included within the scope of BI (Wright and Calof, 2006:453). As this contributes towards much of the ambiguity that exists on BI's scope and definition (Olssen and Sandell, 2008:29; Pirttimäki, 2007b:2), it poses a challenge for those working in a BI or BI-related discipline.

As the research presented in this thesis is conducted at a high enough conceptual level, it is possible to address the challenge of ambiguity in BI and BI-related disciplines but include BI-type exchanges that take place in terms of solutions such as DSS, EIS, etc. within the scope of BI and therefore this thesis.

2.2 BI exchange within the BI landscape

2.2.1 Literature's view: a BI market for technology

Literature on the BI landscape is dominated by market reports written predominantly by BI vendors and research houses with a narrow focus on BI vendors and their technical BI products. Market reports focus on, for example: vendor size, mergers, capabilities, performance, new or emerging vendors as well as on BI technology trends, licencing, integration and evaluations of BI technologies. This highlights the narrow perception where the BI landscape consists of BI vendors and BI customers operating in a BI market selling BI technology and related products. In terms of this, BI customers are perceived on the demand side, demanding BI technology solutions that they anticipate will enable decision-making (Shetty, 2011) and BI providers are seen on the supply side, providing for this demand. BI providers are categorised according to whether they are "IT titans" selling a full range of their IT products to their installed user base or specialised ("pure play") vendors that specialise in a specific BI offering (Sallam *et al.*, 2011:1).

Unfortunately, this presents a short-sighted view of the BI landscape as it omits many of the role players. For example: role players who facilitate the integration of legacy applications and data into BI solutions, or those who sell entire databases of data (e.g. the Companies and Intellectual Property Commission (CIPC)) or even governing and authority role players (e.g. regulatory and legislative bodies such as the Competition Commission). In addition, available literature reflects inconsistency and confusion on the scope, categorisation and segmentation of the BI landscape (e.g. Shetty, 2010 vs. Daems, 2008). Many vendors contribute to this confusion by marketing themselves as BI vendors, with the view of increasing market visibility and thereby sales, without actually providing a true BI solution (Glancy and Yadav, 2011:49; Haasbroek 2012; Joubert, 2012). As a result, there is a need to describe the current BI landscape in broader terms for the context of this thesis – as per Section 2.2.2 below.

2.2.2 Broader perceptions of the BI landscape

In general terms and in the context of this thesis, BI exchange activities are seen to be performed by various economic, social and technical actors interacting with each other and engaging in relationships and agreements, fulfilling various roles such as BI customer, BI provider, or even integrator, authority or competitor in a broad BI landscape. BI customers are seen as entities that seek to receive benefit (e.g. the ability to use actionable information/intelligence for decision-making) in exchange for reward, reimbursement or payment, through relationships they engage in with BI providers. These relationships are typically governed by authorities (e.g. those administering data governance or enforcing legislation) and the benefit is ultimately aligned with the aim to out-perform competitors. BI providers are seen in the same context, but are seen as the entities that seek to receive reward, reimbursement or payment and aim to provide the BI customer with benefit. Typical exchange activities may consist of marketing, sales, consulting services, implementation and support of BI technology solutions, or a combination of these.

In terms of this, it can be understood that, typically, a BI vendor (in the role of a BI provider) sells a Commercial off the Shelf (COTS) or bespoke BI technology solution or BI consulting services to an organisation (as the BI customer). The BI vendor may sell this directly to a BI user or sponsor or indirectly the BI user or sponsor through a BI department that facilitates the relationship, makes customised changes or implements the solution. An alternative scenario is where the BI department develops the solution or offers the service to the organisation themselves, thereby acting as the BI provider (e.g. an in-house solution).

2.3 The South Africa BI landscape and banking industry

The case study was conducted within the South African banking industry. Despite this it is believed that, as the research findings are at a conceptual and not detailed banking- or country-specific level, use of the research findings is not restricted to a South African or banking industry audience. Simultaneously, it is necessary to provide context on the case study environment, given that the case study context will naturally have bearing on the researcher, the research process and the research findings. In addition, it is necessary to provide perspective for the reader so that they can have a sense of "being there" (Stake, 1995:63). Relevant context is now provided.

Available literature does not distinguish between the South African and the international BI market or landscape. In fact, both in South Africa and internationally, this market is said to be dominated by a handful of IT titans such as SAP (including Business objects), IBM, Inform (former Comshare and MIS), Oracle (including Hyperion), Microsoft and SAS (Kanaracus, 2011; Pendse, 2009). Many of these IT titans operate in South Africa and internationally, which is possibly a reason why many of the same trends are noticed in South African and international BI literature on BI vendors, e.g. the mergers and acquisitions (Sallam *et al.*, 2011:1); awareness of the need for integration between BI vendors, the organisation and vendors of other hard and software in the organisation (Daems, 2008; McKnight, 2009). In addition, the congruence between the South African and international BI landscape or market was noticeable during the case study, as firstly, the bank's senior managers selected vendors to approach locally, based on an international and not a local vendor guide and, secondly, the majority of vendors that participated in the case study are international vendors.

In general, the banking industry sees BI as a crucial means to face today's changing environment, risks and challenges. BI is implemented in the banking industry to serve a number of functions, for example: manage risk; sell additional products to existing customers; reduce "churn rate" (losing a client to a competitor); segment customer groupings according to profile, behaviour, etc.; manage "client lifetime value" (define and target clients based on their potential value over their lifetime;

and activation (forecasting which clients will not activate banking products they have purchased and stimulating them to use the product to generate income) (Ćurko *et al.*, 2007:57).

South Africa has well-developed, sophisticated financial infrastructure and support systems for payment processing, credit risk, information management and enterprise risk management (Watson and Donkin, 2005:5) and its financial-sector legislation is streamlined to meet international norms and standards (Financial Forum, 2010). South Africa's banking industry forms part of the finance industry, which is one of South Africa's largest industries (Statistics South Africa, 2011:4). The South African banking industry is comprised of 24 locally controlled banks, seven foreign controlled banks, 42 international banks with authorised representative offices in South Africa, two mutual banks and a number of savings and credit co-operatives. Total banking industry assets amount to R2,967 billion, with the largest four (known as the "big four") banks accounting for 84,6% of this (OECD, 2008; Financial Forum, 2010). These big four – ABSA Group Limited, First National Bank, Nedbank and Standard Bank – also rank as the top four banks in Africa, according to rankings of Africa's top 200 banks according to asset size (Africa Report, 2010). The case study was conducted (anonymously) at one of these big four banks.

As is the case for the international banking industry, the South African banking industry is subject to various challenges brought about by environmental changes and challenges, risks, regulation and compliance. Examples of these are: globalisation, mergers and acquisitions, competition from non-financial institutions, product, market and technological innovation and re-engineering (Nadeem and Jaffri, 2004:1; Ćurko *et al.*, 2007:58). Today's key concerns include: detection and suppression of fraud, risk management, customer management, product management and loss prevention (Ćurko *et al.*, 2007:57). In addition, the South African banking industry also experienced the impacts of the global economic crisis: almost a million jobs were lost between the fourth quarter of 2008 and the first quarter of 2010 (Burger, 2011). This was, however, not believed to be to the same extent as this was experienced in other countries such as the USA and Europe (OECD, 2010:21). In the wake of the global financial crisis, the South African banking sector is benefiting from the economic upswing that gathered momentum towards the end of 2009, though it is still impacted by the crisis' secondary wave or aftershock (Winterboer and Grosskopf, 2009:25,21).

In addition to challenges and risks shared with the international banking industry, South Africa's banking industry faces distinct challenges brought about by its unique conditions. A few examples are: the shortage of resources skilled in BI, data warehousing and banking – aggravated by the large-scale emigration of skilled and educated people (the "brain-drain") (Watson and Donkin, 2005:5); higher relative costs for BI and data warehousing than in Europe and North America (*ibid*); increased competence to operate in a multicultural work setting resulting from South Africa's specific demographic profile (Burger, 2011) and; complexities resulting from South Africa's specific reporting, compliance and legislative requirements. Examples of the latter are: the Broad-

Based Black Economic Empowerment (BBBEE) Act, the National Credit Act (NCA), the Protection of Private Information (PPI) Act, Anti-Money Laundering (AML) requirements, etc. (Institute of International Bankers Global Survey, 2008:152-155).

2.4 The concept of a BI worldview

In terms of the conceptual understanding of BI, this thesis identifies that many of the actors involved in BI exchange have perceptions and engage in actions that shape their interactions and relationships and shape the various BI exchange processes they are involved in. By analysing these perceptions and actions, this thesis identifies typical characteristics and common assumptions that are shared amongst many of BI's actors. These are seen to guide the understanding of the nature of BI, establish the underlying paradigm of BI, organise what is known about BI and make sense of new information that emerges on BI – thereby forming a common BI worldview (Leo Apostel Center, 2012). While some of the concepts and shifts discussed and proposed in this thesis (which fall within and beyond BI or even IS) may not be novel, it is the integration of these and other concepts (e.g. S-D Logic concepts) within the context of a worldview that provides a new approach (Akaka, 2007:17). Existing concepts and shifts that may be related to or which may have preceded this approach are discussed further in section 2.5.2, specifically in the context of existing paradigm shifts within BI and, more broadly, within IS.

A worldview is, simply put: a view of reality that affects behaviour (Heylighen, 2000). It can be held by an individual or collectively by a group. It is not believed that there is only one BI worldview or one set of characteristics and common assumptions shared amongst BI actors (also referred to as role players or entities). However, analysis performed in this thesis identifies distinct, recurring characteristics and assumptions shared amongst BI actors – both in practice and theory – that point towards a dominating BI worldview that distinctly drives and influences BI.

2.5 New lenses to examine BI's dominant worldview

2.5.1 Goods-Dominant (G-D) and Service-Dominant (S-D) Logic

This thesis uses G-D and S-D Logic as lenses to view the dominant BI worldview that emerges. G-D and S-D Logic are – simply put – lenses, perspectives, mindsets or philosophies according to which the notion of economic and social exchange can be viewed (Vargo, 2011b:4), including BI as a series of exchange processes. G-D and S-D Logic may be seen to fit within the multidisciplinary research area of Service Science (Maglio and Spohrer, 2008:18). Service Science is supported by S-D Logic as a philosophical foundation, Service Systems Theory as a theoretical foundation and practical developments such as Service Management and Service Computing, among others (*ibid*; Spohrer *et al*., 2007:71; Spohrer *et al*., 2008:4-6). Service Science studies the Service System, which refers to configurations of social, economic and technical actors and resources, connected through relationships wherein a specific beneficial outcome is proposed (*ibid*). Service, in the context of S-D Logic, is defined as the application of competences (skills and knowledge) through deeds, processes and performances for the benefit of another entity or the entity itself (Vargo and Lusch, 2004b:324-335).

G-D Logic is a term coined by Vargo and Lusch in response to their argument that a conceptual shift is needed from traditional views of exchange to an S-D Logic view of exchange. G-D Logic's focus is on production and distribution of saleable goods, embedded with utility and value during the production and distribution processes. It promotes value-in-exchange and a separation of producer and consumer (Gummesson, 1995:250; Vargo and Lusch, 2006:51; Normann, 2001:99; Vargo and Lusch, 2006:14). It focuses on the product (technology), means, producer and production (Vargo and Lusch, 2004a:8; Vargo and Lusch, 2006:18).

Conversely, S-D Logic – with its central tenet that service is the basis of all exchange (Vargo, 2009b:373-379) – questions G-D Logic's traditional views of service (Barret *et al*., 2011). It represents a shift from G-D Logic's focus to a focus on the use, the customer, the process, the intangible, the relationship and doing (Lusch and Vargo, 2006:xvii; Normann, 2001:99). S-D Logic perceives that exchange consists of a sequence of activities (i.e. a flow of service) whereby customer and provider collaboratively interact with each other, and with others involved in the exchange. Focusing on the customer and the relationship, they co-create value. They simultaneously benefit two or more of the parties involved, providing a service rather than simply a tangible product (though the service may be embedded in a tangible product) (Lusch and Vargo, 2005:89-96; Lusch and Vargo, 2006:xvii; Spohrer and Maglio, 2008:238-246).

Although G-D and S-D Logic are not new, they have not yet been applied explicitly to examine BI (to the researcher's knowledge). This thesis suggests that a shift is made to BI's dominant worldview so that instead of being grounded in G-D Logic, it is shifted to S-D Logic. This offers a new approach for BI to potentially overcome many of its challenges. S-D Logic is seen to be specifically relevant and potentially beneficial for BI.

2.5.2 Application of G-D and S-D Logic to BI

BI represents an integration point for many capabilities that may exist independently (e.g. in other systems) or may not even currently exist (Glancy and Yadav, 2011:48) and may still need to be created. For integration to take place, BI relies on various resources (e.g. data, applications, etc.) and actors (e.g. IT, business, BI) to engage in collaborative activities with the purpose of achieving their own interests. For example, a user must interact with data and a BI application to access information to create the intelligence to be able to make a decision. Various actors – BI, IT, the user, the business product/customer/competitor from where the data comes, etc. – are involved in this. As such, BI represents a highly networked and complex world where a broad range of role players' interests need to be consolidated.

Lusch and Webster (2011:129) argue that S-D Logic is especially useful in such a context. S-D Logic is especially useful for BI as a complex and adaptive environment: it offers a multidimensional view of all of BI's role players, resources, relationships and integration points. It views all social and economic actors as resource integrators (Vargo and Lusch, 2008b:5), broadening the view that BI is all about technology (Herschel, 2008a). Not only can BI be seen in the full context of its end-to-end flow of activities, but use of S-D Logic offers the opportunity to understand the detail of the relationships, from the customer and relationship viewpoint, in context of the use or value that can potentially result from the interaction (Vargo and Lusch, 2008c:27).

When examining the opportunity offered for BI by S-D Logic, an important consideration is that concepts such as these – service, relationship and value-add – are not new to the business environment, to IS or even to BI. Resulting from heightened complexity and competitiveness in today's business environment, the paradigm shift from producer to consumer has already taken place (Korhonen, 2010). Various business and environmental changes – perhaps chiefly technological advances – have lead to paradigm shifts in the way resources are perceived. Compared with a few decades ago, there is a new focus on human knowledge, skills and core competences to escape the finitude of natural resources (Korhonen, 2010). This highlights that the shifts advocated by S-D Logic are not new and may have been inevitable at a point in the future (given the finitude of natural resources for example), even without the emergence of S-D Logic. Further to this, it is identified that these and other S-D Logic concepts (such as a focus on use, a focus on the customer or bringing customer and provider together) are neither exclusive to nor invented by S-D Logic (Akaka, 2007:17).

With this in mind, the researcher draws attention to the cohesive whole – the worldview perspective of BI through G-D ad S-D Logic lenses, wherein concepts such as these are drawn together – thereby providing a new approach. It is believed, however, that there is merit in investigating and comparing what may be considered predecessor or related concepts and suggested paradigm shifts such as customer-orientation, user-centric design or even service-oriented design and Software as a Service (SaaS) in context of the approach suggested in this thesis and in the context of S-D Logic. This may even be extended beyond BI and IS to the organisation, for example, to paradigm shifts such as: from in-house specialisation of a function to outsourced services; or from mass production to mass customisation. As this thesis presents a new approach to BI, exploring the benefits associated with integrating S-D Logic concepts into what is identified as an existing BI worldview, a comparison of existing concepts and paradigm shifts is beyond its scope. It is therefore raised as an area for future and further research.

3. Definition of key terms

Appendix A provides definitions of key terms in a glossary.

4. Purpose

The purpose of this thesis is to analyse BI at a conceptual level to identify the underlying cause of its persistent challenges and, based on this, suggest a new approach to address these challenges to position BI to be able to more readily and consistently achieve beneficial outcomes. Analysis of BI at the conceptual level is conducted across the full breadth – including both IS/IT design (provision of data/information, system development, etc.) and business perspectives on BI (supported decisions, required information, etc.).

5. Problem statement

A number of challenges are experienced by BI practitioners adopting BI, restricting them from consistently and completely achieving BI's intended purpose or benefits. Existing solutions to these challenges tend to address these challenges symptomatically. In this thesis it is argued that in reality the challenges arise at a conceptual level, and that sustainable ways of addressing these challenges should start with an improved understanding of BI at a conceptual level. Based on this understanding, a new approach is suggested to address BI's persistent challenges.

6. Research questions

The core research question is:

- By shifting the worldview that currently dominates BI from a conceptual grounding in G-D Logic to a conceptual grounding in S-D Logic, are new avenues to overcome BI's prevailing challenges opened for those who practice or study BI?

Secondary research questions are:

- What are the core challenges currently experienced in BI?
- What attempts have already been made to address BI's core challenges?
- What worldview characteristics emerge in terms of BI through perceptions, past and predicted behaviour, values, actions and source of knowledge of academics and practitioners studying and working in the field of BI?
- Are there differences in the worldview characteristics (including perceptions) that are held by BI customers *versus* BI providers?
- Do the worldview characteristics identified for BI constitute a typical or dominant worldview that is currently held of BI by these academics and practitioners?
- Can a pattern be detected in BI's worldview characteristics, revealing that BI's worldview is

grounded in G-D Logic?

- Is there a relationship between BI's dominant worldview, its prevailing challenges and a grounding in G-D Logic?

7. Key contributions made by this thesis to existing research

The research presented in this thesis offers four key contributions to research areas wherein research gaps are currently identified.

Firstly, this research contributes towards understanding BI at a broader and more conceptual level by analysing perceptions, beliefs, behaviour and actions that currently shape and inform the BI discipline as a whole. In doing this, it contributes towards the understanding of a socio-technical view of BI. There are few authors who make quality academic contributions towards understanding BI at a conceptual level, none of which share this thesis' approach. For example, contributions include: Ackerman's (2005) research on a definition and process for BI; Glancy and Yadav's (2011) discourse on a true BI system; Middelton's (2006) conceptual framework for IM; Pirttimäki's (2007) conceptual analysis of BI and related terms; Vanmare's (2006) research of BI benefits and; Venter and Tustin's (2009) study of BI and CI availability in South African organisations.

Analysis of BI at a conceptual level leads to the identification of a dominating BI worldview, which is then examined in this thesis. To the researcher's knowledge, this is a unique approach to examine BI and provides novel insight to the discipline of BI. It thereby forms a second contribution.

By examining the BI worldview through G-D and S-D Logic lenses, a third contribution is made. Although G-D and S-D Logic are not new topics, research that spans BI and G-D or S-D Logic remains largely unexplored at present – there are only a few quality academic contributions (e.g. Goul *et al*., 2012; Lin *et al*., 2012). Although the shift from G-D to S-D Logic is discussed at a conceptual level on topics such as value co-creation for Enterprise Architecture (EA) (e.g. Chuang *et al*. (2010)), similar discourse at this level appears to be largely absent from a BI (or related) viewpoint. This limitation is specifically evident for less technical and more conceptual and managerial aspects of BI. Hsu (2008:425) and Zhao (2008:416) stress the need to bridge the gap between computing and management, highlighting MIS' need for a service orientation. While this is not a direct plea for research on BI and S-D Logic, it is logical that research on BI and S-D Logic can contribute towards closing the gap Hsu and Zhao identify.

Finally, a fourth contribution that this research makes is towards understanding BI's specific challenges. While many challenges are raised in current literature, most of these are generic IS challenges and few are unique to BI (Clavier *et al*., 2012:4140). Similarly, Keith *et al*. (2007:1) identify the typical technical nature of data warehousing challenges discussed in the literature. Their (*ibid*) work may be seen to overlap this thesis' research in terms of challenges and the service approach. However, Keith et al. apply a Service Oriented Enterprise (SOE) structure to address selected data warehousing issues, providing a network-based research methodology for understanding the impacts of service orientation in the business-modelling sense.

Although this thesis is aimed at an international audience, it is relevant to note that it also provides much needed research from the Southern hemisphere (Korpela *et al.*, 2008:1), specifically in terms of BI. Available academic literature on BI from South African authors tends to focus narrowly on specific subsets of BI, without addressing BI as a whole or at a conceptual level. For example: Bernstein, Grosof and Provost (2001) provide BI research in terms of IS research; Conradie and Kruger (2006) and Marshall and de la Harpe (2009) provide research on BI and data or information quality; Hart (2006) and Hart *et al.* (2002) examine data mining; O'Brien and Kok's (2006) research on BI's potential to produce higher profits in the South African telecommunications industry; Ponelis and Britz (2003) concentrate on data marts and; Porter and Hart (2004) focus on Online Analytical Processing (OLAP). In addition, although extensive literature is available on Competitive Intelligence (CI) from South African researchers[1], this is not the case for BI (Venter and Tustin, 2009:90).

8. Methodology

This research represents an enquiry within the interpretive paradigm, based on a qualitative approach. A literature and a case study have been used to collect and analyse data. Both aimed to gain an understanding of the perception of BI, its challenges and attempts to address the challenges as experienced by participants in the case study and reported in the literature. This understanding is aimed at BI at a conceptual level, but also involves examples to support this from pragmatic levels of BI. Existing research on S-D Logic has informed the conceptualisation of the research that was undertaken and existing research on worldviews provided the basis of the framework that was used to analyse, structure and represent data. This approach resulted in an explicitly socio-technical perspective on BI.

The case study is based at one of the "big four" banks in South Africa, located in Johannesburg. It is referred to as "Fortune Bank" (a pseudonym ascribed by the researcher) in this thesis due to the bank's request to remain anonymous. The case study was conducted from January 2008 until the end of March 2010 (two years and three months), with an informal follow-up observation between January and April 2012. Three research techniques were used: participatory observation, semi-structured interviews and questionnaires (largely open-ended and qualitative). Questionnaires were conducted as part of a Request for Proposal (RFP) process that Fortune Bank was engaging in at the time of the case study.

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[1] E.g. from Begg and Du Toit (2007); Brummer *et al.* (2006); Sewlal (2004); Sewdass (2009); Viviers *et al.* (2005); Viviers *et al.* (2007); and Viviers *et al.* (2002).

Results of the case study provided a rich data set and a deep understanding of the research phenomena. Results consist of descriptions and narrations, as open-ended questions were asked in the interviews and questionnaires and observations were documented in words and diagrams. The data was analysed through comparisons within and between data sets and the literature study. Specific themes emerged through this analysis and were categorised accordingly. Data was analysed according to these categories and the research questions.

The research methodology is detailed in Chapter 2 of this thesis.

9. Scope of thesis

9.1 Clarification on aspects that are in the scope of this thesis

The following are in the scope of this thesis and must be clarified:

- BI at a conceptual level, including all actors (human and technology) and activities (exchanges) involved in the exchange of data, information and intelligence that enable decision-making needed for the conduct of business. This includes:
    - The full BI process (from sourcing data to using intelligence).
    - Terms that may be used to describe the same concepts or concepts that may be considered to be similar when viewed at a conceptual level, e.g. market intelligence (or marketing intelligence), product intelligence, competitive intelligence (Venter and Tustin (2009:89) state that competitive intelligence may be used in the same context as BI).
    - Solutions, technologies and methodologies that may be used interchangeably to refer to BI or subsets/over-arching concepts of BI, e.g. DSS, EIS, MIS, reporting, analytics, CRM, CI, IM, CPM, etc. insofar as these are involved in the exchange of information and intelligence that enable decision-making needed for the conduct of business.
    - The end-to-end flow of BI exchange rather than the level at which BI exchange occurs. This may include BI exchanges within or beyond the organisation, i.e. at micro and macro levels.
- A literature study across different industries, on academic and practitioner literature and on South African and international literature. Although the focus is on recent (e.g. 2005<) literature, there are some cases where older literature is still relevant and has been referenced, e.g. Luhn's 1958 article, or S-D Logic literature from previous decades/centuries.
- A case study at Fortune Bank in South Africa. As research is conducted at a conceptual level without delving into industry- or country-specific detail and the majority of participating BI vendors are internationally based and do not specialise in a specific industry, case study findings are applicable internationally and across industries.
- BI challenges. All challenges identified in the literature and case study are documented in the thesis. However, certain of these challenges are omitted from discussion in the solution

(Chapter 6), namely: IS implementation challenges. The thesis is aimed at BI specifically and not at ISs in general and, additionally, IS implementation challenges presents a broad topic, warranting separate discourse.

9.2 Aspects that are out of scope for this thesis

The following are beyond the scope of this thesis, as they do not contribute to the research topic, answer the research questions or else result in too broad a scoping:

- The debate on data, information, knowledge, wisdom (DIKW): It is recognised that there is much debate on the process and point at which data is turned into information, knowledge and wisdom (Ackoff, 1989:3; Kaipa, 2000:153; Zins, 2007:479) and on what these different terms mean to different actors. However, this debate is identified to be out of scope.
- Setting the scope of BI.
- Providing a universal definition for BI.
- Testing the proposed solution. Although the solution is discussed in terms of practical applicability the solution is not tested in this thesis.
- IS implementation challenges.
- An exhaustive list of beliefs, actions and challenges within BI. While this thesis aims to reflect an accurate representation of today's literature and practice, an attempt to identify and document all possible beliefs, actions and challenges is seen as futile and unrealistic.
- BI successes.
- Analysis of BI's roots in terms of Military Intelligence (MI) or Information Science.
- Evaluation of G-D and S-D Logic.

10. Potential limitations

Potential limitations are identified. These can be highlighted as opportunities for future research:

- Although BI successes are recognised, this thesis does not identify or discuss them. It is recommended that future research incorporates a study of BI success stories, using this research as a foundation.
- Although vendor perspectives are incorporated in this thesis by means of analysis of vendors' RFP responses, the vendor-perspective in terms of BI successes and how vendors currently do or would apply S-D Logic is excluded.
- A possible limitation of participatory observation that the researcher forms part of the research process and cannot be separated from the research phenomenon – more so than through the use of other techniques. While this is recognised as a limitation, it is mitigated through use of alternative research techniques (interviews, questionnaires) that supplemented the observation. The benefit of participatory observation is also noted, i.e. the opportunity for intense, prolonged exposure to the subject matter allowed the researcher to easily collect multiple perspectives and artifacts, ensuring a richer data set for evaluation and analysis.

- Although this research makes use of a single case study this is not seen as a limitation for two key reasons. Firstly, even a single case study can contribute towards scientific development (Flyvbjerg, 2004:421). Secondly, the case study presents a rich and complimentary set of techniques rather than a single technique or method, consolidating and comparing views from heterogeneous groups within and beyond a single organisation.

11. Target audience

This thesis is aimed at specific groups of academics. The first group consists of academics within the disciplines of BI, Information Systems (IS), Information Science, Computer Science, Management Information Systems (MIS) and related academic fields. A second group consists of academics interested in the inter-disciplinary field of Service Science, including the philosophical branch of S-D Logic and the theoretical branch of Service Systems. A third group consists of those who are interested in interdisciplinary research and application of worldviews in terms of the worldview as the social layer of reality within value systems, society and culture – specifically science and technology (Leo Apostel Center, 2012).

Practitioners working in these or related fields could also benefit by applying the recommendations and solutions proposed in this thesis to realise – or realise more of – BI's benefits. The recommendations are sufficiently pragmatic and can therefore serve this purpose. In addition, practical developments related to these fields are informing and are informed by academia and can also therefore benefit from reviewing and/or applying the recommendations and solutions.

12. Thesis outline

The thesis is split into six chapters, some of which consist of a few parts. These are:

1. Introduction: Provides a foundation for the thesis by setting the context and parameters.
2. Research methodology: Explains how the research was conducted in terms of the paradigm, philosophy, approach and techniques. The rationale for the various research methodology choices is also provided.
3. Literature study: Provides a view of current dialogue available in the literature, in three parts:
   - Part 1: The promise and challenge of BI: Discusses what is expected from BI (the promise), the major challenges preventing BI from consistently meeting this expectation (the BI challenge) and previous attempts to overcome BI's challenges.
   - Part 2: Towards understanding the cause of BI's challenges: Takes the first step towards understanding BI's challenges by identifying BI's worldview and examining BI's challenges in respect of this worldview.
   - Part 3: G-D and S-D Logic: Uses the worldview structure identified in Part 2 to frame a discussion of the emerging body of knowledge on G-D and S-D Logic.
4. Case study: This chapter is split into the following parts:

- Part 1: Background and context: Provides a foundation for the case study by setting the context.
- Part 2: Results, analysis and comparison (BI challenges): Discusses BI challenges that emerged in the case study data.
- Part 3: Results, analysis and comparison (BI worldview): Discusses BI's worldview as per the case study.

5. Analysis of BI's dominant worldview and challenges that emerged in the literature and case study through G-D and S-D Logic lenses. This is followed by a proposal for a shift from G-D to S-D Logic, along with a discussion of the benefits and implications of such a shift.
6. Conclusion: Describes how the research questions have been answered, outlines the thesis' contributions and provides suggestions for future research.

The following appendixes are provided:

A. Glossary: Provides a list of acronyms and a glossary of key terms used in this thesis.
B. Interview questions: Lists interview questions that were used to guide the interviews.
C. Interview tools: Provides examples of cut-outs and diagrams used during the interviews as props or tools. An example is also provided of a completed "landscape diagram".
D. List of artifacts used: Lists the artifacts from Fortune Bank used to inform this research.
E. Interviewee background and profile: Summary of interviewees' background and profile details.
F. RFP: Reflects the Request for Proposal (RFP) that Fortune Bank distributed requesting vendors to respond with a proposal to partner with them to implement a BICC.
G. Vendor background and rating: Summarises the background of the BI vendors who responded to Fortune Bank's RFP. Fortune Bank's initial rating of responses is also reflected.
H. G-D Logic evident in BI's worldview and challenges: Presents a summary of examples of G-D Logic characteristics evident in BI's worldview and challenges.

13. Conclusion

This chapter provides the purpose, scope and outline of the thesis. It defines the research problem and lists the research questions, explaining briefly what the methodology and approach are to address this problem and answer the questions. Guidelines are provided to assist in locating specific information and key topics within this thesis. In addition, existing research and interested parties are detailed.

Chapter 2 provides more detail on the research methodology used in this thesis.

CHAPTER 2: RESEARCH METHODOLOGY

A description of the research paradigm, philosophy, approach and techniques used in this thesis

1. Introduction

Research is not conducted in a vacuum: it is framed within a research paradigm (Henning *et al*., 2004:12), viewed through the lens of a particular mindset and constructed using specific approaches and techniques. This is referred to as the research methodology. It describes the way research is conducted. The aim of using these methods in consolidation is to deliver data, analysis and findings that suit the research purpose and answer the research questions.

The research methodology provides an orientation that influences the research results and influences the results' standing in the different research communities. It is therefore the responsibility of the researcher to provide evidence of the research methods applied (Walsham, 1995) and justification for the choice of these methods. This reflects their understanding of the philosophy and theoretical underpinning (Henning and Gravett, 2001:1-5), proving that sufficient circumspection has been applied (Galliers, 1997:142) and providing a common basis for researcher and reader to work from.

This chapter provides such evidence by describing the context of the thesis in terms of IS research traditions, providing insight into how the research was performed, why it was performed this way and how the results were obtained. It starts with a high level view of the research methodology. This is followed by an explanation of the steps taken to conduct the research and then the components of the methodology are detailed.

2. High level view of research methodology

Figure 1 reflects the thesis' research methodology in the context of the "research onion" provided by Saunders *et al*. (2007:102). It reflects that literature and a case study are used to conduct a qualitative enquiry within the interpretive research paradigm. The focus of the case study is Fortune Bank, its vendors and its environment. Participatory observation, interviews and questionnaires have been used as techniques that are complemented by a literature study and performed through a series of steps in a planned research process. The underlying philosophy or the lens through which the research phenomena is examined is S-D Logic. S-D Logic is applied as a paradigm informing the discipline of Service Science, within the context of Service Systems Theory. Research data is analysed and presented within the framework of a worldview, where the worldview informs analysis and consideration of conceptual aspects of the research phenomena.

The steps of the research process are now detailed, followed by an explanation and justification of the other constructs of the research methodology.

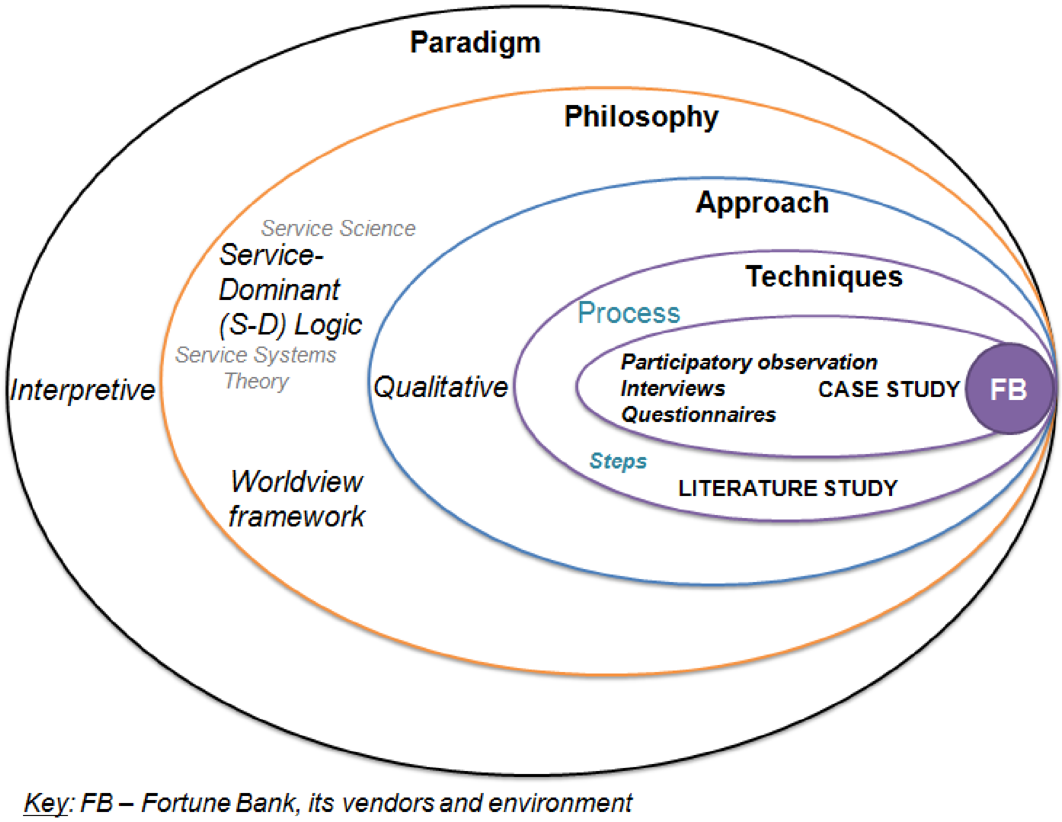


Figure 1: High level view of research methodology (adapted from Saunders *et al*. (2007:102) and Henning, *et al*. (2004:12))

3. Research process

The research process broadly consisted of six steps based on the work of established case study researchers such as Robert E. Stake, Helen Simons, and Robert K. Yin as proposed by Soy (1997). During the course of performing these six steps, a literature study and case study have been performed where the case study consists of participatory observation, interviews and questionnaires. Figure 2 reflects the six steps alongside these activities which are specific to this thesis. It also reflects a high level timeline that indicates milestones. The research process is now discussed in context of this.

Step 1: Determine and define research questions, complete proposal and administration

When starting in the employ of Fortune Bank in 2007, the researcher identified that the BI department in which she worked (Fortune Bank Corporate Business Intelligence department (hereafter referred to as FBCBI) experienced recurrent challenges. This triggered her to ask questions such as "how can these challenges be solved?" and "what is the actual cause of these challenges?". A need for research was therefore established and the researcher started a literature investigation and informal observation. In March 2008 she submitted her academic proposal for research, which was approved. The proposal established the validity and direction of the research, Fortune Bank as the unit of study and initial research questions – which were refined up until the point of data collection. The necessary administrative activities were completed, such as submission of ethical clearance applications and signing of agreements, confidentiality and release forms. After this, initial contact was made with potential research participants – completing step one.

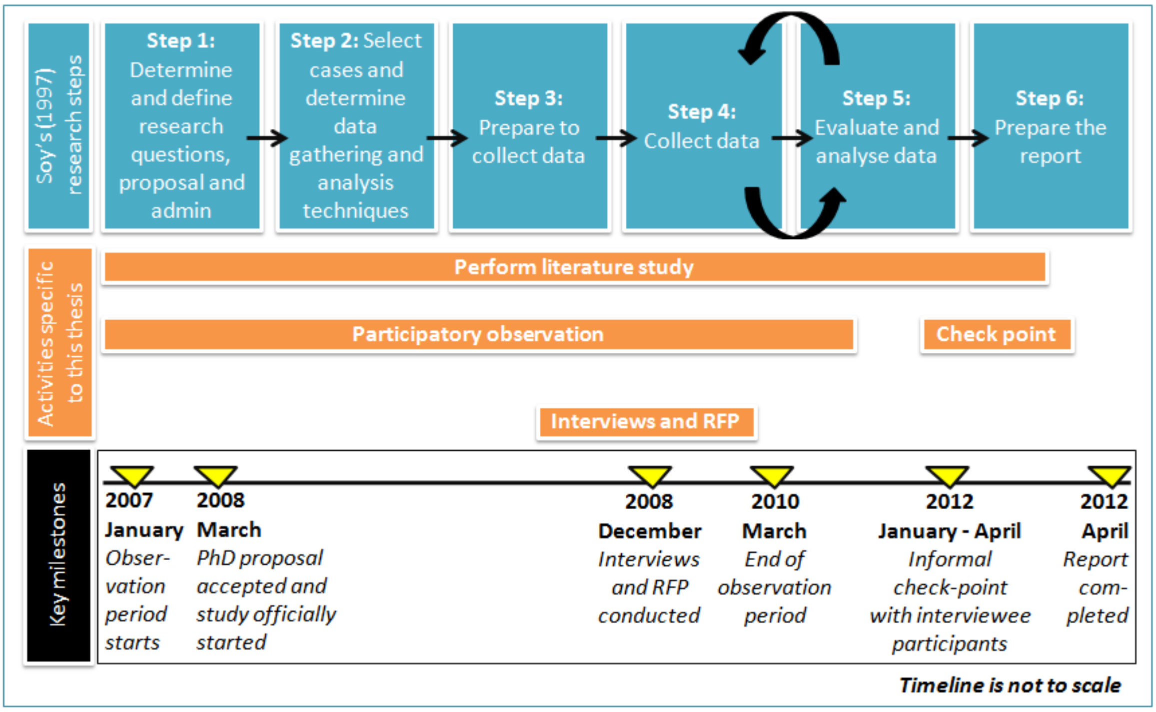


Figure 2: Research process and milestones (Based on Soy, 1997)

Step 2: Select the cases and determine data gathering and analysis techniques

Initial contact with potential research participants confirmed their willingness and ability to participate in interviews and their potential to contribute towards a rich and deep data set. Based on this, the prolonged period of participation and observation the researcher anticipated and the nature of the artifacts that she would have access to, she believed that Fortune Bank and the identified interviewees provided an adequate base from which to gather data. However, when the opportunity to leverage off of a Request for Proposal (RFP) arose, the researcher decided to broaden the case study scope to include this. Fortune Bank had decided to release an RFP in an effort to find a BI vendor to partner with them to assist FBCBI to mature into a Business Intelligence Competence Centre (BICC). The researcher was offered the opportunity to participate in the management of this RFP. This included opportunities to suggest research questions for the RFP.

Based on these opportunities and this research environment, the researcher established that open-ended questions would be likely to yield constructive results and identified a qualitative research approach as an appropriate technique. After contemplating the culture and characteristics of Fortune Bank and its potential BI vendors, the researcher adopted the interpretivist paradigm as an epistemological stance to gather and analyse data to answer the research questions. During this preparatory phase, she did not have a basis for identifying her underlying philosophy and, as a result, explored establishing an ontological basis grounded in Actor-Network-Theory (ANT), Activity Theory (AT) and Structuration Theory (ST). She explored these theories with specific interest in their approach to relationships and interconnectivity between different types of actors. While these theories aligned with the qualitative approach and interpretivist paradigm, they did not spark the necessary insight in the researcher to justify one or a combination of these as her ontology. They did, however, assist the researcher to establish merit in using existing but unrelated research on worldviews to frame her enquiry. Only later – once having gathered and analysed the data that emerged – did she apply the philosophical lenses of G-D and S-D Logic.

Step 3: Prepare to collect the data

Having established a firm base with the specific research building blocks in place, the researcher planned the research collection process. She compiled interview and RFP questions; scheduled interviews; prepared templates and tools for the interviews; prepared herself and interviewees; confirmed her method for documenting field notes; participated in Fortune Bank's RFP process; identified additional Fortune Bank artifacts to use as data sources and; set up a systematic and organised process to store and retrieve research data. At this stage, the researcher was also granted ethical clearance for her research through the University of Pretoria's Committee for Research Ethics.

Step 4: Collect data in the field

Research data was formally collected during scheduled interviews (which took place at the end of 2008) and through the RFP process (conducted over the same period as the interviews). As is the norm during a qualitative study (Baxter *et al*, 2008:554), data collection and analysis took place concurrently in an iterative process. The researcher consistently engaged in the iterative process of researching and asking questions and then researching further. She engaged with Fortune Bank staff members and its documentation, processes and technologies in the course of her employment at Fortune Bank, all the while assimilating data and capturing field notes. The researcher also continuously performed literature searches and reviews, substantiating her findings and providing a platform from which to deepen her enquiry and data collection.

Step 5: Evaluate and analyse the data

Although much analysis had already taken place during the data collection step, the researcher performed analysis of the data as a distinct step when she codified her research notes, flagging and highlighting insights and establishing connections between concepts that emerged in the data. At this point, she applied G-D and S-D Logic lenses to analyse the data – seeking identification of the true underlying problem and insight into potential solutions. She considered the various perspectives that emerged in the research findings, analysed these through a philosophical lens and integrated research findings with those from the literature. Although she experienced that she had a rich data set reflecting the voices of the various participants, she performed a checkpoint after the observation period by informally contacting some of the research participants to enquire the status of the BI department.

Step 6: Prepare the report

As a final step, findings and analysis were compiled into this thesis as the report.

4. Research paradigm

IS research typically consists of research that is positivist, interpretivist or critical (Chau, 1986: 601-632). The choice of research paradigm is influenced by the context of the researcher (e.g. the country or university in which the researcher is based) as well as factors related to the characteristics of the research problem, the researcher and the research environment (Trauth, 2009:3172). As a result of this thesis' research problem and the context of the researcher and her environment, the choice was made to conduct research using the interpretive research paradigm. Understanding the research paradigm that is used assists in enabling an understanding of the researcher's underlying assumptions. It also contributes towards ascertaining the validity of research and whether appropriate research methods have been used (Myers, 2012). For this reason, the interpretivist paradigm – applied to this thesis' research – is now described.

4.1 Interpretivist paradigm

In terms of social behaviour, the positivist belief that empirical investigation whereby systematic and rational investigation of general causal laws is sometimes referred to as "naïve realism" (Guba and Lincoln, 1994). As a result, to overcome this so-called naïve realism, the interpretivist paradigm is occupied with understanding what meaning and significance the social world has for people who live within it, thus seeing the world as socially constructed (Wilson, 2004:85). It seeks to understand social members' definitions and situations, following a communal process of examining various influences by means of a descriptive analysis. This emphasises a comprehensive and interpretive understanding of social phenomena, informed by participants (the insiders) and endorsed by other participants, thereby discarding the broadly applicable laws (Henning *et al*, 2004:20-21).

As such, interpretive research's focus is on the complexity of human sense making, as the situation unfolds (Trauth and Jessup, 2000:54). Its objective is to gain a rich understanding of reality – or the participants' life world/world-view – by piecing together participants' social constructions and the meaning participants assign to these. Social constructions include, for example: language (verbal and body), consciousness, shared meanings, symbols, documents, tools, inferences, observations, etc. They are expressed through the participants' voices, activities, beliefs and behaviour (Goede, 2005:15; Klein and Myers, 1999:69; Trauth and Jessup, 2000:54; Geertz, 1973). These social constructions may be intangible, but are used as data for interpretive research to identify deeper meaning and learning in social and organisational contexts. Interpretive researchers base their findings on insight gained from this and calls this their "truth".

Interpretivism therefore has the epistemological stance that recognises the social aspect of research, does not see the world as orderly or quantifiable and recognises other influences (for example, the researcher's subjective understanding, views and voices of participants or insiders). In the interpretive world view, it is recognised that the researcher is inseparable from the research phenomenon and the researcher and subject are constantly influencing each other.

Interpretivism – being a younger paradigm in contrast to positivism – does not yet have the repertoire of familiar and un-refuted methodological principles that positivism has. There is also a lack of a broader understanding of what constitutes legitimate inquiry and valid knowledge within the interpretive realm (Pozzebon, 2004:275). However, despite this, interpretivist methods have been developed and are widely available, for example: unstructured observation, open interviewing, idiographic descriptions and qualitative data analysis as ways to capture insider knowledge (Henning, *et al*, 2004:20).

4.2 Rationale for choice of the interpretivist research paradigm

This thesis applies the interpretivist paradigm to the collection, analysis and interpretation of data. It is seen to be the most appropriate research paradigm resulting from the alignment between the nature of the thesis' subject matter, objectives, approach and techniques with the paradigm's foundation and principles (Klein and Myers, 1999:72). The choice of paradigm complements the approach and techniques, facilitates achievement of the research objectives and is appropriate for the environment and nature of the subject matter – as discussed next in Sections 4.2.1 to 4.2.3.

In contrast, positivist beliefs – e.g. that the world is orderly – are in conflict with the dynamic and often-ambiguous nature of this thesis' subject matter. The thesis' open-ended research questions, approach to data collection and need for context based on multiple subjective perspectives conflicts with positivist beliefs in empiricism and hypotheses. In contrast to the qualitative approach (used in this thesis) that complements interpretivism, positivism advocates methods which typically use quantifiable measures, verification or falsification of hypotheses, statistical analysis, etc. (Orlikowski and Baroudi, 1991; Henning *et al*., 2004:18; Shanks and Parr, 2003:3).

Use of the critical paradigm offers opportunity for existing worldviews to be challenged and reconstructed (Avgerou, 2005:104-105), which is in line with the aim of this thesis. However, the gap in existing research on BI at a conceptual level (as identified in Chapter 1) – both from an interpretive and positive viewpoint – on this topic means that critical social theory has an inadequate base from which to challenge, contrast and question to provide a comprehensive critique. The interpretive enquiry conducted through this thesis does, however, provide a platform for future studies (outside the scope of this research) that can be conducted based on the critical paradigm. This thesis provides rich descriptions of the subject matter's environment, consolidates voices and perceptions within this environment and identifies imbalances and shifts that are required. This provides a platform for future critical studies to leverage critique. The rationale for use of the interpretive viewpoint is now elaborated on further in terms of the subject matter, aim and approach of the research.

4.2.1 Alignment with subject matter

Consider the subject matter of Fortune Bank, its BI vendors and its environment and the example of the ambiguity in the definition and scoping of BI (as described in Chapter 1). The researcher experiences and perceives BI as a complex and interconnected arrangement of social, economic and technical actors engaged in dynamic relationships and activities, each with their own goals in mind. For example, BI vendors aim to sell BI technologies and products, BI providers aim to develop reports, applications, etc. These actors create and share tangible and intangible social, organisational and economic meanings, experiences and interpretations which are, in fact, their subjective perceptions of reality. They thereby socially construct reality (Goede, 2005:26). They interact in communities with other subjective members, performing activities that potentially result in outcomes creating new realities which may or may not be accepted or endorsed, leading to clarification or ambiguity and further activities and outcomes.

In further alignment with the interpretive paradigm, communication and interaction within BI are dependent on descriptions, narrations, symbols and diagrams that are meaning-laden and context-dependent (Klein and Myers, 1999:73). As an example, consider how context-dependent and meaning-laden a report or data extract is. To one person at one point in time this may be valuable. To another or at another point in time, this is meaningless or the opportunity to take action will have passed (Gilad and Gilad, 1986).

4.2.2 Alignment with research objectives

In terms of the research objective – what it is that is desired to be understood or known – the thesis' research questions (listed in Chapter 1) align with the objectives of the interpretive paradigm as they reflect the need to understand the research environment, how it emerged, its context and the participants' life-view. The thesis' research questions are not quantifiable and cannot be answered in isolation: an understanding of the complex whole must first be achieved by understanding the parts, their relationships and the meanings previously ascribed to or inferred about these (Klein and Myers, 1999:71). By seeking to understand the complex whole by first understanding its parts and their relationships, the interpretive principle of the hermeneutic circle (Boland, 1989:369; Gadamer, 1975:250) is recognised.

As such, the interpretive paradigm complements this thesis' application of the worldview framework as a means to explore and interpret multiple participants' context-sensitive perceptions, the explanation of these perceptions (or misconceptions) and the underlying reasons (or prejudices) for them (Gadamer, 1976:124). The social world of the participants is therefore examined in terms of its structures, interests and resources – looking beyond just understanding the research data. This aligns with the interpretive principle of suspicion.

4.2.3 Alignment with research approach and techniques

This thesis provides a descriptive analysis and interpretation of the social, organisational and economic world in which the research participants – BI vendors, Fortune Bank and the researcher as a research participant and instrument – interact, perform their activities and create meaning and outcomes. It interprets and seeks to understand the subject matter by looking beyond participants' answers into their worldviews – identifying and describing their beliefs, actions and examining the resultant consequences. It uses the worldview as a framework to perform this analysis, seeking to understand participants' perceptions of reality, how this emerged, what they predict for the future, their values, their actions, what guides their actions as well as the source of their knowledge and basis of their understanding. This aligns with the interpretive paradigm's principle of contextualisation in terms of explaining reality and how it emerged.

Application of the philosophical lenses of G-D and S-D Logic aligns with the interpretive paradigm's principle of abstraction and generalisation whereby social theories are applied to data discoveries (Klein and Myers, 1999:72). In sync with this, S-D Logic is used in this thesis as a basis from which to develop concepts, generate theory, draw implications and contribute insight based on the view of BI through a new lens (Walsham, 1995:77).

5. Research philosophy

This thesis identifies that BI's challenges are currently addressed symptomatically and that, if the challenges are to be understood at the level at which they occur, conceptual analysis of BI is needed. The researcher therefore starts with analysis of BI at a conceptual level by analysing BI as a series of exchange processes. A dominant BI worldview emerges through this analysis. This dominant BI worldview is examined through G-D and S-D Logic lenses.

The philosophy of the worldview as well as G-D and S-D Logic are therefore applicable as research philosophies of this thesis. These are contextualised in Chapter 1. Further detail can be found in Parts Two and Three of the literature study (Chapter 3).

6. Research approach

A qualitative research approach is used in this thesis. This aligns with the interpretive paradigm which seeks to gather descriptions and narrations from research participants – letting the results emerge, as already discussed above in Section 4.2. It also aligns with the choice of research techniques, which are now discussed.

7. Research techniques

A literature and a case study were employed as the main research techniques.

7.1 Literature study

A review of the existing literature facilitates the research enquiry. It enables research progress by creating a firm foundation for advancing knowledge, based on the existing body of knowledge, including the opportunities created by the gaps that currently exist (Webster and Watson, 2002:xiii; Henning *et al* 2004:26-27).

The researcher performed an initial in-depth literature study for this thesis' proposal. The aim was to determine whether a case for the study existed, which did. Thereafter, she continued to research the literature as an ongoing process throughout the steps performed to complete this thesis, providing continuous input to the thesis as it progressed. The literature study represents the tangible result of the synthesis of the relevant information gleaned from the study of the existing body of knowledge on BI and SD-Logic. It identifies key findings and highlights relationships in concepts on these topics, allowing the researcher to put forward recommendations after considering these findings alongside the case study results.

Literature findings are reflected in Chapter 3 of this thesis. They represent a consolidated report of the in-depth literature study.

7.2 Case study

7.2.1 Grounds for a case study

A case study is more than simply research of a single situation, group or individual (Baxter *et al*, 2008:556). It is an intensive narration, description and analysis of a single unit or bounded system such as an event, community, project, group or department. It is an inquiry using multiple sources of evidence as data on real-life behaviour, causes, speculations and treatments (Yin, 1984:23; Soy, 1997) as well as the connections and relationships that cause or result from these conditions (Stake, 1988:255). In addition, when using a case study, a researcher's interest lies in the process rather than the outcome, context rather than a specific variable, discovery rather than confirmation (Merriam, 1999:18-19). As a result of this as well as of the fact that the case study considers the influence of the research context and triangulates various real-life data sources, it enables the researcher to answer "how" and "why" type questions, providing immense insight into the subject material. It is a necessary and sufficient method for social science research and fares well when compared to other methods within this realm (Flyvbjerg, 2004:432).

A case study has been used for this research with the aim of enabling the researcher to gain an in-depth understanding of the situation and meaning for the participants involved in the situation. The case study approach has been selected for this thesis as: firstly, the research questions are qualitative in nature (for example, “how” and “why” type of questions); secondly, the behaviour of the participants in the case study (interviewees, FBCBI and their clients/stakeholders/etc. who were observed and vendors participating in the RFP) could not be manipulated by the researcher; the context of the research phenomenon is vital to the understanding and evaluation thereof; and lastly, a clear distinction cannot be made between the research phenomenon and its context. According to Yin (2003), these provide clear reasons to make use of a case study approach.

7.2.2 The case

The case is summarised as:

> *BI at an abstract level, as perceived and understood by Fortune Bank and its typical BI vendors, including the series of interconnected exchange activities (taking place within Fortune Bank and with BI vendors) that are performed with the ultimate aim of providing actionable information and/or intelligence to decision-makers for the conduct of business.*

7.2.3 Case boundaries

Employees of Fortune Bank and BI vendors that participated in Fortune Bank’s RFP are identified as the participants of the case study. The period of observation spans from January 2007 until March 2010, with additional informal checkpoints between January and April 2012.

The case study was conducted at Fortune Bank in Johannesburg in South Africa, but spans to include BI vendors who operate at national and international levels. The case study is based on international and South African literature. It extends to the examination of Fortune Bank’s context and environment which consists of its processes/activities, role players, stakeholders, vendors and the interactions and relationships between these entities.

7.2.4 Aim of case study

The case study was conducted to gain an understanding of BI’s challenges and worldview as perceived by the research participants. The aim was to gather a data set on these topics to enable comparison with the literature study and a comparison of BI customer *versus* BI provider views.
Fortune Bank was selected for the case study based on their BI challenges that the researcher

initially observed in 2007 and on the opportunity to gather data from an environment wherein active BI customer-provider exchanges were consistently taking place. The opportunity to conduct participatory observation including participation in the RFP process provided further motivation for selecting Fortune Bank for the case study. This also provided the opportunity to include BI vendors as BI providers, rather than just the BI department and its staff members as the BI providers.

7.2.5 Relevance of Fortune Bank as a case study to the research

The opportunity to observe, conduct interviews and participate in the RFP at Fortune Bank provided an ideal opportunity and environment for the researcher to examine how participants experience and deal with BI challenges and how they perceive BI, thereby enabling her to gather sufficient data to answer her research questions. In addition, during an interdepartmental BI forum that turned into a heated debate on the topic of “what is BI?”, the researcher identified that Fortune Bank staff members had already recognised that different perceptions of BI exist, causing challenges within the bank. This stimulated their initial thought on the question of what the perception of BI is. Furthermore, Fortune Bank attempted to address its challenges in BI by investigating establishing a BICC, setting up BI frameworks and conducting lessons learned exercises after project completion, among other measures. This also presented data gathering opportunities which would assist in answering the research questions. Overall, the interviews, questionnaires and observation – including access to Fortune Bank’s documentation – provided the researcher with an opportunity to triangulate various research inputs, providing a rich and balanced data set.

8. Case study research techniques

The case study was performed through participatory observation, interviews and questionnaires. Interviews were held with Fortune Bank employees in their roles of BI customer and BI provider, questionnaires were only aimed at BI vendors, external to Fortune Bank, as BI providers. Although observation took place within Fortune Bank, Fortune Bank’s interactions with BI vendors were also observed.

8.1 Participatory observation

Observation took place over the period January 2007 to March 2010. The researcher observed the case study environment as a participant, working as a senior manager of BI analytics and business analysis in FBCBI. As a result, FBCBI is the focus of the case study. She was involved in strategic, project and operational work. Examples of strategic work are: providing input to FBCBI planning and direction and alignment of portfolio’s objectives with FBCBI and Fortune Bank objectives. Examples of project work are: development of BI applications and reports, sourcing of data and building of data marts, cubes and databases. Examples of operational work are: human resource management, capacity planning and oversight of the monthly data Extract Transform Load (ETL) process. As a result of this work, the researcher was able to observe full lifecycles of Fortune Bank's BI activities as well as their relationships and interactions. In addition to being a participant in Fortune Bank's BI activities, the researcher became an "instrument of observation" who was able to see firsthand how people act in a specific setting and what that setting comprises (Henning, *et al*, 2004:81).

As a participant, the researcher was, by default, subjective. She mitigated her subjectivity – as far as this is possible – by compiling field notes during her observation and comparing results with the literature study. She separately noted facts and occurrences from judgments and reflections with the aim of maintaining neutral field notes.

Being a participant provided the researcher with certain benefits and opportunities that may not have been afforded to an outsider. The researcher was able to apply the approach of triangulation as she was afforded the opportunity to gather research data from several information sources, thereby contributing towards the validity of the research (Bonoma, 1985; Leonard-Barton, 1990; Green et al., 2009). For example, she was able to gather a rich data set over an extended period, through interviewees who opened up to her as they most likely would not have opened up to an outsider. She also had access to Fortune Bank documentation pertaining to the case study. A list of types of documents she accessed is available in Appendix D. Furthermore, she was privy to the RFP process and could even participate in this by adding questions to the RFP before it was released to the BI vendors. In terms of the research approach, another benefit of performing participatory observation is that it complements interpretive research: it focuses on language, symbols, documents, etc. (Henning, *et al*, 2004:82).

8.2 Interviews

Location, dates, number and duration of interviews

The researcher conducted 14 semi-structured interviews (excluding the pilot interview) with 14 Fortune Bank employees between the 3rd of November 2008 and the 17th of December 2008 in Johannesburg, South Africa. Interviewees signed consent forms and were informed that their names would not be disclosed. Interviews ranged from one hour to two and a half hours, with the researcher spending approximately eighteen hours conducting interviews.

Pilot interview

The researcher conducted a pilot interview with one of the participants, who later participated in a second interview as a *bona fide* participant. This tested the interview tools' and questions' effectiveness during an interview and potential to yield useful results afterwards. As a result, a few changes to the images and landscaping tools (discussed below) were made, some questions were reordered and some questions were clarified.

Follow-up with interviewees

Between January and April 2012, the researcher had telephonic and email discussions with four BI customers and three BI providers she had previously interviewed at Fortune Bank for the case study. She wanted to ascertain whether participants' views had changed from when she interviewed them at the end of 2008. The researcher was able to identify that there were no significant changes to their perceptions or the challenges they experienced. Based on this, the researcher did not re-interview all the participants. The aim of the follow-up interviews was not to gather new in-depth data or revalidate all existing research findings, but rather to gauge the validity of the data initially collected. The researcher confirmed the status of the projects referred to in the case study as well as structure and name changes at Fortune Bank, details regarding this have been captured and incorporated in the case study where relevant.

The researcher selected the BI customers and BI providers with whom she had follow-up discussions based on the fact that they still worked for Fortune Bank in the same context as BI customer/provider, in the same roles and were still contactable and willing to participate.

Interviewee background

Fortune Bank employees at various organisational levels – e.g. executive (director), senior management, specialist (non-management) – from various departments in Fortune Bank were interviewed. Seven interviewees involved in BI in the role of the BI customer and seven involved in the role of the BI provider were interviewed. Interviewees in the BI customer role were end-users or sponsors of a BI requirement, e.g. a once-off or a project requirement that is provided for either by a BI department or by a BI vendor (external to Fortune Bank) as the provider. Interviewees in the BI provider role consisted of Fortune Bank employees in a BI department in a position to provide a solution for the requirement.

Interviewees' experience in banking ranged from two to twenty eight years. The participant with two years' experience in banking had switched from the medical industry to banking. BI customers' work experience was within finance, accounting and sales industries, except for one BI customer who had worked as a minister (IH) and another who had worked as a surgeon (IM). BI providers' work experience was within engineering, IT development and IT and management consulting. Only one interviewee (IE) had experience in accounting and financial aspects of banking. Interviewees' educational background is reflected in Table 1. Most interviewees studied IT/Computer Science, followed by Finance/Accounting and then MBA/Business Management. Most BI customers are educated in Finance and Commerce and most BI providers in Science and Engineering.

Type of work performed by interviewees

All interviewees were involved in strategic, project and operational work except for three – one of these three was only involved in operational work and the other two only in project and strategic work. Interviewees' strategic work involved work such as strategic planning, forecasting and management at departmental and divisional level. Their operational work involved data and BI operations – such as routine data sourcing, monthly ETL processes, routine checking of financial data, etc. – as well as finance and management operations, involving routine activities in finance and management. Interviewees' were all actively involved, either as BI customers or as BI providers, in one or more BI or MIS project at Fortune Bank.

Key projects that interviewees participated in from which examples are drawn in this thesis include: the Enterprise Data Warehouse (EDW) Project, the Corporate MIS (CMIS) Project and the BI Portal. Projects were identified by interviewees as examples of key BI projects in which were involved. These projects all involved some aspect of BI or MIS application or report development and data sourcing, integration and presentation and were in varying stages of completion at the time of the case study. Project documentation from all three projects has been analysed by the researcher as part of this research. The projects are described in more detail in the case study in Chapter 4.

Table 1: Educational background of interviewees

Key: Interviewee – IA, IB, etc. (I – interviewee; A, B, etc. – interviewee identity)

	Science and engineering *(7)*		Finance and commerce *(11)*		Other *(4)*	
	BI customer	BI provider	BI customer	BI provider	BI customer	BI provider
IT and Computer Science *(5)*	IM *(1)*	IA, IE, IJ, IL *(4)*				
Mathematics and Engineering *(2)*	IB *(1)*	II *(1)*				
Finance and Accounting *(6)*			IC, ID, IH, IK *(4)*	IE, IG *(2)*		
MBA and Business Management *(5)*			IB, IF, IM *(3)*	IE, IL *(2)*		
Legal *(1)*					*(0)*	IN *(1)*
Medicine *(1)*					IM *(1)*	*(0)*
Political Science *(1)*					IF *(1)*	*(0)*
Theology *(1)*					IF *(1)*	*(0)*

Rationale for selecting the interviewees

The researcher approached potential candidates to interview based on her belief that they could satisfy one or more of the following criteria: is involved in a key BI, MIS, data warehousing or analytics project or programme in a key role; has experience on a similar project, programme or environment; is able to offer insight based on experience in or exposure to BI, MIS, data warehousing or analytics; works in a BI, MIS, data warehousing or analytics department; is a user of BI, MIS, etc. All interviewees approached accepted the request for an interview. The researcher was also able to confirm that they met one or more of these criteria.

Representation of the voice of BI customer and BI provider

Reflecting on the interviewees' background and personal details that emerged during the interviews, the researcher believes the research data gathered is sufficiently representative of the voices of the BI customer and the BI provider in Fortune Bank. Where this is not the case, she believes that she has applied appropriately mitigating actions.

In terms of the interviewee role, interviewee responses indicate seven BI customers and seven BI providers – two balanced groups. In terms of interviewee level within the organisation, analysis of the research data reflects that more executives and managers were interviewed (seven executives, four managers and three specialists). This poses a risk of "elite bias" where interviews do not "represent various voices" (Myers and Newman, 2007:15-17). To mitigate this, the researcher made significant efforts to supplement the interview data with data gained through observation to include the voice of non-managerial employees. For example, she specifically observed a number of user group meetings attended by non-managerial users, regularly engaged with analysts, developers and project managers in non-managerial roles in her department as well as with non-managerial employees from other departments (e.g. from whom data or requirements were gathered, people involved in testing, etc.).

A third aspect of representation according to interviewee background is of the type of work the interviewees performed. All interviewees were involved in strategic, operational and project work, bar three – as discussed in the section above ("type of work"). The researcher believes that she was able to gain insight into all three types of work as, firstly, most interviewees were involved in all three types of work, secondly, she was also involved in all three types of work and, thirdly, she engaged with sufficient Fortune Bank employees involved all three types of work. Finally, although consistency emerged on the whole in educational background of BI customers on the one hand and of BI providers on the other, there were a few outliers in this category – contributing to the diversity in backgrounds which, in turn, contributed to the rich data set that was gathered.

A summary of interviewees' background and administrative details can be found in Appendix E.

Interview questions

The researcher prepared a list of questions for the interviews (Appendix B). Using these as a guide assisted her in maintaining the necessary structure and flow in her interviews, while also maintaining an element of consistency in all the interviews. As the interviews were semi-structured, she did not let the questionnaires dictate the flow the interviews but rather was merely guided by the questions, and rather let the responses of the interviewees guide the interview. She therefore did not ask the questions in the same order in each interview.

Interview approach – interpretive

The interviews followed an interpretive approach, treating the interviewees as informants rather than subjects, as recommended by Spradley (1979). To do this, the researcher needed to let the results emerge rather than formulate and test a hypothesis. She focused on asking qualitative interview questions focused on the informants' viewpoints of their culture, experiences, perceptions and understanding of concepts.

In addition, the researcher followed qualitative interview guidelines laid out by Myers and Newman (2007:15-17). They (*Ibid*, 2007:2) advocate that the qualitative interview is the most important data gathering tool in qualitative research. Guidelines include, for example: provide context and situation before starting the interview; minimise any dissonance with the interviewee; interview a variety of people in the organisation; etc.

Interview technique – landscaping

The researcher used a landscaping interview technique to elicit some of the information from the interviewees. This technique involves interviewee participation whereby the interviewee is asked to diagrammatically reflect their answers, using props, images or icons provided in the session by the researcher. The researcher had prepared images and icons which she had printed out on paper, then cut out and laminated. During the interview, the researcher presented each interviewee, or group of interviewees, with a blank A3 sheet of laminated paper, a marker, prestick and the icons and images. Images and icons consisted of: bubbles containing text reflecting BI processes and BI terms; images of individual and groups of people representing different departments or roles; blank bubbles and boxes that the interviewee could fill in themselves; and sets of brackets and arrows. The blank bubbles were provided so that the interviewee was not restricted to a limited set of answers. Examples of these cut-outs are available in Appendix C, along with an example of a response using these tools. Interview questions in Appendix B are flagged to indicate whether the landscaping technique was used in interviewees' responses.

These results are included in this thesis as they triggered meaningful responses in the interviewees, which provided insight that the researcher found to be relevant. During the interviews the researcher experienced that the interview tools stimulated creativity and thought in responses and that the interviewees appeared to contemplate their answers. To mitigate the risk of limiting interviewees to responses within her world view, the researcher based interview questions on available literature and informed interviewees that they may answer questions in any way they saw fit and, if using the landscaping tools, may add or refrain from using certain icons, bubbles, etc. As a result, some interviewees added text and additional bubbles and some drew additional diagrams to substantiate their answers. All interviewees opted to use the tools to answer the questions.

Value of the interviews

The researcher found the interviews to be inspirational and stimulating. Each of the interviewees provided certain gems of information that the researcher would not otherwise have been privy to. The researcher therefore believes that the interviews can be considered to be quality qualitative interviews and has made use of the data obtained from these interviews.

8.3 Questionnaires

Rationale for use of questionnaires within qualitative and interpretive research

Questionnaires using predetermined variables with an empirical base do not capture or yield data reflective of lived experience, deeply held beliefs or feelings or worldviews as expressed in the participant's language (Henning *et al*, 2004:34). As a result, they typically fit well within positivism and are unsuited to interpretivism. The questionnaires used to gather data for this thesis were not, however, set up using predetermined variables or an empirical base. Instead, as explained in Section 3 (Step 2) above, they were based on open-ended questions which yielded qualitative data that could be analysed from an interpretive viewpoint. Furthermore, the researcher saw the opportunity to bring in the voice of the BI vendor as a BI provider by means of leveraging off of Fortune Bank's RFP process – the interviews only captured the voice of Fortune Bank's BI departments as the BI provider.

Fortune Bank's rationale for performing the RFP

FBCBI posted the RFP to elicit information from potential vendors in an effort to find a like-minded vendor to partner with them to establish a BICC. An RFP is normally posted to elicit bids from potential vendors for a product or service. One of the vendors questioned whether the FBCBI's RFP should not have been called a Request for Information (RFI) since the questions in the RFP did not divulge a specific product or a traditional service that was required. Upon hearing this, the FBCBI department agreed with the vendor's reasoning, however, they maintained the terminology RFP in accordance with their long-term view to partner with a BI vendor and not just gather information from vendors.

RFP process

At the end of 2008, FBCBI embarked on a process to find a BI vendor to partner with them to assist them to move up a few maturity levels to become a BICC. As this process tied in with the research theme of this thesis, the researcher gained permission from Fortune Bank to play a role in the RFP process. As a result, she was able to add additional questions to the RFP that would assist FBCBI in its endeavor to find the right vendor partner and would also contribute to the data gathered as part of this thesis' case study. The researcher also discussed the RFP results with the rest of the rest of the senior management team and the BI department head.

The RFP was distributed electronically to BI vendors. More than half of the responding vendors requested to remain anonymous and for their responses not to quoted verbatim, as a measure to protect their Intellectual Property (IP). The researcher complied with this, applying the same measure to all the vendors' responses. Although the content of the vendors' responses are referred to, it is not done verbatim and is done in such a way as to protect the vendors' IP.

RFP respondents answered the questions in an electronic format in response to the Request for

Proposal (RFP) using words (in the form of descriptive paragraphs) and diagrams. Responses ranged from four pages (e.g. in the case of the BI vendor that provided a poor quality response) to over 100 pages.

Questions in RFP

The RFP consisted of twenty questions. The majority of the questions listed in the RFP were compiled by FBCBI. The researcher added a few questions to the RFP, some of these were, however, vetoed by the rest of the senior management team. These are flagged accordingly in Appendix F, where the RFP is provided.

Audience and response rate

FBCBI's senior management team identified vendors to whom to send the RFP to, based on Gartner's 2008 BI magic quadrant diagram (Richardson *et al.*, 2008:2) (Figure 3 below). Gartner's magic quadrant is a categorisation of Gartner's opinion of the main software vendors, globally, that organisations should consider when embarking on a BI initiative. The senior management team supplemented this list of vendors with those they had already established contact with who were not represented on the magic quadrant. The senior management team believed that their full list was representative of BI vendors active in the South African and international BI market.

FBCBI distributed the RFP to a list of thirty six vendors. There were eight responses out of this group, a 25% response rate. FBCBI believed that this was a good response, based on the fact that not all the vendors approached specialised directly in BI and many had a purely technology focus and were therefore unable to assist from an organisational design and culture point of view, which is what was expected in response to the RFP.

Should the researcher have distributed questionnaires independently of Fortune Bank's RFP process, she would have needed to conduct a pilot test and use a method to determine what a representative sample of vendors is. Although this may have been optimal for her study, the researcher does not believe that she would have had the same response rate as when FBCBI distributed the RFP. She therefore believes being able to leverage off the RFP process assisted her study, as she does not believe that there would have been as good a response, during the turbulent economic time of 2008/2009 (Burger, 2011), had vendors been requested to answer questions purely for academic purposes. The researcher also believes that, as the purpose of this study is not to present a representative or even a comprehensive view of all vendors, that the RFP process and response is adequate for this study. The intention of including data from the RFP responses is to be able to obtain an external viewpoint with which Fortune Bank case study participants' views could be contrasted.

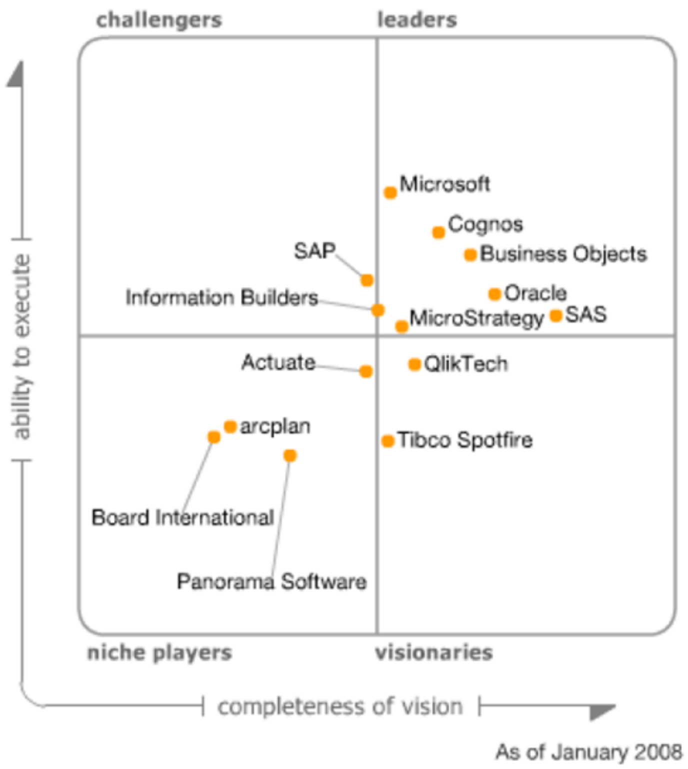


Figure 3: Gartner's 2008 BI magic quadrant (Richardson *et al.,* 2008:2)

Outcome of the RFP process for Fortune Bank

FBCBI found that the vendors' responses were too focused on product and technology offerings, overlooking the aim of the RFP, which was to partner with them to establish a BICC. FBCBI had hoped to find a partner who shared their view of BI from whom they could leverage knowledge of lessons learned, specifically regarding softer organisational issues. As none of the vendors' proposals were viable, FBCBI could not motivate further action on the RFP, specifically given that in 2009 Fortune Bank entered a phase during which time costs were cut due to the impact of the global recession on banking.

Value of the RFP responses

The RFP responses were of a high quality, except for two. One of these omitted to answer some of the questions in the RFP but presented good quality in their other answers. The other one was of an exceptionally poor quality: it did not answer any of the questions, was poorly formatted and contained a number of formatting, spelling and content errors. The RFP responses of a high quality contributed towards this study. These responses are rich and detailed and, quite unexpectedly, reference much of the available literature on BI.

Before the decision was taken to stop the RFP process, the FBCBI senior management team analysed and rated the vendors' RFP responses based on how completely questions were answered – as a first high level step of analysis. A summary of ratings is provided in Appendix G. As this research is qualitative and not empirical in nature, the fact that a number of questions were not answered or were answered poorly (as rated by the FBCBI senior managers) does not have an impact on the research. Sufficient insight emerged from the answers that were provided.

Vendors' profiles are detailed in the Case Study Introduction in Part 1 of Chapter 4 and in Appendix G.

9. Conclusion

This chapter provides an explanation of the research methodology that has been used in this thesis. It summarises the approach taken to conduct the research, starting with an overview of the research methodology as a whole, going into detail on the research process and then elaborating on each of the components of the research methodology. This consists of the research paradigm, philosophy, approach and techniques.

The next chapter is the literature study.

CHAPTER 3 PART 1: THE PROMISE AND CHALLENGE OF BI

A literature study: Promise and praise for BI, BI challenges and attempts to solve BI challenges

1. Introduction

BI is highly promoted and praised in the media. Organisations respond to this promotion and praise by investing in BI, expecting significant returns on their investments. Many organisations even list BI as one of their top priorities. Despite this, not all expectations are realised. Instead, there are numerous reports of failed BI implementations and many discussions that highlight the challenges BI faces. What is the reason for this? Why don't all organisations that implement BI reap the promised rewards? What are the challenges that organisations face when implementing and using BI – and what are the reasons for these challenges?

This part of the literature study starts to investigate these questions. It starts by analysing, firstly, the current situation in terms of what is expected from BI (the BI promise) and, secondly, the major challenges preventing BI from consistently meeting this expectation (the BI challenge). It then provides a summary of BI's challenges in this thesis's context as a foundation for the chapters that follow. Finally, it examines existing solutions proposed to overcome BI's challenges.

2. The promise of BI

2.1 Promise, promotion and praise

BI is specifically promoted and praised in terms of the benefits that the organisation is described to gain after purchasing a BI solution. Glancy and Yadav (2011:53) raise underlying business needs for and benefits of intelligence as: profitability; decision-making; questioning; and planning. The most prominent benefit of BI is raised consistently as the enablement and support of decision-making (Bardoliwalla, 2009; Chou *et al.*, 2005:343; Gao, 2006:7; Herschel, 2010a; Hočevar and Jaklič, 2010:95; Marshall et al., 2004:873; Vitt *et al.*, 2002). BI is typically marketed as the means to enable today's organisation to know what is happening now, what is likely to happen next and the actions that should be taken for optimal results (LaValle *et al.*, 2010:3). This ultimately leads to benefits such as an enhanced ability to compete, enhanced communication and collaboration, improved transparency and accountability, elimination of guesswork, faster response to change, continuous innovation and improvements such as an increase in profits, cost and time savings, timely and organisation-wide access to relevant data and better quality and control of information (Atre, 2008; Andersson *et al.*, 2008:30; Ranjan, 2008; Taskov, 2008:3-4; Watson and Wixom, 2007:97; Zeid, 2009:6). BI is no longer seen as just a back-office operation, it is now seen as a competitive differentiator (Kavanagh and Ericson, 2009).

2.2 Benefits of BI

There are countless vendor reports (e.g. from Accenture; Actuate; Business Objects; Cognos; Hyperion; IBM; Microsoft; MicroStrategy; Spotfire; Sybase; etc. to list a few) of business benefits and success attributable to BI tools, technologies and methodologies associated with these. BI vendor propositions typically emphasise intangible BI benefits, such as agility, responsiveness, customer intimacy, information sharing, collaboration, greater employee/customer/supplier satisfaction, single version of the truth, better reputation, improved public relations, etc. (Andersson *et al.*, 2008:30; Eckerson, 2003; Hočevar *et al.*, 2010:115; Macinnes, 2004:20).

Some intangible benefits that the vendors tend to promote seem superficial and restricted to the characteristics or nature of the BI solution itself (e.g. agility, responsiveness, performance) or are reduced to narrow benefits focused on individual decision makers or BI applications when compared to the intangible benefits resulting as an effect of using the BI solution (e.g. improved public relations, innovation, organization-wide synergies). However, all intangible benefits are harder to measure than tangible benefits, are unpredictable and may only be visible after a certain period of using a BI technology (Hočevar *et al.*, 2010:115; Krigsman, 2010; Negash, 2004:185; Vandergriff, 2008:433; Vanmare, 2006:i). Take for instance an idea that may result from use of a BI solution. As ideas are intangible, when examining a product or service (in the traditional sense), one does not think about the ideas embedded in them, but rather thinks about the idea in terms of the product or service (Cortright, 2001:5). This makes it difficult to link the idea to the product or service that has, for example, seen an increase in revenue.

2.3 Heavy investment in BI

Despite these difficulties in successfully measuring BI's Return on Investment (ROI), organisations are still investing in BI (Gonsalves, 2008:1). BI investment continues even despite the global economic crisis (Kanaracus, 2011). Forrester (Kavanagh and Ericson, 2009) reports no reduction in BI activity and an increase in the number of BI projects starting in 2009. Gartner (Kanaracus, 2011) indicates that the BI market continues to grow despite the world economic downturn: spurred on by both customers' demand and aggressive marketing efforts of BI vendors.

In fact, through their heavy investment in BI technologies and solutions, organisations are seen to have great expectations for BI. Predictions are that BI revenues will grow further in coming years with the release of self-service BI products and technologies such as Apple's iPad and Android tablets (Kanaracus, 2011). More than 87% of organisations across the globe have implemented a BI capability and BI has seen a massive global investment (Ackerman, 2005:1, 26; Calof and Wright, 2008:718; Coulonval *et al.*, 2010:3). Glancy and Yadav (2011:49) report that industry's annual investment in BI ranges from \$7 to \$52 billion (it is assumed that this is U.S. \$, as it is not specified), but states that the size of annual investment is a difficult number to estimate since there is not a commonly accepted definition of BI. This is corroborated by the fact that Gartner (Kanaracus, 2011) reports this at U.S. $10.5 billion for 2010. Irrespective of whether it's USD$7, USD$10.5 or USD$52 billion, BI investment is high and BI continuously emerges as a top business priority.

Trends within the South African banking industry are no different: South African banks are seen to follow the worldwide trend of investing in BI for strategic and tactical decision-making, making significant investments in BI applications, data warehouses and data marts (Vanmare, 2006:1). In a Gartner Executive Programs survey of more than 1,500 Chief Information Officers (CIOs) around the world, it was revealed that BI and related capabilities were rated as the top business priority for 2009 and 2010 (Hočevar and Jaklič, 2010:94). Gartner also identifies BI applications as the most essential technology to be purchased, highlighting how the BI market has recently experienced high growth (Chuah and Wong, 2011:3424).

In addition, BI investment has spread from typically analytical and fact-based industries – such as financial services, investment and trading – to the most typically intuitive and innate industries such as professional sports teams (Davenport *et al.*, 2005:2; Todd, 2009:36). BI is also becoming more integrated within the organisation (Andersson *et al.*, 2008:30) where it is used in various initiatives such as, for example: customer selection, logistics, service, financial management, supply chain, product/service quality, research and strategic planning (Davenport and Harris, 2007:6:24; Davenport *et al.*, 2005:6).

2.4 BI's purpose: solve the historic management issue

The above paragraphs highlight the heavy investment in BI for the purpose of achieving various benefits. The question should now asked, "what organisational needs do these benefits address or aim to address?". Taking a step back and examining these benefits, it becomes apparent that the business benefits that BI is said to result in, do not address anything new (Lönnqvist and Pirttimäki, 2006:32). Instead, they simply address long-standing managerial issues (Mendell, 1997:115-118; Pirttimäki, 2007b:4). Decision-making and analysis of the organisation to improve its performance and predict future trends have always been significant components of conducting business (Azvine *et al.* 2005). Even before the Information Age as it is often referred to (Carlaw *et al.* 2006:634; Zins, 2007:479; Kaipa, 2000:153) organisations have been striving to achieve the benefits BI is promoted for achieving. Gilad (1986) states that organisations have gathered information about their competitors since the dawn of capitalism.

Going about two thousand years back in time – when feudal states and war lords were competing with each other instead of organisations competing with each other – "enlightened rulers and wise generals" gathered intelligence on their enemies (Tzu, 2005:82). Chinese warrior-philosopher, Sun Tzu (Tzu, 1988:vii) dedicates an entire chapter of "The Art of War" to the use of spies to gain knowledge of the enemy with the aim of achieving great results (Cleary, 1988:165). More recently, but as far back as 1958, in an IBM journal article, Luhn (1958) proposed a “Business Intelligence System” to enable decision-making and organise data and information. His proposal was for the automated abstraction of data from various points in the organisation’s key processes, where such data would be encoded into documents and distributed to point-of-need in the organisation. His explanation is akin to today’s explanation of BI systems – albeit with less sophisticated technologies, methodologies and distribution methods. In an article on BI trends for 2010, Bardoliwalla (2009) describes Luhn’s article as a “brilliant visionary piece”, while other authors (e.g. Sabonovic, 2008:5; Mettler, Vimarlund, 2009:255; and Hashmi, 2001) refer to Luhn’s BI system as the seminal work on BI.

Since this, there have been numerous solutions, technologies, tools and methodologies offered to enable decision-making, data analysis and forecasting, etc. BI, with its wide and rich history, is – on the one hand – said to stem from Decision Support Systems (DSS), Executive Information Systems (EIS) and data warehousing (Frolick, *2006*:101). On the other, it is said to be unique and have unique characteristics that make it different from Management Information Systems (MIS), Decision Support Systems (DSS), Expert Systems (ES) and Executive Information Systems (EIS) (O’Brein and Marakas, 2007). BI’s unique characteristics are described to include: support for business needs that are data intensive, have cross-functional focus, require a process view and require advanced analytical methods (Glancy and Yadav, 2011:48). As these characteristics are somewhat generic, they could also be applied to MIS, DSS, etc. However, it can be said – irrespective of which of these two views is most accurate – BI and other concepts or solutions such as MIS, DSS, EIS, etc. have emerged to enable decision-making, data analysis, etc. – addressing the age-old managerial (and even military) requirement for information management and decision-making.

Additional solutions, technologies, tools and methodologies which have emerged for more-or-less the same purposes are (to list a few): analytics, Customer Relationship Management (CRM), the various types of intelligence – Customer, Product, Competitive, Collective, Strategic, etc. – and Information Management (IM). Within the literature, these terms are frequently used in the context of enabling decision-making, data analysis, forecasting, etc. and are often used interchangeably with the term BI. In addition, the scope of BI has broadened to include further technologies, tools and methodologies such as Corporate Performance Management (CPM) (Cochrane, 2009:38). This broadening of scope is often seen as a self-serving move by system vendors to include their systems/system functionality in the scope of BI, with the view to expand market share and provide end-to-end solutions (Glancy and Yadav, 2011:49) while BI is the “buzz word” and the market is demanding BI solutions. This is evidenced today with the widespread adoption of the term “analytics”. Davenport (Henschen, 2010) describes “analytics” as the new buzz word for vendors. He explains that analytics is a subset of BI based on statistics, prediction and optimisation while BI is much more focused on reporting capabilities. Davenport explains that, as “analytics” is a “sexier” term to use than "reporting", it is slowly replacing "BI" in many instances.

After the emergence of DSS, MIS, EIS, etc., BI seemed to re-emerge as the buzz word or term of choice again in 1989. In fact, many appear to ignore Luhn's 1958 proposal for BI, quoting Gartner Analyst Howard Dressner to have "coined the term" rather than Luhn as the father of the term BI. A few examples from many in the literature who quote Howard Dressner or Gartner as the origin of the term "BI" include: Baars and Kemper, 2008:132; Andersson *et al.*, 2008:1; Anandarajan, *et al.,* 2003; Anandarajan, *et al.,* 2004; Burns, 2006; Chou, *et al.,* 2005:341; Cheng *et al*., 2010; Freeman, 1999:72; Olsson and Sandell 2008:25; Glancy and Yadav, 2011:50.

2.5 BI's failure to consistently serve its purpose

Despite all these solutions, technologies, tools, methodologies, etc. proposed to assist the organisation to make decisions and achieve benefits such as cost savings, increased profits, etc., organisations do not all report to successfully achieve these benefits. Findings from scientific and professional researchers suggest that organisations are still data-rich but information-poor (Celestino, 2012; Gibson *et al.*, 2004; Williams, 2004; Williams and Williams, 2007). Organisations still lack necessary actionable information (Popovič *et al.*, 2010:10). Glancy and Yadav (2011:48-49) go as far as saying that a true BI system does currently not exist. They define a BI system as one that supports business needs and is broader than the tools or the limited scope of current BI systems. The sustained intense investment in BI across industries and across various initiatives within the organisation in response to the heavy promotion and marketing of BI, should be an indication that investors (organisations) are receiving the benefits that are promoted. Instead, there are reports that BI ROI is difficult to measure (Krigsman, 2010; Vandergriff, 2008:433; Vanmare, 2006:I; Lönnqvist and Pirttimäki, 2006:33) and still further reports of major BI challenges and failures.

3. The challenge of BI

3.1 Numerous reports of BI failure

Over 50% of all BI projects fail and the same number of vendors fail to deliver on their promises (Atre, 2011). The intense promotion and marketing of BI often leads to disappointment as not all organisations realise substantial business value from their BI investments. Some organisations find that the benefits that occur in practice are unclear and some organisations fail completely in their BI approach (Coulonval *et al.*, 2010:3; Jensen, 2010; Lönnqvist and Pirttimäki, 2006:32; Oracle, 2010:15; Turban, *et al*., 2007; Vandergriff, 2008:433). Many organisations believe that there is room for improvement in the BI environment (Atre, 2011) and that knowledge workers' effectiveness needs improvement (HP, 2009:3).

Organisations experience frustration, disappointment and despondency as challenges mount up on the long road to implement a BI solution, blocking BI success. Deluded expectations that BI is a simple activity of acquiring hardware and software products are shattered as organisations fully experience a BI implementation and discover it is a complex undertaking that requires comprehensive infrastructure and resources, over a lengthy duration (Fuchs, 2006; Watson and Wixom, 2007:96-99). On the other hand, even organisations reported to be benefitting from BI are on the lookout for opportunities to improve and overcome challenges (LaValle *et al.*, 2010:3).

Within South Africa, financial institutions are struggle to realise the value they have invested in BI technology due to the challenges they experience in unlocking actionable BI for decision-making (Ackerman, 2005:1). Based on a study of both European and South African banking institutions, it was established that a number of banking institutions believe that by merely implementing an IT solution for BI, it will be automatically be enabled (Ackerman, 2005:1). This belief is not surprising, based on the mass of vendor-focused literature discussing BI technologies and applications in support of the vendors' products and services (Vanmare, 2006:8). As a result, few banking institutions have implemented and adopted recognised intelligence processes to produce BI output (Ackerman and Wickens, 2001), relying only on IT solutions for their BI.

3.2 Numerous challenges reported for BI

Reports of BI's challenges contribute to its reputation for over-promising and under delivering. Practitioner literature consists mostly of vendors' and research houses' lists of "top ten BI challenges". While academic literature also contains these, it also offers in-depth discussion of individual BI challenges, for example: low use (Buder and Feldon, 2009), futile attempts to collect all data (Davenport and Harris, 2007:6) or absence of the right sponsor (Williams and Williams, 2007). What academic and practitioner literature have in common is that they consistently raise the same main categories of challenges. Challenges within categories of use; data; integration; alignment; personnel and skills and; sponsorship are consistently raised as BI's core challenges by numerous authors (Atre, 2003:2; Hočevar and Jaklič, 2010; Olsson and Sandell, 2008; Pirttimäki, 2007b; Sabonovic, 2008; Simmers, 2004; Willcocks and Whitely, 2009; Williams and Williams, 2007 to list a few). There are, however, many ways in which challenges may be categorised. Hwang *et al*. (2004:3) list challenges in categories such as: project, technical, educational, business, personnel, organisational, and implementation methods and Watson *et al*. (2006:7) use "organisational" and "technical" as their main categories for challenges.

Other challenges that are raised less often include, for example: BI is an ill-defined discipline in an ambiguous environment (largely defined and scoped by vendors operating from an engineering-centric worldview focused primarily on technology) (Ackerman, 2005:1; Celestino, 2012; Coetzee, 2011; Gladwell, 2009); culture (Jensen, 2010; Davenport and Harris, 2007:6); lack of understanding of the necessity for and the use of meta-data (Atre, 2003:2); politics (Morrison, 2010; Ranger, 2006; Oracle, 2010); and standalone BI solutions, piecemeal solutions and stovepipe data (Atre, 2003:2; Kimball *et al.*, 1998:162). Steffen (2009:38) brusquely states that there is a standard list of reasons why BI projects fail, listing the following: inability to meet business requirements; lack of senior management support; poor data quality; inadequate user training; performance problems; and development and testing issues.

Reflecting on the challenges raised in the literature (including examples above) two observations can be made. Firstly, it is apparent that it is acceptable for challenges to be framed either as a problem (e.g. absence of the right sponsor, inadequate training, performance problems, etc.) or in a way where the problem is implied but is not explicit. Examples of the latter are those raised as Real-Time BI (RTBI) challenges by Watson *et al.* (2006:7), e.g. acquisition of new hardware and software; processes and procedures for supporting and managing data feeds from source systems; executive sponsorship and support; etc. In the context that a challenge is defined as “a new or difficult task that tests ability and skill” (Hornby, 2005:231), the researcher believes that both of these ways of framing challenges are acceptable. A second observation is that, although challenges are raised as BI challenges, many are also applicable – some are even more applicable – to Information Systems (ISs).

3.3 The generic nature of “BI” challenges

The challenges (examples of which are raised in the section above) are consistently raised in the literature as *BI* challenges. However, when examining them in more detail, many don’t appear to be unique to BI. Instead, they are typical of generic IS and IS project challenges, as raised in academic (Lyytinen and Hirschheim, 1987:257-309; Tallon, 2007:27-268; Venkatesh, *et al.*, 2003:425-478) and practitioner (Project Management Institute (PMI), 2008) literature. Although it is reasonable to accept that BI will experience the same or similar challenges as a typical IS – based on the understanding that BI is a type of IS (Bertstein, *et al.*, 2011; Euromed Marseille School of Management, 2011; Kelly, 2010) – BI is not *just* an IS. It has unique characteristics (Glancy and Yadav, 2011:48) and challenges. In fact, Atre (2003:2) identifies that one of BI’s biggest challenges is that organisations treat BI projects in the same way as IT projects.

Unfortunately, BI’s unique (or even its specific) challenges appear to be largely neglected in today’s literature. This is a finding corroborated by the fact that many (e.g. Atre, 2003:3; Mantfeld, 2005; Williams and Williams, 2007) raise sponsorship – which can be seen as a generic challenge – as one of BI’s greatest challenges. There are, however, some online community forums that reflect attempts to highlight BI-specific challenges. For instance, the Pentaho Community’s site (Pentaho, 2011) lists a few of what it calls “BI’s unique challenges”. Firstly, “unfamiliar territory for users” is listed – users struggle to get to terms with BI’s particular technology and data terminology. Another challenge is “cost of prototypes” which highlights that, while BI prototypes could alleviate the first challenge and help to quantify benefits or RIO – which is often a challenge on its own – prototypes are normally expensive within the scope of BI. Their third challenge is that building BI solutions is akin to building a house: BI implementations won't have "usable rooms" until the house/infrastructure is complete. The challenge in this is that BI infrastructure is expensive, takes time and cannot be used until most of it has been completed.

When considering these "unique" BI challenges it becomes apparent that, while these may be valid BI challenges, they are not unique to BI and could possibly be common across a number of IS solutions of a complex nature. The challenges are, however, supported in the literature as "BI" challenges by others who also raise them in this context. For example, Atre (2011) and Kolodner and Even (2009:2-3) highlight business users' confusion in navigating complex and potentially unfamiliar BI solutions designed by technical individuals and Altosoft (2009:7) draws attention to the costly nature of BI solutions. In addition, there is much support for the fact that BI experiences challenges as a result of a complex solution architecture that is expensive to implement and maintain and only usable after significant work is completed (Altosoft, 2009:7; Negash, 2004:183).

Further analysis of the literature reflects that, while there is an apparent absence of literature that raises truly unique or even specific BI challenges, there is an abundance of literature where authors state that the challenges they raise are BI challenges. The researcher reflected on this body of literature to identify what it is about these challenges that keeps authors raising them as *BI* challenges. In doing this, she discovered two things. Firstly, that as BI is a concept that is open to interpretation and is applied differently in different organisations ((Lönnqvist and Pirttimäki, 2006:33; Olssen and Sandell, 2008:29; Sabanovic, 2008: 8-9), challenges which may appear to fit better within IS (or another area such as data management, for example) to some authors may be raised within the context of BI by others. Secondly, the researcher discovered that there are aspects to these challenges that are specifically applicable to BI. Based on this, she identifies that one of BI's significant challenges is operating in an ambiguous environment, which even appears to extend to impact the ability to raise and/or agree on specific challenges for BI.

3.4 BI challenges per category

Further challenges the literature raises as BI challenges are discussed within categories that emerge most consistently in the literature (highlighted in 3.2 above). Main challenges and challenges that contribute towards causing the main challenge are reflected. As such, differentiation is made between resultant and causative challenges – e.g. the challenge of using BI optimally results from an overwhelming volume of data, unfamiliar territory for users, etc. Furthermore, while a challenge is listed under a main category, it may also be applicable to other categories and is not mutually exclusive – e.g. e.g. volume of data, poor/absent meta data and dominant focus on data processing may also be categorised under "data".

3.4.1 Challenge category 1: BI use

3.4.1.1 Using BI optimally

Users do not always use BI systems or outputs (e.g. reports, data) optimally, use them incorrectly or infrequently and often only use a fraction of the available functionality (Oracle, 2010:3; Buder and Feldon, 2009:1; Popovič *et al.*, 2010:13; Sharma and Djiaw, 2011:114). Investment in BI is wasted as organisations fail to apply it in the decision-making process (Laughlan, 2009). A number of reasons why BI is not used or is not used optimally emerge in the literature, these are:

Volume of data that is processed is overwhelming

With IT predicted to be a hallmark of how organisations (banks in particular) interact with their customers in the future (Tallon, 2010:244), even more data collection opportunities are likely toemerge than are currently available. However, individuals (both personnel and the organisation's customers) are already unable to process the massive amount of data and information at the speed at which technology generates it resulting in "data deluge" (LaValle *et al*., 2010:90-91) or "*analysis paralysis*" (Davis *et al.,* 2011:3). Due to this overload, much information is lost or ignored (Stedman, 2010:16), only exceptional conditions are examined (Folinas, 2007:68) or customers choose simpler alternatives (Davis *et al*., 2011:3). Up to 60% of executives say they have more information than they can effectively use. This explains why it often takes managers hours or days to answer basic business questions (LaValle *et al.*, 2010:90-91). It seems that data is collected based on the fact that technology is able to do it, rather than on a need for the data – technological speed distracts from questioning appropriateness of its actions (Willcocks and Whitely, 2009:191).

Unfamiliar territory for users

BI is an unfamiliar territory for users (Pentaho, 2011). Today's typical BI user experience is disorienting, frustrating, complicated and time consuming (Atre, 2011; Popovič *et al.*, 2010:13)). A user with a business focus rather than technology focus typically experiences frustration when trying to navigate complex data warehouse repositories or understand data, structures and terminology embedded in the BI solution by a BI or IT team (Kolodner and Even, 2009:2-3).

Poor or absent metadata and training

When a datamart is built using one business unit's terminology, business rules and structures, a user from another area needs metadata to understand and use it. However, metadata is often absent or the user is not trained on how to use it or the importance of it (Atre, 2003:2; Steffen, 2009:38). Furthermore, training often focuses narrowly on how to use a BI tool rather than on how to leverage the underlying data (HP, 2009:8).

A gap between the BI application or output and human decision-making

A top reason BI is not adopted is that the typical user does not know how to ask the right question, make the correct assumption or understand how to use BI (Hopkins *et al*., 2010:30). The result is frustrated users who cannot get answers ("GIGO – Garbage In = Garbage Out") (Mantfeld, 2005) and a wasted BI investment (Todd, 2009:36). Asking the right question is a precursor to making intelligent decisions and BI software only provides information up to a point (reactive knowledge), human decision-making processes need to be applied thereafter to result in proactive knowledge (Green, 2007:18; Ranjan, 2008:464; Pirttimäki, 2007b:11).

Adapting to use BI to make decisions and difficulties making decisions in BI environments

Another factor to consider is that it is difficult to change from making decisions based on personal knowledge, experience and intuition to making them based on facts (LaValle, 2010:7). Often, where a decision-maker is unable to use BI, the problem is believed to be with the decision-maker (Atre, 2011). However, decision-making within a BI environment is often challenging owing to information that is difficult to use. When under pressure, decision-makers often rely only on instinct and experience, perceiving they save time and believing that, as they've survived business challenges based on instinctive decisions before, that it will always work or is the best approach to decision-making (Todd, 2009:36). As a result, nearly half of all major decisions are still based only on intuition rather than on facts (Davenport *et al.*, 2010:1).

Providing BI that is relevant, timeous and valued by the user

A significant challenge is the delay experienced from when data is created to the time it becomes available for use, although this is often resolved through Real-Time BI (RTBI) (Nguyen *et al*., 2005:162; Azvine *et al*., 2006:4; Watson *et al*., 2006:12). It is only possible to use data effectively when it is accurate, up-to-date, complete and available when needed (Marshall and Harpe, 2009). BI customers want adequate answers fast enough to action a decision (BI Summit, 2012), often discarding new information that enters the decision-making process when momentum has already built up (Ghoshal and Kim, 1986:55). This is compounded as the decision-maker's world is constantly changing, including changes to their business processes resulting from BI implementation (Watson *et al*., 2006:12).

In addition, there are complex interactions between information and its source that influences the way it is perceived and acted upon. The same piece of information can be valued differently when received from different people, for example, a trusted employee *versus* a stranger from another department (*ibid*). KPMG Research (Coulonval *et al.*, 2010:3) confirms that 70% of executives based in the United Kingdom (UK) do not get the right information to make business decisions due to poor timeliness and or quality. These points highlight that BI is context and decision-maker dependent (Herschel, 2008a) as well as dependent on format, source, relevance, usability (of format and BI from the perspective of the user) and timeliness in context of ability to react.

Providing BI that is valued by and suited to the organisation's culture

Organisational culture is a factor that determines, to a great extent, whether or not BI is valued and therefore used. Organisational culture, a soft concept compared with hard concepts such as BI or analytics (Davenport, 2006:9), is a shared set of assumptions, beliefs and expectations that the organisation (or groups within the organisation) have developed while learning and adapting to the internal and external environment (Schein, 1985:5; Grantham, 2000:34). Organisations with an inflexible culture or those that shy away from information sharing and innovation may miss the opportunities that BI offers (Hopkins *et al.*, 2010:30; Imhoff, 2004; Taskov, 2008:3). In addition, factors such as information sharing willingness, ability to specify BI requirements in accordance with partly defined business decisions and willingness to participate in information sharing or organisation-wide data integrity impede on the ability to use BI.

Catering for different user needs across the organisation

BI professionals have tried to group different types of business users, workloads and data types into the same solutions and architectures, only to get disappointing results (Eckerson, 2011). Average users may find BI tools and data repositories too complex (resulting in the tools not being used – becoming "shelf ware") while power or super users find them too limiting (resulting in them using the tools only to populate their own spreadsheets or desktop databases). Today's business environment demands agreement on the meaning of data amongst users whose perspective is skewed to suit individual needs (Folinas, 2007:68) and users' needs differ vastly. Getting the right data to the right decision-maker (Todd, 2009:35) through the right distribution mechanism and in the right format (Alter, 2003:10; Baars and Kemper, 2008:133) are major BI challenges.

Dominant focus on data processing reduces time/capacity for use

Many organisations do little more than try to collect all their data, spending too much time on data gathering compared with analysis (Davenport and Harris, 2007:6; Popovič *et al.*, 2010:13). Figure 4 reflects how South African organisations spend more time collecting data and maintaining spreadsheets, rather than on using it to conduct analysis and gain insight (Morrison, 2010). This is likely to result in a low organisational BI maturity level, unproductive use of BI resources' time, inability to take actionable decisions based on BI (Ericson, 2009:15) and a decrease in the organisation's overall performance (Hopkins *et al.*, 2010:29). The dominant focus on data processing ensures the organisation does not mature to a level of sophistication where data management is performed adequately, disempowering it from using BI to answer important business questions (Accenture, 2007; Kimball, 1988:117; LaValle *et al.*, 2010:9). Todd (2009:36) compares this to failing to react to a hostile environment because one is focused on how one's heartbeat or respiration rate compared to historical rates for this.

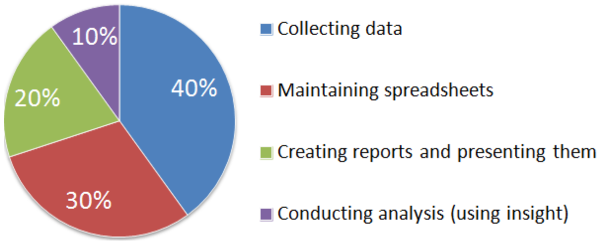


Figure 4: Percentage of time South African organisations spend per BI activity (Morrison, 2010)

Low use overlooked as use is often measured according to volume of software applications and licences sold

Low use of BI is often overlooked as vendors generally testify to increased BI software use, typically equating software sold with software used (Pendse, 2009). In reality, however, BI applications and the related licences become expensive "shelf ware" due to large purchases of BI software that intended users do not use or do not use regularly. Large purchases may be made to qualify for bulk discounts or to cater for anticipated future growth. In addition, BI implementations may be unsuccessful and temporarily or permanently halted after software/licences have been purchased, resulting in no use or reduced use of the BI solution and associated licences.

3.4.2 Challenge category 2: Data

Challenges related to data are consistently raised within literature on BI challenges, possibly resulting from the fact that successful BI is dependent on a solid foundation of data (Atre, 2011).

3.4.2.1 Managing "big data"

The advent of unprecedented "big data"

With organisational information expected to double every 11 months, the volume of data organisations need to manage is exploding (McKinsey, 2011; Zeid, 2009:5). Ironically, a few years ago, organisations saw collection and storage of huge volumes of different types of data collected at different velocities (i.e. "big data" – in terms of velocity, volume and variety) as a technology challenge (Russom, 2011:6). Now, technology has caught up and organisations have moved from having been unable to afford or manage big data to spending their BI budgets on collecting and analysing it (Russom, 2011:4) and struggling with resultant challenges. Section 3.4.1 above already discusses the resultant challenges that impact on the use of BI. This includes the organisation's propensity to focus on collecting and processing as much data as possible, which leads to an unbalanced use of time as well as high volumes of data that intimidate users.

Storing and accessing big data spread across the organisation in various formats/sources

Decision-makers tend to believe information does not exist if it is not organised and ready at their finger-tips immediately when needed (Todd, 2009:36). However, storing and accessing data involves much complexity due to the various formats and types of data sources that are collected (Zeid, 2009:5) as well as the intricacies involved in how the data is stored in the organisation.

Data is now collected from structured, unstructured and semi-structured sources that were previously untapped, e.g. the Internet (Chung *et al.*, 2003:1), social media, web applications, third parties, devices, sensors and data feeds in real time. This includes information disbursed across the organisation in many different formats (e.g. text, images, video, etc.) and from many different sources (ERP, legacy systems, web servers, email repositories, etc.) (Frolick and Ariyachandra, 2006:47). It may be stored redundantly in multiple, disparate data sources where it lacks accuracy, consistency and timeliness (Accenture, 2007; Davenport *et al.*, 2005:7; Atre, 2011; Popovič *et al.*, 2010:13). Furthermore, while BI is fuelled through the use of information aligned with business performance (Green, 2007:18), data is not usually organised or stored according to this or according to analytic competences and disciplines (LaValle *et al*., 2010:3) or the BI questions that may be asked.

Absence of information management methods, governance and data quality

An overwhelming volume of unfocused data often results from failure to plan information (Green, 2007:18; Petrini and Pozzebon, 2009:181; LaValle *et al.*, 2010:9). Information planning is necessary as data are increasing in complexity in both structure and semantics (Nguyen *et al*., 2005:162). Failure to plan contributes to more time spent on integrating, cleaning and managing data, i.e. less time spent on analysis and use activities (Zeid, 2009:5). It also results in clashes between departmental level data requirements and strategic targets. Organisations in this situation tend to start individual BI efforts without consideration for organisation-wide strategic business direction (LaValle *et al.*, 2010:7,13; Davenport, 2006:6).

This leads to interim or rebel solutions and misalignment between different types of users and business functions in the organisation (discussed further in Section 3.4.4). Further data challenges result from this, e.g. ambivalence in data ownership, standalone BI solutions, stovepipe data or piecemeal BI solutions and poor or absent data governance (Atre, 2011; Davenport, 2006:7; Kimball *et al.*, 1998:162).

Lack of planning and governance open the door for poor data quality. In terms of BI, quality is information that is accurate, timely, relevant, complete and consistent (Shanks and Darke, 1998; Wixom and Watson, 2001). Data quality is often listed as one of BI's top challenges (Steffen, 2009:38), highlighting how successful BI is reliant on quality data.

3.4.3 Challenge category 3: Integration

3.4.3.1 Integrating BI across many complex technology, data and business layers

Overlooking integration activities

Significant work is needed to integrate BI with the organisation's existing architecture, data and processes as well as supplier and other external interfaces and applications the BI solution potentially needs to collect data from or push data to. However, integration activities are often considered a "hidden" aspect of BI and are often overlooked or are performed in a rush (Azvine *et al*., 2006:5). BI is not about simply acquiring or developing and implementing BI hardware and software. It involves a comprehensive approach that considers multiple complex relationships, business processes as well as layers of infrastructure and resources across the organisation (Fuchs, 2006; Watson and Wixom, 2007:96-99).

Complexities related to the organisation's technology, data and business layers

Complexities arise as many of the organisation's processes that BI must integrate with are not even documented, referred to as "dark" or unknown processes (Cody *et al*., 2002:697-8; Marjanovic, 2007:1530). Furthermore, integration of different data types and collaboration across the different data and infrastructure layers' languages and protocols increase complexity (Chisholm, 2008). Strategic and tactical data must be integrated into data warehouses in such a way that various query types can still be performed (Daya *et al*., 2009:1; Saggion *et al*., 2007:1; Watson *et al*., 2006:12). Most organisations' IS landscape consists of a complex grid of applications (Schelp and Winter, 2007:1). Not only is integration needed across the various technical layers of the organisation's architecture, but users have different jargon, business terms and data definitions that often affect the speed or ease of integration activities (Folinas, 2007:68).

Complexities resulting from organisation-wide issues

Frustration occurs as organisation-wide issues such as Enterprise Architecture (EA) or organisational strategy are ignored (Chisholm, 2008). There is a general expectation that BI can simply be added to an EA without consideration for other impacts. For example: knowledge of the abstractions and transformations that must take place in the development of the operational solution; existing legacy systems with which the BI solution must operate; how data warehousing architectures designed for batch processing must adapt to handle high velocity volumes and different types of data (Folinas, 2007:49; Chisholm, 2008; Eckerson, 2011). As described above, the Pentaho Community (Pentaho, 2011) compares building BI to building a house, highlighting that BI infrastructure is expensive, takes time and cannot be used until most of it has been completed, highlighting another frustration in this regard.

3.4.4 Challenge category 4: Alignment

3.4.4.1 Aligning and balancing the needs of the various role players in BI

The BI department needs to align with various departments and people in the organisation as well as third parties such as BI vendors, recruitment agencies, third party data suppliers, etc. to be able to provide BI solutions and populate them with the appropriate data. At the same time, the BI department has various customers across the organisation with BI requirements. Misalignment occurs at many levels, between various parties and for various reasons. The literature highlights the following:

Misalignment between BI, IT and the business

There is a fundamental gap in both focus and expectation between BI, IT and business departments in the organisation when attempting BI (Cooter, 2009; Krigsman, 2010). The strained relationship between IT and the business is already well known and documented. When the BI department is added to this, further complications and strain arise.

Conflict arises as IT and/or BI are seen by the business as “the gatekeeper to data and technology” (Atre, 2003), unable to meet business requirements (Steffen, 2009:38) or to focus on understanding BI technology at the cost of understanding the business requirement (Ranger, 2006). The latter may cut BI off from other organisational assets and leads to separation from business customers (Jensen, 2010; Oracle, 2010:3). The relationship is weakened further when the business is brought in as an afterthought when BI or IT makes decisions on BI solutions (Ackerman, 2005:1; Sherman, 2010).

At the same time, IT and/or BI experience frustration with business departments that do not understand their data, don’t know their requirements or are unavailable or unwilling (Atre, 2003). BI departments may face added pressure and react negatively to further pressure or new requirements from the business if they are already working on business requirements and providing 24/7 decision support (de Grauw, 2011). Conflict arises between BI and IT when roles and responsibilities are not explicitly clarified and agreed upfront (Cooter, 2009). In such cases, either IT or BI see the other to overstep boundaries, duplicate work and effort or else make assumptions about which department is responsible to complete tasks, resulting in mismatched expectations and later, in BI failures.

Misalignment between BI vendors and the organisation

BI software vendors experience frustration with organisations that fail to achieve an organisation-wide view and objectives, a practice that is said to contribute towards BI failure (Chuah and Wong, 2011:3424).

Misalignment between departments and levels

Conflict may also occur due to differences between departmental level data requirements and strategic targets (LaValle *et al.*, 2010:7,13; Davenport, 2006:6), or where advanced business users set up interim or "rebel" solutions independently from the BI department (HP, 2009:5). In such cases, the users may believe that the BI department is not meeting their needs quickly enough or is not providing the right solutions. They may also simply fail to buy-in to a BI department's "single version of the truth" (SVOT) vision (*ibid*). Unfortunately, interim or rebel solutions typically lead to further misalignment and conflict in relationships as well as challenges related to inconsistent data sources and BI solutions, e.g. different answers to the same questions or lack of senior management support for interim solutions that grow into permanent solutions (Williams and Williams, 2007).

Another source of conflict occurs when roles and responsibilities to use BI are not clearly allocated. Ghoshal and Kim (1986:54) describe the situation where BI is not used for this reason and management believe staff should be using BI and staff think BI solutions have been purchased for management.

3.4.5 Challenge category 5: BI Personnel and skills

Recently it has been advocated that it's not just people who are the organisation's greatest asset, but the knowledge worker and their productivity (Drucker, 1999:135). While this highlights the importance of the human element, it should not be misconstrued that by simply setting up a BI staff complement that BI will be successful (Ghoshal and Kim, 1986:149). If either the right BI skills or the right utilisation of these skills are absent, BI faces challenges (Atre, 2003:2).

3.4.5.1 Recruiting, retaining and using BI personnel and their skills effectively

Specialist personnel are high in demand but short in supply

As is the case with other specialist fields, BI faces challenges in recruiting specialist personnel who are in high demand and short supply, managing the initial learning-curve and then retaining them when staff may wish to move on after gaining specialist knowledge and experience (HP, 2009:5). Davenport *et al*. (2005:7) state that, as more organisations try to compete using BI, the demand for analytical staff grows at an unprecedented rate. This is confirmed by Herschel (2008b), who draws attention to employers' "desperate" pleas for people with strong technology and analytical skills. In a later publication, Davenport (2006:7) states that identifying, attracting, recruiting and retaining the right BI personnel is a challenge for most organisations, making it a differentiating competitive factor when an organisation gets this right.

A broad skill set is required

What makes recruitment a specific challenge for BI compared with other specialist fields or IS is perhaps not this recent heightened demand and short supply, but rather the broad technical, analytical and business skill set and ability to communicate and interact with all levels in the organisation that is required in a BI resource (Atre, 2011; Howson, 2006). Successful BI depends on BI resources demonstrating hard skills and aptitude to manage complexity and interpret and translate figures and statistics into something that is meaningful in the business world: resources must be able to frame and answer business questions (HP, 2009:5).

3.4.6 Challenge category 6: Sponsorship

3.4.6.1 Absence of the right type of sponsor

Absence of a sponsor who understands BI

This is raised consistently as a major BI challenge (Chuah and Wong, 2011:3424; LaValle *et al.*, 2010:8-9; Mantfeld, 2006; Steffen, 2009:38; Williams and Williams, 2007). Michalewicz (2010) states that many perceive this to be the most important aspect of a BI project. Although this appears to be a generic IS challenge, what is specific to BI is that the right type of sponsor is someone who understands BI (Howson, 2006) and is not under the misapprehension that BI is a quick or easy feat, accomplished through implementation of an IT solution alone (Williams and Williams, 2007). Where a sponsor believes this, they typically fail to get sufficient funding or support and impact on BI's reputation and longevity in the organisation (*ibid*).

In addition, without the right type of sponsor, BI is set up for further challenges. For example: BI opportunities are not even considered as they are overlooked in favour of day-to-day business activities (Stupakevich, 2010); political roadblocks become insurmountable challenges; data quality ownership remains unallocated; measurement of BI ROI is not conducted or is not conducted properly; scoping and prioritisation of BI initiatives become challenging (Atre, 2003:3).

3.5 Summary of BI's challenges

A consolidated list of BI challenges is reflected in Table 2, based on challenges raised within main categories in Sections 3.1 to 3.4 and those briefly touched upon in Sections 3.1 to 3.3. While it is recognised that each challenge reflected in Table 2 may not appear to be a unique or specific BI challenge, the above discussion (at a more detailed level) provides support why the challenge is raised as a BI challenge from within the literature.

As stated above in Section 3.4, the researcher identifies resultant and causative challenges. These are reflected in Table 2 as bold headings reflecting resultant challenges, with causative challenges as bulleted items beneath each of these (with an exception noted in 02). Also as stated above, it is recognised that there are many ways in which BI's challenges may be categorised. Categories in Table 2 reflect just one perception of the main categories based on the researcher's interpretation of the literature. These categories are used as they provide the researcher with a useful means of comparison for in upcoming chapters in this thesis.

Table 2: Summary of BI challenges reflected in the literature

Key:

Ref – Reference

U – Use; D – Data; I – Integration; A – Alignment; P – Personnel and skills; S – Sponsorship; O – Other;

Z – Out of scope challenges are reflected in Italics

Ref	Challenge
	Using BI optimally
U1	• Volume of data that is processed is overwhelming
U2	• Unfamiliar territory for users
U3	• Poor or absent metadata and training
U4	• A gap between the BI application or output and human decision-making
U5	• Adapting to use BI to make decisions
U6	• Providing BI that is relevant, timeous and valued by the user
U7	• Providing BI that is valued by and suited to the organisation’s culture
U8	• Catering for different user needs across the organisation
U9	• Dominant focus on data processing reduces time/capacity for use
U10	• Low use overlooked as use is often measured according to volume of software applications and licences sold
	Managing “big data”
D1	• The advent of unprecedented “big data”
D2	• Storing and accessing big data spread across the organisation in various formats/sources
D3	• Absence of information management methods, governance and data quality
	Integrating BI across many complex technology, data and business layers
I1	• Overlooking integration activities
I2	• Complexities related to the organisation’s technology, data and business layers
I3	• Complexities resulting from organisation-wide issues
	Aligning and balancing the needs of the various role players in BI
A1	• Misalignment between BI, IT and the business , BI vendors and the organisation and between departments and levels
A2	• BI infrastructure is complex, expensive, takes time and cannot be used until most of it has been completed
	Recruiting, retaining and using BI personnel and their skills effectively
P1	• Specialist personnel are high in demand but short in supply

Ref	Challenge
P2	• A broad skill set is required
	Getting the right sponsor in place
S1	• Absence of a sponsor who understands BI
01	Measuring ROI • Realising and measuring ROI
02	Operating in an ambiguous environment • BI is ill-defined and its environment is ambiguous • Treating BI the same as an IT project • These challenges result in: Difficulties in raising BI specific challenges
Z1	*Generic IS and IS project and implementation challenges* • *Performance problems* • *Development* • *Testing*

** Challenges referenced as Z1 are out of scope as this thesis is specifically directed at BI's challenges and not generic IS implementation challenges.

4. Attempts to solve BI's challenges

Before examining BI at a deeper level to determine possible reasons for its challenges (as is done in sections and chapters that follow) – it is necessary to question what has already been done to overcome these challenges. This section discusses some examples of existing approaches to overcome BI's challenges that are currently available in the literature. It should be borne in mind that the the intention is not to provide an exhaustive list, but rather an indication of the current state of attempts to resolve BI's challenges.

4.1 Critical Success Factors (CSFs)

An approach that emerges consistently as a resolution to BI's challenges in the literature is the CSF. While CSFs alone are a representation of measures and need an overarching management approach to be used to successfully plan and control, CSFs are seen to be useful as they can be understood by a wide audience, "executives, managers and IT professionals" (Arnott, 2008). The Business Dictionary (2012) defines CSFs as characteristics, conditions or variables with a direct and serious impact on the effectiveness, efficiency and viability of an organisation, programme or project. This dictionary states that CSFs must be performed at the highest possible level of excellence to achieve intended overall objectives, referring to Key Success Factors (KSFs) or Key Result Areas (KRAs) as synonyms.

Lists of CSFs – frequently appearing as "top ten" or "top five" lists – are abundant in the literature and, when juxtaposed with the challenges, appear to offer the antidote to the challenges. Papadopoulos and Kanellis (2010:16) highlight that BI implementations are typically accompanied by lists of CSFs, such as those provided by Miller *et al.*, (2006) and Ranjan (2008:461-475). They raise that these approaches seem to isolate single success variables such as strong executive sponsorship, organisational accountability, etc. Glancy and Yadav (2011:51-52) echo this sentiment, while raising similar examples of CSFs. As with the BI challenges raised in the literature, many of the CSFs are also applicable to ISs in general, e.g. user support, effective communication, clear requirements. Each main challenge category (excluding 01 and 02) is supported.

Table 3: Relationship between BI challenges and BI CSFs

Examples of CSFs	Support from the literature
Using BI	
• Change management (overcome resistance) • User support and training • User participation and involvement • Organisational culture that supports BI use	• Ariyachandra and Frolick (2008:116-117) • Glancy and Yadav (2011:51-52) • Howson (2006) • Wixom and Watson (2001:20) • Yeoh and Koronios (2010)
Managing big data and integrating BI across the organization	
• Meta-data • Data management, standardisation, quality and maintenance • Solid data warehouse or source as a firm foundation • Existing data management as infrastructure • Iterative BI project planning methods (to repeatedly transform data into information) • Leverage off of existing data and applications • Internal needs of the organisation	• Ariyachandra and Watson (2006:4-6) • Atre (2003:6, 7) • Barrett and Barton, (2006) • Glancy and Yadav (2011:51-52) • Hawking and Carmine (2010) • Hwang *et al*. (2004:13) • Moss and Atre (2003) • Venter (2009:152-156) • Wixom and Watson (2001:20)
Aligning and balancing the needs of the various role players in BI	
• Clear link to business strategy • Align BI with business, across organisation • Organisational accountability and representation • Alignment of organisational dimensions (e.g. technical infrastructure, human capital, organisational culture, etc.) with BI ob-	• Ariyachandra and Frolick (2008:116-117) • Arnott (2008) • Atre (2003:6, 7) • Hawking and Carmine (2010) • Hwang *et al*. (2004:13) • Moss and Atre (2003)

Examples of CSFs	Support from the literature
jectives • Combine BI with other corporate performance measurement tools • Cross-organisational collaboration • Effective communication • BI development methodology • Use of a good project methodology • BI development methodology linked to cross-organisational requirement • Clearly identified and specific information needs • Clear requirements • BI must not be IT-driven • Focus on core business issues or competencies • Use of champions	• Papadopoulos and Kanellis (2010:16) • Politano (2007) • Venter (2009:152-156) • Vessel (2005:27-30) • Wixom and Watson (2001:20) • Zeid (2009:10)
Recruiting, retaining and using BI personnel and their skills effectively	
• Appropriate BI skills • Available and adequately skilled resources • User support and training	• Ariyachandra and Frolick (2008:116-117) • Atre (2003:4-5) • Wixom and Watson (2001:20)
Getting the right sponsor in place	
• Business and management involvement, sponsorship and support • Business representatives/champions • Strong executive sponsorship • Drive a BI solution by way of a framework of intangible valuation areas • Top management support	• Ariyachandra and Frolick (2008:116-117) • Arnott (2008) • Atre (2003:4-5) • Biehl (2007: 52-58) • Eckerson (2006) • Glancy and Yadav (2011:51-52) • Hwang *et al*. (2004:13) • Papadopoulos and Kanellis (2010:16) • Wixom and Watson (2001:20)

It seems logical to simply apply the inverse of a challenge to resolve it. For example, where lack of BI sponsorship is identified as a challenge, highlight adequate and appropriate sponsorship as a CSF. However, the existence – or even implementation and practice – of CSFs does not appear to have solved BI's challenges. Although CSFs should be conducted at the highest possible level of excellence to ensure success – or at least have a good chance of success – CSFs are not resulting in BI success or consistent success. Consider the following arguments from the literature and alternative suggestions to the CSFs to resolve BI's challenges.

4.2 Actor-Network Theory (ANT)

Papadopoulous *et al.* (2010:25) criticise the narrow scope and fragmented view that the typical CSF approaches offer, stating that these offer little or no help to those in need of a holistic and systemic approach to BI implementation. They go on to state that success and failure cannot be confined to "*a-priori* determined" (italics in original text) CSFs but that success is based on a holistic and complete understanding of the various issues and agendas. Papadopoulous *et al.* (2010:25) propose Actor Network Theory (ANT) to enable boundaries to be drawn over an otherwise large implementation landscape and manage it successfully.

Their research contributes to the body of knowledge on BI implementation as it reflects human and non-human actors and networks involved in the various implementation phases of a BI solution, up to training and maintenance. Furthermore, it highlights that a persistent connection is needed from the level of data to that of business strategy. Unfortunately, their research is restricted to BI implementations and does not address one of the key challenges of BI – use. In addition, their research does not link resolutions back to the key challenges experienced. It may be useful to continue and extend their research of ANT within the scope of post-implementation *use* of a BI solution. However, an extension towards ANT is beyond the scope of this thesis.

4.3 Multi-faceted solutions using CSFs

Wixom and Watson (2001:19) provide further criticism of the individual CSFs, stating that simply applying one, multiple or even all CSFs does not guarantee BI success. They (*ibid*) advocate that resolution of BI's challenges should be treated as a multi-faceted construct where multiple appropriate CSFs (based on objectives and the context of the research phenomenon) are considered alongside possible relationships between CSFs in a dimensional research model.

However, even Watson and Wixom's approach – which is more comprehensive than the CSFs alone – can be seen to be insufficient to achieve BI success. Nandhakumar (1996) and Bussen and Myers (1997) – in similar but separate studies to each other – advocate a deeper analysis of CSFs. They state that a study of static CSFs (individual or in relationships) is insufficient for explanation of system outcomes. They recommend analysis of CSFs in conjunction with historical, political, social and economic factors as well as factors such as organisational context, culture, planning, strength of needs, BI maturity phase and phase of implementation.

This provides a necessary view on the social aspect of BI implementations. In addition, Nandhakumar and Bussen *et al.*'s research provides insight into how CSFs can be used, the interrelationship between CSFs and the influence and importance of the CSFs during the BI project. However, it is limited to BI projects up to the point of BI implementation – much like that of Papadopoulous *et al.* (2010:25).

4.4 Critical Contextual Success Factors (CCSFs)

Further authors (Olbrich *et al.,* 2012:4148) agree that CSF literature, while revealing, is insufficient. They state that existing studies only focus on the importance (relevance) of a factor, missing important management issues such as uncertainty and controllability. They recommend that the context in which CSFs apply is taken into account, providing a study of Critical Contextual Success Factors (CCSFs). They define CCSFs as factors outside BI system implementation and maintenance which influence BI system success – either positively or negatively. The authors provide a list of 27 CCSFs, examples of which are: corporate strategy, IT budget, influence of IT on corporate strategy, frequency of product innovations, IT literacy of employees, etc.

Although the provision of context in the form of relevance, controllability and variability for CSFs undeniably adds a multi-dimensional depth to the traditional study of CSFs, Olbrich *et al.*'s (2012:4148-4155) study centres on CCSFs within environmental and organisational parameters of designing a BI system (or IS). As such, these focus on the typical systems development lifecycle activities of designing and implementing a system and neglect the use of the system once implemented.

4.5 BI Maturity Models (BI MMs)

Still further authors (Chuah and Wong, 2011:3424, 3427) explain how BI MMs could be used to guide and plan large-scale BI implementations, thereby increasing the probability of success. BI MMs (also referred to as Maturity Assessment Models) may be used to assess and evaluate capabilities of organisations in the field of BI (Raber *et al.*, 2012:4226). Rajterič (2010:47) highlights how they can be used to justify BI system investment. There is considerable overlap in the work of Chuah and Wong and Rajterič who provide examples of BI MMs such as The Ladder of BI (LOBI); Williams and Williams' (2007) BI MM; AMR Research's BI/Performance management MM Version 2; and The Data Warehouse Institute's (TDWI's) MM.

Further examples of BI MMs can be found in practitioner literature (e.g. from Gartner (2008) and Forrester (Forrester Research, 2010)) and literature provided by various consultancies and vendors (e.g. Accenture, IBM, SAP, etc.). Gartner (2008), for example, provides a list of maturity stages and characteristics that can be evaluated and measured to determine the phase of maturity that the BI department or organisation being measured fits into. Characteristics include, for example: Total lack of awareness (of BI), limited users, BICC in place, spreadsheet and information anarchy, effective use by users driving business strategy, etc. Their aim is to assess existing maturity, map out planned maturity and plan the steps to close the gap between existing and planned levels of maturity. While this can be useful – BI MMs can provide a baseline for comparison – the available BI MMs tend to focus on a specific viewpoint and problem domain (Rajterič, 2010:47).

This is echoed by Chuah and Wong (2011:3424, 3427) who state that BI MMs or even a combination of these MMs fall short of solving BI implementation problems. According to their research and analysis, most of the maturity models do not consider all factors affecting BI, some focusing only on data warehousing and others on knowledge management, for example. Instead, Chuah and Wong request an integrated MM that includes factors such as: user satisfaction; user readiness for further development; system acceptance; system quality from the content viewpoint; customisation to specific user group; etc. Mention of factors such as user satisfaction, user readiness, system quality and customisation highlight that, unlike other approaches discussed above, Chuah and Wong have insight of the fact that there is a need to address the challenge of BI use. Chuah and Wong are successful in identifying this gap that needs to be filled.

Raber *et al*. (2012:4219-4221) also find fault with existing BI MMs, highlighting that, while there are numerous BI MMs that are proposed in the literature, these share common weaknesses. For example: poor theoretical foundation, absence of documentation and methodology, unclear specification of the BI maturity concept and absence of evaluation with real world scenarios. Raber *et al*. (2012:4226) propose a BI MM based on an explicit maturity concept and transparent construction, based on technical and business related aspects of BI.

Another example of how models may be applied to improve BI is from Goul and Corral (2007:915) who suggest improving decision support by analysing the organisation's context (e.g. its data warehouses, knowledge and model management) through an Enterprise Model Management (EMM) lens. In congruence with the proposal of Raber et al., Goul and Corral's proposal involves the complete context of the systems, people and processes engaged in activities impacting an organisation's state of affairs.

Again, although these BI MMs and model applications may overcome many of the shortcomings identified in existing BI MMs and approaches, they do not specifically address BI's challenges and are not explicitly applied to the full BI service flow – from data gathering to use of BI for decision-making, As such, the existing BI MMs and model applications are identified to be ineffective in addressing the research presented in this thesis, i.e. to assist BI to overcome its prevailing challenges.

4.6 BI frameworks

Much research has been conducted on the topic of BI frameworks (Liyang *et al.*, 2011:1025). Despite this, the term "framework" is used ambiguously within the literature on BI. It is used interchangeably with terms such as architecture, environment, model and even value chain (e.g. Huggins, 2010; Eckerson, 2003; Liyang *et al.*, 2011:1025-7; and Viaene, 2008:29 respectively). Within this thesis, a BI framework is considered to be a broad set of ideas and principles based on relevant fields of enquiry, used to provide structure and a coherent view of the topic or research phenomenon (adapted from Reichel and Ramey, 1987).

The emergence of BI frameworks

BI frameworks within academic literature appear to emerge as improvements in response to identified inadequacies within an existing framework or system or in response to a new demand or opportunity. Examples of the former are of Xie and Zhou's (2008:3) BI system framework based on RosettaNet Frame and of Folinas' (2007) conceptual framework for BI based on business activities monitoring systems. Both of these identify shortcomings in existing frameworks and offer their frameworks as improvements. An example of the latter is of White's (2009:12) Enterprise Framework which presents a response to increased BI processing needs, the emergence of the information worker audience and advancements in technologies. Further examples of the latter can be found in the responses to developments such as Open Source, Service Oriented Architecture (SOA), Enterprise Architecture (EA) and even Software as a Service (SaaS). Examples of these are of Baars *et al.*'s (2007:1162) BI outsourcing framework that incorporates Information Technology Information Library (ITIL) service phases, Essaidi's (2010) open source on demand BI services framework and of Liyang *et al.*'s conceptual framework for BI as a software service (SaaS BI). Each of these frameworks provides structure and guidance for BI, from a technical or system viewpoint, in terms of development (Open Source, SOA, EA, etc.).

The technical or system viewpoint is also identified as a typical viewpoint of contributions towards SOA research. Although extensive contributions are made to SOA research, these typically focus on technical or deployment issues and neglect business issues or inter-organisational integration (Schelp and Winter, 2007:1-2) – which can also be seen in typical frameworks related to BI in terms of SOA.

In contrast, some BI frameworks are provided without justification of a requirement or identification of inadequacy. Examples of these are of Bowman's (2011) BI framework and Kimball's (2011) high level BI framework (although titled "BI framework", it is focused only on data). In these cases, the credentials of the author or organisation are promoted – potentially providing enough credibility for loyal followers or customers (e.g. Kimball is a household name in data warehousing) who may adopt the framework.

Practitioner vs. academic BI frameworks

BI frameworks within practitioner literature follow many of the same themes. However, a distinction can be made: practitioners tend to provide product-specific architectures. This is not a recurrence within BI's academic literature on frameworks. An example is of Microsoft's Media BI framework (Microsoft, 2008), consisting of Microsoft products such as SQL servers, ProClarity front-ends, Excel spreadsheets and SharePoint collaboration tools.

Broad categorisation of existing BI frameworks

The literature's BI frameworks tend to focus on managerial and technical concepts and, in many cases, just technical concepts. Both of these broad categories focus strongly on data and the process data follows from being sourced to being presented (e.g. Kimball, 2011; Watson and Wixom, 2007:97). However, while there is much literature that focuses on data warehousing and the BI lifecycle, there appears to be a trend that is emerging towards emphasis on presentation through analytics or visualisation tools (e.g. Davenport et al., 2010:10). Swarbrick (2007) identifies this and even pleads for a return to a focus on data warehousing as the "workhorse of the BI effort".

Managerial concepts typically include concepts such as data governance, information management, top-down or bottom-up types of approaches, programme management, Key Performance Indicators (KPIs), etc. An example of a typical framework encompassing management and technical concepts is reflected below in Figure 5. Some BI frameworks that reflect managerial concepts also demonstrate consideration for the various domains of intelligence. An example of this is from Eckerson (2011), this time entitled the "BI Delivery Framework 2020". Eckerson admonishes approaches of the past as "one-size-fits-all" and pleads for a move to a more flexible BI architecture. He then provides insight into what he calls the "information factory" which transforms data into information and information into insights and action in a virtuous cycle that supports the learning organisation, harnessing of information as a competitive advantage and quick adaptation to new events and conditions. Eckerson (2011) reflects the different types of intelligence as domains that need to be captured. Technical concepts typically consist of concepts regarding the BI architecture, platform, applications, tools, reports, development lifecycle, visualisation tools, data security, etc. An example is reflected below in Figure 6.

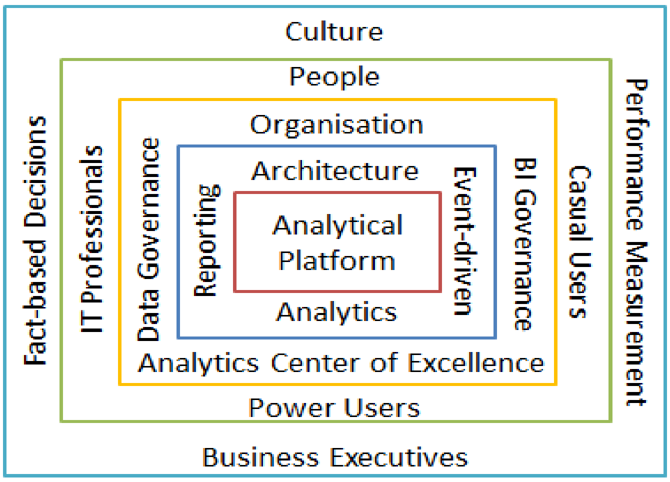


Figure 5: Big data analytics framework - showing management and technical concepts (Adapted from Eckerson, 2011:12)

Inadequacies of existing frameworks: observations

The sample of BI frameworks is provided above as a representation of the BI literature that is available on frameworks. Observations are now made on the inadequacies of the existing frameworks, using this sample to highlight and demonstrate these inadequacies.

The BI challenges – as raised in sections above – remain largely unaddressed by existing BI frameworks. Existing frameworks tend to focus dominantly on technical aspects of BI rather than softer issues such as use, sponsorship, skills and resources or alignment between BI and IT. Although there is a focus on data, the frameworks do not offer direct solutions to data overload, data quality issues or ways to move BI from the space it appears to be in, where data is collected but not used.

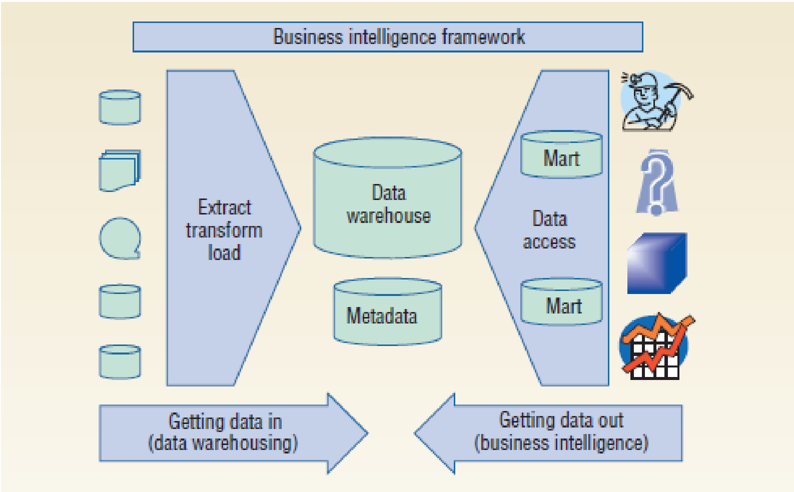


Figure 6: BI framework depicting data and BI components (Watson and Wixom, 2007:97)

BI practitioners (including vendors) tend to become product or brand specific, providing either what can be described as a technical architecture of their products (e.g. Microsoft) or a framework that lacks context and justification (e.g. Kimball's BI framework consisting of only data components). This highlights that existing frameworks provide only for fragments of BI and not the whole BI process. Frameworks encompassing all elements of BI – from data to decision-making where the decision-maker is involved as a human element – appear to be neglected in the literature. This is emphasised by Eckerson's (2011) BI Delivery Framework 2020 which reflects the "information factory" approach. This approach reduces BI to a technology-driven information processing output unit, much like an industrial unit producing pre-configured units of output. In this case: information. Paradoxically, Eckerson pleads for a shift from "one-size-fits-all" with this factory-made approach.

In providing only for isolated fragments of BI, all actors involved and impacted by BI are not considered. Actors involved in the BI process may include technology actors, human actors, organisational actors, etc. There is no framework readily available that includes the man-on-the-street consumer (or the stakeholder of the BI project) as impacted by BI or as someone who can give BI feedback, other than as perhaps a type of intelligence that should be captured. However, legislation governing the consumer and the consumer's information has a direct impact on BI, including BI systems, governance and BI processes.

BI frameworks tend to stop at the presentation layer (e.g. analytics) or with BI implementation and limited post-implementation training and support. However, an interview with Thomas Davenport (Henschen, 2010) reveals that this gap has already been noticed. Organisations recognised to be "really good at analytics" have stopped simply buying technology and now insist on analytical consulting during the use of the technology solutions. Unfortunately Henschen and Davenport do not indicate the period that this would be applicable, but the gist of their discussion implies that it is more than simply extended post-implementation support. This is echoed by Bormann (2007) who indicates that the client-consultant relationship has risen in importance and that, long after implementation, BI consultants are needed to assist clients to use their BI solutions.

4.7 Business Intelligence Competence Centres (BICCs)

Many organisations react to BI's challenges by establishing a specialised unit for running and supporting BI solutions called a Business Intelligence Competence Centre (BICC) (Baars *et al.*, 2009:2; HP, 2009:5). The BICC is seen as the "corporate team" (Eckerson, 2011) that is the connection between the business and technical worlds of BI. It is defined as a permanent body of cross functional members with specialised competences who are responsible for leading, managing and performing all aspects of an organisation's (or a unit's or a department's) BI – including all strategic, project and operational aspects of BI (adapted from Breddam and Day, 2008:6). The most important competency of the BICC is understanding and improving the analytic capabilities of the organisation (HP, 2009:15).

The BICC may be structured according to a number of different models. It may be developed as an IT department, an operations department, it may be outsourced, it may be distributed or centralised – it may even be a virtual BICC that consists of people from departments across the organisation performing their BICC role on a part-time basis. It connects people from business, IT and BI who specialise in the various BI competences needed. It aims to provide a central reference point for BI, unify disparate BI efforts and silos of data across the organisation and efficiently and consistently provide for BI requirements (Breddam and Day, 2008:6-7). Examining these aims shows that the BICC attempts to solve some of BI's long-standing challenges. For example, establishment of a BICC reflects that the organisation recognises that BI is a unique discipline requiring BI, IT and business collaboration that needs a long-term programme – and not just an IT project (Eckerson, 2011). This demonstrates efforts to resolve sponsorship and alignment challenges. Breddam and Day (2008:8-9) indicate that the BICC can be used to address the challenge whereby business users spend most of their time preparing reports and limited time on proactive use of BI to encourage a culture of an information-driven organisation.

Based on these descriptions and definitions, it seems that the BICC is the solution to BI's challenges. However, BICC adoption is reported to be slow, with many organisations testing the water by first establishing virtual BICCs, partly as a result of team members' existing responsibilities and the resultant inability to focus solely on BI work (Techtarget, 2011). Currently there is much interest and research into: which model of a BICC works well under specific conditions; how to distribute competences among users, IT and BICC sides and; how interfaces need to be crafted (Baars *et al.*, 2009:2). In addition, there appears to be a connotation that a BICC is only for organisations that are at a certain level of BI maturity with business users that take ownership of the function, possibly contributing to this slow uptake (Eckerson, 2011).

Like BI, the BICC appears to have its own challenges (and corresponding CSFs). Many of these appear to be generic challenges that typically occur when a change is made or a new department is created. For example: false starts; resistance to change; lack of acceptance or credibility across the organisation; ill-defined outcomes; lack of consensus on BICC structure leads to funding, resourcing and reporting challenges; unclear leadership; imbalance between business, BI and IT staffing; lack of management support; etc. (HP, 2009:15). There are also some more specific to the BICC, e.g.: lack of business ownership; lack of sponsorship; data quality challenges; unclear requirements; lack of available skilled staff; etc. (Breddam and Day, 2008:22, 27).

The paradox is that, as many of the BICC's challenges are common between BI and the BICC, trying to resolve BI's challenges through establishment of a BICC may simply imply facing the same challenges through a different mechanism or in a different guise.

5. Conclusion

This part of the literature study chapter reflects that, although there is much expectation set for BI, it does not always deliver accordingly. It identifies that decision support is seen as BI's primary purpose and that this is a long-standing managerial need rather than a new requirement. The multitude of reports of BI failure and BI challenges are then addressed. It is identified that although the literature consistently raises specific challenges as "BI" challenges, that many of these are in fact, generic IS challenges. Core challenge categories are identified as: BI use; data; integration; alignment; BI personnel and skills and; sponsorship. A summary of BI's challenges in use is then provided for discussion in the chapters that follow.

Existing solutions to BI's challenges are then discussed, namely: CSFs and variations and combinations of these, Actor-Network Theory (ANT), BI MMs, BI frameworks and the BICC. It is identified that existing solutions may have had some effect, but are generally ineffective in resolving BI's core challenge that it is not consistently delivering as expected.

The next part of the literature study chapter takes a step back to gain a better understanding of BI by examining characteristics that constitute a BI worldview. This provides a new approach to understand BI's persistent challenges.

CHAPTER 3 PART 2: UNDERSTANDING BI'S WORLDVIEW

Understanding BI's worldview as a new approach to BI's persistent challenges

1. Introduction

A sore throat may be a symptom of the flu. Treating it in isolation may result in some relief, but this will, in all likelihood, be temporary. Either the sore throat or another symptom of the flu is sure to re-emerge, until the flu is cured. In a simple comparison with this, consider that BI's challenges are manifestations of a greater underlying problem or problems. Current approaches to resolve BI's challenges tend to fall short of consistently resolving the underlying problem, evidenced by the persistent and recurring characteristics of BI's challenges. Current approaches tend to focus on the challenge itself rather than identifying that the challenge is an indication of a deeper underlying problem and addressing this. Without identifying and resolving the underlying problem(s), BI may be unable to move beyond existing challenges. In cases where it does, it may do so with more difficulty than is necessary, only to experience further challenges as a result of the underlying problem in future.

This part of the literature study chapter identifies characteristics of BI's worldview in an effort to understand BI at a deeper level, as a first step to understand and address BI challenges. The chapters that follow examine the worldview characteristics to determine what can be improved or shifted to enable BI to consistently achieve expected results.

2. "Worldview" in context

Chapter 1 briefly introduced the worldview as a view of reality that affects behaviour (Heylighen, 2000), held by an individual or collectively by a group. Further definitions are:

> *A set of images (structures or schemas) and assumptions about the world (Kearney, 1984:10; 47).*
>
> *"A conceptual framework through which perceptions are screened" (Meehan, 1968:41).*

Examining the "worldview" concept in a bit more detail than provided in Chapter 1, it is apparent that it dates back to the 1700s to Immanuel Kant, in a long and fascinating history (Vidal, 2008:2). The concept has been used across disciplines such as philosophy, theology, anthropology, education, humanities and the social sciences (Vidal, 2008:2; Grunig and White, 2010:33). Within IS, an example of where "worldview" has been used is in Soft Systems Methodology (SSM). SSM uses a notion of a worldview to analyse the "people" dimension of a problem situation within managerial, organisational and policy contexts (Lester, 2008). IS research paradigms such as interpretivism or positivism, for example, are also considered worldviews. G-D and S-D Logic are also considered to be lenses, perspectives or worldviews (Vargo, 2011b:4).

Worldview may also be referred to as a philosophy of life, mindset, outlook or ideology as it addresses questions on reality, beliefs and models of the past, future, purpose, values, actions and knowledge (Vidal, 2008:3-4; Funk, 2001). Grunig and White (1992:33) explain that, in terms of the social sciences, worldview refers to "macro thought", the large abstract structures of knowledge that people use to organise what they know and to make sense of new information that comes to them. Vidal (2008:4-6) provides such a structure, reflecting the various elements of the structure as philosophical questions grounded in research by Leo Apostel and Jan van der Veken (1991) and Heylighen (2000). A condensed version of this is reflected in Table 4, updated with insights from Funk (2001).

Table 4: Worldview framework (Based on Apostel and van der Veken, 1991; Heylighen, 2000; Vidal, 2008:4-6; Funk, 2001)

Element	Questions	Description
Ontology	What is? What is the nature of our world? How is it structured and how does it function?	Model of reality (what is/what's perceived) as a whole.
Explanation	Where does it all come from? Why is the world the way it is?	Model of the past. Explanation of how and why phenomena arose.
Prediction	Where are we going?	Model of the future – although always with uncertainties.
Axiology	What is good/evil? What is right/wrong? What should we strive for? What is the meaning of life?	Theory of values. Provides direction, purpose, goals to guide actions, measure of value.
Praxeology	How should we act? What should guide us?	Theory of actions. General principles according to which actions should be organised.
Epistemology	What is true/false? How is knowledge obtained? What are the limitations?	Theory of knowledge. Source of knowledge.

Scott M. Peck, author and psychologist, contextualises the concept of a worldview eloquently in his explanation that "our view of reality is like a map with which to negotiate the terrain of life". He explains that we are not born with maps, but have to make them – and that this is not our greatest challenge, rather our greatest challenge is continuously redefining them to become larger and more accurate (Peck, 1978:32-33). In the same way, there are worldviews of business, economy, IT, ISs – and even BI. A "map" of what constitutes BI, how it works, what it aims to achieve, etc. has been formed by participants in and observers of BI over time. Like the map of the individual, BI's map is constantly revised, redefined and shaped by its environment. Positivists believe that these maps are true representations of reality that can be verified by objective observation. However, as indicated in the interpretive paradigm, philosophers of science are now aware that scientists are human and subjective and that subjectivity plays a role in building worldviews. Today philosophers describe the worldview as a mindset that focuses the attention on observations that fit within that mindset (Grunig and White, 2010:34).

Furthermore, philosophers (Kearney, 1984:4, 53) explain that there is a correlation between worldview, values and behaviour. Funk (2001) explains that a worldview can at least be partially inferred from behaviour. He shows how individuals sense, think and act (and thereby cause responses) in reaction to stimuli (e.g. internal and external environment), intuition, revelation (e.g. sense of higher knowledge, possibly in a spiritual sense) and knowledge formulated in a worldview. An adaptation of this is reflected in Figure 7. Funk's original diagram includes the world/universe, the self, other selves and does not show Figure 7's text in brackets and italics or the link between worldview and "think" as bidirectional. In Funk's diagram this arrow flows in one direction only, from worldview to "think".

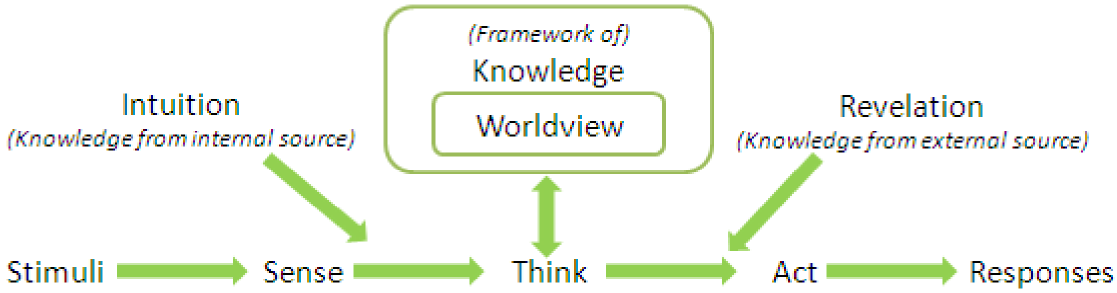


Figure 7: Worldview in context (adapted from Funk, 2001)

Returning to the focus of this thesis, namely, providing novel perspectives that could highlight alternative approaches to address BI's persistent challenges, Figure 7 assists by reflecting the relationship between the worldview, the actions that result from a particular worldview and the outcome or responses that result from the actions. This is reflected in Figure 8.

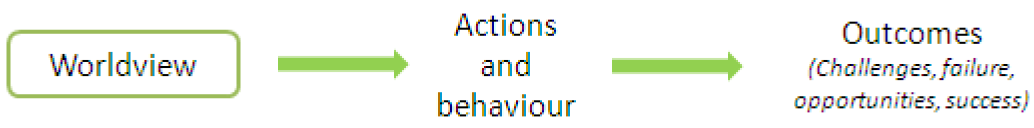


Figure 8: Worldview in context of understanding challenges (adapted from Funk, 2001)

By analysing the available literature, the researcher identifies that there is a dominant worldview that is held of BI. This is now described. The actions and behaviour that can be seen to typically stem from this worldview are then discussed, in context of BI's challenges.

3. Method to determine BI's worldview

Characteristics of the worldview that are commonly held of BI are not explicit. However, they can be inferred in terms of the elements of the framework reflected in Table 4 above and used to identify a common or dominant worldview. To do this, BI participants' and observers' voices are examined in terms of this framework's elements to ascertain how BI is perceived, its values, its sources of knowledge, etc. This is performed in this chapter using the literature as a base and then, in the case study chapter using Fortune Bank and its potential BI vendors as a base. Literature from academic and practitioner sources has been collected and analysed for this purpose.

First, the elements of BI's worldview are identified and then the worldview of BI is described using the findings identified in each element. The first element – BI's model of reality – requires analysis of the literature for the perceptions or realities of BI to emerge. As this analysis is fairly lengthy, involving much literature, it is presented as its own section (section 5).

4. Elements of BI's worldview

4.1 BI's model of reality as a whole (Ontology)

BI's model of reality concerns itself with how BI is perceived. Unfortunately, based on the fact that there is no single, universally accepted definition or context for BI, it can be determined that there is not a unified perception of BI either. Examining the literature on BI's definitions and context, it can be seen that BI is a concept that is open to interpretation and, as such, is a concept of multiple and varying interpretations.

BI is heavily defined in the literature: bookshelves, journals and the Internet are saturated with books, articles, advertisements and even blogs on BI (Miller, 2000:121; Andersson *et al.*, 2008:12; Biere, 2003:7; Tabatabaei, 2009:16). Yet, despite this, there is no universal explanation of or consensus on precisely what BI is, where precisely it fits and what is included in and excluded from its scope. BI means many things to many people (Frolick, 2006:101). Its application in practice also varies from organisation to organisation (Lönnqvist and Pirttimäki, 2006:33). It is a concept that remains generally ambiguous, confusing and open to interpretation (Arnott and Pervan, 2005:71; Ackerman, 2005:43; Fuld, 1995:2 4; Gilad 1996:4; Olssen and Sandell, 2008:29; Pirttimäki, 2007b:2; Sabanovic, 2008: 8-9). Defining what BI is causes substantial debate among practitioners and academics (Wright and Calof, 2006:453).

This highlights that BI's reality is subjective and open to interpretation. It can, however, be contextualised by understanding of the various realities (perceptions) that are held about it. As stated above, analysis of these perceptions and beliefs can be found in section 5. Significant findings can be made from this analysis that feed into the understanding of what is inadequate and can be improved in BI's worldview where such things ultimately result in BI's challenges.

4.2 BI's model of the past (Explanation)

Looking to the past to ascertain why BI's model of reality is so unsteady reveals no definitive explanation, only some examples of behaviour and actions that have contributed to the ambiguity in BI's understanding. One such example is that, as a result of the hype created around BI during the 1990s, BI became something of a "buzzword" (Ackerman, 2005:20; Pirttimäki, 2007b:4; Williams and Williams, 2007:5). This contributed towards clouding the understanding of BI as, due to the hype, there was an inflated demand for BI and opportunists began marketing non-BI or distantly related solutions as BI solutions, just to increase sales opportunities. This resulted in confusion on what BI solutions actually are. Another example of a reason why BI is ambiguous is that numerous ISs are used in conjunction with and in context of BI (Vitt *et al*., 2002:24), with BI often embedded in the organisation's processes and ISs (Campbell, 2009). As a result, BI is frequently confused with IT systems and processes (Sharma and Djiaw, 2011:114)) and it may be difficult to see where the IS starts and where BI ends. An example of this is of Customer Relationship Management (CRM) systems, where one organisation may consider this to be a BI solution, while another considers CRM strictly in its own domain (Payne and Frow, 2005:167).

Taking a step back and examining what BI aims to address, however, reveals that BI – and similarly positioned solutions – do not aim to address anything new. They aim to address the age-old managerial requirement whereby information or intelligence is needed for decision-making (Pirttimäki, 2007:iv). BI's history shows that many solutions have emerged over the years to address the requirement for intelligence for decision-making. Part 1 of this chapter discusses BI's purpose in the context of the historical need for information for decision-making in detail – from Sun Tzu's need for intelligence, to Luhn's 1958 BI system, to the emergence of the various solutions used for this requirement – DSSs, EISs, ESs, etc. What emerges is that BI is a type of IS (although it has many unique characteristics and is not only an IS), that emerged in response to the need for decision-making support (de Grauw, 2011). As such, BI is multi-disciplinary in nature, extending to the traditional disciplines and fields of research such as philosophy, information science, business economics, strategic management, management accounting and Human Resources (HR) management (Pirttimäki, 2007:36).

Grounded in this history, although multi-disciplinary in nature, BI appears to have its roots (at least its deepest roots) in a hard (mechanistic, deterministic) systems and engineering background.

4.3 BI's model of the future (Prediction)

Understanding the vision for BI's future helps to understand the current dominant worldview of BI. This is because it facilitates understanding of dominant forces driving BI today. What emerges clearly in both practitioner and academic literature is the dominant focus on technology. Even predictions about organisations focus on technology vendor merger and acquisitions that are anticipated (Imhoff, 2006; Katta, 2010; Pendse, 2009). Initially this started with the so-called mega-vendors acquiring the smaller vendors to deepen their BI offering with a particular specialisation. The wave then peaked when so-called BI giants Business Objects, Cognos and Hyperion were acquired by software titans from outside the BI industry: SAP, IBM, Oracle and Microsoft (Pendse, 2009; info-Tech Research Group, 2010:3).

Growth in demand for BI specialists and knowledge workers is expected to rise due to technological capability to generate big data and the corresponding need to analyse this (McKinsey, 2011). Operational users now require faster response times and granular levels of data (Shahzad, 2010). De Grauw (2011) indicates that BI has been pushed by technology since the early 1990s and predicts that the next wave of BI will see big data (enabled by technology) pushing BI.

BI literature on the future focuses on future BI technologies and new or emerging technologies that BI can leverage off of. Examples of the former are: BI visualisation (Imhoff, 2006; Campbell, 2009; Katta, 2010; Bardoliwalla, 2009); real-time data processing technologies (Imhoff, 2006; Mckinsey, 2011:2-4; Gartner, 2011; de Grauw, 2011; Hertzberg, 2010); search-based BI (de Grauw, 2011); and; predictive analytics (Campbell, 2009). There are also trends toward BI delivery facilitated by: mobile devices (e.g. a source of "location intelligence") – including tablets (Kanaracus, 2011); composite applications using different services in a SOA or cloud-computing (Dortch, 2009:1) and; social networking platforms (Campbell, 2009; Katta, 2010). User experience expectations are currently being set by Google (for speed) and Apple (for usability and design) according to Hoggarth (BI Summit, 2012).

BI is expected to be integrated into the organisation and spread out to the "masses" with the rise of these types of interconnected solutions (De Grauw, 2011; Info-Tech Research Group, 2010), BI's integration into existing technologies already used by end users (e.g. iPads and applications such as Excel and PowerPoint – Hoggarth and Stacey (BI Summit, 2012)) and the rise of self-service BI products (Kanaracus, 2011). Integration with sales, service and support through "feeders" such as CRM, the organisation's internal telephony and security applications and Enterprise Resource Planning (ERP) applications through "Web 2.0 style" technical collaboration is also expected (Dortch, 2009:1-2; Bardoliwalla, 2009) and "BI 2.0" involving collective intelligence of the user community to enrich existing information (Cooper, 2010).

The introduction of social networking platforms to the BI environment is significant as, not only will more data be gathered (e.g. decision trails, data on relationships, profiles, etc.), but more of a focus is expected on collaboration and decision-making. In fact, it is forecast that decision-making is expected to return as the central focus of BI offerings (Bardoliwalla, 2009). Bormann (2007) identifies organisations' requirement for client-consultant relationships that extend beyond delivery of the BI project, assisting decision-makers to use BI solutions. However, there is little further literature that supports this. Instead, analytics – as an IT solution – is seen as the means to achieve the refocus on decision-making (Gartner, 2011). In fact, "analytics" is seen to be the term to replace BI (Henschen, 2010). It is described as "the new path to value" as organisations rush to capitalise on "increased information richness and analytics to gain competitive advantage" (LaValle *et al.,* 2010:2).

4.4 BI's values (Axiology)

Axiology highlights the relationship between value and purpose. It relates to how to judge, evaluate and recognise value which, in turn, is decided by purpose (Lee, 2011). Identifying the axiology in the literature on BI assists to understand BI's valuing systems. Valuing systems influence BI's perceptions and decisions and can be used to explain the actions resulting in BI's challenges (Hartman, 2011). BI's values, which give it direction, purpose and provide a set of goals to guide actions (Vidal, 2008:4-6) can be seen in the purpose of BI and the benefits that are described for BI. It can also be seen where BI invests time and money – and where it neglects to do so. Currently there is heavy investment in BI IT solutions (Ackerman, 2005:1, 26; Calof and Wright, 2008:718; Coulonval *et al.,* 2010:3) and a focus on BI asset creation, with a neglect of focus on the use of BI (Oracle, 2010:3; Buder and Feldon, 2009:1). BI asset creation encompasses all the activities involved in building, deploying and maintaining a BI environment and applications (Williams and Williams, 2003:14).

BI's purpose, as discussed in the previous chapter, is raised consistently as the enablement and support of decision-making (Hočevar and Jaklič, 2010:95). This relates to an effect of using a BI solution, much like other purposes which are raised in the literature such as improved public relations or innovation. BI purposes are also raised on the characteristics of the BI solution itself (e.g. agility, responsiveness, performance). Pirttimäki *et al.* (2006:83-90) identify that a BI user may perceive value in ease of use of BI tools while, at an organisational level, value is based on benefits realised as a result of the intelligence available. This highlights the subjective nature of BI value. BI's value is constrained by time, relevance and ability to react and also by decision-maker, source and format.

Miller (2000) identifies that the point where information has been driven to a decision is where the value of intelligence lies. However, information driven to a decision point is, like many of BI's purposes and benefits, intangible (Andersson *et al.,* 2008:30). This is not valuable unless it is converted into business value, e.g. the Net Present Value (NPV) of the after-tax cash flows generated by or associated with an investment (Williams and Williams, 2003:12-13). It is relatively simple to calculate the cost of a BI investment by calculating the costs involved in purchasing a BI solution, training staff, running projects, etc. However, calculation of the ROI on BI is difficult to measure as it requires a quantitative value for "benefit" (Krigsman, 2010; Vandergriff, 2008:433; Vanmare, 2006:I; Lönnqvist and Pirttimäki, 2006:33; Pirttimäki, 2007:107). This may be as a result of BI initiatives stopping after creating a BI asset, rather than extending beyond BI solution rollout to capture value after implementation of the BI solution (Williams and Williams, 2003:14). It may also be as a result of the intangible nature of the benefits that are promoted. Pirttimäki (2007:107) speculates that a supporting measurement culture may not exist, measurement is dificult as BI is carried out in several ways or that BI measurement is overlooked because of complexity and cost concerns – giving the example that it is difficult to assess effects of a separate activity or an IS on the organisation's profit.

4.5 BI's guiding principles (Praxeology)

Practitioner literature reflecting content on how BI is guided is typified by the provision of rules (e.g. CSFs/best practices), methodologies (e.g. BI lifecycle) and techniques or tools (e.g. Accenture's BI and IM diagnostic tool). Based on what is said in practitioner literature, BI success can be achieved by applying the rules or tools, in almost a formulaic manner. In a similar way as with the literature on BI's challenges and CSFs, academic literature on BI's guiding principles tends to focus on specific elements to guide BI, rather than on the lists of practices that the practitioner literature tends to provide. Only academic literature provides a body of knowledge on philosophical underpinnings to guide BI. Examples of this are provided in the last point in Table 5.

Table 5: Summary of what guides BI

BI guide and Description and examples from literature
1. BI strategy or roadmap: This may refer to a long-term vision whereby BI objectives are aligned with technology and data structures (La Grouw, 2011). It may also refer to BI project lifecycles, which are of a shorter term (Atre, 2003). Either way, it offers insight into the BI environment by specifying what is to be built, how it is to be built and when it will be ready to meet user requirements (La Grouw, 2011).
2. Critical Success Factors (CSFs) (and best practices): As reflected in the previous chapter, practitioner literature tends to provide lists of "top ten" CSFs while academic literature focuses on specific aspects of the BI process or environment that can make BI successful. Academic literature also expands on CSFs by combining them in multi-faceted solutions (Wixom and Watson, 2001:19; Nandhakumar, 1996; Bussen and Myers, 1997). A list of CSFs can be found in the literature study chapter on BI challenges. The literature's best practices appear to be interchangeable with CSFs.
3. BI scorecard: BI scorecard is used in two contexts. La Grouw (2011) defines it as a tool to measure BI's maturity and development, tracking BI and data warehouse deployment according to BI best practices. MicroStrategy (2011) defines the BI scorecard as a tool that is provided by BI for managers and executives to get an overall view of business performance.
4. BI MM: The BI MM is used to measure and justify investment in BI systems. They define, ex-

BI guide and Description and examples from literature	
	plain and evaluate growth lifecycles (Rajterič, 2010:47). BI may use its own maturity models, e.g. the business intelligence development model (BIDM), Hewlett Package Business Intelligence Maturity Model, Business Information Maturity Model. Or it may draw from maturity models used in other other areas like Software Development, Knowledge Management, Performance Management and Data Management which are still general enough so that they can be modified for the BI domain (Chuah and Wong, 2011:3424, 3427; Rajterič, 2010:49).
5.	BI readiness assessment: Determines where the organisation is currently in terms of BI and the steps it needs to take to get to where it would like to be. Readiness assessments typically involve assessments of current information (including information timeliness), BI capability, BI applications and business need for BI (La Grouw, 2011). Accenture (2008) uses a BI and Information Management (IM) diagnostic tool to identify the BI readiness in an organisation's BI. This tool applies to key areas – governance, delivery, data, storage, strategy and security.
6.	BI lifecycle: While the strategy or roadmap specifies the what, how and when, the lifecycle reflects a generic cycle that individual BI efforts and initiatives will follow. It is described as a roadmap to guide BI's activities from collection (infancy) to reporting (childhood) to analytics (adulthood) to visualisation (maturity) (La Grouw, 2011).
7.	Governance, standards and compliance: The BI environment forms part of the organisation. Both are regulated and governed by various legislative, organisational and industry policies, standards, procedures and strategies. These apply to areas such as: data and the handing of information, IT systems, IT services, finance, etc. Examples of these are: the organisation's data governance strategy; South Africa's Protection of Personal Information Act (POPIA); the IT Information Leadership (ITIL) Service Management framework; the Control Objectives for Information and Related Technology (COBIT) framework; BI frameworks; etc. Frameworks typically consist of managerial/technical guidelines for BI.
8.	Organisational models: The Business Intelligence Competence Centre (BICC) provides another guide for BI actions. The BICC organises all aspects of BI in a model to achieve BI competency (HP, 2009:15).
9.	Philosophy or theory: Academic literature is available on philosophy or theory that guides BI's actions. Examples are from: Papadopoulous and Kanellis (2010:25) who suggest Actor-Network Theory to guide BI; various epistemologists who have begun to apply their work to IM (e.g. Suppe, 1985; Floridi, 1996; Goldman, 1999:161–217; Fuller, 2002; Fallis, 2004); and Gao (2006) who uses Activity Theory to better identify dimensions for data warehouses; amongst others.

4.6 Source of knowledge on BI (Epistemology)

BI's explanation or history reflects that it is multi-disciplinary in nature. It is informed by theoretical concepts and methods from one or more disciplines, sciences, activities and fields of research. Examples of these include: philosophy, information science, business economics, strategic management, management accounting, military science, marketing, ISs and Human Resources (HR) management (Pirttimäki, 2007:36, 90, 92).

The assumption should then be made that BI knowledge stems from multiple disciples and that BI and BI practitioners are well informed and well-rounded in these disciplines as a result. However, BI literature reveals that this is not the case. Challenges are raised on the shortage of BI experts with skills in IT and business (Davenport, 2006:7) – before even considering the rest of the conglomeration of disciplines, sciences and functions that BI stems from – and on the gap between BI, IT and the business (Cooter, 2009). In addition, the technical nature of BI's challenges (as described in the previous chapter) and the evidence of the domination of IT in BI's solutions, and in its values and guides (shown in sections 4.4 and 4.5 above), highlight this as a limitation or imbalance in BI's knowledge and possibly indicate that this emphasis is the reason for the imbalance.

5. Contextualising BI's perceptions

As discussed in section 4.1 on BI's ontology, the researcher analysed available definitions of BI to gauge participants' and observers' perceptions of reality in terms of BI. She based this analysis on examples of similar analysis that has been performed previously. She did this to build on existing insights and to identify a feasible approach grounded in existing research. She also aimed to use methods and categories of comparison that are already accessible and potentially familiar to others. This is discussed next, followed by a summary of her approach and then a discussion of the main four perceptions of BI that emerged consistently in the researcher's analysis.

5.1 Related analysis available in the literature used as a foundation

Research from Ackerman (2005) and Pirttimäki (2007a; 2007b) reflect the most comprehensive analysis of BI definitions and context that the researcher has found in available literature that is relevant to this thesis. Further analysis that has also been used is from Payne and Frow (2005:168, 174-175), Herschel (2010b) and Glancy and Yadav (2011:49) as well as a suggestion from Kaisler (2012).

5.1.1 Conceptual analysis of BI context and definitions from Ackerman (2005)

Ackerman (2005:20) classifies groups of authors in a framework, highlighting the difference in the ways these groups define BI. His framework places BI in context within the business environment while drawing from what he describes to be the settled and established intelligence profession, including academic and practitioner literature on the intelligence profession and BI. Ackerman promotes the intelligence profession's emphasis of the importance of an intelligence process that results in actionable outcomes, indirectly criticising the business world's lack of a concrete BI definition in comparison, calling for a common BI definition in business. He focuses considerably on the difference between authors who define BI including or excluding external data, which is irrelevant in today's BI literature where it appears to be unthinkable not to include both sources. Furthermore, he does not expand on the definitions of BI, contextualise concepts that are often perceived to be the same or related to BI – e.g. MIS, DSS, the various types of intelligence (product, customer, etc.) – or examine the consequences or behaviour resulting from the current contextualisation of BI.

His research, however, still provides useful insights that are used in this thesis. He identifies that confusion has been created by authors who fail to define BI comprehensively. He also reveals that there are numerous authors who define BI according to the practical benefits or outcomes they can achieve by implementing a BI technology solution. Another insight is that he identifies that there is a dominant technology focus, but that there are also process and product perceptions of BI. The researcher used these perceptions as potential categories when she started her analysis.

5.1.2 Conceptual analysis of BI context and definitions from Pirttimäki (2007a; 2007b)

Pirttimäki (2007b:10-12) contrasts Ackerman's call for a common BI definition: she identifies that, due to each organisation's unique and situational nature, BI should be viewed as a multidimensional concept within the organisation's specific context. She maintains that this is aligned with other information-intensive managerial activities, such as management accounting, knowledge management, strategic management, etc. (Pirttimäki, 2007a:84-91). She discusses, compares and positions these activities with BI, along with the concepts that are or may be related to BI (e.g. the various types of intelligence, market research, etc.). Her work on BI definitions incorporates dimensions of BI such as: internal/external; detailed/broad; integrated/specific; and past/future. She categorises BI definitions according these dimensions, placing them in context according to strategic, tactical and operational levels.

In a similar way to Ackerman's (2005) reference to the intelligence profession, Pirttimäki refers to MI. She states that the phases of the BI process are similar to the intelligence procedure used in the context of military activities (Endrulat, 2003:8). However, she also states that BI's roots stretch not only to military science, but also to information science and business economics (Pirttimäki, 2007a:90). The researcher therefore bases her exclusion of MI from the scope of this thesis on this – the scope of this thesis is not sufficiently broad to include military science, information science and business economics. Instead, the researcher focuses on how BI is perceived and experienced within practice in the business organisation.

Although very broad, Pirttimäki's work provides useful insights. The first major insight is that the perception of BI is subjective. Secondly, her work determines that the content of BI definitions, albeit ambiguous, has not changed significantly from the 1980s to present day, aside from technology which is new. Another useful insight is the "main areas" or viewpoints that Pirttimäki identifies. She identifies five typical viewpoints of BI, namely: philosophy; technology; managerial tool; process; and refined form of information.

These are useful insights which the researcher has used as input to her analysis and categorisation of BI definitions, with minor adjustments. However, Pirttimäki unfortunately does not discuss or justify these viewpoints in significant detail in her journal article (Pirttimäki, 2007b:1-11) and loses the substance of this discussion amongst other discussions in her thesis (Pirttimäki, 2007a:93). Furthermore, Pirttimäki (*ibid*) neglects to explain her "philosophy" viewpoint, only describing it briefly as "methods and ways of thinking in the BI context". The researcher discontinued her use of "philosophy" based on this and on the fact that she did not find significant BI definitions that contribute to the perception that BI is a philosophy in available literature.

5.1.3 Conceptual analysis of BI context and definitions from further authors

Payne and Frow (2005:168, 174-175) perform analysis of CRM definitions that is similar to the researcher's analysis. They conclude that potential opportunities available through CRM are restricted by its prevailing focus on technology; a useful insight for this thesis. They analyse 12 CRM definitions from "various sources" (presumably, based on their references, academic and practitioner literature sources).

In contrast, Herschel (2010b) and Glancy and Yadav (2011:49) provide less in-depth analysis of BI definitions. Although Herschel (*ibid*) contends that there are too many inconsistent BI definitions and an unproductive focus on technology components and capabilities, he does not provide significant analysis of this. The focus of his article is a plea for a common, productive definition of BI which he then proposes himself – concentrating this on the result of BI rather than the technology components or capabilities that may be involved in achieving this. Glancy and Yadav (*ibid*) follow suit, contending that a commonly accepted definition of BI or of a BI system does not exist and that BI has very little theoretical foundation. They highlight that previous work concentrates narrowly on subsets of BI systems, tools and business functional areas. Although it is useful in the context of this thesis that they identify the need for a wider or more conceptual approach to the definition of BI, Glancy and Yadav (*ibid*) do not analyse or provide critique on existing definitions or context. They only propose a conceptual model for BI to develop, assess and evaluate BI systems, develop new BI systems, direct research and assist practitioners to understand the potential of a BI process.

Finally, Kaisler (2012) suggests that BI's definitions can be examined semantically and syntactically. Semantics are concerned with prior knowledge or commonly established knowledge as a basis of understanding (Fryer, 1996), while syntax refers to a rule-based grammatical system (Fieback and Planck, 2003:170). Kaisler uses this in the context of BI, explaining that there may be people who define and think of BI in terms of organisational processes and rules (syntactic) *versus* people who define and think of BI in terms of the organisation's environment and context (extending to that of the customer of the organisation) (semantic). He provides the example of WalMart where, to be successful, a branch manager must have knowledge and understanding of the local community and environment in which the branch operates (semantic knowledge). This knowledge is used in conjunction with BI generated by WalMart on its processes (syntactic knowledge). In this example, syntactic knowledge may include information that is internal and external to the organisation. Kaisler's view is therefore broader than merely stating BI should include internal and external sources of information. He specifically draws attention to the importance of knowledge of the customer in terms of the environment and context of that customer.

Although this provides a useful dimension for analysis, the researcher does not apply this to the literature's BI definitions. She believes that, although the definitions provide adequate insight on the perception that is held of BI, they do not yield sufficient insight to accurately gauge whether they take the knowledge of the customer in terms of the environment and customer's context into account. She includes Kaisler's suggestion, however, in the case study, where this deeper level of insight is possible.

5.2 Method to perform analysis

Like Payne and Frow (2005), the researcher collated BI definitions from various academic and practitioner sources. She selected 70 definitions for analysis, spanning the period 1986 to 2012, based on the definition's relevance and the source's academic or professional credibility. She specifically excluded definitions focused solely on what she believes are BI-related terms (e.g. MIS, IM, analytics, etc.), instead, focusing only on those positioned as BI definitions. She did observe, however, that significant differences between BI and BI-related definitions only become apparent at a more detailed level (e.g. where the scope, audience, etc. are discussed in the definition) and do not consistently reflect at a conceptual level.

The researcher then analysed existing research on BI definitions (discussed above in 5.1) and formulated lists of possible categories for analysis, keeping her objective to ultimately provide novel perspectives to overcome BI's challenges in mind. She simultaneously started analysing her list of BI definitions to identify possible patterns or inconsistencies in the way BI is defined. Based on this, she identified that she could categorise definitions according to whether they reflect one or more these perceptions: technology, process, product or capability. Patterns emerged in the BI definitions reflecting a tendency for BI to be defined from one or a combination of these perceptions. At the same time, these perceptions emerged in the body of academic writing from the authors referenced in Section 5.1 above (excluding Kaisler (2012)). Herschel's work reflected the technical and capability perception, while Glancy and Yadav's and Payne and Frow's (2005) reflected just the technical perception. The work from Ackerman (2005) and Pirttimäki (2007a; 2007b) reflected all four viewpoints. While categories "product" and "capability" do not appear verbatim in Pirttimäki's (2007a:93) list of viewpoints, the researcher believes that Pirttimäki's viewpoints "refined form of information" and "managerial tool" are reflective of product and capability perspectives respectively.

It is recognised that, just as there are many different definitions and perceptions of BI, there are also many ways to categorise these perceptions. The researcher's list of BI perceptions is therefore just one subjective view of reality, based on that of the researcher and of the authors whose definitions and discourse were analysed. As reflected above, Pirttimäki's (2007a:84-91) research identifies additional dimensions for analysis that could be applied, e.g. internal/external, detailed/broad, past/future, etc. and there are likely to be further dimensions that emerge in the future or that the researcher is unaware of. The researcher, however, discovered that she was able to perform sufficient analysis based on the perceptions she identified and that analysis through the additional dimensions that had emerged at this stage did not provide significant insights relevant to this thesis' research questions, nor did they counter or invalidate the researcher's findings.

This presents a method grounded in the interpretivist paradigm as the researcher performed a qualitative analysis of BI definitions representing voices of BI practitioners (vendors, research houses, consultancies, etc.) and BI academics. Although she identifies that more support for certain perceptions emerges in the literature, the aim is not to perform a quantitative analysis and the researcher does not represent findings in terms of percentages or exact quantities.

5.3 Perceptions identified through BI definitions

The four main perceptions that guide BI that emerged as a result of analysis of the definitions of BI in the available literature are that BI is a: technology, product, capability or process. A fifth perception that emerged is that BI is understood as an organisation or department (Kent, 1966:vii). This perception is not explored further for a few main reasons. Firstly, available literature on BI does not point towards a significant movement towards defining BI as an organisation or department. Secondly, although it is recognised that one may refer to the BI department or the people working therein as "BI", for example, the same can be said about Finance, Marketing, Sales, etc. Doing this does not change the essence of the context of BI. No significant impact results from referring to the people performing the process, using the technology or assisting to create the output with the same term as that which they are performing/using/creating. Finally, a department – e.g. Sales – may have the connotation of "those who are skilled in and able to perform a sales function". Using this logic, the understanding of BI as a department therefore can be likened with the perception that BI is a capability. The four main perceptions of BI that emerged are now discussed.

While it was expected that vendors would demonstrate a different perception to academic authors, there is no significant observable difference. However, a distinction can be made between authors who call for consolidation of the various perceptions (e.g. Ackerman, 2005:15-20; Herschel, 2010b) and those who hold that, while many contexts lead to ambiguity, a perception of BI is context and organisation dependent (e.g. Pirttimäki, 2007b:10-12). The researcher's view aligns with Pirttimäki's: each perception of BI contains an element of truth.

5.3.1 The perception that BI is a technology

A dominant perception in the literature is that BI is a technology. Many BI definitions speak only to software or technology components (English, 2005) or reflect a strong focus on technology as an enabler (Pirttimäki, 2007b:11; Sharma and Djiaw, 2011:116). Reviewing today's literature – both academic and practitioner – it is clear that there is an overwhelming number of BI definitions that reference technology directly, indirectly, define BI as a technology or define BI in terms of the practical benefits that can be obtained when implementing a BI IT solution (Ackerman, 2005:21). A review of definitions on the Internet leaves an impression that BI is all about technology (Herschel, 2010b). Some technology-focused BI definitions emphasise the technology component of BI to such an extent that it would seem unthinkable to have BI without IT, leaving one with the impression that BI cannot be practiced without technology (Ackerman, 2005:22).

A few of the BI definitions are now specifically highlighted as examples that demonstrate the technical perception of BI. Consider the following examples of definitions; these reflect instances where BI is defined purely from a technological perception:

> *"A common noun for technical applications, software and tools that enable more effective information processing" Raisinghani (2004:x).*
>
> *A group of applications that enables active and passive delivery of information (Kalakota and Robinson, 2001:161).*
>
> *A broad category of computer software solutions enabling the organisation to gain insight into its critical operations (Information Builders, 2008).*

Still further authors (e.g. IBM, 2008; Microsoft, 2008; Davenport and Harris, 2007:6:7; Papadopoulos and Kanellis, 2010:16) provide BI definitions that highlight the technology perception through a focus on technology components such as software applications, data management activities, data warehousing and decision support. From the technology perception, BI is seen to consist only of the layers of technology (data, analytics, access/presentation, etc.) and is typically governed and guided by technology methods, processes and policies. Technologies may include, for example, Online Analytical Processing (OLAP) and Relational Databases, Extract Transform Load (ETL) tools, front-end applications, report generators, etc. Examples of further authors using these or similar terms in their BI definitions are: Andersson, Fries, Johansson (2008:3); Du Plessis

(2006:23); Eckerson (2003:1); Gilad and Gilad, (1986:65-70); Gao (2006:11); Harris (1999); Herschel (2010b); Loshin (2003:6); Ranjan (2008: 461); Tustin, Venter (2007:1); Vanmare (2006: i) and; Vitt *et al.*, (2002:13-22).

In contrast with the view that BI is a technology, Filenet (2008) (a BI vendor) advocates that, although BI is often defined by the practices and technologies that enable it, it is more than a technology. Filenet states that BI requires new processes, resources and competencies. Aligned with this, Williams and Williams (2007:2) clearly state that BI is not a technology, or even a single product – they state that BI is the combination of products, technologies and methods. Similarly, there are other authors who recognise the technology focus and describe it to be problematic (English, 2005). Payne and Frow (2005:168) perform analysis of CRM definitions and, relevant to this discussion, find a similar dominant focus on technology, identifying this as a "limited technology perspective". Sharma and Djiaw (2011:116) highlight that while many BI initiatives focus on technology as an enabler, not all BI initiatives actually require implementation of IT to make them successful (Davenport and Prusak, 1998; O'Dell and Grayson, 1998). In fact, BI is considered to be broader than the tools or the limited scope of current BI systems (Glancy and Yadav, 2011:49).

An observation about the authors who define BI as a technology is that this group consists mostly BI vendors, although not all BI vendors can be categorised in this group and some even advocate that BI is more than a technology (e.g. Filenet, 2008). Some research houses and consultancies are also included in this group (e.g. Accenture (2008), Gartner Group and META Group (Ackerman, 2005:22)), as well as academic writers (e.g. Georgia State University Business School (2012), Raisinghani, 2004:x, Davenport and Harris, 2007:6:7 and Kalakota and Robinson, 2001:161). Gladwell (2009) identifies the shortcoming that today's vendors generally think of BI from an engineering-centric worldview, focused primarily on technology rather than on people.

Ackerman (2005:21-22), who provides a study of how authors define BI, identifies technology as a major category into which the literature's BI definitions fit. He states that many BI vendors (giving examples of IBM, Microsoft and Decisions from Data) circumvent defining BI by merely listing the technology benefits. In addition, examining the BI literature available from Microsoft as another example, one can see their tendency to define BI in terms of their product range (Olssen and Sandell, 2008:26). Many vendors go so far as to distort the view of BI to include their specific technology products, which may only be indirectly related to BI – with the intent to increase sales while BI enjoys heightened investment and prioritisation (E-Solutions Integrator Inc. (ESI), 2010; Haasbroek 2012; Joubert, 2012).

BI vendors' fervent promotion and marketing of their technology products – released at a rampant pace in a competitive market – may be a catalyst for the overwhelming technology focus that is evident in the literature. Another factor contributing to the technology focus may be that organisations now have more data than ever before (Himmelsbach, 2005:12; Murphy, 2005:2) which they need to extract, process and analyse with sophisticated technology in the interest of time and accuracy. Paradoxically, organisations may overestimate their requirement to process high volumes of data as a result of the technological capability to do this (Accenture, 2008; Willcocks and Whitely, 2009:191). Another factor may be that the technology focus is a result of the pressure exerted by management in an attempt to remain competitive by implementing the latest BI solutions. Another paradox is that management may, in turn, be influenced by the BI vendors' product promotion, which is frequently aimed at the higher echelons of the organisation where the buying power is seated. However, irrespective of the reasons for its origin or existence, the technology perception clearly demonstrates its existence, with sufficient literature support.

5.3.2 The perception that BI is a process

Another perception that clearly demonstrates literary support for its existence is of BI as a process. Much like the perception that BI is a technology, the support for the perception that BI is a process is overwhelming. This perception is supported by an abundance of definitions in the literature from academic authors, research houses and BI vendors. Unlike the technical perception, which is dominated by definitions from BI vendors, the BI process perception is dominated by definitions from academia and dominates academics' BI definitions.

Some of these definitions imply that BI is a process while others state directly that it is a process. In terms of those which imply BI is a process, these typically describe how BI performs activities or how it assists decision-makers or the organisation (e.g. from Andersson *et al.,* 2008:2; Brackett, 1999:1; Group 1 Software, 2008; Information Builders, 2008; Turban *et al*., 2007:9). Examples of definitions that refer directly to BI as a process are:

> *BI is a systematic process that gathers, analyses and classifies the flow of significant information (Thomas, 2001:48–49).*

> *BI is an organised and systematic process by which an organisation acquires, analyses and circulates information from internal and external sources relevant to its business activities and decision-making (Lönnqvist and Pirttimäki, 2006: 32).*

These definitions emphasise BI as a systematic process, however, not all definitions emphasise the "systematic" aspect of BI as a process. Others emphasise, for example, the ability of the process to assist decision-makers or the organisation (as described above) or the interactive nature of BI as a process (e.g. from Harris, 1999; Eckerson, 2003:1). There are also authors who state that BI should be defined as only a process and not as a system or product (e.g. Gao, 2006:11) and, conversely, those who define BI as a process and a product (e.g. Ackerman, 2005:38-39; Jourdan *et al*., 2007:121) or as a process and a capability (e.g. Oracle, 2007).

Analysis of definitions where BI is defined as a process reflects emphasis on the processes involved in the creation of BI in terms of activities such as gathering, processing, analysing and presenting data, information and intelligence, neglecting the use thereof. Only a few definitions refer to BI use when defining BI in this context. Examples are:

> *Use of information enabling organisations to best decide, measure, manage and optimize performance to achieve efficiency and financial benefit (Gartner, 2008).*

BI is a comprehensive concept, whereby an entire organisation is committed to use the available information systems (including business intelligence) in the most effective way to obtain quality and timely information for decision-making, thereby creating competitive advantages (Hočevar and Jaklič, 2010:92).

Bräutigam *et al. (*2006:2) also refer to the use of BI in the context of BI as a capability.

5.3.3 The perception that BI is a product

The product perception, as discussed in this thesis, refers to the perception that BI is an output or result, i.e. the goal of BI and not the means of BI (Herschel, 2010b). It therefore specifically excludes BI vendors' products (e.g. the Microsoft product) or any other technology that may be involved in the creation of a product (these fall within the technology perception). It may refer to tangible (e.g. data extracts, reports, dashboards, etc.) or intangible (e.g. knowledge, insight, intelligence, etc.) products and may even be referred to generically as "the result of a process" (du Plessis, 206:23). Other examples from the literature are:

> *BI is the type of granular information that line-of-business managers seek as they analyze sales trends, customer buying habits and other key performance metrics of an organisation (Computer World, 2008).*

> *BI consists of business information and business analyses within the context of key business processes that lead to decisions and actions and which result in improved business performance (Williams and Williams, 2007:200).*

This perception is not supported in the literature as overwhelmingly as the technology or process perceptions are supported. However, there are still sufficient definitions to establish this as one of the main perceptions of BI. Authors who define BI as a product range from BI vendors to research houses to academic writers, with the latter proliferating this category.

5.3.4 The perception that BI is a capability

BI may also be seen as an ability or capability. Consider the following definitions that use these words, implying that intelligence is something that requires a level of skill or competence to accomplish or achieve:

> *Intelligence is the capacity to act purposefully, think rationally and deal effectively with one's environment (Wechsler,1972:79).*

> *BI is regarded as a strategic capability for most organisations for creating, collecting, analysing and applying information and knowledge (Raber et al., 2012:4219)*

> *BI is the ability to access and analyze information primarily via reporting tools, ad hoc query and online analytical processing, to be used by business management and analysts (Gartner, 2008).*

> *BI and Information Management (IM) refer to the capability of collecting and analyzing internal and external data to generate knowledge and value for the organisation (Accenture, 2008).*

The support for BI as a capability within the available literature is less than for BI as a product and significantly less than for BI as a technology or process. In fact, where BI is defined as a capability or ability, there is a tendency to define it as a capability/ability as well as in the context of the other perceptions – technology, process and product. Authors who define BI as a capability span across research houses, academic authors and even BI vendors, with a fair spread between all of these.

6. Consolidating a worldview of BI

Based on the discussion of the individual elements of the world view and the analysis of the perceptions that feed into the BI realities, the worldview reflected in Table 6 can be consolidated.
The worldview provides a conceptual framework that will be used in upcoming chapters to reflect the current situation (with challenges), a shift (changes to the worldview) and the outcome of this shift (the desired situation – challenges overcome).

The worldview highlights a few core points about how BI is perceived and understood. It highlights BI's ambiguity and its unsteady base which it operates from. In addition, it highlights how BI is informed by many disciplines, but is biased towards seeing BI as an IT solution. This emphasises the point that, although BI's main purpose is decision-making and although it aims to focus on collaboration and interconnection in the future, technology is the driver and it is believed (according to the current worldview) that it will be the enabler too.

Table 6: Summary of a BI worldview

Element	Key findings
BI's model of reality as a whole (Ontology)	• BI operates from an ambiguous and unstable model of reality. Many perceptions of BI exist. BI may be perceived as one or a combination of these perceptions: • A technology that consists of one/a combination of components such as hardware, software, databases, etc. controlled, managed and governed by technical practices and methodologies. • A process that consists of activities to gather, process, analyse and distribute information, transforming data into information into intelligence. • A product, output, result or outcome representing meaningful and useful information that is actionable. It may be the outcome of the BI or another process (e.g. intelligence from an employee's own personal knowledge). • A capability to perform the BI process or to access and analyse information.
BI's model of the past (Explanation)	• No definitive explanation for uncertainty in BI perceptions. • BI emerged from a hard (mechanistic, deterministic) systems and engineering background for management support.
BI's model of the future (Prediction)	• Focus on technological advances. However, a return to focus on decision-making is expected – enabled by analytics. • Data (enabled by technology) is the new driver of BI. • Collaboration and interconnected solutions receive attention.
BI's values (Axiology)	• BI values the BI environment and applications (neglecting use of BI). • BI values relate to the characteristics of a BI solution (agility, performance) or to the effects of a BI solution (e.g. decision-making, innovation). • Decision-making is listed as BI's foremost purpose. • BI's purposes are largely intangible, subjective and hard to measure (ROI).
BI's guiding principles (Praxeology)	• BI is guided by various strategies, CSFs, models, frameworks, etc. • Many of these are tools or methodologies provided by BI practitioners and vendors to manage, govern and guide the BI environment and its technologies – with some provided by the growing community of design researchers contributing generic artefacts.
Source of BI knowledge (Epistemology)	• BI is informed by various disciplines, science and business functions. • A limitation is identified in the imbalance caused by the focus on BI's IT and IS aspects.

7. Understanding BI's worldview to identify novel perspectives to address BI challenges

With BI's worldview identified, as far as this subjective and fluid "reality" can be identified, the next step is to identify the challenges that result from this. Figure 9 reflects the relationship between the worldview elements, as interpreted by the researcher, based on the worldview literature referenced in this part of the literature study (Apostel and van der Veken, 1991; Heylighen, 2000; Vidal, 2008:4-6; Funk, 2001). It shows how the understanding of what is (ontology) results in specific values (axiology) and actions driven by guiding principles (praxeology) and how these are influenced by the underlying source of knowledge (epistemology), the past and the future.

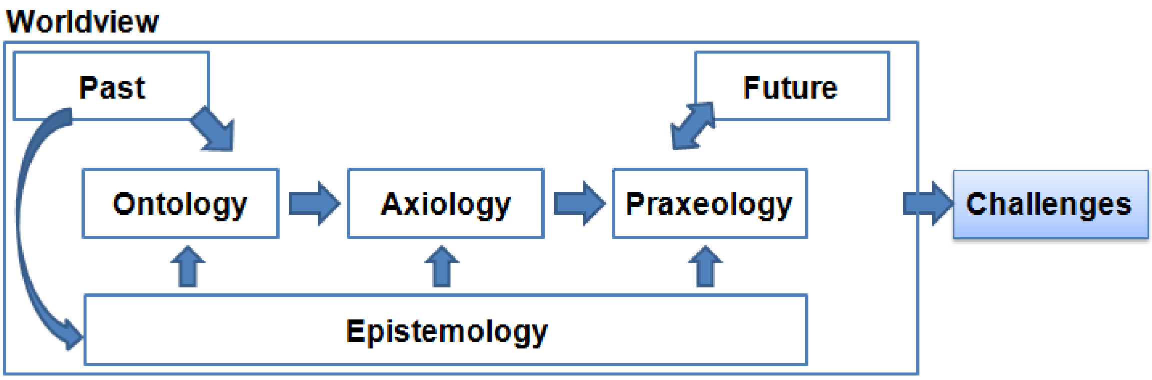


Figure 9: Relationship between worldview elements and challenges (Based on Apostel and van der Veken, 1991; Heylighen, 2000; Vidal, 2008:4-6; Funk, 2001)

A few examples are now provided in Table 7. The aim is to reflect a few examples, rather than an exhaustive list, a more detailed list, reflecting the literature and case study findings in this regard, in Appendix I. Table 7 reflects challenge categories as coded in Part 1 of this chapter.

Table 7: Examples of BI worldview actions and behaviour resulting in BI challenges

Perceptions, values, guiding principles, actions	Challenge (and category)
Technology perception: Collect/process volumes of data because technological capability exists (Accenture, 2008; Willcocks and Whitely, 2009:191).	Focus is on generating data rather than using BI (U1, 9).
Capability perception: Where a decision-maker is unable to use BI, the problem is believed to be with the decision-maker (Atre, 2011).	Decision-making is not supported or facilitated, there is a gap between BI and business (U2, 5-8, A1)
Technology perception: By merely implementing a BI IT solution, BI is automatically enabled (Ackerman, 2005:1). Capability perception: The average business user has the time or know-how to use BI tools (LaValle *et al*., 2010:3; Quinn, 2007:4; Todd, 2009:36). Capability perception: BI users have the capability/know what to ask and what assumptions to make when using BI	Lack of understanding of how to use BI solution – which only provides information up to a point (U2-8, A1)

Perceptions, values, guiding principles, actions	Challenge (and category)
tools (Green, 2007:18; Ranjan, 2008:464).	
Product perception: If the BI product (e.g. a report/data) exists, it will automatically be used instead of intuition/experience alone (Davenport *et al*., 2010:1).	BI user experience is disorienting, frustrating, complicated and discouraging (U2, 3, 5, A1)
Technology perception: BI use measured by number of licences sold (Pendse, 2009).	Low use of BI is overlooked as it is not reflected in vendors' sales figures (U10)
Process perception: BI is a repeatable, automated process and generic, pre-configured BI can be mass produced (Cohen, 2008:26; Schick, 2005:5).	BI that is not valued is not used. BI business requirements are not met or are unclear. "One size fits all" doesn't suit all (U5-8; A1, 02)

It would be ideal if one of the perceptions identified above did not link to any BI challenges. One could then neatly conclude by advocating that the BI community examines their worldviews and makes adjustments to adapt to the utopic perception that does not result in challenges. Unfortunately, this is not the case. However, identification and discussion of BI's worldview has enabled insight into what could potentially be fundamentally wrong with this worldview. It is foreseen that BI's worldview is centred in a G-D Logic. This is discussed in an upcoming chapter.

8. Conclusion

This part of the literature study chapter presents an in-depth discussion of BI's worldview by examining the literature on BI, per worldview element. Worldview elements consist of: a model of reality (ontology); model of the past (explanation); model of the future (prediction); values (axiology); guiding principles (praxeology); and source of knowledge (epistemology).

In terms of BI's ontology, discussions on the definition and scope of BI as well as various definitions of BI are examined to understand BI's reality, as subjective and fluid as this may be. What is identified is that BI is consistently perceived as one of four main perceptions namely, a: technology; process; product or; capability. Other insights are gained on each of the worldview elements of BI. These are taken forward to case study chapters where the literature's view of BI is compared with that in practice at Fortune Bank, as the case study.

Before this can be done, however, G-D and S-D Logic must be explained as, following the case study chapters, BI's worldview is examined through these lenses. The same approach of a worldview is used to frame the discussion on G-D and S-D Logic.

CHAPTER 3 PART 3: GOODS- AND SERVICE DOMINANT LOGIC

Discussion of the emerging body of knowledge underpinning Goods- and Service-Dominant Logic

1. Introduction

Previous sections of the literature study chapter identified BI's challenges and described its worldview, recognising that BI's worldview results in behaviour and actions that, in turn, result in its challenges. Evidence of a dominant underlying G-D Logic emerges when BI's worldview and the resultant challenges are examined through G-D and S-D Logic lenses. This section of the literature study chapter explains what G-D and S-D Logic are and positions S-D Logic as a potentially viable approach for BI to be able to open new channels through which its persistent challenges may potentially be resolved.

This part of the literature study chapter establishes the basis of understanding of G-D and S-D Logic that are necessary for chapters that follow. To do this, it explains G-D and S-D Logic using the worldview framework presented in Part 2 of this chapter. However, before G-D and S-D Logic worldviews are examined, the notion of exchange must be explained.

2. The notion of exchange

G-D and S-D Logic are – simply put – lenses, mindsets, worldviews or philosophies according to which the notion of exchange is viewed (S-D Logic, 2012; Vargo, 2011b:4-5). In general terms, exchange refers to the act of giving and receiving (Hornby, 2005:506). The act of giving and receiving also applies in the context of G-D and S-D Logic, where the concept of exchange may be applied to economic or social acts of giving and receiving. For example, exchange for economic purpose where something is given and received in the market for financial gain, or social exchange without financial gain/economic purpose, such as that within a family or group of friends. Exchange may also refer to acts of giving and receiving that take place within BI, e.g. the exchange of BI services (e.g. consulting, training, support) or a BI system, report, data extract, etc. for financial gain. This may take place between BI vendors and organisations or between BI departments, as providers of BI, and other departments within the organisation. It may also take place between teams or individuals within BI departments.

The aim of exchange is to give those involved in the exchange access to resources that provide them with benefit (Chandler and Vargo, 2011:35). Exchange concerns itself with interactions and relationships and therefore always consists of at least three components: two nodes (e.g. giver and receiver) and a thread (e.g. whatever is exchanged) (Schultz and Gnoth, 2008:129). This highlights the broad scope that exchange is applicable to: from exchange that takes place within an economic market, to social exchange, to BI (which may fit within economic exchange) or even to the "process of knowing" (Gummesson, 2001:27). Gummesson (*ibid*) describes this as an exchange between (1) the knower (researcher) and (2) the known (the outcome of the research), connected by (3) the “process of knowing” as the thread.

Schultz and Gnoth (2008:129) maintain that exchange (and the lenses through which it is viewed) is directly applicable to organisations, employees, suppliers, customers and other stakeholders. This thesis extends their proposition by positioning BI as a series of exchange processes and discussing exchange within the BI process. Exchange is contextualised in terms of two of the worldviews that have emerged through which it may be perceived (G-D and S-D Logic). BI should therefore be understood as an exchange process that can be examined through G-D and S-D Logic lenses.

It is already established that G-D and S-D Logic are worldviews according to which the notion of exchange is viewed (S-D Logic, 2012; Vargo, 2011b:4-5). G-D and S-D Logic worldviews are now explained, following the worldview framework based on the work of Apostel and van der Veken (1991), Heylighen (2000), Vidal (2008:4-6) and Funk (2001) that was presented in Part 2 of this chapter.

3. A worldview based on G-D Logic

Vargo and Lusch (Vargo, 2011b:4) have called the manufacturing-oriented (Lusch *et al*., 2008:11) process of exchange or the microeconomic and related marketing-management view “Goods-Dominant Logic”. They identify that G-D Logic is a restricted, production and product-centred orientation that provided the fundamental direction for economic science and, later, for marketing (Vargo, 2011b:5). As such, at this point in time, it is identified that economic science and marketing are predominantly influenced by a worldview based on G-D logic, but that a Service System worldview based on an underlying philosophy of S-D Logic and theory of Service Systems is emerging (Spohrer and Maglio, 2008:243).

G-D Logic is now discussed in terms of its worldview elements. The epistemology and prediction elements’ order has been shifted within the framework to facilitate the flow of the G-D Logic discussion.

3.1 G-D Logic informed worldview: A model of what is (ontology)

A G-D Logic informed worldview – reflected below in Figure 10 – typically sees value in the linear series of activities of manufacturing and distributing tangible goods, designed and built by a producer, with a consumer in mind (Vargo and Lusch, 2004a:5; Edvardsson *et al*., 2011:540). The producer creates value (without the “interference” of customers (Lusch *et al*., 2008:6)) and embeds it in the physical goods by determining upfront what the features and attributes of the goods will be and which customer segment is likely to buy the goods (and thereby receive value). They then promote the goods to this customer segment as their target market, using advertising, marketing and promotions. Goods are distributed by means of a supply chain and are sold through exchange transactions of goods and money (Edvardsson *et al*., 2011:540).

After the producer and consumer have exchanged the goods, value is depleted from the producer and transferred to the consumer, who consumes or destroys the value of the goods (Edvardsson *et al*., 2011:540). The point of exchange is where value is seen to occur and is referred to as “value-in-exchange” (Nam and Lee, 2010:1764). Producer and consumer are typically separated and are seen to have distinct roles. The producer is seen to be the creator of value (in terms of place, time and use) and the consumer the destroyer of value (Edvardsson *et al*., 2011:540; Lusch *et al*., 2008:6). Value is seen to be embedded in goods, which can by standardised and inventoried until sold – retaining their value during inventory (Vargo *et al*., 2010:136).

The producer is typically seen to capture the market if they manage to outdo their competitors in terms of selling more outputs or units, and through the sale of goods, makes a profit. Organisations function to optimise production variables. There is a focus on standardisation, design for production efficiency and the maximisation of outputs which can be sold for profit – which, even if unsold, may retain their value (Vargo and Lusch, 2004a:5; Lusch *et al*., 2008:6).

Services are also recognised by G-D Logic. However, due to G-D Logic’s focus on units of output (goods), it sees services only in the context of goods – as “that which is not goods” and therefore discounts services as a byproduct or residual of goods (Kowalkowski and Ballantyne, 2009). Services are “lumped” into the “last” economic sector (tertiary), seemingly sidelined after agriculture and manufacturing (Miles and Boden, 2000:1-3). Services are differentiated on the basis of four relative shortcomings known as the IHIP characteristics - intangibility, heterogeneity, inseparability and perishability (inability to be inventoried) (Nam and Lee, 2010: 1761; Lusch *et al*., 2008:6).

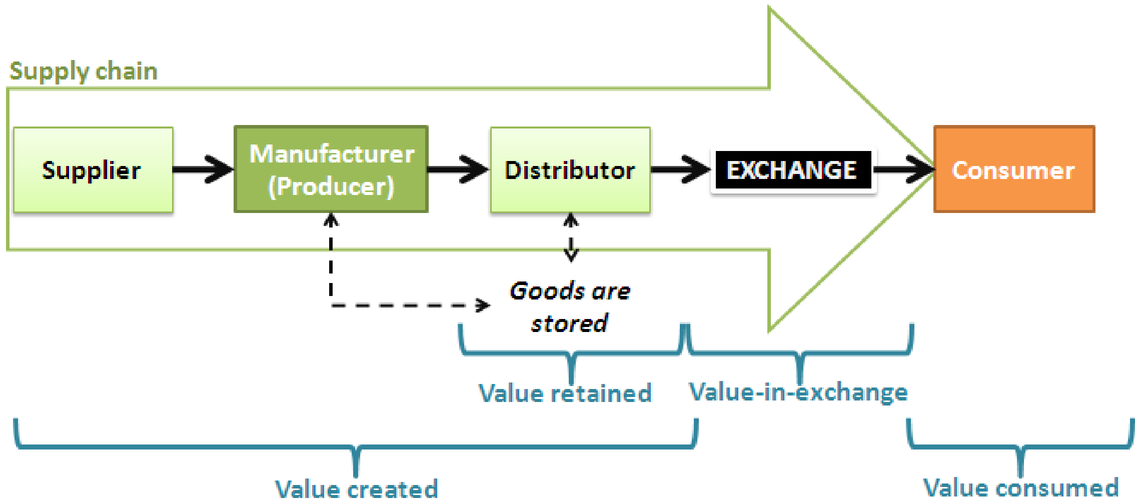


Figure 10: G-D Logic perspective of exchange (Based on Edvardsson *et al*., 2011:540; Nam and Lee, 2010:1764; Vargo and Lusch, 2004a:5)

In summary, the worldview informed by an underlying philosophy of G-D Logic focuses on the means and production, the producer, the product, the tangible, the transaction and the being (Vargo and Lusch, 2008c:25-27).

3.2 G-D Logic informed worldview: A model of the past (explanation)

G-D Logic first emerged as a term in the work of Vargo and Lusch (2004a) to describe the focus of exchange on goods (as described in the ontology above). However, its roots extend to the turn of the previous century and the Industrial Revolution (Vargo, 2011a:218; Vargo, 2011b:4). It was at this time that Adam Smith published his seminal work on economics, "The Wealth of Nations" (Vargo *et al.*, 2006:30). G-D Logic is said to be grounded in the work of Smith and the economic philosophy and science that followed (Vargo *et al.*, 2009:34; Vargo *et al.*, 2010:136). Smith started with a wide explanation of exchange and value but was of the opinion that only certain types of labour were productive or contributed to the gain of national wealth. At the time, national wealth was a thing of aspiration, as it determined social well-being (Vargo and Lusch, 2004a:12; Vargo *et al.,* 2008:147).

Based on this, Smith designated tangible-good producing activities as productive and all other activities as unproductive. Activities classified as unproductive were not useless or non-essential, but simply did not contribute to national wealth through creation and export of surplus tangible goods (Vargo, 2011a:218; Vargo, 2011b:4). Smith's opinions amounted to a view that economic exchange should be based on output: tangible goods with embedded value. Newtonian mechanics contributed to this view through establishing matter with properties and deterministic relationships (Vargo, 2007:5).

This neoclassical model of economics, with its strong ties to manufacturing as a result of the focus of the Industrial Revolution (Lusch *et al*., 2008:6), established the foundations of G-D Logic for the economic science of exchange (Vargo, 2011a:218). A change occurred during the 1960s resulting in de-industrialisation when a post-industrial society shifted their demand from manufactured goods to services. However, the economic crises of the 1980s brought about reflection on and questioning of this movement and, to stimulate the manufacturing industry and economy, re-industrialisation took place (Miles and Boden, 2000:1-3). The business of exchange remained focused on the G-D Logic perspective (Doan and Kosaka, 2011:1).

3.3 G-D Logic informed worldview: Source of knowledge (epistemology)

With roots that reach back to the Industrial Revolution (Vargo *et al.*, 2006:30) G-D Logic is informed by the viewpoint that national wealth can be improved through the division of labour and an increase in productive capacity and sale of tangible units of output, i.e. value-in-exchange (Spohrer and Kwan, 2009:7).

Lusch *et al*. (2008:5) highlight the limitation in that this viewpoint is oriented towards manufacturing and uses words such as: product, production, goods, distribution, supply and consumption. They indicate that this diction is a disadvantage as it relegates service/s to a supporting secondary role. In line with this, the lack of effort to define service is identified to have has resulted in a restrictive myopic view of exchange, visible through the distortions in the economic taxonomy and related accounting systems (Hill, 1977:320; Miles and Boden, 2000:1-3).

3.4 G-D Logic informed worldview: Values (axiology)

A fundamental value of a G-D Logic informed worldview is value-in-exchange (Lusch *et al*., 2008:9; Nam and Lee, 2010:1764). The concept of value-in-exchange implies that value is determined and created upfront by a provider (and potentially also a supplier) in the production and distribution process and that it is either stored (where value is retained) or transferred to the customer upon exchange – achieving value (Vargo and Lusch, 2004a:5; Lusch *et al*., 2008:6). Value is predetermined according to place, time and use by the provider, based on their knowledge of what goods and features will be of value to one or more customer or customer segment. After exchange has taken place, the customer consumes or depletes the value (Edvardsson *et al*., 2011:540; Lusch *et al*., 2008:6).

G-D Logic therefore places value on the provider, production and the tangible goods that are produced. This is supported by G-D Logic's focus on activities that take place from the supplier and provider point of view up until the point of exchange where the goods are distributed. These are, for example: the linear exchange process (Vargo and Lusch, 2004a:5; Edvardsson *et al*., 2011:540); standardisation and production efficiency (Vargo and Lusch, 2004a:5; Lusch *et al*., 2008:6); tangible units of output (Miles and Boden, 2000:1-3); ability to group and inventory goods (Nam and Lee, 2010:1761); and separation of customers and providers so that customers do not "interfere" in the production process (Lusch *et al*., 2008:6).

In contrast, G-D Logic does not value the customer process that takes place after exchange, i.e. the use of the goods that are exchanged. By implication, it can be seen that G-D Logic does not value the customer, other than as a production or marketing variable that must be taken into account in so far as it must be marketed or sold to. As it values the tangible good or unit of output, value is also not placed on intangible services. In fact, activities producing intangible services are discounted as unproductive and, although not seen as useless or non-essential, they are simply not seen to contribute to the creation of wealth (Vargo, 2011a:218; Vargo, 2011b:4). Services embody characteristics that are not valued – or are seen as disadvantageous – by a G-D Logic mindset, namely: heterogeneity and inseparability (making them difficult to group and inventory) as well as perishability (which leads to inability to store and retain value) (Nam and Lee, 2010: 1761; Lusch *et al*., 2008:6).

3.5 G-D Logic informed worldview: Guiding principles and actions (praxeology)

G-D Logic is guided by many of the principles from disciplines such as manufacturing, operations, logistics/distribution, economics etc. Those informing G-D Logic can be seen to promote, for example, a linear supply chain (Vargo and Lusch, 2004a:5), market acquisition through increased sales (typically of tangible output), standardisation of design, production efficiency and maximisation of outputs that can be sold for profit (Vargo and Lusch, 2004a:5; Lusch *et al*., 2008:6).

Principles from Porter's value chain or 4Ps model that emphasise discrete, linear stages (Porter, 1985), emphasise the producer and production and considers customers to be resources that must be targeted, captured and segmented (Vargo and Lusch, 2004a:5) provide an example of supply chain guidelines that have informed G-D Logic (Ballentyne *et al*., 2008:45; Callaway and Dobrzykowski, 2009:225). Another example is of manufacturing principles such as the "lean manufacturing" principles that originated in Japan (Key Lean Manufacturing, 2011). What is significant about these is that while many of these principles focus on the human element and quality aspects of manufacturing, these principles still focus on the tangible output, separation of customer and provider, maximising production and inventory efficiencies, and on building quality (value) into the tangible output.

Within the systems engineering, IS and software engineering disciplines, an example of guiding principles are of those that stem from the traditional Systems Development Lifecycle (SDLC) methodologies. G-D Logic is informed and – in turn – appears to inform traditional SDLC methodologies such as the so-called "classic" Waterfall Approach (Tech Target, 2011). Methodologies such as this tend to focus on separation of customer and provider, upfront development whereby the provider embeds value and delivers this to the customer as a finished product and minimal input from the "consumer" (end user, sponsor or another key stakeholder). The Waterfall Approach is a linear and sequential approach where teams are separated and stage-by-stage design, development, testing and maintenance take place (Tech Target, 2011).

3.6 G-D Logic informed worldview: A model of the future (prediction)

Various research efforts and developments in ICT, economics, marketing and other areas and disciplines highlight that G-D Logic does not serve exchange optimally (Vargo and Lusch, 2004a:2, 2007:2). The surfacing of this discontent – which is discussed in Section 5 – is perhaps indicative of a shift that starting to take place and may be expected in the future. Although the future cannot be predicted with any amount of certainty, the emergence of this discontent makes it reasonable to say that the era whereby G-D Logic is accepted wholeheartedly and unquestioningly is potentially drawing to a close. Spohrer and Maglio (2008:243) draw attention to the emergence of a Service System worldview based on an underlying philosophy of S-D Logic and theory of Service Systems. Emergence of such a worldview (in addition to the shift in BI's dominant worldview that is proposed in this thesis) may be a catalyst for a shift from G-D Logic for economic exchange, marketing and various other social and economic exchange activities – including the exchange that takes place within BI.

4. A worldview based on S-D Logic

A worldview based on S-D Logic is now discussed, followed by a discussion in the next section of the need that is identified to shift from G-D to S-D Logic, i.e. where G-D Logic fails and why it is believed that S-D Logic offers alternative solutions to overcome BI's prevailing challenges.

4.1 S-D Logic informed worldview: A model of what is (ontology)

4.1.1 What is "service"?

"Service" must be explained before the S-D Logic informed worldview is discussed. The distinction between service and services represents a fundamental shift in understanding from the traditional view of goods and *services*. "Services" creates some confusion, as it carries the connotation that only traditional services are included while "service", as referenced by S-D Logic, has a significantly wider meaning (Rust and Thompson, 2006:291; Vargo, 2008:211; Vargo and Lusch, 2008a:255; Vargo and Lusch 2008c:25). In terms of S-D Logic, service is defined as the application of competences (skills and knowledge) through deeds, processes and performances for the benefit of another entity or the entity itself (Vargo and Lusch, 2004b:324-335; Lusch and Vargo, 2008).

In terms of this, service can refer to traditional services, such as hairdressers' or consultants' services, or it can refer to the exchange of a tangible product/good. In the latter case, the product is merely the transport mechanism for the provider's skills and knowledge, which are embedded in the product and deliver the service when the product is used. Vargo and Lusch (2011:1302) explain S-D Logic's "service" eloquently in everyday English as, "I received excellent service from my physician" (direct service through another actor) and as "I received excellent service through my lawn mower" (indirect service through a good). This represents a shift in how economists have defined "services" – i.e. as intangible products; the absence of primary or extractive industry (fishing, timber, mining, agriculture) or secondary or manufacturing (of tangible products); or residually, as what goods are not (*ibid*). This distinction is reflected in Figure 11, which also reflects the shift in understanding of goods and service/services from a G-D Logic view of exchange to an S-D Logic view of exchange.

As stated in section 2, Schultz and Gnoth (2008:129) examine exchange in the context of the organisation. They highlight that exchange is directly applicable to organisations, employees, suppliers, customers and other stakeholders. They apply S-D Logic principles to the organisation, showing how service is also applicable at an organisational level – between organisations and within the organisation. Figure 12 reflects this, relating to their identification that exchange concerns itself with interactions and relationships and consists of at least two nodes (e.g. giver and receiver) and a thread (e.g. whatever is exchanged) (*ibid*). This thesis highlights that exchange is directly applicable to BI and applies S-D Logic to BI, referring to an "S-D Logic informed worldview". As S-D Logic is the philosophical branch of the discipline of Service Science, it is now contextualized in terms of Service Science.

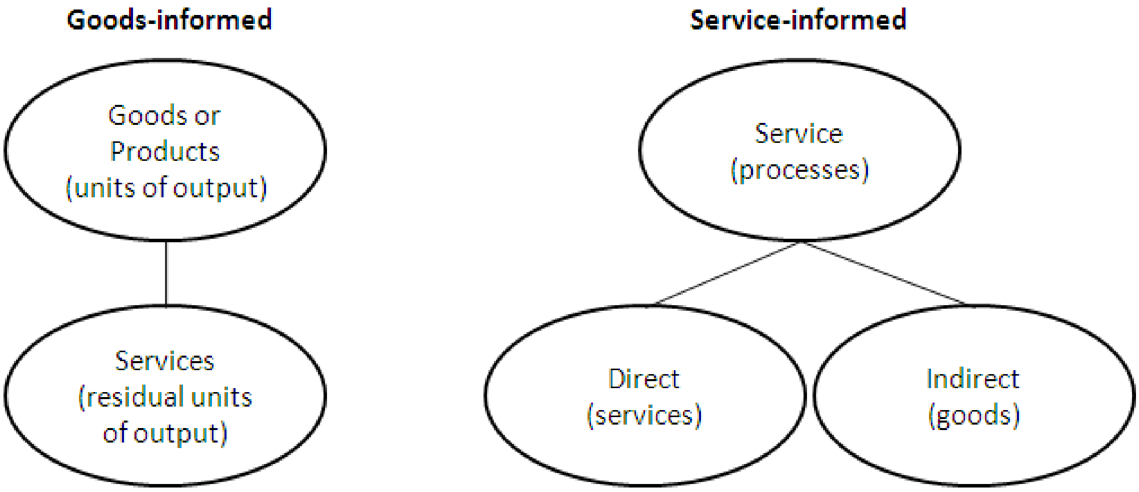


Figure 11: Hierarchies of exchange for goods- and service-informed worldviews (Adapted from Kowalkowski and Ballantyne, 2009)

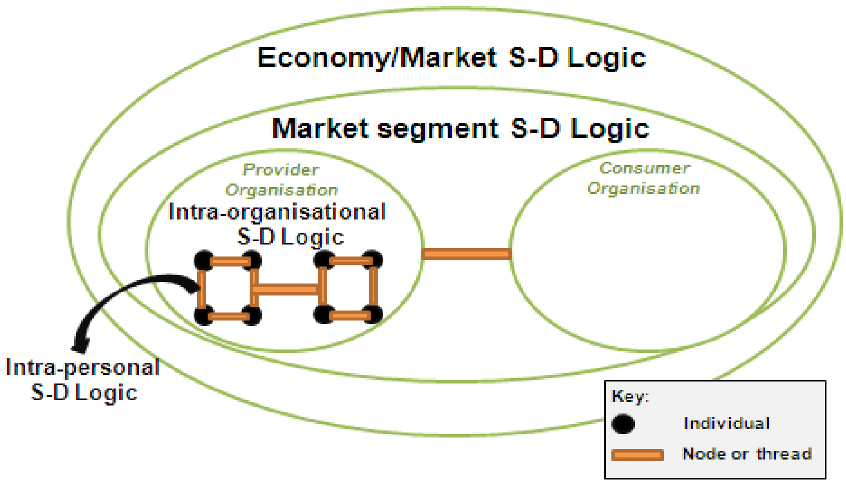


Figure 12: Intra-organisational S-D Logic (as adapted from Schultz and Gnoth, 2008:130)

4.1.2 Service Science in context: an interdisciplinary field

Service occurs within Service Systems – which are identified as an emerging worldview (Spohrer and Maglio, 2008:243). Spohrer and Kwan (2009:4) define the Service Systems worldview as a view that the world consists of populations of normatively interacting Service System entities such as people, businesses, government agencies, nations, cities, hospitals, universities, etc. They state that these entities interact within Service Systems via value propositions with the purpose to co-create value, although disputes do also frequently arise – in which case, governance mechanisms are invoked to resolve disputes. The emergence of the Service Systems worldview has led to inter-disciplinary fields of study such as Service Science Management Engineering and Design (SSMED), also referred to as Service Science, Management and Engineering (SSME) or simply as Service Science (Spohrer *et al*., 2007:71).

Service science is a multidisciplinary research and education effort (some accredit this to IBM – e.g. Barile and Polese (2009:3)) to study the methodology and technology for service innovation, design and delivery (Lin and Chang, 2009:429). Service science studies the Service System. The Service System is defined as: value co-creation configurations of people, technology, value propositions connecting internal and external systems and shared information (e.g. language, laws, measures and methods) (Maglio and Spohrer, 2008:18). It spans topics in commerce, the organisation, people and technology (Spohrer *et al*., 2007:71).

As reflected in Figure 13, Service Science is supported by S-D Logic as a philosophical foundation and the Service System as a theoretical foundation (Spohrer *et al*., 2008:4; Maglio and Spohrer, 2008:18). Both of these are discussed in upcoming sections 4.1.2.1 4.1.2.2. As the bodies of knowledge on S-D Logic and Service System Theory continue to grow through contributions from various disciplines and scholars (Spohrer *et al*., 2008:5-6), they influence each other, along with the inter-disciplinary field of Service Science – as reflected in the bi-directional arrows in Figure 13. Practical developments are also seen to have an influence on Service Science which, in turn, has an influence on them, i.e. a symbiotic relationship (Spohrer *et al*., 2008:5-6). Practical developments then also indirectly influence S-D Logic and Service System Theory. Practical developments include developments such as Service Management, Service Computing, Service Orientation, Service Engineering, Service Operations and Service Marketing – amongst many others which are emerging as quickly as Service Science develops (Spohrer *et al*., 2007:71; 2008:4).

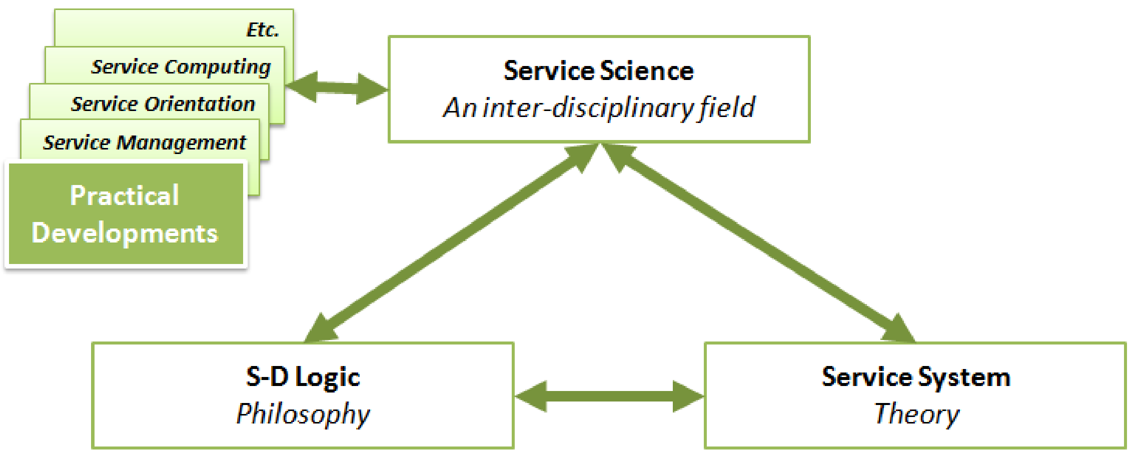


Figure 13: Service concepts in context (based on Spohrer *et al*., 2008:5-6; Spohrer *et al*., 2007:71; 2008:4)

4.1.2.1 Theory of the Service System

Service Systems exist in populations of Service Systems which, in turn, form part of a service ecology (also referred to as a service world or universe) (Spohrer and Kwan, 2009:3). Service systems are defined as complex, dynamic arrangements of resources in Service System entities which engage in dialogical interaction for the purpose of co-creating value. They are connected to each other in value networks, forming mutually-beneficial agreements with each other by means of value propositions (Spohrer *et al*., 2008:9).

Value propositions are reciprocal promises of value (Ballantyne and Varey (2006:334-5)), which lead to value co-creation (a win-win outcome) or disputes (either a lose-lose or lose-win outcome) (Spohrer *et al*., 2008:9; Spohrer and Kwan, 2009:4). Governance mechanisms are used to resolve disputes which may arise between stakeholders – customer, provider, authority or competitor – if value is not co-created. Value is measured according to stakeholder perspectives: customers evaluate quality; providers evaluate productivity; authorities evaluate compliance; and competitors evaluate sustainable innovation (Spohrer and Kwan, 2009:4).

Value networks are connected communities held together by the trinity of competences, relationships and information (Lusch *et al*., 2009:22). Value networks may also be referred to as value constellations, Service System networks or value chains, though value chains is more of a transitory term than a pure S-D Logic term. Value networks are abstractions that emerge upon assumption of a particular analysis overlay in the history of interactions amongst Service System entities (Spohrer and Kwan, 2009:3-4). Value networks are much the same as social networks, except that value networks extend to include organisations (Lusch and Vargo, 2006). Today, communities may even be linked in value hyper-networks where entities can connect via multiple types of networks laid over one another using different mechanisms (ranging from digital devices to social and biological bindings) (Chan and Hsu, 2011:3).

Service system entities are dynamic configurations of resources (Spohrer and Kwan, 2009:3). Service system entities may consist of people, technology, other internal and external Service Systems and shared information (Spohrer *et al*., 2007:72). Service System entities may be of an operand or operant nature. Operand refers to resources that are tangible, static and upon which action must be taken for them to be of use (e.g. coal). Operant refers to resources that are typically intangible, are dynamic and typically participate in the value co-creation process (e.g. knowledge) (Lusch and Vargo, 2005:91-92).

Service systems exist as a result of the need to exchange and co-create value, brought about by specialisation that occurs. As people, organisations, processes, etc. focus on a particular skill or knowledge, they become more dependent on each other for the others' specialisation. The process whereby increased specialisation – leading to micro-specialisation – occurs is referred to as "complification" (Giarini, 1985:134). As a result, the customer – like the other Service System entities – is in an interdependent relationship with other Service System entities – therefore playing the role of both customer and provider, according to the nature of the relationship and the service that takes place. The interdependent relationship occurs both in consumer services and in the organisation. In consumer services, value co-creation takes place around episodic experiences and brands while, in the organisation, it is built upon long-term interactions over the life of the organisation (Chesbrough and Spohrer, 2006:39).

4.1.2.2 The philosophy of S-D Logic

S-D Logic is a philosophy, worldview, mindset or lens through which exchange (service) can be viewed. As stated above, it complements Service Systems theory and is recognised as a potential philosophical foundation from which a science of service, as well as the research of service systems can be built (Maglio and Spohrer, 2008; Vargo *et al.*2010:134). Its central tenet is that service is the basis of exchange. By this, what is meant is that when an exchange takes place, service is exchanged for service (Bastiat, 1848:161-162; Walras, 1894:225; Vargo, 2009b:374).

S-D Logic perceives that exchange consists of a sequence of activities, i.e. a flow of service. Customer and supplier collaboratively interact with each other, and with other economic and social actors who are also directly or indirectly involved in the exchange, to deliver a service. S-D Logic therefore sees that people *and* other entities (e.g. organisations, technology, processes/activities, etc.) deliver service (Lusch and Vargo, 2008; Vargo and Lusch, 2004b:324-335). In a mutually beneficial relationship, customer and provider (and other entities involved) co-create value by collaboratively working on resources (Lusch and Vargo, 2005:1; 2006:xvii; Spohrer *et al*., 2008:9). They apply their collective knowledge to the resource to change it into something they find mutually beneficial. The S-D Logic worldview is therefore focused on the customer and the relationship and recognises knowledge (an operant resource) as a fundamental source of competitive advantage. The value that is created may be embedded in a tangible product (i.e. indirect service – which masks the true nature of service-for-service exchange, but is service nonetheless) or may be provided through a person (direct service) (Vargo and Lusch, 2011a:1319).

The value (or beneficial outcome) that emerges through this relationship depends on the customer's unique and subjective perception of what value is, upon use of the exchanged service. Emphasis is therefore placed on value-in-use. As such, the provider is seen to be incapable of unilaterally determining value upfront and needs the customer to co-create value in a mutually beneficial relationship. The provider can therefore only offer the customer a value proposition and not value. As such, value is not embedded in what is exchanged; only knowledge and skills can be embedded in what is exchanged.

These above concepts are elaborated on in section 4.4 where the ten Foundational Premises

(FPs) upon which S-D Logic is based are discussed.

4.2 S-D Logic informed worldview: A model of the past (explanation)

Although there may be conceptions that service is a contemporary logic (Randall, 2007:3; Finney *et al*., 2011:2-3), it could be argued that that awareness of S-D Logic concepts had their origins in the ancient world. Aristotle is recognised as the first to separate “use value” from “exchange value” (Fleetwood, 1997:729). However, even before then, Plato’s Republic reflects the notion of voluntary exchange of applied skills and competences (Vargo and Lusch, 2011b:181). Since then, further evidence of awareness of S-D Logic has been recorded in the 1700s and 1800s. For instance, in the 1700s Galiani (1751:304) is quoted to have stated, “It is certain that nothing has a price among men except pleasure, and that only satisfactions are purchased”. This corresponds with the more recent statements with a similar meaning: e.g. “importance of physical products lies not so much in owning them as in obtaining the services they render” (Kotler, 1977:8) and “customers do not buy goods or services: they buy offerings which render services which create value” (Gummesson, 1995; Vargo and Lusch, 2011a: 1319-1321).

The 1800s saw a number of the economic philosophers and scientists argue in favour of an economic law based on S-D Logic (Vargo and Lusch, 2008c:27). Frédéric Bastiat (1848:161-162) and Leon Walras (1894/1954:255) are two of many such authors. They saw economic law to be an exchange of services for services and also subscribed to the view that value arises from use, wants and satisfactions (Barbon, 1903:21; Dixon, 1990:304; Bastiat, 1860:40). Say and Mill are other notable contributors of this period. They saw production as the creation of utility and not matter or the rearrangement of matter, defining services as activities or immaterial products consumed at production (Vargo and Lusch, 2006:31; Mill, 1848:45).

Even authors who wrote around the time of the Industrial Revolution around the turn of the 19th century stated that the social order – both its structure and functioning of activities – is one of service in exchange (Delaunay and Gadrey, 1992:64-65). Their voices were, however, drowned out when the dominant view of the day – accredited to Adam Smith (“the father of economics”) – became the view that economic exchange should be based on output – tangible goods with embedded value (Vargo, *et al.,* 2006:29, 31). The Industrial Revolution, with its focus on production and output of volumes of units with a view to increase national wealth, is recognised as the turning point when focus was placed on goods, production, units of output and a move towards a science of exchange of things (products), embedded with properties (utiles). Previous awareness of S-D Logic concepts was buried under the dominant focus on the exchange of goods. Service became “services”, in line with the focus on units of output, but even services were side-lined. They were seen to be an unproductive residuum of goods and were even categorised in terms of goods, i.e. “that which is not goods” (Miles and Boden, 2000:1-3) and not specifically defined (Hill, 1977:320). The de-industrialisation of the 1960s provided some hope for a re-emergence of service, however, this was offset by the re-industrialisation during the 1980s. Services remained a sideline of the other economic sectors – mining, agriculture and manufacturing.

Since then, however, both services and service have seen a turnaround. The services economy has grown from being a side-lined “that which is not goods” to now be recorded as the sector that contributes 60% towards Western democracies’ Gross Domestic Product (GDP) (O’Shaughnessy and O’Shaugnessy, 2009:784). The economic paradigm has shown a shift from a product- to a service-based economy (Nam and Lee, 2010:1761, 1763; Doan and Kosaka, 2011:1). For the first time in history, there are more service jobs (40%) than agricultural jobs (39.6%) and manufacturing jobs (20.4%) (Spohrer and Kwan, 2009:1). Although this is a shift for services, which still denotes a G-D Logic outlook, it reflects that nowadays more people survive (and even thrive) without making a living from making physical goods – which demonstrates a turnaround for service.

The re-awakening of service can also be seen over the past thirty years through the growing number of academics and practitioners who have started studying service as a distinct phenomenon, with its own body of knowledge and rules of practice (Spohrer and Kwan, 2009:1). There have, however, been hints at awareness of service throughout the last century. For example, Kitson (1922:417-419) identified that tangible goods provide service; Penrose (1959:30) highlighted the service-provision of capital; Day (2004:18), the S-D Logic argument of value-in-use can be traced back to Levy and Boyd’s1963 article “New Dimensions in Consumer Analysis” (ibid); and Mauss (1950) referred to the total exchange of service among early civilisations. Even in biology, the concept of mutualism (Bronstein, 1994) identified service-for-service exchange (Vargo and Lusch, 2011a: 1319-1321).

The awareness of service appears to have soared to new heights in January 2004 when Vargo and Lusch’s article “Evolving to a New Dominant Logic for Marketing” appeared in the Journal of Marketing (Vargo, 2011a:217-218). Since then, the debate on service – including Service Science and its underlying philosophy S-D Logic – has had centre stage (Williams and Aitken, 2011). With various contemporary scholars across the globe and across disciplines explicitly contributing to the growth in the body of knowledge on service – perhaps the most notably Grönroos (e.g. 2000), Gummesson (e.g. 1995), Normann (e.g. 2001) and (Vargo and Lusch, 2011a: 1319-1321) – service has gained increased attention in academia. By the first quarter of 2012, Vargo and Lusch’s original article had over 2,600 citations according to Google Scholar. S-D Logic, with its grounding in economics provides a conceptual framework that enables thinking about markets and exchange (Vargo and Lusch, 2004a:4-5) in general. In fact, the debate, which originally proliferated marketing, has now expanded to be included in the curricula of many other disciplines such as engineering, computer science, information systems, etc. (Ballentyne and Varey, 2008:11; Rust and Mui, 2006:50; Spohrer and Maglio, 2008:241). Even at a practitioner level, an increased effort to understand service activities is visible (Miles and Boden, 2000:1) as organisations re-structure technical and organisational resources to become service orientated (Sheth *et al*., 2006:56).

4.3 S-D Logic informed worldview: Source of knowledge (epistemology)

4.3.1 A service body of knowledge

Various disciplines contribute to the body of knowledge that informs Service Science. This body of knowledge is continuously expanding through contributions from scholars and professionals across the globe, studying and working in various disciplines. Section 4.1.2 reflects how Service Science as a discipline grows from contributions stemming from S-D Logic as a philosophy and Service Systems as a theory – as well as from knowledge from practical developments. Spohrer and Kwan (2009:15-16) identify specific professionals that contribute towards and can simultaneously benefit from Service Science. These are entrepreneurs, business consultants, scientists and engineers. They (Spohrer and Kwan, 2009:6-7) also identify ten academic discipline pillars of Service Science that provide an understanding of the Service Systems. For example, history, marketing, computing, anthropology, design, etc.

In addition to the growth of the service-informed body of knowledge through scholarly disciplines and professional practices, service-related knowledge is also growing as a result of the awareness and sense of opportunity brought about as specialisation increases (Spohrer and Maglio, 2008:243), specialised knowledge becomes more intensive, service-for-service exchange dominates modern economies, more people have service jobs than ever before (Nam and Lee, 2010:1761; Doan and Kosaka, 2011:1) and more people are making an income that is no longer based on the creation of new physical things (Spohrer and Kwan, 2009:1).

Although the incredible growth of “services” as an economic sector (O’Shaughnessy and O’ Shaughnessy, 2009:284) is not seen as the trigger of the growth in the service body of knowledge, it contributed by awakening the realisation that skills and knowledge are the most important resources (Vargo and Lusch, 2004a:8). Some of these factors highlight, on the one hand, the inefficiencies of G-D Logic and, on the other, the potential for S-D Logic. They have resulted in the phenomenon whereby a growing number of academics and practitioners study service as a distinct phenomenon with its own body of knowledge and rules of practice (Spohrer and Kwan, 2009:1).

4.3.2 Limitations identified in the source of knowledge of S-D Logic

A potential limitation or weakness that is identified in the epistemology of the service-informed worldview is that Service Science is “at the beginning of the beginning” and substantial work is still needed to integrate insights from the various disciplines (Spohrer and Kwan, 2009:16). Work is not just needed in empirical research, but also to establish and define S-D Logic concepts. In addition, the study of S-D Logic in the ambit of societal and ethical issues has largely been neglected to date and S-D Logic scope and boundaries still need to be set (Vargo and Lusch, 2008b:1).

Growth is also needed to establish governance mechanisms, ensuring that S-D Logic's governance mechanisms progress in parallel with the technological progress enabling service. A lag in governance may result in abuse of service, for example, producers who use prediction and control to manipulate customers rather than to use these to provide a better service for them. Other examples are of producers who unscrupulously gather customer data or inconvenience customers by "outsourcing" tedious "self-service" processes to them, engaging them in co-production rather than co-creation (Hilton, 2008:1-5). Paradoxically this provides the opportunity for contributions from various disciplines to refine and integrate Service Science.

O'Shaughnessy and O'Shaughnessy (2009:284-793) make statements that S-D Logic is centred in marketing and restricted to America. Vargo and Lusch (2009) however, put this argument to rest by referencing the numerous contributions towards Service Science that have been made since their 2004 article. This highlights the interdisciplinary and global nature of service contributions and discourse. Further arguments and debate on S-D Logic are discussed in Section 6.

4.4 S-D Logic informed worldview: Values (axiology)

Axiology provides the theory of values and goals to guide actions. As such, it is appropriate to discuss the Foundational Premises (FPs) of S-D Logic in this section.

The above sections introduce some of the concepts of S-D Logic. A deeper understanding of S-D Logic is, however, provided through an explanation of its ten FPs, as compiled by Vargo and Lusch. In January 2004 Vargo and Lusch's article "Evolving to a New Dominant Logic for Marketing" appeared in the Journal of Marketing (2004). Since then, S-D Logic has received much academic attention, leading to debate and discussion and expanding from the marketing discipline. In 2008, Vargo and Lusch revisited their initial S-D Logic article, providing further insights by updating the original eight FPs with a further two. The complete set of FPs is reflected in Table 8.

Table 8: Summary of the ten FPs of S-D Logic

Foundational Premise (FP) and description
FP 1: Service is the fundamental basis of exchange: At the core of any exchange, capabilities are exchanged for capabilities. E.g. it is not fish that is exchanged for grain, but fishing knowledge and skills for farming knowledge and skills (Vargo and Lusch, 2004a:10-11).
FP 2: Indirect exchange masks the fundamental basis of exchange: Indirect exchange occurs when exchange delivery vehicles (e.g. money, salaries, products) or ICT developments (e.g. medium of exchange is electronic) are used to facilitate exchange. Indirect exchange may result in in separation of customer and provider resulting in loss of knowledge sharing and mutual adaptation opportunities, time lags, loss of quality (Spohrer *et al*., 2008:10; Vargo and Lusch, 2004a:14).
FP 3: Goods are distribution mechanisms for service provision: Thought, research and design

Foundational Premise (FP) and description
(specialised skills, knowledge and the application thereof) are invested in products, over a period by a community, and are exchanged with the product (embedded) as the vehicle of exchange. It is not an operand resource (e.g. a tangible product) that is exchanged, but an operant resource (e.g. knowledge and skill). It is not the product that is purchased, but what the product provides. As per Leo McGinneva's famous clarification, "They don't want quarter-inch bits. They want quarter-inch holes" (Levitt, 2006:1). An ICT example is of on-demand access to a software service (Software as a Service (SaaS)), where use of the software is possible without owning it (Zhao, 2008:415).
FP 4: Operant resources are the fundamental source of competitive advantage: Resources that are hard to transfer, copy or combine are a source of competitive advantage (e.g. knowledge embedded in such resources) – with the opposite also being true (Barabba, 1996:48; Normann and Ramirez, 1993:69; Quinn *et al*., 1990:60; Vargo and Lusch, 2006:16). This becomes obvious when an organisation's ideas, designs, etc. are protected by Intellectual Property (IP), a patent or copy right (Vargo and Lusch, 2006:15). When knowledge is embedded in a value network, this is even harder to copy, resulting in a greater competitive advantage (Spohrer *et al*., 2008:10).
FP 5: All economies are service economies: This becomes clear when considering that service is at the core of every exchange (as per FP 1) and – even though tangible goods were the focus of previous periods due to a G-D Logic – goods are distribution mechanisms for service provision (FP 3). Even hunter-gatherer and agriculture/manufacturing eras therefore exchanged services and are markets of service (Spohrer *et al*. 2008:10).
FP 6: The customer is always co-creator of value: The customer is in an interdependent relationship with other Service System entities, playing an interchangeable role of customer and provider according to the nature of the relationship and service (Chesbrough and Spohrer, 2006:39). The flow of service does not end with exchange, but continues into consumption. The customer is responsible for co-creating value in consumption or use. An example from Spohrer and Maglio (2008:240) is of a doctor (provider) instructing a patient (customer) to eat certain foods and exercise. The provider performs certain activities to transform the customer's state, but the customer must also perform certain activities to transform their own state to receive full value of the service.
FP 7: The enterprise cannot deliver value, but can only offer value propositions: Value is created upon consumption (Gummesson, 1998:247) – i.e. value-in-use – therefore it is the customer who determines the value. Therefore, neither organisation nor provider can deliver value on their own, but can only offer value propositions. The value proposition represents what the customer stands to gain or sacrifice when accepting what the provider offers (Spohrer *et al*., 2008:11).
FP 8: A service-centred view is inherently customer oriented and relational: The intrinsic nature of a service-centred view is that it focuses on the customer and the relationship and is participatory. It is not narrowly concerned with the customer, but has a balanced service-for-service performance. Customer and provider both have rights and duties in terms of an agreement and inseparably co-create value in a relationship with each other and other Service System entities. The relationship may be a once-off or repeat transaction over a short- or long-term (Vargo, 2009b:375).
FP 9: All economic and social actors are resource integrators: Whether economic or social, Ser-

Foundational Premise (FP) and description
vice System entities or actors (individuals, technology, etc.) dynamically combine, construct and employ operand and operant resources to co-create value (Vargo and Lusch, 2008a:52).
FP 10: Value is always uniquely and phenomenologically determined by the beneficiary: Value is only created upon consumption (use) by the customer (beneficiary) (Gummesson, 1998:247). It is personal, experiential, contextual and meaning-laden (Vargo, 2009b:375), i.e. the customer who uses the service determines whether it is valuable to them, at the point when they use it – according to their own life-world. Edmund Hesserl's philosophy of phenomenology states that the customer's life-world is based on their own experience, the way they experience things and the meaning they attribute to the experience (Smith, 2009).

4.5 S-D Logic informed worldview: Guiding principles and actions (praxeology)

Various guiding principles can be inferred from the body of knowledge that informs Service Science. For example, the ten FPs provide guidance for the customer and the provider in terms of their relationship and interactions. An example is of FP 6, which implies that the customer must be involved and is responsible along with the provider in co-creating value. The literature does not, however, overtly provide a clear list of guiding principles that are widely recognised and debated or accepted in the same way as the ten FPs. Guiding principles that are provided tend to focus on isolated components of service provision. For example, Lusch and Vargo (2006:415, 2010:288) specifically offer normative guidelines for the organisation. Another example is of the steps presented by Tanniru (2007:418), which instruct how S-D Logic should be applied. Although not expressly stated as such, Tanniru's steps are from the viewpoint of the provider. Both sets of guidelines are provided in Table 9. Undoubtedly there are further guidelines within the literature, those provided in Table 9 just serve as examples of the guidelines that are available rather than an attempt to provide an exhaustive list.

Table 9: Guidelines to apply S-D Logic (examples from Lusch and Vargo, 2006:415 and Tanniru, 2007:418)

Guideline	Source
Be transparent and make all information symmetric in the exchange process. Because the customer is someone to collaborate with, anything other than complete truthfulness will not work.	Lusch and Vargo (2006:415)
Strive to develop relationships with customers. Ideally take a long-term perspective.	
View goods as transmitters of operant resources (embedded knowledge); the firm should focus on selling service flows.	
Support and make investments in the developments of specialised skills and knowledge that are the fountainhead of economic growth.	
Identify or develop core competences, the fundamental knowledge and skills of an	Tanniru

Guideline	Source
economic entity that represent potential competitive advantage.	(2007:418)
Identify other entities (potential customers) that could benefit from these competenc-es.	
Cultivate relationships that involve customers in developing customised, competitive-ly compelling value propositions to meet specific needs.	
Gauge marketplace feedback by analysing financial performance from exchange, to learn how to improve the organisation's performance and offering to customers.	

Further guidelines can be found within the scope of Service Science's practical developments such as Service Computing and Service Management. IT Service Management guidelines have been published for, amongst others, the Service Oriented Architecture (SOA) which is considered to be the mainstream IT architecture affecting IT application modeling, development and management (Jain, 2007:420), the IT Infrastructure Library (ITIL) (Lemieux, 2008:2), the Microsoft Operations Framework (MOF) (Microsoft, 2008) and the Service Management Framework (QUT IT Services, 2008). Numerous frameworks, models and architectures such as these are available from IT vendors, practitioner authors and consultancies. Academic literature also provides various service frameworks for application within the practice of Service Science. A few examples are, Nam and Lee's (2010:1772) proposal for a typology showing service innovation, the Computer-Aided Market Engineering (CAME) tool suite – which is actually a conceptual framework for service design within electronic market processes – from Weinhardt *et al*., 2006:79 and Doan and Kosaka's (2011:1) IT infrastructure-based service mediator model (which facilitates web information exchange based on S-D Logic concepts).

BI service frameworks have already been discussed in the literature study, where it is identified that these tend to focus on isolated fragments of the BI process and typically end with the presentation layer, e.g. an analytics application that is delivered.

The literature on service guidelines – within Service Science and overlapping with BI – highlights two things. Firstly, it is possible and accepted to apply Service Science within management and computing fields – amongst many others (marketing, engineering, etc.) as evidenced by the developments taking place within these fields. This indicates acceptance of Service Science principles in general. Secondly, a gap exists in the existing literature to provide service guidelines that encompass the full BI process and both provider and consumer. The framework provided as this thesis' main contribution contributes towards filling this gap.

4.6 S-D Logic informed worldview: A model of the future (prediction)

Current developments highlight evidence that, one the one hand, practical application of Service Science some organisations are applying S-D Logic successfully and that, on the other, the Service Science community should be vigilant about monitoring application of Service Science in its true form as intended. In terms of the former, an example is of Nike, Inc. Nike has assumed the role of a value creation network architect rather than that of a manufacturer. It no longer manufactures or handles much of the physical movement of tangible goods, rather applying its competences to design products, build brands and marketing while outsourcing most other functions. Nike also incorporates the final customer in its value creation network – customers promote the Nike brand through prominent display of Nike logos on the apparel they have purchased. In this way, customers co-create the Nike brand, which they use as a resource to define their own identities (Lusch *et al*., 2008:11).

While Nike is an example of an organisation that makes Service Science work for it, it should be borne in mind that not all organisations manage to do this. In contrast, some misunderstand what is truly needed to be a service organisation, proffering to pursue true service solutions strategies but misunderstanding that a service orientation is not simply outsourcing all functions. Many of the Fortune 100 organisations claim to offer service solutions, which highlights the need to question whether service solutions are a significant offering or whether this is simply a "fashion statement" that is made while they fail to follow a true service solution strategy (Day, 2008; Kowalkowski, 2010:288). It is identified that further research is currently needed to build a distinctive and robust science of service (Lusch *et al*., 2008:6). The ultimate goal is establishment of a service theory based on S-D Logic as the underlying philosophy (Vargo, 2011b:4).

5. The need for a shift from G-D to S-D Logic

G-D Logic, which is identified in the next chapter as an underlying and restrictive logic of BI resulting in BI challenges, is seen as an inadequate logic that does not benefit today's exchange process (Vargo and Lusch, 2004a:2). It is believed that G-D Logic fails BI – causing or contributing towards many of its prevailing challenges – and that S-D Logic offers BI alternative solutions that can assist in overcoming prevailing BI challenges. A few examples that highlight this viewpoint are provided, first generally and then specifically in terms of BI.

Vargo and Lusch (2004a:2) draw attention to the G-D Logic perception that the organisation's success lies in increasing its market share. According to G-D Logic, the customer market is segmented or penetrated and customers are promoted to. They highlight that G-D Logic is restrictive as it sees customers merely as resources that can be captured or acted on. Organisations "capture" and then manage customers, often resulting in the customers losing their voice (Prahalad and Ramaswamy, 2004:13). Information distributed to customers is often perceived as propagandistic as it is often distorted, intrusive or even abusive. It is frequently one-sided, biased towards the producer and is not shared symmetrically (which allows balanced views from customers, employees, partners and other actors involved in the exchange). As a result, informed decisions cannot be made and value co-creation cannot be achieved (Edvardsson *et al*., 2011:544). An example of the ill-effects of this outlook can be seen in Sony's alleged disregard to communicate known risks to its consumers. In May 2011 a few thousand Sony customers' credit card details and accounts were compromised. According to the media, Sony held back on informing customers of this risk when they were first aware of the attacks. Initially, only a few accounts were compromised and Sony allegedly chose not to communicate, favouring its reputation and believing further attacks had been stopped. According to reports, Sony favoured its reputation, as it was hoping to have stopped the attacks and maintain a low profile on them, but further attacks occurred where uninformed customers were then jeopardised (Gilbert, 2011).

In addition, G-D Logic overlooks the consumer's joint role and responsibility in creating value (Vargo and Lusch, 2004a:2). This is often to the detriment of the producer (and the customer and the entire network they form part of). In contrast to this oversight of the customer, consider a marathon where runners must compete successfully in several other races as an entry requirement. The provider thereby recognises the customer's role in creating value (e.g. a successful marathon that the customer is fit and able to finish and enjoy). This benefits the runner, the marathon provider as well as the network they form part of – e.g. medical support services will be less burdened with runners who are unfit and need medical attention as a result.

Another example is of the inefficiencies created by G-D Logic's perception of customers as value destroyers, who consume value that is embedded in products that are sold to them (Vargo and Lusch, 2004a:2). This highlights the G-D Logic view that value is perceived in exchange, rather than use (Akaka, 2007:1). This viewpoint's inadequacy is emphasised by Leo McGinneva's famous clarification about why people buy a quarter-inch drill bit – "they don't want quarter-inch bits. They want quarter-inch holes" (Levitt, 2006:1). The value is not only in the exchange, but rather in the use. In addition, the customer is not a value-destroyer, but has a role in creating the value (Vargo and Lusch, 2006:18): the producer of the quarter-inch drill bit needs the customer to drill the holes. The viewpoint of value solely in exchange is likely to cost the opportunity of a longer-term relationship that enables mutual adaptation and growth.

Hill (1977:320) identifies that G-D Logic's focus on services (rather than service) brings a restricting myopic view of exchange. Shortcomings of this myopic view are visible in the distortions in the economic taxonomy and related accounting systems. Traditional economic classifications focus on the output that organisation's produce, rather than on the competences and resources used to develop their service offerings (Vargo and Lusch, 2011a: 1319-1321). Such distortions are made visible where an organisation retrenches a department performing a specific function, only to hire the same people to perform the same function in an outsourced capacity. Prior to retrenchment, the department's activities may have been counted as *goods production*. However, after the outsourced function is set up, the function is counted as a *services* category (Hill, 1977:320). Vargo and Lusch (2011:1301) provide the example of this distortion in the example of a tailor. A tailor who makes custom suits in a private practice is classified as offering a tailoring service. However, if the tailor works for an organisation in a cut-and-sew suit-making factory, he/she is classified as a manufacturing employee producing suits (goods). This highlights the meaninglessness of traditional G-D Logic based classifications.

Furthermore, new insights and opportunities are brought about by ICT progress and ongoing development and research within Service Science. For example, ICT progress makes it increasingly possible to exchange information separately from goods, thereby increasing opportunities to concentrate on core competences and outsource others and rendering most supply chain concepts inadequate (Lusch, Vargo and Wessels, 2008:11). Edvardsson *et al* (2011:541-549) advise that, according to their empirical investigation, an S-D Logic informed Service System outperforms a G-D Logic informed Service System. They compare two bus transport Service Systems in the same domain and with similar functionality, finding that the S-D Logic informed system evokes a better experience from bus users in terms of total overall experience and total time spent waiting and in transit.

G-D Logic can be seen to fail BI specifically in a number of ways. Based on the above discussion, it is evident that, with G-D Logic, BI users lose their voice (Prahalad and Ramaswamy, 2004:13), are disempowered from making informed decisions (Edvardsson et al., 2011:544) and are excluded (although sometimes willingly) from participation and the co-responsibility of creating value (Vargo and Lusch, 2004a:2). By focusing on the tangible product or output (a BI application, report or data), sight is lost of the user and the process that must take place after the tangible product or output is created. G-D Logic primarily fails BI as it focuses on production rather than on use, in effect neglecting the entire span of the processes that should be taking place after the tangible product is exchanged and the BI user or beneficiary attempts to obtain value from this. In terms of this, S-D Logic appears to be superior with its focus on the customer, the relationship and use. By applying S-D rather than G-D Logic to BI, BI customers/users are drawn into the creation process, thereby co-creating value and the processes after the tangible product is created are not neglected – instead they are focused on to the point where value is perceived by the BI user/beneficiary.

More broadly, Korhonen (2010) analyses the paradigm shift that takes place in IT in terms of S-D Logic, highlighting how G-D Logic suggests a goal-seeking system. He explains that the system can be abstracted as relatively self-contained and closed, with the goal to minimise costs and maximise profit, limiting organisational learning to incremental improvement within established structures. In contrast, he explains that S-D Logic suggests a purposeful system that exhibits will, it is able to change its goals and select both ends and means to pursue them. An S-D Logic IT system forms part of the bigger picture – the organisation and the context that the organisation fits into – as part of a greater open system that interacts with its environment. Participatory relationships and learning from innovation are encouraged.

6. The G-D and S-D Logic debate

The inadequacies of G-D Logic point towards the need for a shift from G-D to S-D Logic. However, it must be borne in mind that S-D Logic is still a "pre-theory" (Vargo, 2011b:4). It is not yet a conclusive and robust science that has been unquestioningly accepted. As a result, there is much debate and discourse on the topic of Service Science – including Service Systems theory and the philosophy of S-D logic. It appears that Vargo and Lusch's 2004 article on S-D Logic (2004) put the service perspective in the spotlight where it has attracted much dialogue and debate (Lusch and Vargo, 2006; Randall, 2007:32). Since this 2004 article, there have been at least six S-D Logic focused conferences, twelve S-D Logic special issues or sections in journals, hundreds of articles and presentations grounded in S-D Logic and thousands of citations and cross citations to S-D Logic related work – from various disciplines and countries across the world (Vargo, 2011a:217-218; Williams and Aitken, 2011). It is evident that this "open source" body of knowledge representing collective thought on the service perspective is growing and evolving through a collaborative effort from scholars and practitioners across disciplines and countries (Vargo and Lusch, 2011a:1320).

While much of this has been in support of S-D Logic, building up the body of knowledge on S-D Logic towards reaching its goal of becoming a robust science of service, the literature shows evidence that S-D Logic is also subject to a certain amount of scrutiny and even criticism. Three distinct factions or schools of thought emerge in the literature: supportive; resistant and; hesitant but critical and/or hopeful (Vargo, 2011a:217).

6.1 Faction 1: Supportive of S-D Logic

There are many who praise Vargo and Lusch for highlighting S-D Logic as a promising, robust and insightful alternative to the traditional G-D Logic mindset (Randall, 2007:31; Webster, 2006b:xiv; Rust, 2004:20; Day, 2004; Hunt, 2004:22; Vargo and Lusch, 2011a:1320). In fact, a move from the traditional G-D Logic mindset is advocated: it is identified that a level of maturity has been reached whereby knowledge drives and transforms the economy (Rust, 2004:25, Day, 2004). Rust (2004:25) identifies that this has been brought about largely through technological advancements and links advances in the service to the ICT progress. Maglana (2007) highlights some examples where the service perspective is already evident, stating that S-D Logic is already an ongoing, albeit implicit, phenomenon within the practitioner domain. Examples include: grid computing which changes how people access computing power so that this is similar to accessing electricity; Google's provision of spreadsheet and word processing services without having to own the software; Coca-Cola and PepsiCo's offering of healthier beverages – acknowledging that it is the service the beverage provides and not necessarily the beverage itself that is valuable to the consumer.

Furthermore, based on ICT progress, Randall (2007:27) predicts that, as technology progresses, the focus on service will intensify, thereby hastening the movement to accept the service perspective. This is echoed by Spohrer (2008b:25) who predicts a Moore's Law of service. Randall (2007:27) identifies that it is time to move away from the old school's product-centric focus, specifically portrayed in Porter's 4Ps model, as this old school way of thinking considers customers to be resources that must be targeted, captured and segmented (Vargo and Lusch, 2004a:4-6).

Logic that is already emerging across various disciplines is of partnership, networking, customer intimacy, proactive meeting of needs in a win-win situation, support for co-creation of value (Oliver, 2006) and focus on interaction between exchange partners (Gummesson, 2004:20). The emergence of Service Computing, management, marketing, engineering, etc. and the examples from the practitioner domain within paragraphs above attest to the emergence of a service approach across various disciplines. The spread of the service approach and orientation shows that changes in practice, although some of these are either nascent or implicit, are aligned with S-D Logic concepts and therefore supportive of S-D Logic.

Readiness for change is demonstrated through a change in attitude and awareness. Consider as examples, Nike Inc.'s service approach ((Lusch *et al.*, 2008:11) (as per section 4.6) or MasterCard's "priceless" advertising campaign (as per FP3 above) where the campaign reflects awareness that goods are not purchased but experiences or higher order needs are met. Consider IBM as a service forerunner in terms of research and a service example in itself with its successful and profitable shift from goods to service (Bjurklo, Edvardsson and Bebauer, 2009:494). Even consider the examples of self-service and mass customisation where technology is implemented to support service principles, e.g. providers extend opportunities for customer participation.

Maglana (2007) – who writes an article that, in essence, highlights the pros and cons of S-D Logic – examines S-D Logic from two key perspectives: the organisation as producer; and the consumer. His conclusions are generally complementary of S-D Logic, as he identifies benefits for both the producer and consumer if applying an S-D Logic mindset. He identifies organisational benefits of "a wider range of opportunities" and "maximisation of profits from limited operand resources". Benefits for the consumer are improved offerings and more responsible marketing.

6.2 Faction 2: Resistant to S-D Logic

Two key articles from O'Shaughnessy and O'Shaughnessy (2009; 2011) reflect strong antagonistic responses to S-D Logic. In both, loaded terms such as "radicals", "evangelists" (O'Shaughnessy and O'Shaughnessy, 2009:784), "revolutionaries" and "hucksters of ideas with radical claims" (O'Shaughnessy and O'Shaughnessy, 2011:1317-8) are used to describe Vargo and Lusch after the release of their 2004 paper on S-D Logic. O'Shaughnessy and O'Shaughnessy state that their argument against S-D Logic is founded solely on this 2004 paper as "a contestable base" or "central premise on which this literary corpus rests" (O'Shaughnessy and O'Shaughnessy, 2011:1310-1311), to the exclusion of further research contributing to the S-D Logic body of knowledge. This discredits much of their argument (Vargo and Lusch, 2011a:1320) and also results in several unfounded statement, e.g. that the service perspective is limited to America and the Marketing discipline and it does not call for critical assessment or contribution from theory (O'Shaughnessy and O'Shaughnessy, 2009; 2011).

Had O'Shaughnessy and O'Shaughnessy reviewed the mass of literature that is available on S-D Logic, these arguments would have been countered. As Vargo and Lusch (2011:1320) counter-argue: it is apparent that O'Shaughnessy and O'Shaughnessy have missed the mass of literature on the service approach that reflects the cross-disciplinary and global nature of the service evolution. Vargo and Lusch (2011:1299-1301) also highlight the inaccuracy in the statement that calls for theoretical and empirical contributions have not been made. Vargo and Lusch (2011:1321) address these arguments from O'Shaughnessy and O'Shaughnessy in a structured and logical manner, addressing each individual argument. However, they (Vargo and Lusch, 2011a:1319-1321) eventually renounce their counter-arguing effort, identifying that the continued arguments of O'Shaughnessy and O'Shaughnessy (2009; 2011) are unfounded, unconstructive, represent a misunderstanding of S-D Logic and undermine scholars who have already contributed constructively to the S-D Logic body of knowledge (whom O'Shaughnessy and O'Shaughnessy dismiss without making the effort to read). At the same time, Vargo and Lusch (2011a: 1319-1321) encourage competent arguments, based on sound critical assessment where the existing body of literature has been referenced.

A further argument from O'Shaughnessy and O'Shaughnessy (2009:784) that warrants discussion is their argument that S-D Logic is a backwards step. They start this particular article with a statement that service has gained prominence due to the growing contribution the service economy in Western democracies is making to those countries' Gross Domestic Product (GDP). Vargo and Lusch (2011:1299) respond with exception to the suggestion that S-D Logic is regressive and highlight that justification of an increased focus on the service perspective cannot stem from a transition from an agricultural to an industrial to a service economy. Quoting the service economy's increased contribution to GDP in the context of "services" highlights a misunderstanding of the service perspective (Vargo and Lusch, 2011a:1319), however, appears to be a common error that a few authors make (e.g. Nam and Lee, 2010:1761; Doan and Kosaka, 2011:1; Ballantyne, Varey, 2008:11; O'Shaughnessy and O'Shaugnessy, 2009:784; Rust and Miu, 2006:49) except for those (e.g. Spohrer *et al*., 2007:71) who, while mentioning the increased contribution to GDP that the service economy makes, do so to highlight that more people are now performing jobs that do not produce a tangible output. Later O'Shaughnessy and O'Shaughnessy (2011:1311) attempt to remedy the perception by stating that they said an inference from the increased contribution of the service sector to GDP has resulted in Service Marketing being heralded as paramount.

6.3 Faction 3: Hesitant but critical and/or hopeful

This faction represents those who are a mixture of cautious and somewhat skeptical or curious and perhaps even hopeful, though uncertain if not unconvinced (Webster, 2006b:xiii; Randall, 2007:33). With regard to their criticism in comparison with Faction 2, this faction is less confrontational in their arguments against S-D Logic and its arguments represent work that appears to be more grounded in research and less grounded in emotion.

6.3.1 A need for clarification of lexicon and concepts

The first set of arguments is the constructive and accurate identification that further research and refinement are needed within S-D Logic. These highlight the need for further research and contributions – as called for (e.g. Vargo and Lusch, 2008b:1) and identified (Randall, 2007:39) consistently in the literature. Vargo and Lusch (2011:1320), who invite contributions, state that they have neither invented S-D Logic, nor do they own it, indicating no particular issue with scholars' preference for "other labels" within the service orientation.

Day (2004:18) identifies that – as a result of the push towards service awareness brought about by changes and movements such as Service Marketing, customer relationship management, mass customisation, Service Computing, etc. – S-D Logic is already comprehensively composed as a framework. However, based on the philosophical and theoretical groundwork provided by academia and the methodological and technical foundation provided in practice, he urges further support from academics and practitioners to make the opportunity presented by S-D Logic a reality. Finney *et al*. (2011:3) also plead for academics and practitioners to connect S-D Logic theory and practice, or face negative consequences in both areas.

Many (including O'Shaughnessy and O'Shaughnessy, 2009:784) identify the need for clarification in the S-D Logic lexicon. Normann (2001:98), Maglana (2007) and Rust (2006) caution of over reliance on a G-D Logic lexicon. However, Normann (2001:98) simultaneously recognises that, as with any dominant logic, other elements of logic will exist. Levy (2006:62) identifies that it will be difficult for organisations to escape the G-D Logic mindset if S-D Logic is not firmly grounded as a framework and if S-D Logic does not expand beyond the realm of philosophy. In addition, Schembri (2006:385) identifies that focusing on the product as either goods or services negates any focus on how the customer experiences that product – obscuring the customer's needs.

Others highlight ambiguity in S-D Logic. E.g. it is stated that "service" is a term that has become confusing and overloaded (Zhao, 2008:415) and that "services" is just another word for "value added" (Prahalad and Ramsaswamy, 2004). Ambiguity is also evident in the use of "coproduction" and "co-creation" – some (Spohrer and Maglio, 2008:240) use these terms interchangeably while others (e.g. Hilton, 2008:1-5) abhor this. Absence of definitions and interchangeable use of terms such as “client”, “customer” and “consumer” create further ambiguity.

Another argument in line with this – which is also constructive – is that S-D Logic is too conceptual and abstract, lacking sufficient empirical support and objective realism (O’Shaughnessy *et al*., 2009:784-793; Gummesson, 2006 (although he is generally in support of S-D Logic); Shugan (2004); Webster (2006a); Deighton and Narayandas (2004). Comparing S-D Logic to Porter’s 4Ps, Maglana (2007) also identifies weaknesses in the conceptual, abstract and un-actionable nature of S-D Logic, calling it a “loose framework undergoing further construction”. He (Maglana, 2007) calls for clarification and research on how to make S-D Logic more actionable, specific and measurable – asking how it affects the organisation’s profit or bottom line.

Plé and Cáceres (2009:431-434) add to these arguments by identifying further S-D Logic research that is needed due to the neglect of research on disputes that take place, or “co-destruction” as opposed to “co-creation of value”. They argue that, although authority mechanisms are identified, there is an over-optimistic view of the inevitability of value co-creation. In the same vein, Hilton (2008:1-5) warns about the “dark side” of self service, where producers unscrupulously gather customer data or inconvenience customers by “outsourcing” tedious “self-service” processes to them.

6.3.2 Inappropriate focus

The next set of arguments asserts that S-D Logic has an inappropriate focus. Prahalad and Ramaswamy (2000; 2003; 2004) state that S-D Logic is too focused on the organisation and is obsessed with interaction between customer and provider. At the same time, Maglana (2007) identifies a neglect of focus on the customer and O’Shaughnessy and O’Shaughnessy (2009:284; Vargo and Lusch, 2011a:1319) allege “too much technology”. Vargo and Lusch (*ibid*) respond to the statement that S-D Logic has too much of a focus on technology by questioning the validity of this argument in light of the volume of theoretical contributions that are not focused on technology.

Without justifying the remaining arguments in this section (this too subjective), it is identified that when applying S-D Logic it is critical to identify all resources, stakeholders and participants. S-D Logic highlights the importance of customer, provider, experience (value-in-use) and the entire value network. Therefore, the focus that is placed on these different entities depends on the perspective of whoever is applying the logic. For example, when applying S-D Logic within an organisational context, all resources, stakeholders, participants and their roles, perspectives and interests should be identified and considered. Spohrer and Kwan’s (2009:11) outline of Service System Theory provides a clear list of who and what should be considered.

The need for further research is identified here again, possibly in the form of guiding principles or even CSFs that are applicable to S-D Logic. In response to this need, this thesis provides guiding principles for BI from an S-D Logic viewpoint (in the Solution Chapter).

6.3.3 Neglect of newer logic

A further argument is that S-D Logic neglects other newer logic. Two examples of this argument are described below. However, it is recognised that, as a result of the rapid pace of development within the service body of knowledge – made possible through practical and theoretical contributions – there will always be new developments emerging. The researcher is hopeful, however, that newer logic will be aware of S-D Logic and disprove and replace it, or – preferably – contribute towards growing the S-D Logic body of knowledge. Based on the volume of fervent contributions that can already be seen to contribute towards growing S-D Logic, it is believed that this is the more likely option.

One example of this argument is from Prahalad and Ramaswamy (2004:7) who identify experience-centric logic as a new logic to be incorporated into S-D Logic. Experience-centric logic focuses on the experience rather than – as they state S-D Logic does – on the organisation, customer, provider or relationship (Randall, 2007:35). It is worth noting that, while Prahalad and Ramaswamy argue for representation of newer logic, their articles are generally supportive of S-D Logic – although, as reflected in sub-sections above, they do provide constructive criticism. Their argument in this context is valid. However, it should perhaps be stated as more of a guideline that S-D Logic can incorporate. For example, S-D Logic should ensure that it places focus on the experience (value-in-use), in addition to taking the resources, stakeholders, etc. into account.

Another example is from Sampson *et al.* (2010:31) who argue that S-D Logic is inadequate, in favour of their new strategic application. They compile their "Process DNA" strategic application based on a combination of S-D Logic and Unified Service Theory (UST). UST is identified as a basis for Service Operations management, although it is not defined by Sampson *et al*. They argue that it can be used to complement S-D Logic by compensating for specific S-D Logic weaknesses, e.g. S-D Logic does not discriminate explicitly between service and non-service activities. They go on to identify non-service activities as production of "make-to-stock" goods that are produced to keep stocked in an inventory until needed, where customer input is not needed at the time of production. A fundamental flaw in their argument that highlights a possible misunderstanding on their part of S-D Logic and the concept of "service" is that S-D Logic already applies to "make-to-stock" goods, value cannot be embedded in such goods with the view of retaining the value without participation from the customer (e.g. this could be possible for items where value is co-created and part of the customer's requirement is storage of the goods until such time as needed). Despite this, Spohrer and Kwan (2009:9) list Sampson's Unified Theory of Services as an emerging discipline that contributes to Service Science through advanced views of Service Operations as a distinct scientific field.

7. Positioning S-D Logic as a viable approach for BI

S-D Logic cannot be proved/disproved (Williams and Aitken, 2011). However, it can be demonstrated as a viable approach. This thesis demonstrates how S-D Logic is a viable approach that can be used to address BI's challenges and that a shift to S-D Logic can yield certain benefits for BI. Furthermore, use of S-D Logic does not suggest that it is superior to other logics – existing or emerging – it simply addresses the evident need for a broader view under which BI exchange may be understood (Yazdanparast *et al*., 2010:379; Vargo, 2009a). Based on this, S-D Logic is unashamedly taken as the point of departure, accepting that the service mindset is conceptual and in need of further research and refinement as well as the other arguments raised against it (as discussed in the section above).

The reason that the arguments in the section above have been raised is therefore to identify insights from the academic community applying and learning from S-D Logic as this body of knowledge emerges. Therefore, the above discussion of arguments for and against S-D Logic is of merit since it identifies insights that, firstly, reflect the viability of using S-D Logic as an approach to BI and, secondly, must be addressed before use of S-D Logic is warranted. These insights are discussed now in light of further examples from this chapter in the sections on the worldviews above.

7.1 Insights emphasising the viability of using S-D Logic

Although S-D Logic is not yet unquestioningly accepted, it is seen to be promising and insightful. The necessary maturity to unlock the potential of S-D Logic is evident – both in developments in ICT (e.g. increased ability to separate information and tangible product) and in examples of business attitudes that are changing towards accepting and implementing a service perspective.

The fact that some of the shifts to an S-D Logic approach may not be consciously made as a result of a formal or planned adoption of an S-D Logic approach highlight the need for awareness of S-D Logic and the benefits that can be attained from using it – as well as the challenges that may result if not used. An example of the latter is of ICT developments that lead to workplace changes such as the ability for some employees to work from home. Where the employee is a provider, lack of awareness of S-D Logic benefits could potentially result in further separation of customer and provider (a G-D Logic approach) rather than increased communication through social networking tools (communication and networking being the S-D Logic approach). This further highlights not only the viability of using an S-D Logic approach, but the necessity for it. ICT has the potential to be used inappropriately, furthering the G-D Logic approach, with a negative impact. Insights gained through analysis of the arguments on S-D Logic reflect that the move away from G-D Logic is both necessary and beneficial. Benefits for both the customer and provider are identified.

In fact, the research discipline of MIS – encompassing ISs and thereby also BI – has been mandated responsibility to take a leadership role in developing S-D Logic research that contributes from an MIS perspective. MIS is seen to have an "enormous opportunity" resulting from the overlap in Service Management (which deals with management), and Service Computing (which deals with technical aspects) (Zhao, 2008:414). The opportunity for MIS (including BI) is reflected below in Figure 14.

7.2 Addressing insights about S-D Logic to warrant the use thereof

Not all literature demonstrates equal support for the promise of S-D Logic (Randall, 2007:3). The above section's discussion of arguments on S-D Logic identify that a core issue is the need for further research in particular areas of Service Science and in the service perspective as a whole. Paradoxically, while this highlights that use of S-D Logic as a philosophy poses a limitation or a risk, it also highlights the opportunity to contribute further research that is necessary and even invited (Vargo and Lusch, 2011a: 1319-1321). Rather than succumb to the perception that the emerging nature of S-D Logic is an insurmountable limitation and neglect to dare to contribute to this emerging body of knowledge, the risk/limitation is mitigated through provision of a solid foundation of literature explaining Service Science's current position (worldview) and through transparency in establishing how this can be applied to practice (the Fortune Bank case study).

In addition, the arguments above highlight the research opportunity that is presented by the weakness identified in S-D Logic in terms of the need for it to focus appropriately on – e.g. – experience, the customer, etc. This thesis contributes by providing a framework and guiding principles that are needed to address this weakness. While these are specific to BI, they can be applied in other areas and it is envisioned that they will stimulate further research and discourse. The guiding principles are provided in the Solution Chapter.

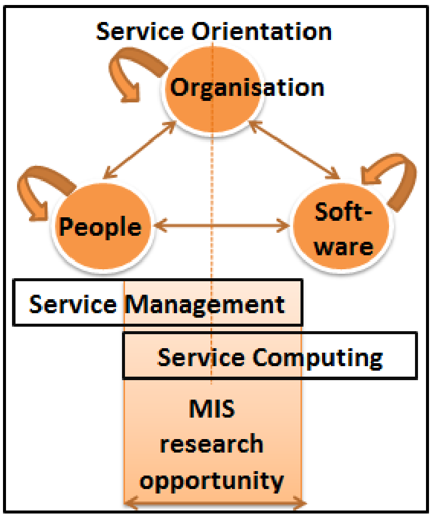


Figure 14: MIS research opportunity (adapted from Zhao, 2008:416)

8. Conclusion

This chapter provides a foundation of understanding of G-D and S-D Logic as lenses to view exchange. G-D and S-D Logic are lenses or worldviews through which exchange is viewed. Exchange, the process of giving and receiving, can be applied in a social or economic context. It can also be applied to BI as an exchange process, as applicable to this thesis.

G-D and S-D Logic are explained in this chapter according to the structure of the conceptual framework for a worldview. This contextualises G-D and S-D Logic concepts such as goods and service/s and positions S-D Logic as an underlying philosophy that – together with Service Systems theory – supports Service Science. The history, source of knowledge, theory of actions and guiding principles are discussed for both G-D and S-D Logic worldviews.

The need for a shift from G-D to S-D Logic is then highlighted in terms of the general inadequacies that emerge in G-D, brought to light as a result of various changes. Before S-D Logic is accepted as a point of departure for this thesis, current arguments for and against S-D Logic are examined. These identify several insights which are discussed in terms of using S-D Logic as an approach for BI.

The chapter concludes by identifying that S-D Logic is a viable approach that can be used to achieve benefit for BI, assisting BI to overcome its challenges. Chapter 4 identifies BI's worldview and challenges as experienced and perceived by case study participants. Chapter 5 examines these through the G-D and S-D Logic lenses.

CHAPTER 4 PART 1: CASE STUDY BACKGROUND AND CONTEXT

Case study background and context for Fortune Bank and its BI vendors as research participants

1. Introduction

The case study makes sense of the evidence (Brand, 2011:27) by reflecting on and analysing the research results gathered at Fortune Bank. Research results consist of interpretive data gathered from interviews at Fortune Bank, questionnaires to Fortune Bank's potential BI vendors and observations of Fortune Bank's BI activities, interactions and operations in the practice of BI.

2. Case study structure, input and notation

The case study chapter is divided into three parts. This part provides background and context on the case study environment, specifically Fortune Bank and its typical BI vendors and their roles as BI customers and BI providers. Part 2 provides case study results and analysis of BI's challenges and Part 3 provides this for BI's worldview. Part 3 also examines BI's challenges to determine the relationship between these and BI's dominant worldview and ascertain if they result from underlying G-D Logic in BI's worldview.

Data was gathered using interviews with BI customers and BI providers at Fortune Bank, observation of Fortune Bank's BI activities and questionnaires to Fortune Bank's potential BI vendors. Research data from the 2008-2010 period and the 2012 follow-up discussions have been integrated. Where data is specific to 2012, this is highlighted and discussed at the point where relevant.

Throughout the case study, interviewees are referred to as IA to IN where "I" stands for "Interviewee". Vendors are referred to in the same way, as V1 to V8. Direct quotes from participants are in italics.

3. BI customers and BI providers in the case study context

Figure 15 reflects two scenarios. In the first scenario, Fortune Bank employees are the customers of the BI vendors as the providers. In this case, V1 to V8 represent the typical vendor that engages with one or more Fortune Bank employee as a customer (represented through IA to IN). Examples are: a member of the BI department involved in purchasing and implementing a BI solution for one of their users in the bank, or an end-user who purchases a BI application directly from a BI vendor, or a BI sponsor who attends a conference and receives a marketing demonstration from the BI vendor. In this scenario, the researcher observed from the point of view of a Fortune Bank employee, i.e. a customer.

In the second scenario, employees (e.g. IB, IM, etc.) from Fortune Bank departments with BI requirements are the customers of one or more of the three Fortune Bank BI departments, where they interact with employees (e.g. IA, IE, etc.) from these departments. In this case, the Fortune Bank BI department – as the BI provider – typically develops an application or report, sources data or provides some form of BI solution for a user or sponsor as their BI customer based in a different Fortune Bank department. In this scenario, the researcher observed from the point of view of the FBCBI department, where she worked. As most of her observations took place from within FBCBI, she focused the research on FBCBI activities and interviewed the bulk of the BI provider research participants from FBCBI. She used BI provider views from the Retail BICC and the EDW department to compare findings and established that FBCBI experienced similar challenges and had a similar viewpoint as others in Fortune Bank, enabling her to conclude that FBCBI represents a typical BI department within Fortune Bank (further indications of this are emphasised in the other two parts of this chapter).

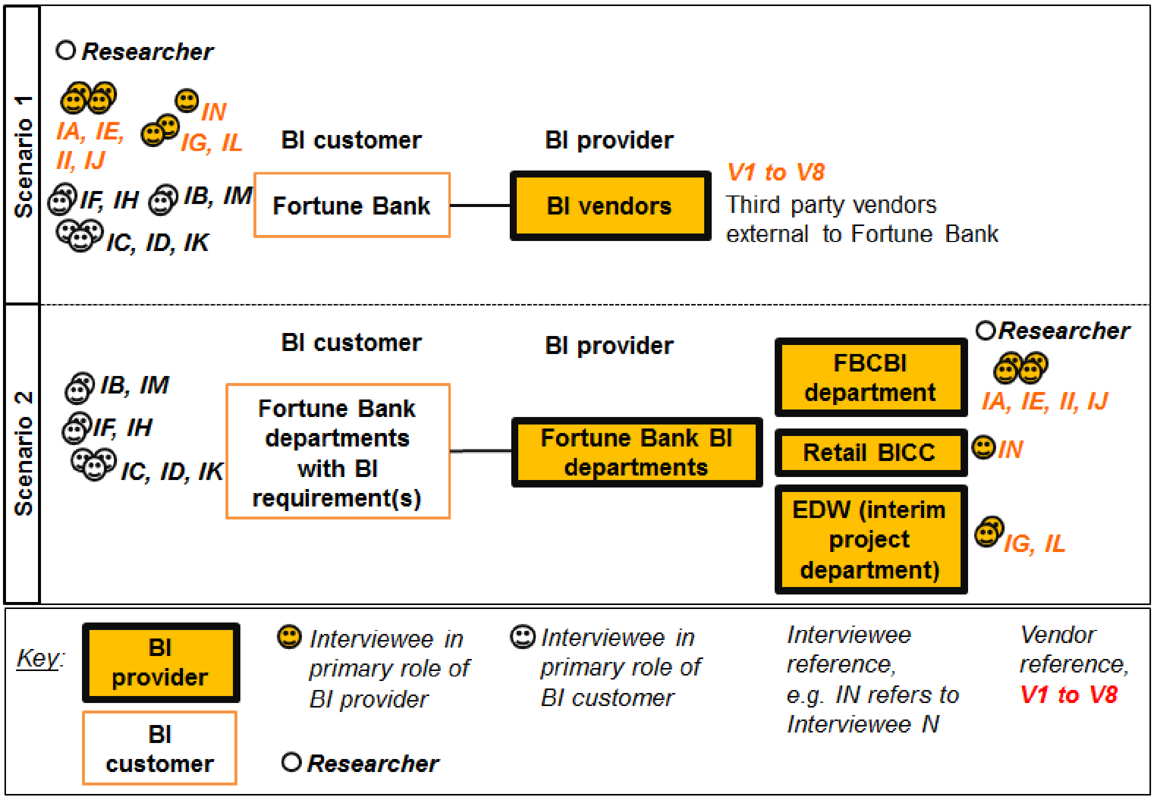


Figure 15: BI customer and BI provider roles in Fortune Bank case study

Figure 15 reflects that each interviewee was involved in both scenarios. The researcher clarified which role the interviewee played most often and has flagged this as the primary role of the interviewee, but did not stop interviewees when they provided perspectives from the point of view of their secondary role. She refers to the BI customer and the BI provider throughout the case study. She provides context when referring to interviewees in these roles so that it is clear whether the viewpoint is reflective of their role in scenario 1 or 2 – i.e. whether they express an opinion from the point of view of their role as a provider or a customer of a BI vendor or a customer of a BI department.

4. Fortune Bank overview

The researcher interviewed employees from a few departments within Fortune Bank's Corporate division, as potential customers of the BI vendors and customers of Fortune Bank's BI departments. She also interviewed BI provider interviewees from three BI departments. Background and context are provided for Fortune Bank as a whole, including detail on the history and background of each BI department. Greater detail is provided on FBCBI, as FBCBI is the focus of the case study.

Statistics and background information are relevant to the observation period, ending in March 2010. This was not revised in 2012 when the follow-up discussions took place, as follow-up discussions were used only to confirm research data initially collected are still valid.

4.1 Location and size

Fortune Bank's head offices are located in Johannesburg, South Africa. It has offices and branches across South Africa – in all of the nine provinces – and in several countries in Southern Africa, where it also operates. The big four banks in South Africa have between 24,000 and 37,000 employees across all their operations (Metcalfe, 2009), this includes Fortune Bank (exact figures are not disclosed to maintain their anonymity).

4.2 Structure and nature of business

Fortune Bank is split into three divisions: Capital, Retail and Corporate, as reflected below in Figure 16. Within these divisions, Fortune Bank offers the full spectrum of banking products and services for the individual (including High Net Worth (HNW) individual) and organisation (from small to large). For example, it offers insurance, investment, advisory, funding, foreign exchange, trading and sales, risk management and credit cards. Each division operates in all nine South African provinces and conducts aspects of their business in the other countries in Africa where Fortune Bank operates. In addition, Fortune Bank has correspondent banks and branches internationally, has a number of shareholders and is listed on the South African stock exchange. It is controlled by a bank holding company that is a national financial services provider within South Africa.

4.3 BI and BI projects at Fortune Bank

Figure 16 also reflects the location of interviewees (BI customers and providers) within the Fortune Bank organisational structure and the three Fortune Bank areas that perform BI. One is Retail, where the Retail BICC serves all the Retail business units. The Retail BICC consisted of 18 staff members. Another is the FBCBI department, that operates from within Business Banking but serves all the Corporate business units. FBCBI comprised of 22 employees. A third is the EDW

Project, run as a department from within Corporate, to provide bank-wide data and BI. The EDW department had approximately 17 employees and was set up as an interim department due to the magnitude and anticipated duration of the project.

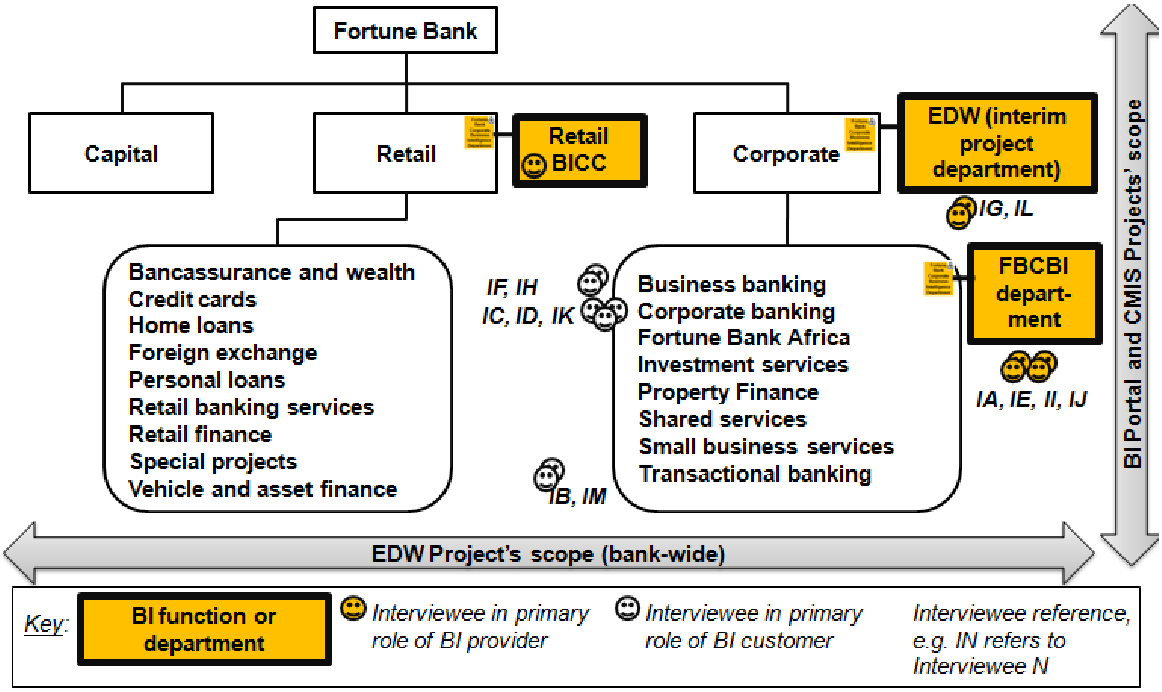


Figure 16: Fortune Bank organisational structure, showing BI departments, location of interviewees and project scope

As highlighted in Chapter 2, this thesis draws from the BI Portal, CMIS and EDW Projects. The BI Portal and CMIS projects were both staffed and managed from within FBCBI and not from departments specifically set up for these as special projects, as is the case with the EDW project. The researcher performed work on the BI Portal and CMIS projects and attended EDW project meetings and was aware of its purpose, challenges and activities. The CMIS and the EDW projects both aimed to consolidate data into centralised databases, with unified business rules and BI processes to achieve a "single version of the truth", providing BI for various types of users. For example, super-users accessing their BI through front-end query applications, users provided with reports and users for whom specific BI applications were built using the centralised CMIS/EDW database. The CMIS project spanned all business units within Fortune Bank's Corporate division and the EDW project was bank-wide. Some of the reports and front-ends provided for the CMIS project were available through FBCBI's BI Portal, which is detailed in FBCBI's history and background (Section 4.5.1).

At the end of March 2010 when the researcher concluded the period of observation, the EDW project had only delivered the home loan data (about a tenth of what it aimed to do) in a centralised database, but no BI. It was over budget and schedule. The CMIS project had delivered approximately eight data marts for the Transactional Banking business unit but, as users failed to use these, they were no longer updated with monthly data and this was cancelled. The CMIS project had also nearly delivered Income Statements and Balance Sheets for Corporate Banking (available on the BI Portal in a format where users could "slice and dice" the information on these). However, these deliverables remained in a prolonged User Acceptance Testing (UAT) phase that had exceeded both the UAT and project deadline. By 2012, the EDW project was still ongoing but had not delivered significantly more than in 2010. The CMIS project had completed Corporate Banking's financial statements and had started this for another business unit.

Capital business units are not reflected as Capital is out of scope of the case study. Although Capital performs reporting and analysis within each of its business divisions, it does not have a BI department. The Retail BICC and FBCBI both perform all the activities involved in the provision of business information/intelligence for their divisions as a whole and originated separately.

4.4 Behaviour and culture

4.4.1 Overall culture at Fortune Bank

Fortune Bank's organisational culture is measured annually using the Barrett Survey, a cultural transformation survey of employees' attitudes and beliefs towards key cultural diagnostics (Value Centre, 2010). To the knowledge of the researcher, the organisational culture was only measured as perceived from *within* Fortune Bank – i.e. it excluded Fortune Bank's customers or third parties (e.g. BI vendors, other vendors). In 2010, the following descriptions emerged using this survey: dynamic; agile; ambitious; forward-thinking; accountable; people-focused; takes the lead.

Although these are valid outputs of the survey, they only reflect positive traits. Based on her experienced working at Fortune Bank, the researcher believes that addition of the following traits reflects more of a realistic view of Fortune Bank's culture: hierarchical and concerned with status and position; lack of integration between departments (often resulting in empire-building and siloed-thinking); performance driven; paper-based (though there is a vision to change this and a good measure of environmental awareness); multi-cultural and diversity in employee age; lack of trust between employees (visible in the need for various signoffs and email confirmations after meetings); values team work and collaboration; much time spent in meetings; time invested in team-building; a focus on charitable events and assisting the bank's environment; a fair amount of bureaucracy; change is implemented slowly due to size of organisation.

The global economic crisis had an impact on Fortune Bank's culture and economic position. According to economic reports that Fortune Bank released internally in 2009 and 2010, the retail business was severely impacted economically. Many of Fortune Bank's clients – organisations and individuals – were negatively impacted by the economic crisis which, in turn, had negative repercussions for Fortune Bank. For example, some organisations could not service their debts and some performed fewer transactions than usual. Within Fortune Bank, many employees working on a contract basis experienced that either their contracts were not renewed or were forced to become permanent staff members; an option perceived by Fortune Bank to be less costly for them as an organisation. Fortune Bank employees, especially those in banker and sales client-facing positions or pricing and cost-cutting positions, increased their demand for intelligence as they tried various means to acquire business and maintain existing clients.

4.4.2 FBCBI, Retail BICC and EDW Interim Project Department culture

The culture within FBCBI and the Retail BICC resembled that of Fortune Bank as a whole, except for the following additional observations that can be made on their culture in particular: long working hours (due to e.g., lack of available skilled BI resources, typically long learning curves for new resources, heavy administrative load); innovative; excited by technology and technology-driven; less conformance to strict methodology and compliance (where this did not violate Fortune Bank, legislative or regulatory compliance); separation of analyst and developer teams; strong team work within developer teams; focus on project deliverables and “go live” milestones; and heavy loads of internal departmental reporting and administration (e.g. lengthy individual, team, project, portfolio and department weekly status and progress reporting). Based on the challenges raised in the literature study, it appears that these are rather generic characteristics of departments and even of BI departments, supporting the viewpoint that the findings of the case study performed at Fortune Bank extend beyond the banking industry and South Africa.

The EDW department, including its culture, was described by IG to be the same as FBCBI’s Corporate Banking project, which aimed to provide MIS to all the functional business streams within Corporate Banking. IG stated that “EDW is like Corporate Banking MIS multiplied by twenty”, emphasising both the complexity and size of the EDW project.

4.5 History and background

4.5.1 Fortune Bank Corporate Business Intelligence (FBCBI)

FBCBI, initially “Business Banking MIS”, was established by Business banking at the end of 2004 in response to the need for Management Information (MI). It was started in a small office with a large server, a few Business Banking staff members and the same number of external consultants, hired on an interim basis. As they generated and released BI deliverables, the volume of MIS data and information they managed increased. Each deliverable led to additional requests for more from Business Banking: the demand for MIS and BI spread to other business units within Corporate. At the same time, many of Fortune Bank’s executives attended BI conferences where they saw vendor demonstrations that whet their appetites for BI and grew their expectations. As a result, Fortune Bank invested heavily in MIS and BI.

In 2005 and 2006, Business Banking MIS focused on ad hoc development of BI software applications and reports for stakeholders in the Corporate division. Unfortunately, the ad hoc nature of this resulted in isolated development and a "messy" environment where integration was difficult and duplication was common-place. A single view of a customer or product was impossible and users became frustrated with having to access multiple tools, reports and applications to view different aspects of the same customer or product's information. In response to this, in 2007, Business Banking MIS embarked on an initiative to consolidate and clean-up. During this period, external consultants were replaced with permanent staff members, a vision and strategy were set and Business Banking MIS was renamed and rebranded "FBCBI". FBCBI aimed to provide a single, consolidated view of the Bank's corporate clients and products and provide BI and not just MIS. It saw MIS as provision of reporting and financial information, while it saw BI as the provision of most types of information and intelligence (e.g. client, industry, market, financial, etc.). FBCBI migrated stand-alone applications into a single consolidated framework and architecture, made available through a web-based BI Portal.

The BI portal, developed as a project and released to the business in February 2008, provides a central location for various types of information (e.g. Financial Intelligence, Product Intelligence, Customer Intelligence, etc.). It integrates vital BI applications, document systems, databases, information feeds, reports and raw data for delivery to its community of users. The FBCBI head and one of his senior managers performed "road shows" to the various BI users around the country where it was experienced that enthusiasm was high, though users expressed some reservations, e.g. about accuracy, timeliness and performance of the BI portal over the network. The BI Portal represents a significant success for FBCBI. However, despite this success, FBCBI continued to face many of its old challenges as well as some new challenges. Operations took up more time than anticipated from already-pressurised resources (who were in short-supply), staff worked substantial overtime, deadlines were not usually met and there was not always time to adhere to standards and best practices. Some BI initiatives were implemented but never used. Others were not even implemented. BI became synonymous with "a sea of reports" and interdepartmental squabbling started about what exactly BI is.

As a remedy, quality and improvement became the focus. FBCBI discovered that: technology was not at fault, it was leading edge; BI project processes were not at fault, they were PRINCE 2; people were not at fault, they were dedicated and competent. At a loss, FBCBI turned to an RFP process to find a vendor to help them to move up a few maturity levels to become a BICC. Unfortunately, RFP responses highlighted vendors' highly technical perception of BI, which did not correlate with FBCBI's managerial and organisational long-term vision. Ironically, in 2011 FBCBI changed its name, branding and vision, calling itself BI Technology Solutions (BITS), which it is still known as today (2012).

4.5.2 Fortune Bank Retail BICC

The Retail BICC grew as a shared offering to Retail divisions and to other support units. Initially it only provided reporting and Management Information (MI) in the form of applications, reports and data extracts – and was not referred to as a BICC. Retail business stakeholders would approach the department, providing sponsorship for an idea and together they would determine whether the idea was feasible – once off or as a pillar of excellence. Customised solutions were built for the business in this way as business concepts would be reverse engineered into what was needed for implementation.

As this department grew and matured, more analytics and analysis were performed and much operational work and standard reports were automated. As a result, the number of staff members involved in operational and routine work was reduced. This enabled the department to focus on empowering the business through advanced analytics and client analytics. It started providing the business with high level indicators instead of many different reports. This enabled the business to sum up the health of their business in a few variables, a considerably shorter time and less effort. The business was able to quickly identify any issues and then drill into the detail from there.

In 2005 the leaders in Retail's BICC realised that their area was performing at and providing the services of what the industry (both locally and internationally) termed a BICC – and consequently renamed the Retail BI unit a BICC.

4.5.3 Enterprise Data Warehouse Interim Project Department

The EDW Project – including the interim department set up for this – emerged from Fortune Bank's desire to centralise its data and make this available to all areas of the bank in a consistent manner. It involved a bank-wide initiative to migrate bank-wide data from the outdated Information Centre (IC) into a new EDW. It was envisioned that BI could then be conducted more easily at a division level as a result of this initiative. The EDW started with the requirement for BI, but then "scaled down" (in the words of IG) to MIS. The rationale for this was that, because EDW was years past its scheduled due date and was not close to completion, Fortune Bank realised that EDW should just get the foundation in place and each area should then be responsible for its own BI. The EDW Project, which was initially expected to finish in 2007 had its deadline extended to 2008 and, in 2012, was still incomplete.

4.6 Method of operation

Fortune Bank's BI departments perform strategic, operational and project work. This is now detailed from the point of view of FBCBI, as the focus of the case study. Additional discussion is provided below for examples where Fortune Bank's other BI departments' methods differ from these.

Strategic work typically entails planning, direction and alignment of departmental or business unit objectives with the vision of Fortune Bank as a whole. Operational work typically entails month-end data extracts, data transformation, cleansing and loading into databases from internal and external sources. Internal sources may include Fortune Bank's central data warehouse, product systems, etc. External sources may include data purchased from CIPC, Moody's, chain stores, etc. This data is used to populate FBCBI's databases and data marts and is reflected on reports and applications, housed centrally on the BI Portal for the entire BI user population. The BI user population consists of users who are Fortune Bank staff (internal to Fortune Bank). It spans the whole of South Africa, stretches into Southern Africa and consists of many different levels and types of users. For example: sales staff, financial managers, auditors, etc. The data is also made available to the super users through a front-end such as Microsoft ProClarity and other applications. Super users constitute about 20% of the total user population – typically comprised of financial and technical staff.

Project work typically entails the full systems methodology lifecycle – analysis, design, programming, testing, training, rollout and maintenance – on requirements for reports and applications. FBCBI gets BI requirements from Fortune Bank's Corporate Division. It develops these in order of business priority; aligned with the Corporate Division strategy and according to FBCBI's adapted version of the PRINCE2 (Projects In Controlled Environments 2) project methodology. Requirements are met and made available in the form of reports and applications on a central BI Portal, or made available in the Corporate BI databases to specific user audiences via various tools.

At almost any point during the research period, FBCBI had at least thirty active projects on its project list. This thesis does not attempt to provide detail on each of these but rather examines FBCBI's interactions as a whole. This may involve examples from a few of FBCBI's projects, operational work and ad hoc requests. Projects that are specifically mentioned in this thesis can generally be related to the EDW Project (a Corporate-level project where FBCBI was responsible to give some inputs but were not tasked), the Corporate MIS Programme or the BI Portal. EDW and the BI Portal are detailed in the history above. The Corporate MIS Programme was an initiative, similar to the EDW project, whereby data from all the divisions of Fortune Bank Corporate was to be consolidated into a central data warehouse enabling each division to pull its own BI from this, according to their own specifications. The rationale for this exercise was to have a common repository, a single version of the truth, less duplication, consolidation of resources/maintenance, etc.

The Retail BICC operates in much the same way as FBCBI does, also performing strategic, operational and project work. However, it differs from FBCBI for a few reasons. Namely, it spends less time and resources on operational activities, provides a centralised BI function for Retail and does not have a formal requirements channel set up to collect business requirements (and uses business analysts that IN calls "relationship managers" for this). In addition, it has automated over

3,000 reports that it provides to its business users on a daily basis, whereby the user can specialise and customise the report on their BICC portal. The BICC's BI Portal centrally houses data and information such as: financials, business insight and innovation reports, dashboards, product information and HR MI. The BI Portal, like FBCBI's BI Portal, is a gateway that provides a central location for various types of BI.

5. BI vendors

Fortune Bank's typical BI vendors are represented by RFP respondents. A summary of relevant details on the vendors' profiles is provided in Appendix G, as sourced from their RFP responses compiled in December 2008. While aspects of the vendors' profiles have changed over time (e.g. staff complement, partners, etc.), their December 2008 profiles are used in this thesis as they describe the vendors' profiles that were applicable at the time when they responded to the RFP.

The profiles reveal that none of the vendors were specialised in a particular industry and that they have a BI focus – except for V7 who listed experience in Performance Management (PM), and V3 and V4 who respectively indicated their focus is IT and software.

Two of the eight responding vendors were based solely in South Africa at the time of their response to the RFP. Both of these vendors were newly established, with a range of zero to five years' vendor experience in BI and had a staff complement of less than 50 people. Both these vendors had two IT partners, one in software and the other in software and hardware. The other vendors all had a staff complement of more than 1,000 and extended their operations across South Africa and internationally. One of these vendors had between 11 and 20 years' experience as a BI vendor, the others all had more than 21 years. These vendors listed numerous IT partners (from 20 to over 150). Furthermore, their IT partners were described using more descriptions – e.g. niche player, consulting company, etc. – than just hardware/software partner, as described by the two South African-based vendors.

6. Conclusion

This chapter provides an introduction for the case study by positioning the case study participants in their roles as BI customer and BI provider and by describing the environment in which the case study is set. Fortune Bank and its typical BI vendors are described to give context to the reader for the case study analysis and discussion that follows in subsequent parts to this chapter.

The next part of this chapter discusses key insights on BI's worldview gained through the case study.

CHAPTER 4 PART 2: CASE STUDY INSIGHTS ON BI CHALLENGES

Analysis of case study data on BI's challenges and measures applied to resolve challenges

1. Introduction

This part of the case study builds on the literature study of BI's challenges. It examines practice to see whether BI is as highly promoted and praised as in the literature. It then examines practice to determine whether BI is seen to achieve its purpose, the typical challenges that are experienced and existing measures taken to address challenges. A summary of BI challenges is then presented.

The aim is to ascertain whether literature simulates reality and to see whether additional insights emerge in practice that are not reflected in the literature. As case study respondents have been categorised as BI customers and BI providers, it is possible to compare views from these groups for another level of analysis (where relevant) and potentially further insight to BI's challenges.

2. Research data used to inform this part of the case study

Main sections of the interview questions and RFP questionnaires used to inform the case study are Sections I and J (BI challenges and measures to overcome challenges) in the interview questions and Section D (BI challenges) in the RFP. Further insight came from interview questions on BI values and purpose (Section F), the 2012 follow-up discussions as well as from observations. Observations are integrated with participants' views, except where observations highlight examples that do not come across clearly through the participants' voices. In these cases, they are documented separately.

3. The promise of BI

As raised in the literature, the case study revealed that BI was highly promoted and praised within Fortune Bank: BI customers and BI providers had high expectations for BI to assist in informed decision-making, resulting in business benefits. As a result, Fortune Bank invested heavily in BI. In addition, the case study revealed instances of how BI vendors may contribute towards BI customers' high expectations. These topics are now discussed, integrating and comparing BI customer and BI provider viewpoints and highlighting observations in this regard.

3.1 High expectations for BI

High expectations were apparent in the views of the customers of Fortune Bank's BI departments. When asked directly about BI's importance in terms of its priority on performance score cards and allocation of funds on their business units' budgets, all seven indicated that BI is a top priority and has received substantial funding. BI customers, IB and IK stated that they were facing additional pressure to deliver promised BI outputs that FBCBI was developing for them, resulting from their directors' high expectations after heavy investment in their areas in BI initiatives and technologies. It appeared that Fortune Bank's top directors created a sense of urgency surrounding implementing BI solutions by allocating high percentages to performance measures linked to successful implementation of BI. Fortune Bank is a performance-driven organisation that links desired outcomes into their performance measures, linked to bonuses and salary increases, as a means to achieve these outcomes.

Opinions expressed by interviewees from Fortune Bank's BI departments (BI providers) confirmed the high expectations that BI customers had expressed. All of these BI providers who were interviewed indicated that there was an intense demand for them to deliver BI to the various areas across the bank. Both IE and IL, in separate interviews, highlighted the occurrence where executives attended IT conferences and would return with high expectations for BI, believing that BI could be implemented simply by means of installing the "flashy" front-ends that they saw demonstrated and that BI implementation was quick and easy. IL was in the process of implementing Qlickview as a "quick win" for a Fortune Bank Corporate department as a result of this. IE's opinions highlighted that he believed he saw this to be "*pacifying business areas*", which he did not intend to do, stating that it created increased maintenance for his department which was already over-burdened with customer queries.

Furthermore, BI providers in FBCBI confirmed their high expectations for BI in terms of the scope of its influence in the organisation when they all stated that everyone should be using BI, "*from the tea lady/gent to the top director*" (IE). This viewpoint was confirmed in their BI customers who also indicated that BI should be used by everyone (except for IC, who stated only managers should use it).

3.2 Purpose of BI

Case study data reflects that most of the participants share the view that informed decision-making is the core purpose of BI. This correlates with the finding in the literature study, where enablement and support of decision-making is consistently raised as BI's purpose. Only four interviewees did not express this opinion, namely: IA (who stated that BI answers management's queries), IF (who stated that BI influences business activities), IG (who stated that BI refers to consistent measurement) and IM (who stated that BI gives the complete picture to drive the bank).

3.3 Heavy investment in BI

Heavy investment in BI was visible in the form of the BI infrastructure set up in Fortune Bank's BI departments. This was evidenced by, amongst other things: massive storage capacity, servers and sophisticated ETL and presentation applications. In addition, these departments were each resourced with 18 to 22 permanent and contracting employees, brought in as "*BI specialists at high rates*" (as stated by FBCBI's main sponsor, IF). Minutes of a CMIS steering committee meeting reflect that IK's director (a BI customer of the CMIS Project) stated "*It is imperative that BI is enabled throughout Corporate through implementing the CMIS solutions. Bring any funding issues to me as I can sort these out*". This reflects the director's willingness to invest heavily in BI. Project budget figures reflect that he did invest heavily in BI.

3.4 BI vendors' contribution to high expectations and heavy investment

Reflecting on the BI vendors' RFP responses, it can be seen that typical BI vendors promote their BI technology solutions and services as well as the benefits they associate with these. Although this is not surprising, insights can be gained from the way they do this. The way they typically do this creates heightened expectation for BI and, when these solutions and/or services are purchased, results in heavy investment in BI in the form of technology application, implementation and support fees as well as ongoing licencing fees.

In terms of the way BI vendors typically promote their technology that leads to high expectations for BI, it appears that they: promote that implementation of their solutions will undoubtedly result in "*customer value*" (V1, 2) or "*happy users and happy customers*" (V7); imply that BI can be implemented quickly through statements such as "*ROI can be delivered fast through identification of quick win areas*" (V1) and; advocate that their solutions will deliver actionable insight (V2, 6), will enable strategic business decisions (V2, 3, 4, 5) and will ensure expertise filters through all levels of the organisation (V1). The researcher perceives that these benefits are not only rather intangible – as identified in the literature's view that BI vendors typically promote intangible features and benefits (Macinnes, 2004:20) – but also may lead to high expectations that are likely to be inconsistent with reality. For instance, BI technology alone cannot result in these types of benefits, other factors also play a role, e.g. ability of a human using the technology to make decisions, interpret the data, etc.

4. The challenge of BI: perceptions that BI does not consistently serve its purpose

As stated in the literature study, the sustained and intense investment in BI in response to the heavy promotion and marketing thereof should be an indication that the benefits that are promoted are received. However, instead of this, aligned with the literature study, the case study interview results reflect numerous challenges and a dominant perception that BI does not consistently serve its purpose. The latter is now discussed – BI's challenges are then discussed specifically in Section 5.

4.1 BI customers' perceptions

Despite their expectations, high demand and heavy investment, BI customers of Fortune Bank BI departments do not perceive that BI consistently achieves its purpose. All seven BI customers stated that BI does not achieve its purpose when asked this directly as part of the interview. Examples from the data that reflect customers' viewpoints are: IC stated that BI does not consistently achieve its purpose as "*it is not always reliable and cannot be used*"; IF indicated that BI does not influence business activities and that a lot of development would be needed before it serves its purpose and; IK highlighted that all she gets is data and not BI, in correlation with IM who stressed that "*BI is currently very operational and given to us at a data level*". IM questioned whether this really even is BI and identified that there are a shortage of people in Fortune Bank who know how to use data at this level.

The views of interviewees who are primarily BI providers, but are also BI customers of the BI vendors (e.g. IA, IE, etc.) are consistent with viewpoints expressed in the next paragraph.

4.2 BI providers' perceptions

The BI providers in Fortune Bank's BI departments indicated that they believe BI consistently achieves its purpose (IA, IE and IN), expressed uncertainty (II, IJ and IL) or showed an awareness of a need for improvement (IG). One of the BI providers who expressed uncertainty (IJ) revealed, "*we don't know how BI is used once we've provided it, we just meet the BI requirement. Sometimes queries after delivery indicate BI's being used, other times it indicates the requirement wasn't understood*". Another (IL) identified that Fortune Bank staff do not typically state they have used BI when they have made a decision. She suggested to "*take it away and see if anyone asks for it*" as a means to identify whether it's being used for decision-making, which she'd listed as BI's purpose.

Six of the eight BI vendors (BI providers to Fortune Bank) responded to this question in the RFP (V2 and V7 neglected to answer this question). Four of these vendors did not commit to a "yes" or a "no". Instead, they detailed challenges that organisations experience when BI is implemented in a silo in a single department instead of across the organisation (V8) and how use of their BI technology assists organisations to consistently achieve BI benefits (V1, 3, 4). V5 and V6 stated BI does consistently achieve its purpose, providing examples of BI successes they achieved with their customers.

4.3 Insights and observations

Case study participants' responses indicate that, although there is a demand and high expectation for BI along with commitment to BI through investment, there is a strong perception that BI is not achieving the results it should on a consistent basis. An observation in this regard is that BI is typically listed as a "must-have" initiative at a strategic level, where the expectation is set and from where the investment is made, but is often implemented at lower levels within the organisation in a somewhat different form than expected. The gap between the CMIS executive sponsors and the end-users was clear, for example, during post-implementation discussion sessions with CMIS end-users when FBCBI BI providers encouraged use of the CMIS data marts that they delivered in response to the CMIS sponsor's need for BI. Sponsors envisioned "BI" that would solve their business challenges through provision of information and intelligence. FBCBI then delivered CMIS data marts as the "BI" solution, which the users did not use. Interview data highlights that there is often a gap between the "*strategist that designs a solution in their ivory tower and the end-user who actually has to use the solution*" (IL).

5. The challenge of BI: BI's challenges and measures to address BI's challenges

5.1 Challenges identified through observation at Fortune Bank

Many challenges experienced at Fortune Bank are also reflected in the literature. Conversely, all categories of challenges identified in the literature study were evident at Fortune Bank, confirming that BI at Fortune Bank represents the literature's view of the typical organisation performing BI. A few examples of challenges observed at Fortune Bank are discussed in Table 10. The intention is not to discuss an example for each of the literature study's detailed challenges (e.g. U1-U10, D1-D3, etc.), as the literature study already discusses these. Instead, challenges are discussed at a higher level to enable concentration on new insights, which the researcher is not aware of in the literature. New insights from in Table 10 are discussed with those from other sections, in Section 5.3.2.

Table 10: Examples of BI challenges observed at Fortune Bank that support the literature study

Challenge description – per literature study category
Use: Analysis of BI Portal and CMIS application and report usage statistics confirmed the low use that FBCBI (as BI providers) suspected after users (as BI customers) showed frustration and then apathy. During 2009, FBCBI developers performed a clean-up of the BI Portal after usage statistics revealed that users had not accessed over 60% of the BI reports over a six month period. Furthermore, the data marts delivered as part of the CMIS project were only used by one or two users for a trivial number of queries during the first few months after implementation and not again thereafter. This was despite the fact that these users had personally requested the Microsoft ProClarity licences that were purchased for them and had booked themselves on the training courses on this.
Data: FBCBI's capacity planning and timesheets reflect a high percentage of time as a department (as a BI provider) was spent on operational activities such as data processing, e.g. FBCBI's

Challenge description – per literature study category
monthly ETL process. This was also observed on the CMIS project, where monthly population of the data marts eventually took up the developer's whole month: she moved from being in BI development to being in data operations. In contrast, the Retail BICC manager (IN) highlighted that her department had "*evolved from being MIS to being BI*", as more of her resources performed systems development and automation activities compared with those who performed operational work. FBCBI also aimed to reduce the time spent on operational work to free resources' capacity to do project work.
Integration: Integration work was largely overlooked at FBCBI. This was even observed within FBCBI where Business Analysts, Developers, Database Administrators, etc. struggled to collaborate and worked largely in isolated teams. In addition, in terms of integration of BI across Fortune Bank, although Business Analysts' Context Diagrams and Data Flow Diagrams (DFDs) that formed part of their Functional Specifications assisted them to identify potential integration requirements and interface points, they generally compiled these based on input from business stakeholders (with limited data and technical knowledge) and limited exposure to the bank's technical architecture or data structures. During 2008, integration with other bank or third party applications was needed on a particular BI Portal pricing sub-project and Service Level Agreements (SLAs) were established to govern this – but even this small measure was only performed as a reactive measure after one of the parties negligently debited Fortune Bank customers with fictitious fees that were on a test script that was not supposed to have run in a Live environment.
Alignment: FBCBI worked in the same physical area as many of their business stakeholders (e.g. sponsors and users), which they perceived to cause challenges between themselves as BI providers and the stakeholders as their BI customers. FBCBI staff often expressed that it was frustrating and unproductive to sit in proximity of these stakeholders as they would "*meddle in development of their BI requirements*", "*waste the time of the BI developer*" and "*cause dissention among FBCBI staff*". Stakeholders often approached FBCBI developers directly, instead of channeling requirements in accordance with FBCBI's process, where requirements would first be assessed by a project office in terms of priority, capacity and impact (among other variables) before being allocated and developed.
Personnel and skills: Fortune Bank BI departments struggled to find true BI resources. It was often discovered, after hiring a BI resource, that he/she is an IS professional or is only proficient in an IT product. Fortune Bank contributed to this by focusing recruitment efforts on IS and IT competences.
Sponsorship: A gap appeared to exist between the typical BI sponsor (typically in an executive position)(as the BI customer), the BI department developing the sponsor's BI solution (BI provider) and the end-user for whom this solution was developed (BI customer). When end-users were reluctant to use the BI solutions that the BI sponsors had envisioned and invested in, many BI sponsors turned to change management practices to gain acceptance of their BI solutions in efforts to engage with and change end-users' opinions of BI solutions (which only worked to a limited extent).

Challenge description – per literature study category
ROI is difficult to determine: After heavily investing in BI, BI sponsors could clearly identify BI costs in terms of, e.g. licence and COTS application fees paid to BI vendors and funds transferred to Fortune Bank BI departments for time spent developing and implementing BI technology solutions. However, they found it difficult to link these costs to the benefits they perceived they would experience once implementing BI solutions. In contrast, when business benefits could be attributed to being informed by BI, the BI department was not given acknowledgement for this. An example of this is where BI was used to identify pricing opportunities that lead to new revenue streams and a performance recognition award for a BI user, where the user did not acknowledge FBCBI's role in this.
BI is an ill-defined discipline: BI was understood to mean different things to different people. Some saw reports and data to constitute BI and referred to them as BI. Others indicated that they did not believe Fortune Bank performed "true BI" (which they stated they saw to be analytics). Discussion of "the definition of BI" at a bank-wide BI forum turned into an inter-departmental squabble. An example of a point of contention was that some individuals perceived that FBCBI only provided reports and data and therefore did not have a right to have "BI" in their department's name.
IS implementation*: Analysis of project lessons learned documentation and reflection on project progress according to plan as well as the number of cancelled projects or projects that got an "abandoned" status (where the BI sponsor abandoned the project) highlights that Fortune Bank BI departments experienced a number of IS implementation challenges.

5.2 Challenges raised by case study participants

Case study participants described their challenges during interviews and in their RFP responses. Table 11 reflects participants' "voices", where each "voice" is attributable to the first participant listed in the "Participant" column; further participants that expressed a similar statement are also listed in this column. Challenges have been categorised by the researcher according to the main categories established in the literature study, although there is much overlap between categories – as reflected by references to multiple literature study categories within Table 11's "category" rows. A comparison of the literature and case study and the new insights that emerge are discussed below Table 11.

Table 11: BI challenges raised by case study participants supporting the literature study

<u>Key</u>:
New findings not explicitly identified in the literature study are numbered and referenced (brackets)
BI – BI-specific challenge (as per opinion of the participant. Not all are in fact true BI challenges)
C/P – BI customer/provider perspective
C(V) – BI customer of a BI vendor *C(FB) – BI customer of a BI department in Fortune Bank*
P(V) – BI provider that is a BI vendor *P(FB) – BI provider that is a Fortune Bank BI department*

Participant's description of challenge (and reference to literature study challenge) *(sorted by customer/provider, per category)*	**BI**	**C/P**	**Parti-cipant**
Category: Use (A1; U1-7, U9)			
BI reports and data are open to interpretation	BI	C(FB)	IF, IH
Inadequate training is provided for the business to understand the data	BI	C(FB)	IC, ID
Even though BI is implemented, we still base decisions on experience	BI	C(FB)	IB
BI vendors' COTS solutions have too many features, intimidating our users and reducing use of BI		C(V)	IG
A "fear of the unknown". IS and IT are more familiar to users as they have had chance to get used to these – this is not the case with BI (1)	BI	C/P(FB)	IB, ID, IE, IK
Users are unwilling to try new things to use BI		P(FB)	IN
We produce much data/information that is not used by the business		P(FB)	II, IJ
An unready organisation in terms of its maturity level		P(V)	V4
Category: Data (A1; D1-3; I1; I2; U1; U3; U9)			
Intense reliance on data, if the foundation is wrong, BI is wrong (2)	BI	P(FB)	IA, IN
Most of my day is spent on data processing	BI	P(FB)	IJ, IG, IL
Ownership of BI and data at the different points in the data lifecycle (3)		P(FB)	IN, IE, II
The business does not know their own data		P(FB)	IG, II
There are many untapped data sources that we are not even using yet, but users still feel overloaded with data	BI	P(FB)	IE, IN
Data quality, managing data, sourcing data		P(V)	V3-5, 8
Sourcing intelligence from business processes, which are not static and are usually not even documented or known	BI	P(V)	V8
Refusal to sign-off on MIS data due to political reasons		C/P(FB)	IC, IE
The wealth of information in organisation's systems: extracting, managing and planning it	BI	P(V)	V5
Category: Integration (A1; D1; D2; I1; I2; Z1)			
It's difficult to understand where BI starts/ends and how it integrates (4)	BI	C(FB)	IH
Additional work is created for BI when "cowboy" (siloed) solutions must be incorporated for an area that was not supposed to create its own BI		P(FB)	IA, IG, IJ
Applications are built without consideration for BI needs upfront (5)	BI	P(FB)	IE, IG
BI brings together many areas and all their challenges (6)	BI	P(FB)	IE
Business analysts forget about data when writing their specifications for a BI solution and often rework their specifications as a result (7)		P(FB)	IE
Data exists in silos and the integration is not always understood	BI	P(FB)	IL
BI runs horizontally and not vertically along the typical functional verticals that the organisation is structured according to (8)	*BI*	P(V)	V8
People who are "married" to specific vendors' BI products		C(V)	IB

Participant's description of challenge (and reference to literature study challenge) *(sorted by customer/provider, per category)*	**BI**	**C/P**	**Parti-cipant**
Integration activities are commonly left out causing challenges later (9)	*BI*	P(V)	V1
Category: Alignment (A1; A2; D2; P1; U2; U8; Z1)			
BI resources have knowledge of systems development but not of the business environment	BI	C(FB)	IF
BI's structure under a single division (Business Banking) does not support the other divisions' needs (24)		C(FB)	IB, IC, ID, IM
More collaboration is needed than when implementing an IS system due to BI's reliance on data and monthly ongoing data feeds (10)	BI	C(FB)	IL
The business' need to make fast decisions is not supported	BI	C(FB)	IB, IF, IK
User requirements that change before BI is implemented mean that the BI solution is not used or is cancelled. Users only truly know their requirements when they see the BI deliverable (too late for changes)		C(FB)	IB, IC, ID
BI vendors who try to bypass us, selling "quick and dirty" solutions (11)		C(V)	IG
Availability of business to share data in a timely and accurate manner		P(FB)	IA, IN
Business does not understand that it's not technically feasible to have all our BI resources working on one dimensional data mart together	BI	P(FB)	IE
Business's lack of commitment and an unwillingness to partner in re-spect of risks or cost (they only commit for benefits)(12)		P(FB)	IE, IL
Competing project priorities, especially those with dependencies on each other resulting in a stale mate situation (13)		P(FB)	II, IJ, IN
No consistent definition of business rules		P(FB)	II, IN
Responsibilities between BI and business are not shared (14)		P(FB)	IE
There are disputes over who carries BI's costs (15)		P(FB)	IE, IN
When business processes or data change and business doesn't inform us, but we're in the middle of a BI project based on these (16)		P(FB)	II
Dealing with the organisation's various departments who all want BI, but do not consolidate their departmental requirements (17)		P(V)	V5
The BI department gets between the BI vendor and the business they are trying to support. The BI vendor then fails to get to know the organ-isation or the true BI need (18)		P(V)	V8
Category: Personnel and skills (A1; I2; P1)			
Costly dependencies exist on resources skilled in specific products (19)		C(V)	IA
A lack of resources with the right skill set and experience in BI	BI	P(FB)	IE, IN
BI resources experience a long learning curve and retention of these resources once they are marketable as a BI resource is difficult	BI	P(FB)	IN
Due to the dependency on a few key resources who have BI compe-		P(FB)	II, IJ

Participant's description of challenge (and reference to literature study challenge) *(sorted by customer/provider, per category)*	**BI**	**C/P**	**Parti-cipant**
tencies, these BI resources are over-worked			
Finding the right resources who are truly BI resources	BI	P(FB)	II, IJ, IG
There are few people in BI or in business who understand the bank's architecture and data structures (20). We often feel like we're in the dark		P(FB)	IJ
There is too much reliance on key individuals to use BI, we do not perform the necessary first line of analysis (21)	BI	P(FB)	IE
Finding the right vendor to partner with in terms of experience and skill		P(V)	V1, V6
Category: Sponsorship (A1; S1)			
A sponsor with an affinity for a particular BI vendor, when the vendor only offers stack solutions – locking us in		C(V)	IB
BI is often sponsored by a non-technical person who "saw something cool" at a convention, resulting in "quick and dirty" solutions		P(FB)	IE
Only the areas and individuals who have a culture of using facts come to BI to partner with them (22)	BI	P(FB)	IG
Sponsorship is one of the biggest challenges	BI	P(V)	V3
Category: ROI is difficult to determine (01)			
Calculating ROI after implementing a BI solution to justify future costs		C(FB)	ID
Category: BI is an ill-defined discipline, operating in an ambiguous environment (02)			
IT vendors pretending to be BI vendors just to increase marketability	BI	C(V)	IL
"What is BI?" – where do we even start? This is a challenge in itself as seen in the BI forum that we attempted	BI	P(FB)	IE, IG
People want "intelligence titles" but they work in the MIS or data layer (23)	BI	P(FB)	IN
Many vendors claim to provide BI, but are only involved in data or presentation layers for example, causing confusion and providing only part of a BI solution	BI	P(V)	V1
Category: IS implementation (A1; I2; U3; Z1)*			
Ad hoc requests change the scope of the project		P(FB)	II, IL
Resources are often pulled off of BI projects due to competing priorities in the bank, e.g. Basel II took a lot of resources		P(FB)	IL
Finding the right vendor to partner with in terms of costing, licencing and solution models		P(V)	V1
Identifying the right users		P(V)	V5
Overlooking change management results in major challenges later		P(V)	V3-5, 8
Structure of implementation is often a challenge, i.e. centralised or decentralised (depends on maintenance, support and architecture)		P(V)	V1

Participant's description of challenge (and reference to literature study challenge) *(sorted by customer/provider, per category)*	**BI**	**C/P**	**Parti-cipant**
Time to implement, integration and ease of implementation		P(V)	V1
Training and support are two of BI's biggest challenges		P(V)	V3

* Challenges in IS implementation are reflected (also reflected above in Table 10) to show that case study participants also raised these challenges when asked about BI challenges, in much the same way as the literature does. However, discussion of these challenges is discontinued from this point, as resolution of this challenge category is not in this thesis' scope.

5.3 Analysis and discussion of case study challenges

Above sections reflect that case study data supports findings from the literature. It also reflects new insights and challenges. New insights emerge, firstly, in the observations and challenges raised by case study participants and, secondly, through analysis of this data. A comparison of the literature and case study is now provided and then insights are discussed, with reference to the new challenges raised.

5.3.1 Detailed literature study challenges absent from case study participants' responses

Although the case study reflects support for each of the literature study's challenge categories, a comparison reflects that two detailed literature study challenges are not referenced directly in the case study observations documented this far (Table 10) or participants' views (Table 11). They are, however, supported by observations. These are:

- Experience of "Catering for different user needs across the organisation" (U8) was observed when the EDW Project identified that a bank-wide "one-size-fits-all" solution for BI would not be feasible as initially planned. Instead, in 2011 (as discovered in 2012 during follow-up discussions), project managers obtained permission to change the project objectives to provide MIS for all areas and BI for only a few. The aim of was to enable each area supplied with MIS to customise and provide their own specialised BI, based on the MIS.
- "Low use overlooked as use is often measured according to volume of software applications and licences sold" (U10) was a challenge experienced at Fortune Bank on the CMIS Project. Many user front-end query tool licences were ordered for Transactional Banking users (as BI customers of FBCBI and the BI vendor selling these licences) where only one or two users performed a trivial number of queries using the tool after implementation and then failed to use it again. Although it was reported that a high number of licences were purchased and im-

plemented, this inaccurately reflected the reality of the situation where BI was not used.

5.3.2 New insights and challenges that emerge through the case study

Case study data reflects consistent views from Fortune Bank's three BI departments, highlighting again that FBCBI represents a typical BI department in Fortune Bank. It also reflects that, in comparison with the other categories, case study participants raise alignment challenges the most and ROI challenges the least. Alignment challenges are specifically discussed in the upcoming sections as a result of this. They are discussed in the upcoming section on segregation of customer and provider viewpoints and the section on tension in BI relationships. The fact that only one ROI challenge emerged in the case study data may be because ROI challenges are not "top of mind" for case study participants, as Fortune Bank does not measure ROI directly on improvements or benefits resulting from BI investment. Instead, it measures BI success based on implementation of a BI IT solution or data processing performance measures. This is identified as a new insight and is discussed in the sub-sections that follow, along with the insights flagged as "new" (numbered (1 to 24) in Table 11).

BI is perceived narrowly as an IS or (even more narrowly) as an IT or data solution within an IS

The researcher asked participants what BI-specific challenges they experience or perceive in practice as the literature consistently raises generic IS challenges as BI challenges, presenting a gap. Reflecting on challenges in Table 11, it is evident that some challenges participants identify as BI specific accurately highlight BI specific challenges but that many challenges are in fact generic IS challenges. For instance: sponsorship, lack of personnel with the right skill set and experience, business does not understand what is technically feasible, etc. This indicates how case study participants think of BI narrowly in terms of it being an IS, or even as an IT or data solution within an IS. As an example of this, IE (the head of FBCBI) identifies that his department does not perform the first line of analysis that is necessary after a BI application or data is delivered ("new" 21), but rather focuses on IS development and implementation, believing that this alone meets the need for BI. Some BI customers (IB, ID, IE, IK) interviewed even highlight, "*IS and IT are more familiar to users – this is not the case with BI"* ("new" 1), potentially providing an explanation for the BI customers' failure to consistently raise BI-specific challenges. Case study participants also demonstrate that there is a propensity for BI providers to confuse BI with other layers such as data management or data warehousing activities as "*people want intelligence titles while working in the data or MIS layer*" (IN) ("new" 23).

As raised in the literature study, although BI is a type of an IS, it is far broader. Viewing BI narrowly as an IS (or even more narrowly as an IT or data solution within an IS) poses a significant challenge for BI for a number of reasons. Firstly, it restricts BI's actions to those that focus on IS development and implementation or data processing. It may even restrict the understanding of BI to that of a BI IT solution or the output of a BI IT solution. This was seen at Fortune Bank where "the wrong type of sponsor" would express frustration and disappointment when implementation of a BI IT solution did not result in BI use and therefore did not manifest the anticipated benefits. Secondly, it results in failure to identify and address true BI challenges, as evidenced by the fact that case study participants struggled to consistently indicate BI specific challenges.

A third reason is that viewing BI in this way restricts measurement of BI success or use to BI vendors' volumes of software application and licence sales, IS project measures or data processing performance measures (e.g. accuracy, speed, productivity (such as using fewer resources to produce more), etc.). These only reflect that BI is purchased or delivered successfully and not whether it is used successfully. Not only does this contribute towards an inaccurate reflection of BI use, but this may contribute towards challenges in measuring ROI, as BI does not generate a return/benefit at the point of BI delivery/implementation where measurement takes place. Finally, viewing BI narrowly as an IS (or IT/data solution) may contribute towards BI providers seeking to recruit IS and IT professionals (as evident at Fortune Bank, described in Table 10) rather than other types of professionals (such as business, analytics, statistician, etc.) who could potentially contribute towards assisting the business to use BI.

BI is an ill-defined discipline operating in an ambiguous environment: failure to recognise this as a challenge leads to further challenges

The literature draws attention to the fact that BI is an ill-defined discipline operating in an ambiguous environment, as discussed in Chapter 3. This is confirmed in the case study, where it emerges in interviewees' landscaped diagrams and responses on the definition and scoping of BI as well as in BI vendors' responses on related questions in the RFP. However, only a few participants specifically raise this as a challenge, emphasising that the challenge of ambiguity is not seen as a significant challenge – or at least is not top of mind for BI practitioners. Failure to identify this as a challenge is perhaps an indication that BI practitioners are content to continue with this ambiguous environment due to failure to identify or understand the repercussions of this challenge.

Two examples of repercussions are: misaligned expectations between BI customers and BI providers (e.g. when "BI" is promised and data marts are delivered as occurred on the CMIS Project) and; that when the definition or scope of BI are unclear, it may be defined and scoped to suit a particular role player's perception or even objective – e.g. a BI vendor would define it as an IT solution, a typical BI user based in Finance would define it as an income statement (based on the case study at Fortune Bank where the latter did materialise in the case study findings).

Participants' challenges reveal segregated BI customer and provider viewpoints

Analysis of the challenges raised by case study participants highlights that they raise challenges mostly from their own perspectives, without consideration or apparent awareness of each other's environments, context or challenges. For example, Table 11 reflects that only BI providers raise challenges in categories such as IS implementation, data and personnel/skills – which are categories that relate to aspects of BI that fall within typical "BI production" activities or the typical provider viewpoint of BI. While it could be expected that a participant would approach BI's challenges from their particular viewpoint and experience, the significant finding is the different viewpoints that emerge.

The case study highlights that challenges raised by BI providers – BI vendors and BI departments – tend to focus on their application development activities, data processing activities and problems related to these activities. Firstly, BI vendors' challenges all relate to data, finding the appropriate BI vendor from whom to acquire a BI technology solution or related consulting services and implementation of such a solution. Secondly, BI departments at Fortune Bank tend to focus on challenges related to development and implementation of BI solutions, without looking beyond this to how the BI they provide is used. For example, as stated above, IJ – an FBCBI senior manager – reveals "*we don't know how BI is used once we've provided it, we just meet the BI requirement".*

Furthermore, although Fortune Bank BI providers recognise that they have a dominating focus on data processing, the case study reveals that their intention is not to evolve from focusing on data processing to focusing on use of the resultant data. Instead (as discussed in Table 10), BI departments aim to evolve to spend more time developing BI applications – i.e. they remain within the "BI provider" world, largely separated from the customer.

Conversely, challenges raised by BI customers of Fortune Bank BI departments tend to revolve around problems they experience after the BI solution is implemented or their experience of the relationship with the BI provider while they wait for the BI solution to be delivered. The case study reveals that BI customers' involvement tends to take place during requirements gathering, User Acceptance Testing (UAT) and change management activities such as training. These are activities largely controlled by the BI provider. The BI customer is typically then a passive recipient, waiting to be involved by the provider. As BI providers focus on development and data processing activities and BI customers wait for BI solutions to be delivered (playing the role of a passive recipient), neither BI provider nor BI customer understands the other's context, process or environment and this situation often leads to frustration, misalignment and animosity. In addition, when the BI customer plays the role of a passive recipient, he/she is likely to have had little or no input into the BI that is then delivered – reducing the likelihood of the solution being customised for them and thereby also reducing likelihood of use.

Challenges raised by BI customers of the BI vendors highlight a certain amount of animosity towards BI vendors, who – in turn – raise challenges that reflect their frustration with these customers. This animosity and frustration is discussed in the next section, as it applies to the tension identified in these relationships.

Participants' challenges reveal tension in BI relationships

The section above touches on tensions between BI customers and Fortune Bank BI departments, the literature study identifies misalignment as a core challenge and case study participants raise the greatest number of challenges within the "alignment" category (Table 11). This highlights the tension in various relationships within the BI environment. Examples of additional tension identified in the various relationships are now discussed, highlighting misalignment between role players resulting from, e.g. failure to: communicate; understand BI (or the full BI process) from another's viewpoint; share common BI objectives; collaborate; recognise all or other role players.

- Fortune Bank BI providers and their customers

Challenges BI providers at Fortune Bank raise highlight their perception that many of BI's challenges result from BI customers' lack of understanding, incompetence or unwillingness. For example, they highlight challenges related to BI customers' inability to understand the complexity of BI or their competing priorities and dependencies and unwillingness to try new things ("new" 12). They also raise that BI customers do not inform them timeously of business changes, do not know their own data or requirements and do not share responsibilities and dispute costs ("new" 14-16). In addition, it was observed that – on the CMIS Project – when the data marts that were delivered were not used, FBCBI believed the problem was that users did not understand their data and could not generate useful answers to queries, i.e. they believed the problem lay with the users. Another observation in this regard was that FBCBI expressed irritation with interfering customers and a desire to move physical location from where they sat with their customers (identified in Table 10). At the same time, they expressed frustration that only those with a culture of using facts approached them for BI ("new" 22). The relationship was strained further when recognition was given to a BI customer for work he had been able to perform as a result of the BI FBCBI had provided him with (identified in Table 10) – highlighting that even where it is clear that BI has been used, it is not always acknowledged.

Conversely, challenges raised by BI customers tend to highlight their perception that: the BI provider does not provide sufficient training or change management, that there is fault with the BI that is provided (e.g. reports that are open to interpretation or the need to make fast decisions is not supported) or that they don't trust the BI provider as they don't understand the BI process.
In addition, conflict arose between the various BI customers as it was the BI department's approach to "*let the business fight about what they want and come to us when they're clear on their requirements*" (IE). Unfortunately, the business did not manage to "get clear on their requirements" and, due to the high number of urgent and important requirements raised by different BI customers, tension ensued around prioritisation of requirements, resulting in numerous prioritisation sessions. The fact that FBCBI reported to Business Banking but provided BI for the whole of the Corporate division contributed to negativity and strained relationships in this regard ("new" 13, 24).

- BI vendors and their customers at Fortune Bank

Challenges raised from the perspective of the BI customer of BI vendors highlight a certain amount of animosity towards BI vendors. For example, their view that vendors try to “lock” them in, that there are too many features that intimidate users, that the vendors try to bypass the BI departments or increase their marketability by passing off non-BI solutions as BI solutions or even the costly dependencies on resources skilled in vendors’ specialist products (“new” 19). In addition, IE expressed irritation with and dismissed efforts of BI vendors that “*mislead sponsors or executives to believe BI is a quick and easy implementation*” (“new” 11). In the same situation, IL (another BI provider at Fortune Bank) would “*pacify”* the BI customer by implementing a *“quick win*” while continuing work on a more comprehensive BI solution that would ultimately replace the quick win interim solution. Conversely, it is also a notable observation that animosity towards BI departments is expressed by BI vendors, e.g. where the BI vendors raise that the BI department gets between them and the customer or express frustration in dealing with various departments in the organisation where these departments do not communicate with each other (“new” 17-18).

- BI sponsors and end-users (both BI customers)

As raised above, the case study identified the gap between the “*strategist that designs a solution in their ivory tower and the end-user who actually has to use the solution*” (IL). This was also an observation on the BI Portal and CMIS Projects. BI sponsors urgently raised BI requirements but, when these were delivered to the end users reporting to the sponsors, they did not share the urgency and did not even use the BI solution delivered, continuing performing their duties as before. BI sponsors were frustrated as their directors had invested in BI solutions, but they were still unable to provide them with the answers, facts or insights that they wanted and needed to conduct business.

- Internal teams within the BI department

FBCBI performed much rework as their teams – e.g. analyst, developer, report writer, database administrators – demonstrated a tendency to work in silos. In addition, FBCBI personnel also experienced difficulties in finding internal business staff representing the various areas that would be integrated in a BI solution. BI sponsors then made business representatives available for input during requirements gathering, but these representatives typically did not understand or take ownership of the data or their department’s technical architectures to be able to help FBCBI (“new” 3, 20).

In addition to this, tension was identified between individuals and teams within FBCBI due to challenges related to lack of capacity and the frequent need for individuals who demonstrated competence (and willingness) to work overtime. There was also tension between operational *versus* strategic/project personnel as it was possible for non-operational staff to work some of the time at alternative locations (e.g. home, quieter offices), which was seen as an unfair benefit. These challenges are, however, not unique to BI. The insight in terms of this is the challenge in the fact that the balanced work-life of the employee was often overlooked in favour of completing the BI process or producing deliverables.

Data needed to answer a query may overlap functions, departments or even the organisation's boundaries – resulting in challenges in ownership, governance and expertise

Observation reflects that, when they didn't "*forget this activity*" ("new" 7) BI business and data analysts experienced challenges identifying data sources as well as experts within Fortune Bank with expertise to assist them to source some of the data necessary to provide complex intelligence. The data or information needed to answer a BI query or populate a report or database does not always mirror the organisation's structure or the way its data is organised. Often data from various disparate sources is needed, where it is unclear who the data owners are or where the responsibility or expertise for this data lies. BI is not restricted to a business function or department and flows across (and beyond) the organisation ("new" 8). It is identified that "*it's difficult to understand where BI starts/ends and how it integrates"* (IH) ("new" 4). In addition, BI customers' demands grew to include more than just data from the bank's legacy, ERP and product systems (for example), they required "*RTBI and inclusion of new data sources such as social media data, Internet banking activity data*", etc. (IM).

IL identifies "More collaboration is needed than when implementing an IS system due to BI's reliance on data and monthly ongoing data feeds" ("new" 10). However, BI customers and BI providers appear to be "stuck" in isolated business *versus* IT thinking rather than collaborating. Challenges in alignment, ownership and responsibility where BI overlaps IT and business realms resulted at Fortune Bank, e.g. there were arguments about who should understand and take responsibility for business data, including the quality thereof. In 2010 FBCBI performed a change management initiative to establish a culture of data quality in Fortune Bank as, based on the queries that were logged at their help desk, "BI customers do not understand that the BI Portal just reflects their data, what they've captured, we cannot be responsible for their spelling or typing errors" (IJ).

In addition, the full impact of BI was seldom considered during BI initiatives conducted at FBCBI. On one BI Portal pricing project, for example, it was discovered that Fortune Bank customers were closing accounts with Fortune Bank after reaching a "saturation point". It was determined that customers left due to feeling exploited through heavy pricing. Had the full impact of BI been considered before the pricing project designed additional fees, the project's angle could have been changed to ensure that customers did not reach the point of leaving the bank. Where integration is omitted or where applications are built without consideration for BI needs upfront, further challenges occur later (In this section: "New" 5, 6, 9).

5.4 Attempts to solve BI's challenges

5.4.1 Case study findings

Much like the literature study, case study respondents indicated measures to address BI's challenges such as BI best practices (IE, II, IJ, IN, IL), CSFs (IE, II, IG and IN), BI frameworks and strategies (IA, IL, IN) and readiness and maturity assessments (V4, IN, IB). While BI vendors tended to raise measures related to their BI technology solutions, BI customers and providers within Fortune Bank raised measures related to BI methodologies and best practices (BI providers) and BI projects (BI providers and their customers).

In terms of BI projects, Fortune Bank BI providers tended to raise measures to address BI's challenges that related to aspects of the BI project that they worked on or perceived that they had control over, e.g. project management and design and development activities. Likewise, their BI customers tended to raise measures they perceived they had control over, e.g. establishment of steering committees (IC, IF, IK), project charters (IC, ID, IH) and governance (IK, IM). In addition, Fortune Bank BI providers were seen to encourage collaboration between their departments' internal teams – e.g. FBCBI's analyst, development, data and reporting teams tended to work in silos neglecting integration and IE and the senior management team discouraged this. IB, a BI customer of FBCBI, had complained several times that FBCBI prioritised their list of BI requirements in favour of Business Banking, at the cost of other Corporate business units. He made the suggestion to centralise FBCBI to provide the whole of the Corporate business division with BI. IE and the senior management team actually did aim to centralise FBCBI (though this had not materialised by 2012), but also wished to establish "*business satellite units*" in each business area that they partnered with. IE's vision was to mature his BI department into a BICC and thereby do this to overcome these types of challenges.

IN (a BI provider in Fortune Bank) explained that changing a BI department into a BICC through measures such as a name change, restructuring and even training do not guarantee success. During her interview, she indicated that her department only changed into a true competence centre when they reached the level of maturity whereby they were less data-intensive and more focused on developing BI solutions and automating routine processes. Another insight from her interview is that she saw "*focused morning coffee chats*" between her analysts and dedicated business representatives as critical to enable her department to identify "*what's top of mind for business*". She explained that most of her department's requirements stemmed from these discussions, as her analysts would "*get their hands dirty in the data to resolve business' questions shortly after these interactions*".

Reflecting on the scoping documents of the BI Portal, CMIS and EDW Projects, it can be seen that CSFs such as "availability and support of project sponsor and business stakeholders", "timely reviews, approvals and sign-off" and "availability and know-how of business representatives" were raised at the start of these projects. However, it can be seen that this did not ensure that these factors were adhered to, ensured or that they materialised. Project risk and issue logs as well as lessons learned captured at various project milestones reflect that mere awareness of CSFs and documentation thereof at the start of a project does not guarantee success: many of the CSFs appeared later as risks, issues and later, lessons learned.

As expected, the BI vendors indicated their BI IT solutions are best used to overcome BI challenges. This emerged in all their responses (excluding V7 who provided a poor quality response). Vendors predictably raised measures such as change management (V1, V6, and V8), training and support on their specific BI IT solutions (V2, 3, 5) and pre-implementation readiness and maturity assessments (V4). Amongst these and similar predictable measures, two measures were raised that stand out, namely: "*align BI with business processes*" (V8) and "*partnership with the organisation*" (V6).

These measures also emerged at Fortune Bank: Not only did the Retail BICC's analysts' "*morning chats*" with the business show that partnership works well – aligned with V6's identification of this measure – but it was also evident within FBCBI. Where proactive business representatives approached FBCBI and were "*hungry for BI, making a reciprocal effort with my team*" (in the words of IE, head of FBCBI), FBCBI completed projects. The opposite was also true: where business sponsors were unwilling to partner, either by providing business representatives in their area with adequate knowledge of the business and data or through funding of BI initiatives, these projects tended to end up with a status of "abandoned" on the project register. The insight that alignment of BI with business processes is a measure to overcome BI challenges, as raised by V8 above, was also evident within FBCBI. Usage of BI applications that replaced and improved on existing processes was high, for example, the Customer Intelligence module of the BI Portal. Again, the opposite was true: II stated that "*where users have to go out of their way to use BI and it does not form a normal part of their everyday work life or represent something they need, they will not end up using it*". IA stated that implementation of user-friendly applications is a measure to overcome BI challenges, however, it can be seen that applications need to be aligned with and embedded in business processes before users will regularly use them.

5.4.2 Key insights from case study findings

As the literature study identified, current attempts to overcome BI challenges are not entirely successful. Current attempts seen in practice focus mainly on the project and implementation activities involved in implementing BI technology solutions. Case study respondents essentially focus on project success – e.g. that the project is implemented within cost, schedule and quality constraints – but neglect to address challenges they've raised regarding use, data, alignment, resourcing and sponsorship.

It is apparent that BI customer and BI provider are separated in their views of how to overcome BI challenges. BI customers and BI providers suggest measures that fit within aspects of BI that they are involved in or possibly have control over. Furthermore, BI vendors specifically suggest measures related to the BI technology product that they market and sell.

Two insights that emerge, however, are that collaboration as well as alignment and embedding BI in business processes are essential measures – raised by the BI vendors and seen at Fortune Bank. Observations of this highlight that for collaboration to be successful, all involved parties need to have a vested interest in a successful outcome and need to play an active role, providing what the other lacks/cannot provide. For example, for a partnership between a BI department and a BI customer to be successful, at least one of them must understand the business and its data and at least one must understand BI and how it can use this data to meet requirements.

5.5 Consolidation of literature and case study findings on BI's challenges

Table 12 reflects a list of the challenges that emerge for BI from the literature and case study. Challenges that originated in the literature are still referenced with the code allocated in the literature study. New challenges that emerged in the case study are referenced with a prefix "CS". While it has been necessary to examine the challenges at this detailed level to be able to compare literature and case study findings, the next chapter provides a more conceptual view of the challenges. The next chapter examines the relationship between the challenges and BI's worldview, referencing the coding reflected in Table 12 for continuity and traceability.

It is recognised that Table 12 reflects the researcher's interpretation of the literature and case study findings. However, as the intention is not to identify an exhaustive list of BI's challenges (this would be a futile attempt), the challenges reflected in Table 12 serve as an adequate basis for a) comparison with the worldview that emerges in practice and b) analysis through a G-D Logic lens. These are both performed in the next chapters.

Table 12: Consolidated list of literature and case study challenges for BI

Ref	Challenge
	Using BI optimally
U1	• Volume of data that is processed is overwhelming
U2	• Unfamiliar territory for users
U3	• Poor or absent metadata and training
U4	• A gap between the BI application or output and human decision-making
U5	• Adapting to use BI to make decisions
U6	• Providing BI that is relevant, timeous and valued by the user
U7	• Providing BI that is valued by and suited to the organisation's culture

Ref	Challenge
U8	• Catering for different user needs across the organisation
U9	• Dominant focus on data processing reduces time/capacity for use
CSU1	• BI providers aim to evolve to focus on BI development, still neglecting capacity for use
U10	• Low use overlooked as use is often measured according to volume of software applications and licences sold
CSU2	• Low use overlooked as use/BI success is measured according to successful implementation of IS project or completion of data processing
	Managing "big data"
D1	• The advent of unprecedented "big data"
D2	• Storing and accessing big data spread across the organisation in various formats/sources
D3	• Absence of information management methods, governance and data quality
CSD1	• Managing customer demands for data from new and unstructured sources
CSD2	• Ongoing data feeds and support long after deployment
CSD3	• Gaps in ownership or responsibility for data or data quality
CSD4	• Skills and competence on data are largely missing within the organisation, appointed business representatives do not understand the data or know where to source it
	Integrating BI across many complex technology, data and business layers
I1	• Overlooking integration activities (BI fails to consider integration with organisation's ISs)
CSI1	• Failure to consider integration with BI upfront when acquiring/developing organisation's ISs
I2	• Complexities related to the organisation's technology, data and business layers
CSI2	• Skills and competence on IS/IT architecture are largely missing within the organisation, appointed business representatives do not understand IS/IT architecture
I3	• Complexities resulting from organisation-wide issues
CSI3	• More collaboration is needed than when implementing an IS/IT solution
	Aligning and balancing the needs of the various role players in BI
A1	• Misalignment between BI, IT and the business , BI vendors and the organisation and between departments and levels
A2	• BI infrastructure is complex, expensive, takes time and cannot be used until most of it has been completed
CSA1	• BI customers (of BI vendors) have negative impressions whereby BI vendors are seen to: "lock" them in, offer expensive solutions with costly dependencies on specialists and too many/intimidating features
CSA2	• BI departments get frustrated with BI vendors who try to bypass them

Ref	Challenge
CSA3	• BI provider and customer are separated: • BI providers believe BI challenges result from incompetence/unwillingness of BI customer • BI providers believe BI customers don't understand BI complexity, priorities, dependencies • Separate views on how to resolve BI challenges • Isolated business *versus* IT thinking – focus on differences rather than collaboration • Failure to learn each other's environments/contexts or offer knowledge to the other • BI providers focus on application development and data processing, neglecting use thereof • BI customers act as passive recipients, only participating upon request of BI provider • BI customers are unable/unavailable to provide adequate business input • BI providers believe BI customers forget to inform them of business changes • BI providers believe BI customers don't know their data/requirements or dispute BI costs • Communication and collaboration often fails • BI providers expect BI customer groups to collaborate independently (this fails to happen)
CSA4	• BI vendors expect the organisation's departments to collaborate and consolidate their BI requirements (this fails to happen)
CSA5	• BI vendors express frustration when BI departments obstruct direct relationships with users
CSA6	• Managing new customer demands (such as RTBI)
CSA7	• All role players needed in BI initiative are not successfully identified or brought in
	Recruiting, retaining and using BI personnel and their skills effectively
P1	• Specialist personnel are high in demand but short in supply
P2	• A broad skill set is required
CSP1	• BI departments recruit IS and IT rather than BI professionals/experts
CSP2	• Employee's work-life balance is overlooked in favour of completing BI deliverables
CSP3	• Skills and competence to assist BI departments are largely missing within the organisation, appointed business representatives are not able to assist
	Getting the right sponsor in place
S1	• Absence of a sponsor who understands BI
CSS1	• Sponsors who are "mislead" by BI vendors into believing BI is a "quick and easy" endeavor
CSS2	• Sponsors who expect BI IT solution to provide for full BI requirement
01	Realising and measuring ROI

Ref	Challenge
	• Realising and measuring ROI
CS01	• BI success (value/return) is measured at point of delivery of BI project or data process, making ROI harder to calculate
02	Operating in an ambiguous environment • BI is ill-defined and its environment is ambiguous • Treating BI the same as an IT project Resultant challenges: • Difficulties in raising BI specific challenges
CS02	• BI is perceived narrowly as an IS or even more narrowly as a data or IT solution. This results in further challenges (already raised above): • BI success is measured according to BI vendors' volumes of IT sales or IS project measures/data processing performance measures • BI providers seek to recruit IS, IT and data professionals rather than BI experts • More collaboration is needed than when implementing IS solutions, though this is not always acknowledged or performed
CS03	• Failure to recognise and address the fact that BI operates in an ambiguous environment results in further challenges (already raised above): • Misaligned expectations • BI is defined and scoped narrowly as an IS solution (or more narrowly as data/IT)

6. Conclusion

This part of the case study chapter establishes that BI is highly promoted and praised within Fortune Bank and by the BI vendors, as it is in the literature. It confirms that Fortune Bank's investment in BI is high and BI providers and customers within Fortune Bank see BI is a high priority. BI's purpose is confirmed – by the majority of participants – to be to inform decision-making. A strong perception emerges that, although there is a high demand and expectation for BI, BI does not consistently achieve expected results. Furthermore, it is identified that decisions to use BI are made at a strategic level, but that BI implementation takes place at levels which report to these strategic levels – where gaps emerge between the strategist who designs a solution and the end-user who actually has to use it.

The challenges that are identified in the literature study are confirmed in the case study, through observations and reflection on the case study participants' views that emerged in the interviews and RFP responses. Analysis of the case study data reveals additional insights and challenges which are categorised and discussed. Firstly, it emerges that BI is perceived narrowly as an IS (or even more narrowly) as an IT or data solution within an IS. Next, the fact that participants fail to recognise and address BI's ambiguity is identified, along with the resultant challenges, e.g. misaligned expectations, confusion, etc. A third key finding is the segregated viewpoints of BI customers and BI providers and a fourth is the various levels of tension in relationships between participant groups within BI practice. A final category emerges in the challenge whereby data that is required overlaps boundaries but that case study participants' thinking and the organisation's structure are largely restricted to silos and BI provider *versus* BI customer domains.

The ways in which BI's challenges are addressed are then examined. As both BI customer and BI provider groups suggest that BI's challenges are addressed through measures related to aspects of BI that they are independently involved in, their separated viewpoints emerge. Views from BI vendors emerge that their BI IT solutions and services are the key to solving BI's challenges.

Finally, this part of the case study concludes with a consolidation of BI challenges raised in the literature and case study. Challenges are referenced with literature study coding where these originated through the literature study and new codes are assigned for challenges that were identified for the first time in the case study. These challenges are referred to in the next part of the case study and again in Chapter 5.

The next part of the case study examines the worldview of BI held in practice and relates the challenges, as identified in this chapter, to this worldview.

CHAPTER 4 PART 3: CASE STUDY INSIGHTS ON A DOMINATING WORLDVIEW FOR BI

Analysis of case study data to extract insights on the worldview of BI as perceived in practice

1. Introduction

This part of the case study chapter examines and analyses the case study data to discover insights on BI's worldview. The aim is to identify how case study participants perceive BI, whether there are common characteristics that emerge from their perceptions that form a common worldview and whether there are similarities with findings from the literature study. It identifies characteristics that constitute the various elements that make up a worldview and compares perceptions that stem from BI customers and BI providers, including Fortune Bank BI departments and their customers and BI vendors (as potential providers to Fortune Bank).

A consolidated worldview is then presented, based on the findings from the case and literature studies. BI worldview elements and BI challenges are then examined to establish whether there is a connection between challenges experienced and how the BI is understood, perceived and acted upon.

2. Research data used to inform this part of the case study

Questions that were used to elicit responses from interviewees and BI vendors are listed in Appendix B (Sections C to H) and D (Section B) respectively. Further insight is attributed to the researcher's observation at Fortune Bank as well as the 2012 follow-up interviews. As with Part 1 of the case study, interview and RFP findings and observations are integrated, except where observations highlight examples that do not come across clearly through the participants' voices. In these cases, they are documented separately.

3. Elements of BI's worldview

In the same way as the literature study does this, this part of the case study discusses BI's worldview according to the elements identified in the conceptual framework of a worldview (based on literature from Apostel and van der Veken, 1991; Heylighen, 2000; Vidal, 2008:4-6; and Funk, 2001). Analysis of the perceptions that constitute BI's ontology is also presented in its own section (4).

3.1 BI's model of reality as a whole (Ontology)

Case study participants' views on BI, including how they define and scope BI, confirm the literature study's findings that BI is ambiguous and made up of multiple perspectives. This also aligns with the key finding in Part 2 of this Chapter, where it was established that the case study participants' challenges reflect that BI is an ill-defined discipline operating in an ambiguous environment.

This is true of the views from the BI vendors and Fortune Bank's BI departments (as BI providers) as well as from BI customers at Fortune Bank, although there is evidence that different perspectives are held by BI customer and BI provider groups. These are discussed below in Section 4. Divergent views are also visible on the topic of whether BI is a new concept that replaces concepts such as EIS, MIS, DSS, etc. or whether it is related to these terms but does not replace them. Some case study participants (V1, V6, V8, IB, ID, IE, IF, IM, IN) express views that BI is a new concept replacing concepts such as these "*that have lost popularity*" (IN), even stating that BI is being replaced by analytics as "*analytics is the latest term*" (IM). Others (V2, V3, V5, IA, IG-J and IL) express that BI is an umbrella term for these terms and, conversely, others (V4, IC, IK, IM) indicate that BI is a subset of a related term (e.g. IM, knowledge management, etc.). This reflects the ambiguity in the understanding and scoping of BI that mirrors that seen in the literature.

Also in line with literature study findings, the case study reflects that there is much debate within practice on the question "what is BI?". This is evidenced by, for example, the inter-departmental squabble on this question when it was debated during a BI forum at Fortune Bank (discussed in the observations in Part 2 of the case study), interviewee responses on questions in this regard and divergent views expressed on what BI is by the BI vendors in their RFP responses. An interesting finding highlighted in Part 2 of this chapter that was not evident in the literature study is that, despite their awareness of the ambiguity and debate surrounding the BI definition and scope, BI customers and BI providers did not express much concern about BI's ambiguity or express interest in resolving this. Only IE, IG, IL (BI providers) and IN (a BI customer) highlighted that the fact that BI is ill-defined results in the creation of additional unnecessary complexity and misaligned expectations between BI customers and providers in Fortune Bank. The remaining interviewees expressed that they were satisfied with the way BI is currently defined (IB, ID, IF), that "*BI will never be consistently defined as the technology moves too fast*" (IA) or that although BI is ill-defined, this is just a complexity of the environment (IC, IH, II, IJ, IK, IM) and "*comes with the territory*" (II).

Further new insights emerge in the context of BI's ontology. Firstly, when interviewees were asked to define BI and describe the BI process, all the BI providers (BI departments in Fortune Bank in this case – IA, IE, IG, II, IJ, IL and IN) used terms and descriptions related to the creation of BI up to the point of exchange of the BI product (e.g. report, application, etc.). Although BI customers' descriptions also described this, their descriptions extended to the use of the BI product, after the point of exchange, which was not evident in the BI providers' views. BI providers, for example, focused on the extraction, processing and presentation of data and information and on the phases of the development lifecycle for BI applications. BI customers brought in, for example, decision-making, interpreting reports and alignment with strategy. This highlights Fortune Bank BI providers' tendency to focus on production of BI and BI applications rather than the use thereof, resulting in a separation of BI customer and BI provider and in a dominant focus on BI technologies and data processing. Views from BI vendors simulated those of the BI providers at Fortune Bank, although a number of the vendors (V1, V3, V5 and V8) addressed change management (including support and training) as part of their proposed BI solution. Although change management may apply after the point of exchange, it relates to the support of the BI application, usually with a finite post-implementation support period.

A second significant insight from the case study in the context of BI's ontology stems from analysis of the case study data according to Kaisler's (2012) suggestion. As discussed in Chapter 3, Kaisler suggests that another way to establish how BI is perceived is to examine whether BI definitions focus on the organisation's processes and rules (i.e. are syntactic) or focus on the organisation's environment and context (i.e. are semantic). Analysis of participants' definitions and explanations of BI in various interview and questionnaire responses reflects a syntactic rather than semantic focus. This is evident in case study data from all types of BI providers and customers.

For instance, BI vendors' definitions of BI, in context with the rest of their RFP responses, reflect that six of the eight BI vendors framed BI syntactically (V1-4 and V6), one (V7) provided insufficient responses to evaluate this and one indicated Fortune Bank should aim to understand their customers (V5), i.e. a semantic definition. This is also evident in the BI providers at Fortune Bank, where only one interviewee (IE) described the external environment in his definition and explanation of BI. It is also evident in the views of the BI customers of Fortune Bank BI departments, where six of the seven focused on the organisation's processes and rules: IM was the only BI customer to bring the organisation's context and environment into consideration in defining and scoping BI. He explained the importance of understanding the customer's point of view for BI, providing an example (among others) of the data that can be collected on the customer experience when using the Fortune Bank website and how it is necessary, not just to collect and understand this data, but to understand where it fits in, i.e. its context from a customer viewpoint.

3.2 BI's model of the past (Explanation)

The history of BI at Fortune Bank – as observed and gleaned from interviewees' responses during the interviews – reflects that BI departments were established as a result of Fortune Bank employees recognising the need for information and intelligence to inform decision-making. FBCBI, the Retail BICC and the EDW department were all established as a result of the recognition of this need followed by action from individuals, who previously had worked in IS and IT departments, to establish these departments. As a result, BI departments were formed to provide BI to the various departments in Fortune Bank, as their BI customers. As such, the literature's view that BI stems from a systems and Engineering background for management and business support is also evident at Fortune Bank.

The same can be said about the BI vendors. Reflecting on the history of the vendors, it can be seen that most of the vendors were established as BI competencies by IT organisations or as BI vendors providing BI IT solutions and services. Furthermore, all the vendors indicate that technology is their primary business and that they have software and technology partners. Even the two smaller local BI vendors who responded to the RFP indicate IT as their primary business (V3) and verify that they have software partners (V1).

As with the literature study, no definitive explanation for the uncertainty in BI perceptions emerged.

3.3 BI's model of the future (Prediction)

The model of the future envisioned by case study participants simulates the focus on technological predictions that emerged in the literature study. An additional perspective from the case study is that BI customers (of Fortune Bank and the BI vendors) (IB, IC, IF, IK, IM) are typically concerned about the features and functions (e.g. ease of use, accessibility and fast response rate) that BI technology solutions will have in the future. With Fortune Bank's tendency and culture to use Microsoft Excel to document almost anything, a number of interviewees (IC, ID, IK, IM) expressed that they foresee BI becoming available in this application for them in the future. Some BI department members (BI customers of BI vendors) (IE, IG and IN) raise similar characteristics, but from their BI department viewpoint, e.g. performance, traceability of data and ability to track, control and monitor user access and use. Another insight aligned with this is that BI providers (Fortune Bank BI departments as well as BI vendors) are typically concerned with collecting and managing greater volumes of data, different types of data, BI delivery mechanisms and expanding the "*audience to whom BI is rolled out to*" (V6). For example, a number of BI vendors raise "*big data*" (V1, V4, V5) and "*BI to the masses*" (V1, V3, V5, F8) in their responses on BI's future. The technology focus continues in both types of BI customer and BI provider views through speculation about BI's integration with existing, new and emerging technologies (mobile devices; social media platforms; document management systems; etc.) – much akin to what has already been raised in the literature study.

In addition, a number of interviewees (IE, II, IJ, IG, IL, IN) from each of Fortune Bank's BI departments shared the view that the future would entail "*freeing up BI resources' time from data processing to automate and develop more BI*". Although this is perceived as "*an evolutionary step*" (IN, IE, II), it only shifts a BI department's focus to development activities – i.e. more technology and production focus and not to the BI customer space where BI providers could potentially assist with the use of BI.

The BI vendors' dominant focus on technology was expected, given that they market and sell BI technology solutions. However, it was not expected to such an extent from the Fortune Bank interviewees, specifically since they had been asked in the interviews to think beyond IT and current BI technology solutions. The fact that they still raised technological advancements along with the BI vendors' dominant technology focus confirms the literature study finding that people think BI is predominantly about technology or impossible without technology (Ackerman, 2005:22; Herschel, 2010b). In addition, in 2011, FBCBI changed their name to BI Technology Solutions (BITS), indicating even more of a propensity to focus on BI technology and the production of this.

An unexpected case study finding was the sentiment expressed by interviewees that they have an awareness of and desire to change the current separation of the BI customer and BI provider in the future. Some BI providers at Fortune Bank (IE, IG and IN) indicated that they believe there will be an evolution of the "*BI resource*" (IG) resulting from increased pressure to demonstrate competence in business, IT and BI – "*resulting from the demand for resources who know the business and how to apply BI in the business*" (IN). This was also evident in the BI customers who admitted that they are often unable to interpret BI reports or data and need a "*BI analyst dedicated to my area who can understand and interpret reports and have conversations with me about their findings*" (IB). Surprisingly, BI vendors also appeared to share this sentiment, indicating that the future will see BI vendors equipping the end user (V2; V3) and performing extended user support periods (V2; V5). However, the sentiment was not shared by all, some BI department providers (II, IJ) expressed frustration with the interference of their BI customers and a desire to even move physical location.

3.4 BI's values (Axiology)

As stated in the literature study, BI's axiology is identified by understanding its value and purpose (Lee, 2011). Part 1 of the case study identified that BI is seen by BI customers and BI providers (including Fortune Bank customers and providers and BI vendor providers) as a top priority, that it is in high demand and receives substantial funding. It also established that BI's primary purpose is seen by case study participants to be to inform decision-making, but that there are also views that BI is used for consistent measurement, to answer queries and to influence and drive business activities and the bank as a whole. This establishes the purpose of BI, as seen, interpreted and reported on by the researcher and the case study participants.

BI's axiology also emerges when examining what the organisation measures and strives towards, in other words, what it values. The researcher analysed what Fortune Bank measures by examining how they measure performance of the organisation and the employee. She analysed what it strives towards by examining its vision and mission. She also analysed what the BI vendors place value on in terms of BI by analysing the benefits and purposes they list for BI in their RFP responses. Insights from this analysis are discussed in sub-sections 3.4.1 to 3.4.3 below.

Insights highlight that, although case study participants view that BI's purpose is to inform decision-making, BI case study participants do not measure success or determine value at this point. Instead, as reflected in sections 3.4.1 to 3.4.3 below, case study participants typically measure success and determine value according to quality, cost and schedule measures performed on BI projects (typically delivering IT solutions) and determine value at the point of completion, delivery or implementation of the BI IT solution.

3.4.1 Fortune Bank performance measures

Fortune Bank has a performance driven culture resulting from their belief in the maxim "what you measure you get", which various of its managers attribute to Kaplan and Norton (1993:135) who developed the Balanced Score Card (BSC). The BSC is used to plan and measure performance – from employee, to business unit, right up to organisational level. As such, the BSC defines what the organisation values – i.e. its purpose or reason for existence – and provides a measure against which performance can be quantified according to these values. Thereby, by analysing Fortune Bank BSC measures related to BI, the values that shape its BI worldview can be identified.

The researcher analysed several BSCs from FBCBI (representing a typical Fortune Bank BI department) and their BI customers. Table 13 reflects high level measures related to BI from an FBCBI Business Analyst's (BA's) BSC as an example. These high level measures are typically broken down into more detailed measures applicable to the period of measurement. They also include additional categories which are not directly related to BI, e.g. organisational learning (3%) and transformation (5%). Analysis of these BSCs highlights a few key findings, discussed below Table 13.

Table 13: Examples of typical BSC measures (based on actual BSC of FBCBI Business Analyst)

BSC category, measure and weighting
Financial: Grow Economic Profit (EP) through successful completion and delivery of BI Projects or Operational deliverables (12%).
Client: Become client-driven through proper requirements management, throughout FBCBI project process, i.e. from conceptualisation to delivery and change management (60%).
Internal processes: Enhance productivity and execution by delivering quality work with minimum rework through use of templates and adherence to process (20%).

Firstly, measurement takes place upon completion and distribution or implementation of a "deliverable" or output, i.e. value is measured at the point of exchange. The point of exchange is, for example, the point when a BI department has completed a project milestone, e.g. implementation, post-implementation support, etc. and has handed a tangible BI deliverable (output) over to a BI customer. For a BI provider this may be, for example, an application, report, design specification or an operational output such as completion of a month-end ETL process. For a BI customer this may include, for example, production of monthly financial statements, design of a new banking product, restructuring of fees, etc. BI customer deliverables may even involve implementation of a BI solution in their department, facilitated by a BI department.

Secondly, measurement takes place from the point of view of the provider. The word "deliverable" already reflects that value is measured from the provider's viewpoint, i.e. from where delivery is provided and not from where it is received (it is not a "receivable"). This was also evident in the actions of BI customers and providers at Fortune Bank as, firstly, performance appraisals were performed by an individual's manager, based on observation, team feedback and assessment of deliverables in terms of cost, quality and schedule measures and, secondly, customer input to performance appraisals was discouraged. Although at a stage FBCBI provided performance input for their stakeholders' performance appraisals and *vice versa*, this practice was later abandoned (senior management identified issues resulting from bias due to personal relationships and politics). Another insight gained from analysis of the BSCs is that Fortune Bank aims to optimise its internal "deliverable production" processes to maximise quality (as determined by the provider) output. Focus is on requirements management and project management, even where the BSC indicates "client-driven" as a category.

A final insight stems from observation at Fortune Bank. It was observed that Fortune Bank individuals do not provide BI vendors with feedback on use or performance of their BI applications solutions once implemented, unless a problem or an exceptional interaction is experienced and a complaint or compliment is submitted.

3.4.2 Fortune Bank vision and strategy

The essence of FBCBI's BSC measures stem from their business unit's vision and strategy, as was also evident in the other BI departments' measures and their corresponding business units' strategies. Business Banking's vision was to improve performance in key areas, according to the strategic measures reflected in Table 14. These measures highlight how Fortune Bank focuses on identifying and targeting customers, selling to them and optimising production processes – including the employee as a means of production.

The customer appears to be something that Fortune Bank markets and sells to and it appears to view markets as opportunities to be captured or taken advantage of. Although Business Banking's vision applies to the "man-on-the-street" customer of Fortune Bank, it was evident that these sentiments were also embodied in exchanges and activities within the bank, e.g. FBCBI's BI projects had to be linked to one or more of the measures if staff were allowed to work on the project.

Table 14: An example of Fortune Bank strategic measures as part of their vision

Strategic measure	Key observations
Acquire Primary Banked Clients	1 Identify, target and sell to customers
Sales Force Productivity and Size	2 Sell to customers 3 Optimise productivity/production
Cross Sell	Same as 1, 2
Easy to do Business	Same as 3
New Markets and Products	Same as 1, 2
Talented, Skilled and Energised People	Same as 3

3.4.3 BI benefits and purpose identified by BI vendors as BI providers

As identified in the literature study, BI vendors tend to promote and place value on intangible benefits or the features of their BI IT solutions (Pendse, 2009), e.g. enablement of analysis (V4, 5, 6); consistent delivery enablement (V1); faster response rate (V4); or improved communication (V1, 3, 6). Analysis of RFP responses also identifies that some BI vendors (V1, 7) identify BI's benefit and purpose to be "*customer value*" or "*happy customers and happy users*" as the output of implementing their BI solution, which results from performing a generic "*analyse-design-build-deploy*" methodology. Others see their BI solutions resulting in value such as: enablement of strategic business decisions and strategies (V1-5, 8); "*delivering fast ROI through identification of quick win areas to deliver value*" (V1); delivering actionable insight (V3); promoting expertise throughout the organisation (V2); or providing a comprehensive view of the organisation (V8).

This highlights how BI vendors assume they can determine value upfront or unilaterally. It also highlights that – in the same was as reflected in the measures and actions of BI department as BI providers – BI vendors believe value takes place at the point at which their solution is implemented, which can be seen as their view of the point of exchange.

3.5 BI's guiding principles (Praxeology)

Aside from guiding principles identified within the category of philosophy and theory (e.g. ANT, as identified in academic literature (Papadopoulous *et al*., 2010:25)), case study participants identified the same guiding principles that were identified in the literature study, e.g. strategy, CSFs, maturity models, etc. Many of these were also observed in various stages of adoption and were used within FBCBI at various points during the case study observation period. This was an expected finding, since Fortune Bank BI departments were observed to consistently perform research and attended industry conferences with the aim of "*keeping up with the best in the BI industry*" (IN).

The case study revealed additional guiding principles that were used within FBCBI (as a representative of a typical BI department/BI provider in Fortune Bank) that were not explicitly identified within the literature study. For example: Projects In Controlled Environments (PRINCE2) project management processes; Kimball's (Kimball *et al*., 1988:117) requirements gathering process, technical frameworks and dimensional modeling guidelines and; BI strategies and roadmaps compiled by the BI department head. These focused largely on "the next wave of BI technologies". Further examples are: BI's architectural design; bank-wide standards to implement a Service Oriented Architecture (SOA) approach to analysis, design and development activities; data processing, archiving and retrieval methods and; data governance methods. This draws attention to the technical nature of FBCBI's guiding principles whereby the focus is on the BI IT application or on the processing of data – an insight that also emerged in the literature study.

Although the BI vendors did not explicitly state which methodology they use by name, the RFP responses reflect a similar view to the Fortune Bank BI providers, i.e. a view that is highly technical in nature and focused on BI IT solution development and data processes. According to the BI vendors who responded to the RFP, BI is or should be guided by a linear software development process and implementation methodology. A number of vendors (V1, 2, 4, 6, 8) indicated that BI is the result of a typical waterfall software development lifecycle or that it results from completion of data processes such as "create data, deliver information, analyse delivered information" (V3, 4, 5). While the latter hints at analysis as a process to create BI, none of the BI vendors explain how analysis or decision-making take place once their solution is implemented and change management has wrapped up – despite many of them raising decision-making as the ultimate purpose of BI (V1, 3, 6) in other answers. In fact, this was also observed with the BI providers within Fortune Bank's BI departments. Again, these are not new insights as they are similar to those that emerged in the literature study.

A new insight that emerges is that BI is guided by practices and principles defined and implemented unilaterally by BI providers, without significant input or influence from BI customers. This emerges through analysis of FBCBI's activities as a provider to various BI customers (stakeholders) in Fortune Bank. It also emerges in the fact that BI customers of BI departments responded to interview questions on this topic indicating that BI processes are largely the responsibility of the BI department and that they "*only get involved when we are needed for User Acceptance Testing (UAT) or to give input in the form of our requirements*" (IC, ID). Furthermore, BI customers of FBCBI expressed that they find it difficult to understand the BI process, specifically where it starts and where it ends (IH) and that, although they believe they are familiar with IT and IS software development processes and life cycles, they "*feel lost when it comes to BI processes*" (IF). This highlights the separation of the BI customer and the provider and the BI provider's tendency to drive the BI process, delivering BI to a passive BI customer who gets involved as per the BI department's request, if that.

Another new insight is the identification that BI guiding principles – from BI vendors and BI departments as BI providers – tend to revolve around design and development of the BI technology application and the data sourcing and processing activities, without extending to the human decision-making processes on the "use" side of the BI process. No case study participants raised any guiding principles that relate to how BI should be used or to decision-making. Furthermore, although IE and FBCBI's senior management team indicated a desire to change from a traditional software development lifecycle approach to an agile approach, the collaboration they envisioned related to collaboration between analyst and development teams within FBCBI and did not involve a BI customer, other than as per typical IT development methodologies in requirements gathering, UAT and training and/or change management activities.

3.6 Source of knowledge on BI (Epistemology)

The source of knowledge of the case study participants emerges through interviewees' educational backgrounds and previous work experience, analysis of the type of people recruited for BI customer and BI provider roles and understanding of what these types of interviewees base their activities and actions on (discussed in Sections 3.4and 3.5 above). It also emerges by identifying the BI vendors' primary business and by understanding what qualifications and experience they seek in the people they recruit, as reflected in their websites' recruitment information. This is now discussed. A summary of interviewees' and BI vendors' backgrounds can be found in Appendix G.

All the BI vendors indicated IT as their primary business and their websites reflect that, aside from support functions such as finance, human resources, etc., BI vendors seek to employ people with IT backgrounds, specialising in BI (including BI-related disciplines such as IM, analytics, MIS, etc.) or data administration or management. Interviewees' educational backgrounds and previous work experience reflects that they have been informed by various fields, some directly related to BI and banking and others not at all related to BI and banking, e.g. ministry, the medical industry. However, as indicated in Chapter 2, a commonality that emerges between Fortune Bank's BI providers is their background in Engineering and IT fields and between BI customers of Fortune Bank BI departments is their background in Accounting, Finance and Business fields. When asked what types of qualifications and experience are required to work in their departments, BI customers indicated Bachelor of Science (BSc) or Bachelor of Commerce (BCom) degrees or diplomas, with specialisation in IT, IS, Computer Science or IM and experience working in BI, IM or IT. BI customers indicated BCOM degrees or diplomas, with specialisation and experience working in, for example, Accounting and Finance or in Sales and Marketing – depending on the department and function. Reflecting on the interviewees' educational background and work experience, however, it was apparent that these are not fixed resource requirements; individuals with experience outside of these fields were also recruited.

This reflects that BI customers (excluding BI departments as BI customers) are typically informed by Business and Finance fields and BI providers are typically informed by IT disciplines, with a gap between BI customer and BI provider in this respect. This epistemological limitation could be expected, based on the identification of the dominance of IT in BI's axiology and praxeology (identified in the two sections above), the challenges in alignment between BI customers and BI providers and the literature study's finding that there is a shortage of BI experts with skills in IT and business (Davenport, 2006:7).

An unexpected finding resulted from the observation that BI customers and BI providers at Fortune Bank would typically complain about their lack of knowledge of the others' expertise and environment when raising challenges related to BI customer-provider alignment, rather than focusing on what they could do to breach this gap – e.g. sharing their knowledge/expertise. This insight emerged through the interviews where a number of BI customers (IC, ID, IH, IK) expressed frustration and distrust due to lack of understanding the BI provider's processes, focusing on this rather than on assisting the BI provider to better understand the business environment. At the same time, BI providers (II, IJ) complained about the business' failure to share relevant expertise and knowledge, rather than focusing on educating the business (their BI customers) on their world (e.g. the BI process).

Another new insight is that, although BI customers and BI providers have their specific areas of expertise/are informed by diverging disciplines, BI is not consigned to Business/Finance, on the one hand, or IT, on the other: "*BI's complexity is that it runs, like a golden thread, through the organisation, irrespective of business function or department*" (IL). The case study revealed BI customers (of Fortune Bank BI departments) had expectations that these BI providers would understand *all* Fortune Bank data (including their business data – location, structure, source, etc.), while BI providers had expectations that the BI customers would have expertise on their business data – or at least knowledge of where it was stored and where it originated. This emerged in the interviews (identified by IC, ID, IE, II) and was also apparent in challenges experienced on projects when BI customer and BI provider would reach a stalemate about, for example, responsibility to identify where data resides or to explain data structures. This gap in also became clear in challenges resulting from the business' reluctance (as perceived by BI providers – IE, IL) to take ownership and responsibility for their data (e.g. quality of what they captured, responsibility to clean-up or identify data, etc.).

4. Contextualising BI's perceptions

Analysis of the way BI customer and BI provider interviewees defined BI using the landscaping approach, analysis of their verbal responses on this as well as analysis of the BI vendors' RFP responses on this provided insight into how BI is contextualised in practice. While the main perceptions that were identified in the literature study also emerged in the case study, the case study identified new findings. For instance, new ways of defining BI emerged, which the researcher is not aware of in the literature. Consider the following definitions from BI providers at Fortune Bank and their BI customers:

> *BI brings together the tools, technology, data, super-user knowledge, industry and business knowledge and other facets of knowledge (IE).*

> *BI is the information/analysis/analytics that empowers the business to understand the business better, make business decisions and have a strategic view (IK).*

IE's definition highlights BI as a point of integration and identifies the resources or components that are integrated through the activity of BI. His (IE's) definition, however, does not specify what the aim of the integration or collaboration of these resources and components is. IK's definition provides a better view of the aim of integration or collaboration, namely, identifying business understanding, ability to have a strategic view and the ability to make business decisions. Together, IE's and IK's definitions provide the insight that BI involves collaboration of various resources and components that jointly aim to achieve the ability to understand the business, make [informed] business decisions and enable a strategic view. The researcher adds "informed" as business decisions are made daily, with or without BI, but BI can assist in informing decisions. In addition, consider the following BI definitions from the BI vendors' RFP responses:

> *BI is an action (V4).*

> *BI is a series of interactions with products, services, communications, etc. over a period of time (V1).*

> *BI is a software capability that, together with systems and methodologies, enables a number of other capabilities in the organisation (V8).*

V4's definition of BI as an action may be considered to fit within the process perception as the process perception (as per this thesis) refers to a series of activities or actions. V1's definition may also be considered to fit within the process perception, but also offers support for the view of BI as a series of exchange activities (interactions) and highlights the various resources involved in the creation of BI, in a similar way to IE's definition above. V8's view of BI software as a capability reflects a new approach to define BI in terms of the skills and competences – or capabilities – that it consists of. However, defining BI in terms of a software capability alone is short-sighted as – even from a purely technical point of view – BI consists of more than just software.

Another new insight is that case study participants' BI definitions – for all BI providers and customers – focus on BI development and data processing, typically as linear processes, without mentioning decision-making or another type of use of the BI application or data that is developed or processed. Further new insights emerge when comparing how BI providers (BI departments and BI vendors), BI customers and academic and practitioner literature define BI, as reflected below in Table 15. Insights are discussed below Table 15.

Table 15: Summary of BI provider, BI customer and literature perceptions of BI

BI P(V) – BI provider that is a BI vendor BI P (FB) – BI provider that is a BI department

BI C (FB) – BI customer (of a Fortune Bank BI department)

	Dominant perceptions that emerge of BI in the literature and case study			
	Technology	**Process**	**Product**	**Capability**
Overall case study	*Frequently defined* • Mostly BI providers (V and FB) • A few BI customers (of FB)	*Most frequently defined* • All Fortune Bank BI customers and providers • A few BI vendors	*Frequently defined* • Mostly BI providers (FB) • Some BI providers (V) and customers	*Seldom defined* • Mostly BI providers (FB) • No BI customers • One BI provider (V)
BI P(V)	• 6 define BI as a technology (all except V2 and 7*)	• 3: V2, 3 and 6 define BI as a process	• 3: Reference to BI as a technology solution offering (V1, 4 and 5)	• 1: V8 identifies BI is a software capability
BI P(FB)	• 5 define BI directly as a technology (all except IA, II)	• 7: All reference BI as a process • 4 reference/imply BI as/is a linear process (IA, G, I, N)	• 7: All reference tangible and intangible BI products	• 3 identify BI as a capability (IA, IL, IP)
BI C(FB)	• 2 directly as technology (IB, M) • 1 mentions technology (IF)	• 7: All reference BI as a process	• 1 directly defines BI as insight (IK) • 3 mention in/tangible BI products (IC, F, H)	• 0: None identify BI as a capability
Literature	*Frequently defined* • Mostly BI vendors • Some research houses and consultancies • Some academic writers	*Frequently defined* • Mostly academic writers • Some BI vendors • Some research houses and consultancies	*Less frequently defined* • Mostly academic writers • Some BI vendors • Some research houses and consultancies	*Seldom defined* • A fair spread between academic writers, BI vendors, research houses and consultancies

* V7's responses on this question were of too poor a standard to take into account.

The literature study's finding that BI is defined as a technology mostly by BI vendors is supported by the case study finding that mostly BI providers (Fortune Bank and BI vendors) define BI in this way. Reflecting on the comparison in Table 15 above, it is apparent that BI vendors' dominant perception is that BI is a technology and BI customers (of Fortune Bank BI departments) predominantly see BI as a process. BI departments at Fortune Bank (as BI providers) tend to view BI dominantly as a process and product, but also as a technology.

What is perhaps the most significant finding is that the same dominant perceptions emerge with similar consistencies in the case study as in the literature. A potential reason is that, to keep abreast of industry developments, Fortune Bank BI providers read and are influenced by practitioner literature, which they apply to BI practice and thereby influence their BI customers. This literature typically consists of best practices, methodologies, etc. from BI vendors, research houses and consultancies and constitutes a significant volume of available literature. The findings also align with the key finding in Part 2 of this Chapter, where – based on the challenges raised by case study participants – it is identified that there is a strong perception that BI is seen as an IS or as an IT or data solution within an IS.

5. Consolidating a worldview of BI from literature and practice

Table 16 reflects a summary of the characteristics that are seen to constitute the dominant BI worldview experienced and perceived in practice by the case study participants, alongside the dominant worldview that is reflected in the literature on BI. It is recognised that this is an interpretation of case study participants' perceptions and experiences and of the literature's reflections and that, like anything else, the worldview is subject to change. However, on the whole, it can be seen that a dominant worldview emerges, which emulates the worldview that emerges in the literature study. While each characteristic is not directly supported by both the literature and case study, no findings are in conflict with another.

Table 16: Summary of the BI worldview (informed by literature and case study findings)

Key:
E – Element *L – Literature study (the finding is informed by the literature study)*
C – Case study (the finding is informed by the case study)

E	Worldview characteristic	L	C
Ontology	1. BI operates from an ambiguous and unstable model of reality, where BI is perceived as a: technology, process, product and capability (one or multiple of these perceptions).	✔	✔
	2. Although there is much debate, few people express concern about BI's ambiguity.		✔
	3. BI is defined as a technology by BI providers more than by BI customers.	✔	✔

E	Worldview characteristic	L	C
	4. BI vendors' dominant perception is that BI is a technology. Fortune Bank BI departments (as BI providers) view BI mostly as a process and product, but also as a technology. BI customers see BI mostly as a process.		✓
	5. A few individuals see BI as a process enabled by technology to understand the business, make informed business decisions and enable a strategic view.		✓
	6. BI is generally understood (by BI providers and customers) to consist of a linear series of development or data processing activities up to the point of exchange (e.g. implementation/delivery), potentially including change management. Only a few individuals define BI beyond this point, these typically are BI customers.		✓
	7. BI is generally understood by BI customers and BI providers in terms of the organisation's processes and rules (syntactically) rather than in terms of the organisation's environment and context (semantically).		✓
Past	8. No definitive explanation for uncertainty in BI perceptions.	✓	✓
	9. BI emerged (to provide management and business support) from a hard (mechanistic, deterministic) systems and Engineering background.	✓	✓
	10. Fortune Bank BI departments were established by individuals with dominant IT backgrounds responding to business' need for information/intelligence.		✓
	11. BI vendors were established with an IT focus or by an IT organisation.		✓
Prediction	12. Technological advances are envisioned for the future. E.g.: customisation, enhanced technology characteristics and improved delivery mechanisms.	✓	✓
	13. FBCBI demonstrated a renewed technology focus by changing its name to BITS.		✓
	14. BI customers are concerned about future technology solution's features and functions.		✓
	15. BI providers are concerned with collecting and managing greater volumes of data, expanding their BI target market (audience) and improving delivery mechanisms.		✓
	16. BI providers wish to reduce time spent on data processing to be able to spend more time developing and automating BI technologies.		✓
	17. Frustration is experienced due to customer "meddling", but there is a desire to close the BI customer-provider gap through, e.g.: conversations in business jargon; a new type of BI resource (with expertise in business and IT); longer support periods to equip user.		✓
	18. A return to focus on decision-making is expected – enabled by analytics.	✓	
	19. Data (enabled by technology) is the new driver of BI.	✓	
	20. Collaboration and interconnected solutions receive attention.	✓	✓

E	Worldview characteristic	L	C
Axiology	21. Value is measured by the BI provider at the point of exchange of a tangible BI output.		✔
	22. BI's purpose is seen to be "inform decision-making" but value is measured according to cost, quality and schedule measures on the BI IT solution and implementation thereof. Furthermore, BI is aligned with marketing and banking strategies that target and acquire customers and markets.	✔	✔
	23. BI vendors don't typically receive feedback on use or performance of their BI solutions.		✔
	24. Fortune Bank targets customers, selling and marketing to them and optimises its processes to do this as efficiently as possible.		✔
	25. BI vendors promote and value intangible benefits or features of IT solutions, assuming "customer value" is the output of their software development process that takes place upon implementation (exchange) and can be defined unilaterally by vendor, upfront.		✔
	26. BI values the BI environment and applications (neglecting use of BI).	✔	✔
	27. BI's purposes are largely intangible, subjective and hard to measure (ROI).	✔	✔
	28. BI is a top priority/value. BI is for all levels of the organisation ("everyone").	✔	✔
Praxeology	29. Various strategies, CSFs, frameworks, etc. (grounded in IT) are provided by BI providers to manage, govern and guide the BI environment and its technologies.	✔	✔
	30. BI's guiding principles are defined and implemented unilaterally by the BI provider, without interference or influence from the BI customer.		✔
	31. BI consists of a linear series of activities in a software development process or a data warehousing process, guided by relevant IT/data methodologies.		✔
	32. The decision-making process is referred to, but not described. Focus is on delivery of BI technology solution and/or product and the activities to do this.		✔
	33. BI customers don't typically participate in BI solution development unless required to by BI provider e.g. for requirements gathering, UAT, training.		✔
	34. Agile development approaches are strived towards to increase collaboration within BI departments (i.e. between data, development, analyst teams) and to increase the BI department's productivity and deliver BI requirements at faster response rates.		✔
Epistemology	35. BI is informed by various disciplines, Science and business functions, but focuses on BI's IT and IS aspects, causing an imbalance.	✔	✔
	36. BI providers (BI vendors and Fortune Bank BI departments) typically have a IT, Engineering and Science backgrounds while BI customers (excluding Fortune Bank BI departments) typically have Business, Finance and Accounting backgrounds.		✔
	37. A limitation is identified in the gap between BI customer and provider competencies.	✔	✔

E	Worldview characteristic	L	C
	38. When raising challenges, BI customers and providers restrictively focus on their lack of knowledge of the other's expertise rather than on sharing their expertise.		✔
	39. BI flows across the organisation, irrespective of business function. BI providers and customers restrictively think of BI in terms of function, creating gaps where BI overlaps between business, BI and technical realm – e.g. business data ill-understood by all.		✔

6. BI's challenges: in the context of the dominant worldview that emerges for BI

The previous chapter ends with a summary of the prevailing challenges experienced in BI according to literature and case study findings, stating that these will be discussed at a more conceptual level in this chapter. This chapter examines BI conceptually to understand how it is perceived, identifying common characteristics that make up a dominant worldview that is held of BI according to theory and practice. It is now necessary to examine whether there is a relationship between BI's prevailing challenges and this dominant worldview. Challenges are referenced according to the headings and coded references provided in the consolidated list of literature and case study challenges for BI in Chapter 4 Part 2 (e.g. as U1, A1, etc. and the relevant heading – summarised) as a means to maintain continuity. They are, however, now reflected at a higher level to facilitate a discussion in the context of BI's worldview. The four dominant perceptions that characterise BI's ontology are used to frame this discussion and provide structure for Table 17. Consider the examples in the next paragraphs and further examples below in Table 17.

Firstly, where BI is perceived narrowly as a process (i.e. that it is only a process or that it is predominantly a process), it is likely that there will be a strong focus on processing as much data as technology will allow for (e.g. in terms of processing, cleansing, storage and distribution capabilities). This results in reduced time for the BI provider to spend on analysis and insight activities. It potentially also overwhelms the BI customer, as when great volumes of data are delivered, many busy executives or other types of decision-makers do not know where to start – or do not have the time or inclination to identify what is important and relevant to them over and above their normal workloads.

Another example is where BI is perceived narrowly as a technology, it may be construed that simply by implementing a "quick and easy" technology solution that BI benefits will materialise. This may result in the same type of scenario that took place at Fortune Bank on the CMIS Project. FBCBI delivered data marts and a front-end for CMIS BI users, but the solution was not used. As the success of the CMIS Project was measured on implementation of the technology according to being delivered on time (i.e. on the technology), at the right quality and within budget, the sponsor did not understand why the technology he invested in had not resulted in BI benefits. In this case, viewing BI narrowly as a technology caused the sponsor to overlook communication with the end users and to neglect to ensure that the end users were involved throughout development so that they understood the data and how to use it upon delivery.

Even where BI is understood as a combination of the perceptions that emerge – i.e. where it is understood to be a process, product, capability and the underlying technology that enables or results in these – challenges are evident. For example, where it is believed that the BI provider is the BI department that has the IS, data and IT capabilities to develop BI applications and perform the BI process – to the exclusion of participation from the BI customer.

Further examples are provided in Table 17, where BI's challenges are framed in terms of scenarios such as these, linked to the detailed challenges raised in Part 2 of this chapter and also linked to the worldview characteristic that is seen to underlie or contribute towards manifestation of the challenge. Chapter 5, which follows, examines BI's worldview to identify G-D Logic characteristics in this worldview and how S-D Logic can be applied to explore new avenues to overcome these challenges.

Table 17: BI's challenges in the context of BI's dominant worldview

Key:
WV ref – reference to worldview characteristic numbered in Table 16 above
Challenge reference – Reference to consolidated list in Chapter 4, Part 2

WV ref	Challenges associated with BI's worldview (per perception identified in BI's ontology)	Challenge reference
	BI is perceived as a TECHNOLOGY	
1-5, 9-11, 13, 14, 22, 25, 26, 29, 31, 32, 35, 36	BI is an ill-defined discipline operating in an ambiguous environment. This, and failure to consistently recognise or address this, results in misalignment and confusion. BI is then largely defined by BI providers. They typically operate from a systems and engineering-centric worldview focused primarily on BI as an IS (or data/IT solution). As a result, a dominant focus on BI technology and its features, processes, etc. overshadows other components and resources that are also needed in BI, e.g. ability to use data/IT solution, relationships, etc.	CSU1, CSI3, A1, CSS1, CSS2, 02, CS02, CS03 *(Use, integration, alignment, sponsor, ambiguity)*
1, 3, 4, 15, 16, 18, 24-26, 28, 32	Where there is a focus on BI as only hardware and software, BI providers tend to aim to increase their installed user base - "BI to the masses" (failing to customise for specific user needs). Integration and data are largely overlooked. BI's low use is overlooked as use is measured according to volume of software applications and licences sold/installed and/or on successful implementation of the hardware/software or successful completion of data processing.	U8, U10, CSU2, I1, CSA1 *(Use, integration, alignment)*

WV ref	Challenges associated with BI's worldview (per perception identified in BI's ontology)	Challenge reference
	BI is perceived as a PROCESS	
1, 4, 5, 6, 7, 15, 25, 31, 32	There is a dominant focus on the organisation's internal data processing (enabled by technology) and BI IT development activities, performed by the BI provider. This is compounded when BI customers demand more data or "all the data" but don't even use what is provided. This results in: separation of BI provider and BI customer; data overload; and an unproductive and inefficient spend of BI provider's time where insight and analysis activities are neglected. This can also be seen as an effect of the technology perception.	U1, U9, CSU1, D1, CSA6, CSA3, CSP2 *(Use, data, alignment, personnel)*
1, 17, 21, 30, 31, 33, 37, 39	Costs associated with producing a prototype of a BI solution are regarded as high. However, the alternative is a long wait: BI is only usable when the infrastructure is complete and interfaces successfully with existing infrastructure. This leads to: involvement of the BI customer at a late stage after development processes when requirements are likely to have changed (e.g. new data sources and requirements have emerged); costly changes often involving rework; and BI customer frustration, distrust and lack of empathy for BI 's processes - often resulting in interim "rebel" solutions or independent dealings with BI vendors leading to further BI provider/customer separation.	U6, U7, I2, I3, CSD1, A1, A2, CSA2, CSA3 *(Use, data, alignment)*
	BI is perceived as a PRODUCT	
1, 3, 4, 18, 25, 26, 32, 39	BI use is low as BI is often misunderstood (often by sponsors) to be a non-complex, easy feat solved by simply implementing a BI IT tool/product; human decision-making processes are neglected in favour of implementing the tool/product; training focuses on the tool/product and not underlying data or how to adapt to making decisions using BI or ask the right questions	U2, U3, U4, CSS1, CSS2, S1 *(Use, sponsor)*
1, 3, 4, 14, 17, 21, 25, 26, 29, 31, 32, 36-39	More emphasis is placed on the actual BI product or output and its features than on integration with underlying data and business processes or alignment with the organisation's competences. Integration with organisational infrastructure (e.g. SOA, EA, information security) is not considered or conducted properly. BI personnel are recruited based on their knowledge of BI products (e.g. ETL or development products) but lack proficiency in the business environment, cannot communicate with the business as they use IT jargon and don't have ability to perform analysis or insight activities. Business representatives allocated to BI projects to fill these	U4, CSD3, CSD4, I1, I2, I3, CSI2, CSI3, A1, CSA3, P1, P2, CSP2, CSP3 *(Use, data, integration, alignment, personnel)*

WV ref	Challenges associated with BI's worldview (per perception identified in BI's ontology)	Challenge reference
	gaps often also do not have adequate knowledge of the organisation's data or IT infrastructure.	
	BI is perceived as a CAPABILITY	
1, 3, 6, 7, 10, 14, 25, 26, 30-33, 35-38	The BI capability is largely seen as an isolated function performed by a group of IS (or data or IT) specialists whereby a solution is delivered to the business and the job is thereby completed. The fact that BI provides ongoing support after delivering the BI solution tends to be forgotten, as well as the role of the business and other role players who need to participate and then support and use the BI solution after implementation. The organisation's environment and context are also largely forgotten as the focus is on technical capabilities. The assumption is made that if the BI that is delivered is user friendly, the BI customer will use it and knows how to adapt to making decisions based on it and knows how to ask the right questions and use it in context of the organisation's environment. The BI provider experiences difficulties involving the right people and groups, motivating them to participate and neglects to build a BI capability in the organisation, aside from developing BI and processing data.	CSD2, CSD3, CSD4, I2,CSI1, CSI2, CSI3, A1, CSA3, CSA4, P2, CSP1, CSP3 *(Data, integration, alignment, personnel)*
1, 3, 4, 6, 14, 17, 19, 21-23, 25, 26, 32, 37	When BI feasibility assessments are done, they tend to focus on the BI IT product's capabilities or on gathering and processing "all the data" rather than on the organisation's core competences . BI investments are then typically linked to intangible benefits that BI vendors promote and BI success is measured on the IS project success or successful processing of data. It may then be difficult for BI users to adapt to use the BI solution and make time for it as it's not embedded in their specific business processes. It also becomes difficult to measure ROI.	U9, CSU1, D1, D2, CSD1, CSA3, CSA6, CSP3, S1, CSS1, CSS2, 01, CS01 *(Use, data, alignment, personnel, sponsor, ROI)*

7. Conclusion

This part of the case study chapter identifies characteristics of BI's worldview, using the worldview framework identified and discussed in the literature study. In doing so, a common or dominant worldview emerges for BI, which reflects many similar findings to those discovered in the literature study. New insights are also identified.

After discussing each element of BI's worldview and identifying key characteristics, a common worldview is constructed, using the viewpoints of the case study respondents and complementing these with findings from the literature study. The challenges identified in the previous part of this chapter are then compared to the worldview characteristics and the relationship between these is discussed. A correlation is established where the common dominant worldview that emerges for BI can be seen to be associated with the challenges that are experienced.

The next chapter examines this dominant worldview and its associated challenges through G-D and S-D Logic lenses and proposes a shift to S-D Logic based thereon.

CHAPTER 5: A CONCEPTUAL SHIFT FROM G-D TO S-D LOGIC FOR BI

Identification of G-D Logic in BI's dominant worldview and prevailing challenges, followed by a proposal for a shift to S-D Logic

1. Introduction

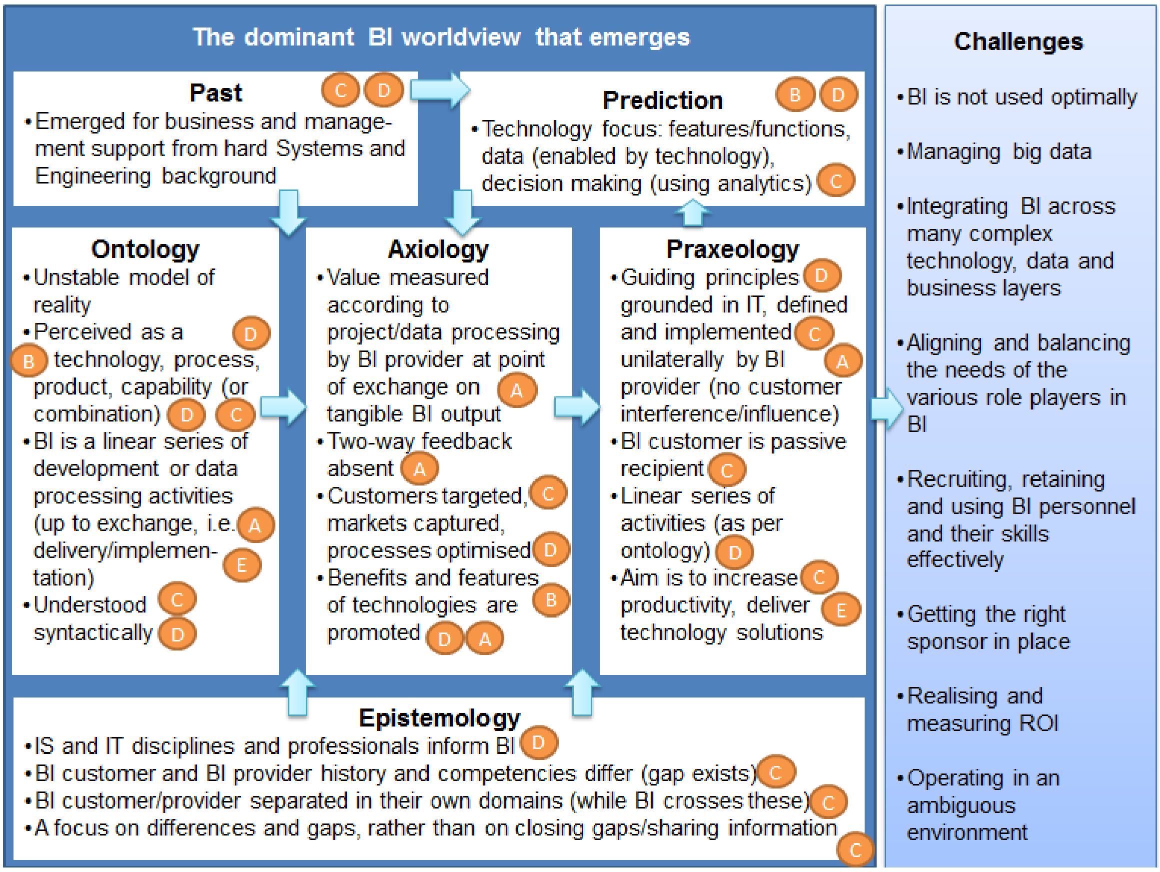
The previous chapter establishes the relationship between the dominant worldview of BI and its prevailing challenges. Continuing with this stream of thought, this chapter identifies the relationship between BI's dominant worldview, its prevailing challenges *and G-D Logic*, thereafter suggesting a shift from G-D to S-D Logic. Representing the culmination of this thesis' research, references are made to both literature and case study findings presented in this thesis.

This chapter starts by examining the dominant BI worldview identified in theory and practice, as reflected in the worldview summary in the last part of Chapter 4, through a G-D Logic lens. In doing so, it determines that BI's worldview is grounded in G-D Logic and that this contributes to the prevalence of BI's challenges – which are also examined in the context of G-D Logic. It then argues for a shift to S-D Logic, discussing a conceptual shift from G-D to S-D Logic for BI and how this presents new avenues to overcome BI's prevailing challenges. It explores conceptual approaches to apply S-D Logic to BI as a foundation for a future pragmatic shift to S-D Logic and future research. Finally, it examines the potential implications of such a shift, not only in terms of the potential new opportunities to overcome BI's challenges, but also in terms of potential complications, implications and challenges that may arise from such a shift.

2. BI's dominant worldview grounded in G-D Logic

By analysing BI's dominant worldview through S-D and G-D Logic lenses, the G-D Logic inherent in many of BI's worldview characteristics becomes apparent. As an example, consider the BI worldview characteristic "BI is a linear series of development or data processing activities (up to exchange, i.e. delivery/implementation)" which reflects the G-D Logic characteristics whereby value is perceived in exchange rather than use (Gummesson, 1998:247) and a focus on means, production and producer (Gummesson, 1995:250; Normann, 2001:99; Vargo and Lusch, 2006:51). In fact, analysis through a G-D Logic lens reveals that each BI worldview element demonstrates inherent G-D Logic.

This is reflected in Figure 17 (below) and in detail per worldview characteristic in Appendix H. The G-D Logic characteristics that are identified are based on application of the available G-D and S-D Logic literature to the dominant BI worldview identified in theory and practice (at the end of Chapter 4). G-D Logic characteristics are explained below, in Sections 4.1 to 4.5 and not directly within this section to facilitate a streamlined discussion and comparison with the shift that is recommended to S-D Logic. It is recognised that there are many ways to categorise the G-D Logic characteristics identified in the dominant BI worldview and its prevailing challenges. The categories of G-D Logic characteristics provided in Figure 17 reflect just one such way. These categories are used because analysis of the case study data reveals that they provide thorough yet concise categories for analysis of BI's worldview and challenges. How this inherent G-D Logic identified in BI's worldview contributes to BI's prevailing challenges is discussed next in Section 3.



Key:

Reference	G-D Logic characteristic	Link to worldview characteristic(s)
A	Value in exchange	6, 21-23, 25, 26, 32
B	Compete through goods and their features	3, 4, 5, 12-14, 16, 18-22, 25
C	Separation of BI customer and BI provider	3, 4, 6, 7, 9-11, 14-17, 21, 29, 30, 33, 35-39
D	Focus on means, production and producer A linear production line of activities performed from the BI provider's viewpoint Goods as the output – value determined by BI provider Focus on technology	1-7, 9-13, 15, 16, 19, 21, 22, 24-26, 28-36
E	"Services" in the context of G-D Logic	N/A

Figure 17: BI's dominant worldview reflecting challenges and G-D Logic characteristics

Based on the prevalence of G-D Logic characteristics in each of BI's worldview elements, the statement can be made that BI's dominant worldview is fundamentally grounded in G-D Logic. It may, however, be interpreted that there are some characteristics that emerge in BI's prediction worldview element (described in detail in the previous chapter) that subtly reflect S-D Logic. For instance, the prediction of trends of customisation and collaboration, a return to focus on decision-making (i.e. use of BI) and the desire to close the customer-provider gap. While these predictions reflect that BI may be inclined to demonstrate characteristics of S-D Logic in the future, they also focus on technology (production, means, provider-viewpoint) and reflect BI provider frustration due to customer "meddling" – which can be seen as G-D Logic characteristics. It is therefore believed that BI is firmly grounded in G-D Logic, despite these hints of potential for S-D Logic in the future. A recommendation for future research is, however, to examine BI in terms of whether examples of S-D Logic characteristics emerge in other environments or under other conditions, how they can be enhanced and also whether G-D and S-D Logic characteristics may co-exist within a group or individual's worldview without creating separate factions or other types of tensions.

3. How the G-D Logic in BI's worldview contributes to the prevalence of BI challenges

Challenges raised in the literature and case study are summarised in Table 12 in Chapter 4 Part 2. They are then reflected again in Table 17 in Chapter 4 Part 3 where they are described, consolidated and contextualised in terms of BI's dominant worldview, specifically in terms of BI's dominant perceptions. The latter establishes that BI's dominant worldview contributes towards the occurrence of its prevailing challenges. Furthermore, as BI's worldview is inherently grounded in G-D Logic (discussed above in Section 2), it should follow that this inherent G-D Logic contributes to the prevalence of BI's challenges.

This section now continues this reasoning. It examines BI's prevalent challenges, at the same consolidated and descriptive level provided in Table 17 in Chapter 4 Part 3, identifying examples of G-D Logic characteristics in BI's worldview that contribute towards the occurrence of these challenges. This is reflected below in Table 17, per worldview perception (technology, process, etc.), alongside examples of G-D Logic that are evident in BI's worldview. Reference is made to G-D Logic characteristics A to E, listed above in the key for Figure 17.

Appendix H supports this by reflecting G-D Logic examples at the more detailed level originally provided in Table 12 in Chapter 4 Part 2. Examples of G-D Logic characteristics can be seen for all but one of these detailed challenges. This is "specialist personnel are high in demand but short in supply" (P1), which is a fairly generic challenge. While the prevalence of G-D Logic characteristics in BI's challenges indicates that there is a relationship between G-D Logic and BI's challenges, it cannot be said that G-D Logic is the sole cause of these challenges. For example, complexities resulting from the data, technology and business layers (I2) or organisation-wide issues (I3) may result from an array of technical, social or managerial reasons. Nonetheless, the pervasiveness of G-D Logic examples in both the dominant BI worldview and BI's challenges points towards an underlying G-D Logic that contributes notably towards the occurrence of these challenges and the potential for a shift from G-D to S-D Logic to provide a significant new approach to assist BI to overcome these challenges.

Table 18: Challenges associated with BI's dominant worldview

Key:

A: Value-in-exchange

B: Compete through goods and their features

C: Separation of BI customer and BI provider

D: Focus on means, production and producer

BI challenge	G-D Logic characteristic in BI worldview
BI is perceived as a TECHNOLOGY	
BI is an ill-defined discipline operating in an ambiguous environment. This, and failure to consistently recognise or address this, results in misalignment and confusion. BI is then largely defined by BI providers, typically operating from a systems and engineering-centric worldview focused primarily on BI as an IS (or data/IT solution). A dominant focus on BI technology and its features, processes, etc. then overshadows other components and resources that are also needed in BI, e.g. ability to use data/IT solution, relationships, etc.	• BI is defined and scoped from the provider's point of view, as linear series of production activities (Edvardsson *et al*., 2011:540; Vargo and Lusch, 2004a:5). **D** • A focus on the means, production and producer (Gummesson, 1995:250; Normann, 2001:99; Vargo and Lusch, 2006:51). **D** • The full service flow is not understood. **E** • A focus on BI technology and its features (goods and their features) (Gummesson, 1995:250; Normann, 2001:99; Vargo and Lusch, 2006:51). **B, D**
Where there is a focus on BI as only hardware and software, BI providers tend to aim to increase their installed user base - "BI to the masses" (failing to customise for specific user needs). Integration and data are largely overlooked. BI's low use is overlooked as use is measured according to volume of software applications and licences sold/installed and/or on successful implementation of the hardware/software or successful completion of data processing.	• A focus on BI technology and its features (as above). **B, D** • Producers typically perceive that they "capture the market" by selling more outputs than their competitors and, through the sale of goods (e.g. licences), making a profit (Vargo and Lusch, 2004a:5). **B** • Value-in-exchange is perceived rather than value-in-use (Gummesson, 1998:247; Nam and Lee, 2010:1764; 6:37). **A**
BI is perceived as a PROCESS	
There is a dominant focus on the organisation's internal data processing (enabled by technology) and BI IT development activities, performed by the BI provider. This is compounded when BI customers demand more data or "all the data" but	• A focus on the means, production and producer (as above). **D** • Most of BI's time and effort are spent on collecting/processing operand resources (e.g. data). These represent discovery ra-

BI challenge	G-D Logic characteristic in BI worldview
don't even use what is provided. This results in: separation of BI provider and BI customer; data overload; and an unproductive and inefficient spend of BI provider's time where insight and analysis activities are neglected. This can also be seen as an effect of the technology perception.	ther than use activities in terms of the BI value coin (based on Spohrer, 2008a:417). **D** • Separation of customer and provider leads to loss of knowledge of each other's environments and context (Chesbrough and Spohrer, 2006). **C, E**
Costs associated with producing a prototype of a BI solution are regarded as high. However, the alternative is a long wait: BI is only usable when the infrastructure is complete and interfaces successfully with existing infrastructure. This leads to: involvement of the BI customer at a late stage after development processes when requirements are likely to have changed (e.g. new data sources and requirements have emerged); costly changes often involving rework; and BI customer frustration, distrust and lack of empathy for BI 's processes - often resulting in interim "rebel" solutions or independent dealings with BI vendors leading to further BI provider/customer separation.	• Co-creation of value through use of a prototype as an operand resource (as input to value co-creation and source of competitive advantage (FP 4)) is overlooked in favour of completing the BI production process quickly, which is seen to be more cost effective without customer interference (Lusch, *et al.*, 2008:6; Vargo and Lusch, 2009:7). **B, C, D** • Value can be determined by the provider alone (Grönroos, 2000:24-25; Gummesson, 1998:247). The producer is able to make assumptions about the consumer's environment and how they will use/benefit from the BI product (Chesbrough and Spohrer, 2006). **D** • Separation of customer and provider (as above). **C**
BI is perceived as a PRODUCT	
BI use is low as BI is often misunderstood (often by sponsors) to be a non-complex, easy feat solved by simply implementing a BI IT tool/product; human decision-making processes are neglected in favour of implementing the tool/product; training focuses on the tool/product and not underlying data or how to adapt to making decisions using BI or ask the right questions.	• Focus is not on competence and skill to co-create an operant resource, but rather on production (Vargo and Lusch, 2006:18). **D** • Production of a product is seen as the end of the value chain (Vargo and Lusch, 2008c:27). **B, D** • A focus on BI technology and its features (as above). **B, D**
More emphasis is placed on the actual BI product or output and its features than on integration with underlying data and business processes or	• Focus is not on competence and skill to co-create an operant resource, but rather on production (as above). **D, E**

BI challenge	G-D Logic characteristic in BI worldview
alignment with the organisation's competences. Integration with organisational infrastructure (e.g. SOA, EA, information security) is not considered or conducted properly. BI personnel are recruited based on their knowledge of BI products (e.g. ETL or development products) but lack proficiency in the business environment, cannot communicate with the business as they use IT jargon and don't have ability to perform analysis or insight activities. Business representatives allocated to BI projects to fill these gaps often also do not have adequate knowledge of the organisation's data or IT infrastructure.	• Technology is the provider of the service, entities such as people, relationships, etc. are not adequately acknowledged (Vargo and Lusch, 2005:1). **D, E** • A focus on BI technology and its features (goods and their features) (as above). **D** • BI technology is not seen as a transport mechanism of competence (Michel, *et al* , 2008:152; Spohrer *et al*., 2008:10). It is seen as paramount to other entities in the BI service flow. **D, E** • Separation of customer and provider (as above). **C**
BI is perceived as a CAPABILITY	
The BI capability is largely seen as an isolated function performed by a group of IS (or data or IT) specialists whereby a solution is delivered to the business and the job is thereby completed. The fact that BI provides ongoing support after delivering the BI solution tends to be forgotten, as well as the role of the business and other role players who need to participate and then support and use the BI solution after implementation. The organisation's environment and context are also largely forgotten as the focus is on technical capabilities. The assumption is made that if the BI that is delivered is user friendly, the BI customer will use it and knows how to adapt to making decisions based on it and knows how to ask the right questions and use it in context of the organisation's environment. The BI provider experiences difficulties involving the right people and groups, motivating them to participate and neglects to build a BI capability in the organisation, aside from developing BI and processing data.	• Value can be determined by the provider alone (as above). The producer is able to make assumptions about the consumer's environment and how they will use/benefit from the BI product (as above). **C, D, E** • Value is not personal, experiential, contextual or meaning-laden (Vargo, 2009a). **A** • Customer and provider are separated (as above) and do not switch roles (Vargo and Lusch, 2008c:27). BI customers are seen as passive recipients and, where they get involved, to "interfere" (Lusch, *et al*., 2008b:6). This separation means that BI customer and provider lose out on contextual knowledge and understanding of each other's environments (Chesbrough and Spohrer, 2006:37). **C, E**
When BI feasibility assessments are done, they tend to focus on the BI IT product's capabilities or on gathering and processing "all the data" rather than on the organisation's core competences . BI	• Producer determines the value upfront (Grönroos, 2000:24-25). **D** • Value can be embedded in goods (Gummesson, 1998:247; Lusch and Var-

BI challenge	G-D Logic characteristic in BI worldview
investments are then typically linked to intangible benefits that BI vendors promote and BI success is measured on the IS project success or successful processing of data. It may then be difficult for BI users to adapt to use the BI solution and make time for it as it's not embedded in their specific business processes. It also becomes difficult to measure ROI.	go, 2006:19) – and is measured according to goods' intangible features. **A, B**

4. A conceptual shift from G-D to S-D Logic in terms of BI's dominant worldview

By shifting BI's worldview to a foundation of S-D rather than G-D Logic, it may be possible to change BI's current actions and behaviour, potentially reducing the prevalence of its challenges and failures and augmenting the successes and benefits it is acclaimed for.

The shift from G-D to S-D Logic is described comprehensively in academic literature in terms of the conceptual shift that is proposed for exchange. However, to the researcher's knowledge, there is no literature available that describes the shift specifically from a BI or even a BI-related point of view. By describing the changes needed for BI to shift to an S-D Logic informed worldview, this section provides research that can potentially start to narrow this gap in the literature.

In terms of the literature on the conceptual shift proposed for exchange, an article from Vargo and Lusch (2005:89-95) reflects one of the earlier contributions on this topic. This is followed by further contributions by authors such as Akaka (2007:22), Michel *et al.* (2008:152-153), Nam and Lee (2010:1765) and again by Vargo (2007:13, 29; 2009:376), Vargo *et al.* (2008:148) as well as in recent S-D Logic presentations, e.g. Lusch and Vargo, 2012:2-3; Lusch et al., 2012:15, 18, 19). Nam and Lee (2010:1765), for example, provide a summarised comparison of G-D *versus* S-D Logic perspectives. While they (*ibid*) describe the shift fairly generically for exchange, Akaka (2007:22) describes the shift specifically from the perspective of value creation. She (*ibid*) describes the shift in: the value driver (from value-in-exchange to value-in-use); the role of the customer (from "using up"/"destroying" value to co-creating value); the creator of value (from the organisation often with supply chain input to the organisation with network partners and customers); etc.

The next sections describe the shift from G-D to S-D Logic specifically from a BI perspective, integrating references to the S-D Logic FPs as relevant, summarised in Table 19 below. Vargo (2012a) advocates a focus on a few of the S-D Logic FPs rather than all of them when applying S-D Logic to BI. However, after attempting to do this by focusing only on certain FPs, the researcher reached the conclusion that, in BI's particular case, a broader foundation is first needed whereby

S-D Logic is applied to BI at a conceptual level. This resulted from the absence of an S-D Logic approach to BI combined with the findings that, firstly, each S-D Logic FP can be related to BI and secondly, each shift proposed for BI is supported by various of the S-D Logic FPs. Table 19 now references the S-D Logic FPs alongside the G-D to S-D Logic shift that is proposed, showing all ten FPs are associated with the shifts that are proposed.

Table 19: Summary of the G-D to S-D Logic shift for BI, based on G-D Logic characteristics identified in BI's worldview and challenges

Reference	G-D to S-D Logic shift	Associated S-D Logic FP
A	Value-in-exchange to value-in-use	6, 7, 10
B	Compete through goods and their features to competition through operant resources embedded in value networks	3, 4, 7
C	Separation of BI customer and BI provider to a customer-oriented and relationship focus	2, 4, 6, 7, 8
D	Focus on means, production and producer to a focus on both production and use activities and role players	9
E	From "services" to "service" and BI as a service flow informed by S-D Logic	1, 2, 5

4.1 A shift from value-in-exchange to value-in-use (A)

4.1.1 The G-D Logic evident in BI's worldview: value-in-exchange

G-D Logic typically sees value in the linear series of activities of manufacturing and distributing tangible goods, designed and built by a producer, with a consumer in mind (Edvardsson *et al.*, 2011:540; Vargo and Lusch, 2004a:5). The point of exchange is where value is seen to occur, rather than the point of use, and is referred to as "value-in-exchange" (Chesbrough and Spohrer, 2006:37; Nam and Lee, 2010:1764). As a result, most focus in terms of time and effort is spent on the production and distribution activities that the provider performs leading up to the point at which value is perceived (exchange) and measured by the provider according what he/she unilaterally determines to be valuable upfront (*ibid*). Even communication takes place from the viewpoint of the provider: through "promotion" by the provider, pushed to the customer, instead of through bi-directional dialogue between customer and provider (Vargo, 2009a).

BI's current dominant worldview perceives value at the point of exchange, focusing on the technology or product exchanged and the process of producing this. Characteristics of value-in-exchange are seen in BI's:

- Ontology: BI is understood as a linear series of development or data processing activities up to the point of exchange (e.g. implementation and/or delivery).
- Axiology: Value is measured by the provider at the point of exchange of a tangible BI output. Two-way feedback is largely absent: it is not typically given to BI vendors on use of their BI

solutions after exchange, unless as a complaint or request for technical support. BI vendors are seen to promote and value intangible benefits or features of IT solutions, assuming "customer value" is the output of their software development process that takes place upon implementation (exchange) and can be defined unilaterally by the BI vendor, upfront.

- Praxeology: Although the decision-making process is referred to, focus is on delivery of a BI technology solution which is exchanged for a monetary cost (seen as value).

4.1.2 The shift to S-D Logic: value-in-use

A shift to value-in-use is proposed as, in focusing dominantly on exchange, BI loses sight of the decision-making and resultant action (i.e. use) that it is actually intended for. BI then focuses inefficiently on exchange and production activities, losing sight of other components involved in realising value-in-use.

Consider the following examples from the literature that emphasise that BI is valuable when acted upon. Ackerman (2005:217) emphasises that BI must be "actionable" and Brown (2005), Lönnqvist and Pirttimäki (2006) and Popovič *et al.* (2010:5) recognise that BI has no value of its own: value is only created by acting on the intelligence delivered or when improvements are created in the organisation. Miller (2000) draws attention to the human role in BI by explaining how information that has been driven to a decision point and can be acted on is valuable and is what distinguishes a business leader. In the same vein, English (2005) identifies the importance of the human role in BI, stating that BI cannot exist without people to interpret meaning and significance of information and to act on knowledge that is gained. Another example is from Williams and Williams (2003:13) who recognise the dominant focus on BI implementation – recommending that, to realise BI value, focus is shifted to post-implementation activities.

Although the literature emphasises that BI is valuable when acted upon, to the knowledge of the researcher, existing BI literature unfortunately does not clearly highlight the need to move beyond traditional IS post-implementation support activities to the actual use of BI. It also does not advocate that use should be the focus from the outset of a BI initiative or highlight the dependency on the BI customer to co-create value through use. For instance, although Williams and Williams (2003:13) indicate that post-implementation activities are the domain of business Subject Matter Experts (SMEs), their view of these activities narrowly focuses on process engineering and change management activities involving integrating BI applications into the organisation. This highlights the inappropriate focus that BI currently has on the technology and the product at the cost of focusing on decision-making based on intelligence and insight (i.e. use).

The shift from value-in-exchange to value-in-use relates to three of S-D Logic's FPs – 6, 7 and 10 as formulated by Vargo and Lusch (2008c:25-38) – discussed in the following paragraphs. In addition, what is also relevant to this shift is that Vargo (2012a) reasons: if value is placed on exchange, then value-in-use is neglected, whereas if value is placed on use, then it is more likely that value is also achieved in exchange.

FP 6 “the customer is always co-creator of value” highlights the customer’s interdependent relationship with other Service System entities and their joint role in realising value-in-use (Spohrer and Maglio, 2008). The lifecycle of a BI product does not end at the point of exchange, implementation or even post-implementation support, it continues through use by the customer. This entails a shift from the current focus on data and technology to a focus on the customer and decision-making. While BI’s dominant worldview already reflects characteristics of user-enablement and extended support, S-D Logic sees the BI lifecycle as a service flow – extending beyond support into use.

The BI provider must ascertain whether the customer is able to assist in value co-creation and the BI customer must take an active role in value creation. FP 7 “the organisation cannot deliver value, but can only offer value propositions” highlights that value is not delivered by the provider alone, the BI provider cannot impose a BI solution in the world of a passive user/decision-maker with the aim of this being valuable to them. The provider can only propose that what is delivered could offer value if it is acted on by the customer. This makes the BI provider responsible to learn the BI customer environment – including the customer organisation’s data, culture, architectures, etc. – and link compelling value propositions to the customer’s competences (i.e. where the customer shows potential ability to co-create value). A potential opportunity in terms of this is if BI customers link their BI investment and BI providers link their potential earnings to the value proposition, BI ROI may become more tangible and measurable than is currently the case (where it is typically linked to intangible technology features (Williams and Williams, 2003:13)). A savvy BI vendor will see the opportunity in creating a win-win value proposition where they can potentially link earnings to the organisation’s revenue generated when realising the value proposition. This has the potential to create a long-term revenue stream for the vendor that is worth more than once-off BI technology implementation fees or even perpetual software licence fees.

FP 10 “value is always uniquely and phenomenologically determined by the beneficiary” indicates that value is created in use by the customer and, based on this use – which is personal, experiential, contextual and meaning-laden – the customer determines whether or not the service is valuable (Vargo, 2009a). BI literature already supports this by, firstly, recognising that BI value is context, format, decision-maker, time, etc. dependent (Coulonval *et al.*, 2010; Ghoshal and Kim, 1986; Herschel, 2008a). Secondly, by recognising that knowledge, insights and intelligence that stem from BI have no limited or fixed capacity: the generation of a new idea may have a great impact or none at all (Huggins and Izushi, 2007:2). Therefore, while it is important for BI customers and providers to identify what is valued, so that they can focus on and produce this (Fallis and Whitcomb, 2009:176), they must also recognise that this value is subjectively determined by the customer.

4.2 A shift from the view that competitive advantage is gained through value embedded in goods and their features to competitive advantage gained through operant resources embedded in value networks (B)

4.2.1 The G-D Logic evident in BI's worldview: competing through the perception of value embedded in goods/features

Goods are seen as the end of the production line and value chain (Vargo and Lusch, 2008c:27) and, along with their features, are focused on in terms of G-D Logic (Gummesson, 1995:250; Michel *et al*., 2008:152-153; Normann, 2001:99; Vargo and Lusch, 2006:51). They are seen to provide a sustainable competitive advantage (Quinn, *et al*., 1990:60) where the provider can unilaterally determine and embed value in goods and their features (Chesbrough and Spohrer, 2006:37; Gummesson,1998:247; Grönroos, 2000:24-25). As a result, value is not personal, experiential, contextual and meaning-laden (Vargo, 2009b:375). The focus is not on the competence and skill that are needed to co-create an operant resource, but rather on production (Vargo and Lusch, 2006:18). The producer is typically seen to capture the market if they manage to outdo their competitors in terms of selling more outputs or units, and through the sale of goods, makes a profit (Lusch, *et al*., 2008:6; Vargo and Lusch, 2004a:5).

BI's current worldview sees that goods and their features provide a way to compete. This is evidenced by, amongst other things, the "flashy" feature-laden BI applications (Pendse, 2009) and over-emphasis of intangible BI benefits such as performance, agility and collaboration (Williams and Williams, 2003:13). Furthermore, this perception comes across in the BI worldview in its:

- Ontology: BI is defined as a technology by BI providers (specifically the BI vendors) more than by BI customers, potentially highlighting BI providers' focus on technology as a means to compete or participate in BI exchanges.
- Prediction: Technological advances are envisioned by BI providers and BI customers. BI customers raise concerns about future ease-of-use of technology features and BI providers about being able to capture more of the market by extending their installed user base.
- Axiology: Value is measured on a tangible product according to measures such as cost, quality and schedule (typical IS project measures that measure the IS solution (product) and its features) and BI vendors promote and value intangible benefits or features of IT solutions. The BI customer links their BI investment to the intangible benefits – e.g. performance, agility (Williams and Williams, 2003:13) promoted by the vendor.

4.2.2 The shift to S-D Logic: competing through operant resources embedded in value networks

According to S-D Logic, where the provider's knowledge and capabilities transferred with the BI technology are easily transferred, copied or combined, the ability to compete is reduced: there is much room for quick imitation (Quinn *et al.*, 1990:60). Conversely, by embedding knowledge and skills in resources that are difficult to copy (e.g. operant resources), the ability to compete is increased - as per S-D Logic's FP 4 (Vargo and Lusch, 2008c:25-38). Competitive advantage can be increased even more if knowledge is not just embedded in goods or techniques, but is embedded in a value network or value chain. Even where tangible BI products are exchanged, service takes place: BI products are just distribution mechanisms for service provision, as per FP 3 (Vargo and Lusch, 2008b:7). Therefore, the shift to the view that competitive advantage is gained through service whereby operant resources embedded in value networks is advocated for BI.

In terms of BI, an example of quick imitation is of the current flood of analytics applications and vendors since analytics has been identified as "the next big thing" in the BI market (Gladwell, 2009). Although "IT titans" try to embed their software "stack" in multiple layers within the organisation's architecture (Info-tech, 2010:5) as a means to compete, organisations' requirements for integration across multiple vendors' solutions creates the need for new ways to compete. This shift to S-D Logic can assist in providing this.

In line with this, in an article on knowledge competitiveness where Huggins and Izushi (2007:1-2) explain how organisations that mobilise their knowledge and skills to create novelty in their products face better prospects when competing in advanced economies. They emphasise the interaction between the various actors and identify that knowledge (in terms of BI: knowledge, insight, intelligence) is the outcome of the intensity of this interaction. The creation of knowledge as an operant resource is grounded in a proper combination of human networking, social and intellectual capital and technology assets, facilitated by a culture of change (Edvardsson, 2011:1-2; Vorakulpipat and Rezgui, 2008). This is difficult to copy, transfer, split or combine (Spohrer *et al*, 2008:10) and the service taking place between the value network's entities facilitates a flow of information (Evans and Wurster, 1997:72). This flow of information and service leads to understanding of the full value network. This enables the value network's Service System entities to provide value-propositions to each other, thereby gaining a competitive advantage for themselves and – potentially – others in the value chain (Normann and Ramirez, 1993:65-66). Recognising the service flow assists BI to focus on data and integration activities that align with the value proposition, organisational competence and processes. Resources (data, information, etc.) can be integrated according to the value proposition and service flow rather than according to organisation function or structure. In addition, recognising the service flow assists with management of the various handovers (exchanges) that take place, including the various responsibilities for ownership and integration into the organisation.

By shifting from competing through goods and their features, BI investments may be linked to operational terms realised through business processes, i.e. use – as advocated by Williams and Williams (2003:13). They (*ibid*) caution that BI ROI becomes more difficult to measure and value may actually be destroyed if BI investment is linked to intangible benefits and features typically promoted by BI vendors. They explain that value co-creation is achieved through the use of business information and analysis linked to core business processes as outputs of BI (Williams and Williams, 2003:4).This also emerged in the case study, where it was identified that BI technologies that are part of the BI user's everyday work processes are more likely to be used. In addition, Davenport and Harris (2007:6) stress the importance of linking BI investment to the organisation's core competences. Lusch and Vargo (2006:415) take this further by advocating that, for investments to be the "fountainhead of economic growth", providers must define value propositions specifically to achieve the organisation's core competences.

An insight from this discussion is therefore that BI investment should be linked to a value proposition that is linked to a core competence and enabled through business process. This can potentially contribute to improving the ability to measure BI ROI and increase use of BI solutions as BI customers' (users') competence will be discussed and evaluated upfront and focus will be on use/realisation of the value proposition.

4.3 A shift from separation of customer and provider to a customer-oriented and relationship focus (C)

4.3.1 The G-D Logic evident in BI's worldview: separation of customer and provider

G-D Logic typically sees that the producer creates value unilaterally and upfront without the "interference of customers", who are the passive recipients (Lusch, *et al*., 2008:6). After the producer and consumer have exchanged the goods, value is depleted from the producer and transferred to the consumer, who consumes or destroys the value of the goods (Edvardsson *et al*, 2011:540). The producer is seen to be the creator of value (in terms of place, time and use) and the consumer the destroyer of value (Edvardsson *et al*, 2011:540; Gummesson, 1998:247; Lusch, *et al*., 2008:6). Never do producer and customer switch roles. As a result, the producer focuses on production activities, leaving consumption activities to the consumer, meaning that both producer and customer lose out on contextual knowledge of each other's environments (Chesbrough and Spohrer, 2006:37). Production and distribution are seen as the end of value creation (Vargo and Lusch, 2006:18). G-D Logic then perceives that the goods, as the output of production and distribution, are what are exchanged for funds, masking the fundamental basis of exchange, namely service for service (Vargo and Lusch, 2009:7). As a result, the customer and provider are separated, are seen to have distinct roles and do not understand each other's environments (Chesbrough and Spohrer, 2006:37) and no real need is seen to learn the data or each other's context (Chesbrough and Spohrer, 2006:37).

This concept emerges in BI's worldview in its:

- Ontology: BI customer and BI provider have largely separate perceptions of BI and, as BI is generally understood to be a linear series of activities performed by a BI provider up to the point of exchange, further separation occurs. Furthermore, as BI is understood syntactically rather than semantically, the focus is on the organisation's processes and rules and not the organisation's environment and context, thereby excluding knowledge and context of the BI customer as part of the organisation's environment.

- Past and epistemology: BI customers and providers have different backgrounds, focus on their differences and are separated as a result of both these differences and the approach whereby they complain about this rather than share the knowledge that they can. Furthermore, as BI flows across the organisation, the separation of customer and provider and their restrictive thinking in terms of function creates gaps where BI overlaps the "IT *versus* business" silos that BI customer and provider tend to relegate themselves to.
- Future: While BI customers are concerned about future technology solution's features and functions from the point of view of their own ease-of-use, BI providers are concerned about collecting greater volumes of data and expanding their markets. The BI customer is separated further as BI providers tend to see them as markets that must be captured and dominated – releasing "BI to the masses" and expanding the installed user base.
- Praxeology: BI providers tend to prefer to be left alone to work productively or unilaterally define BI's guiding principles and strategies without "customer meddling", although there is a desire to close the BI customer-provider gap. BI customers play the role of passive recipient as they don't typically participate in BI solution development unless required to by BI provider.

4.3.2 The shift to S-D Logic: a customer-oriented and relationship focus

Separation of the BI customer and BI provider may occur on a number of levels, for example: physical separation where the BI customer and provider are located in different parts of the organisation some distance apart; separation as a result of not understanding each other's business/IT/BI jargon, acumen or contexts; different work cultures; different objectives; etc. Value creation fails, as value cannot be created by either the customer or the provider alone. Not only can't the BI provider determine value upfront without the "interference of customers" (Lusch *et al.*, 2008:6) as per FP 7 discussed above, but the customer is also responsible for co-creating value – as per FP 6. Unfortunately, the BI customer often plays the role of passive recipient (Lusch, *et al.*, 2008:6), waiting for the BI solution to be delivered to them. In addition, when the customer and provider are separated, they miss the opportunity to learn each other's environments and improve the service between them, including opportunities for providers to offer competitive value propositions offering value-in-use (Kowalkowski, 2011:289; Normann and Ramirez, 1993:65-66; Vargo and Lusch, 2004a:3-24).

The shift to S-D Logic is therefore recommended. This shift is not simply to bring the separated customer and provider together; it entails a shift of focus to the customer *and the relationship*, as proposed in FP 8 "a service-centred view is inherently customer oriented and relational" (Vargo and Lusch, 2008c:25-38). This entails a paradigm shift whereby the relationship, and not just the customer, is key – both customer and provider (and any other involved entities must have a vested interest (value proposition) that they work on towards creating benefit for all involved). In terms of BI, this means that both the BI provider and the customer (e.g. the BI user, super-user, business user, sponsor, etc.) have joint roles in co-creating value and must both see benefit of the relationship.

In addition, customer and provider may be separated still further because the BI technology that is exchanged masks the actual service that is exchanged, as in FP 2 (Vargo and Lusch, 2008c25-38). By recognising this, BI customer and provider can rather focus on their relationship in terms of the skills and knowledge they are actually exchanging (i.e. the true nature of exchange) and their mutual responsibilities and roles in terms of this. BI literature reflects an understanding that BI IT investments deliver greater value when the responsibility for business value capture resides on the business side (Williams and Williams, 2007; Popovič *et al.*, 2010:11). Although this is a useful insight, it neglects visibility of the joint responsibility and the need to bring customer and provider together and should be expanded to include all parties in the relationship in terms of S-D Logic.

4.4 A shift of focus from the means, production and producer to focus on both production and use activities and role players (D)

4.4.1 The G-D Logic evident in BI's worldview: focus on means, production and producer

BI's worldview shows evidence of a focus on the means, production and producer, which is a G-D Logic characteristic (Gummesson, 1995:250; Normann, 2001:99; Vargo and Lusch, 2006:51; Vargo and Lusch, 2006:14). Organisations are seen to function to optimise production variables. There is a focus on standardisation, design for production efficiency and maximisation of outputs which can be sold for profit (Lusch, *et al*., 2008:6; Vargo and Lusch, 2004a:5). In addition, the flow of service (Lusch and Vargo, 2008; Vargo and Lusch, 2004b:324) is not recognised. Key insights indicative of this G-D Logic are now discussed.

BI is seen as a linear production line of activities, performed from the producer's viewpoint
BI's worldview reflects that it is seen as a systems development lifecycle, a dependent value chain or a linear series of operational and managerial activities completed with a predetermined idea of the customer in mind. In addition to highlighting the focus on production, this insight emphasises that BI is seen from the provider's perspective.

Conversely, it may be argued that BI development involves the BI customer and develops the BI solution based on customer requirements. Like the typical IS development methodology, BI development typically involves BI customers in iterative or once-off Joint Application Development (JAD) sessions or similar requirement gathering sessions. However, the case study reveals tensions resulting from requirements that are not gathered properly or are assumed, a gap between the BI customer and the ultimate end user upon whom the BI solution is "imposed" and that often BI customers are unable to provide their requirements due to insufficient understanding of BI or even of their own data. The latter highlighting that some BI customers may see the BI process solely as the BI provider's responsibility.

Furthermore, case study participants refer consistently to "BI deliverables", in the interviews and in the project documentation and RFP responses. The word "deliverable" has a G-D connotation, as it refers to a tangible good that is delivered and is stated from the producer's viewpoint (i.e. it is not a receivable). There is little evidence within BI literature of guidance and actions that are described from the user's point of view – e.g. of BI use or decision-making.

Goods as the output – where value is determined upfront by provider

BI's linear series of activities are seen to produce an output in the form of data, reporting, intelligence, ability, insight, information, knowledge or a BI solution. Some BI providers even state that "customer value" results from the BI production process. Emphasis on a product is typical of G-D Logic and the perception that value can be delivered indicates the G-D Logic belief whereby the provider determines value upfront and embeds this in the goods which are manufactured, making assumptions about the consumer's environment and how they will use/benefit from the product (Chesbrough and Spohrer, 2006). Furthermore, BI is guided by and consists of actions in a series of activities in software or data warehousing processes – typically in a water fall systems development approach.

Focus on technology (the means)

A dominant focus on technology emerges in BI's worldview – both from BI customer and BI provider – that draws attention to the G-D Logic inclination to focus on the tangible means and the tangible output of the means. Technology is not seen as a transport mechanism of competence (Spohrer *et al*, 2008:10; Michel, *et al*., 2008:152), but is seen to be paramount to other entities in the BI process.

G-D Logic related to these insights is evident in BI's worldview elements, for instance:

- Ontology: BI operates from an unstable model of reality and is understood as one or more of four dominant perceptions. Although, this alone is not indicative of G-D Logic, these perceptions establish that BI is typically seen as a linear production line of processes performed by a BI provider (i.e. the capability) to produce an output with a dominant focus on technology as a means. Furthermore, the dominance of syntactic definitions of BI reflect that BI is defined and seen with an inwards focus, looking towards the organisation's rules and BI processes (largely technology enabled) rather than the context and environment.
- Past and epistemology: The fact that BI emerged from a systems and engineering background and is grounded largely in IS and IT/data solution thinking emphasises the focus on

technology as the means.

- Future: Technology advances are envisioned for the future. Although BI providers envision evolving towards decreasing their time on data processing, they aim to increase time and effort on the development of BI applications and automation of BI processes – still maintaining the focus on the means rather than the use. Their aim is to maximise output (e.g. data generated) with minimum resources (G-D Logic characteristics). In addition, even where analytics is seen as a trend for the future, it is seen from the perspective of the means as a BI hardware and software solution.
- Axiology: Value is measured according to the means – BI application development and data processing. The benefits and features of technologies are promoted.
- Praxeology: Not only is BI seen as a linear production line, but it is typically guided by principles grounded in IT.

4.4.2 The shift to S-D Logic: focus on production and use activities and role players

It may be argued that BI's current dominant focus on the means, production and producer serves BI as firstly, during the Industrial Era, information and data were in short supply and, secondly, the BI industry's focus on this has resulted in sophisticated technology that enables the processing and storage of great volumes of data which was previously unavailable (Russom, 2011:4). However, in today's post-industrial Information Age or Knowledge Era (Miles and Boden, 2000:1-3), the typical G-D Logic "software factory" view is seen to be restrictive. It creates challenges associated with a dominant focus on processing rather than using data and BI. Today's challenges do not exist because there is a lack of information and technology to generate great volumes of data and information, but rather because there is a lack of understanding and use of it (Gladwell, 2009). A dominant focus on technology creates challenges that range from, for example, inappropriately linking BI investments to technology rather than value propositions to difficulties in finding human resources competent in more than just a BI technology solution. In addition, the dominant focus on technology reduces the understanding of BI to BI as an IS, limiting its focus to IS development and implementation.

Today, instead of venerating technology and crediting the Industrial Revolution for triggering economic growth, it is recognised that economic growth started before the Industrial Revolution, independently of technological change (Mokyr, 2002:29). It is now acknowledged that economies can grow as a result of continuous re-allocation of resources (Mokyr, 2002:285). In line with this, Jones (2002:20) believes that the impressive achievements technology is credited with can, in fact, be achieved by simply investing in organisations that encourage invention and enterprise – independently of technology. Mokyr (2002:3,9) talks about the interconnectedness of society's collective knowledge as something that can be drawn upon by the producer who knows what they do not know but knows where to find this – thereby resulting in "useful knowledge" and innovation or, in S-D Logic terms, resource integration.

In terms of this, two major shifts towards S-D Logic principles are proposed. Firstly, a shift from the linear production line or software factory to an interconnected value network of Service System entities integrating resources (also described in section 4.2 above)– as per FP 9 (Vargo and Lusch, 2008c:25-38). Secondly, a shift to recognise value-in-use, also as described above (in section 4.1). The second shift to value-in-use does not advocate neglect of BI processing in favour of value-in-use but rather that they are treated as equally important aspects of BI. It is recognised that it is impossible to create value – i.e. improve, advance, innovate – without both sides. This is discussed further at a conceptual level in Section 5 where approaches and concepts to guide the application of these shifts are discussed.

4.5 A shift from "services" to "service" and BI as a service flow informed by S-D Logic (E)

4.5.1 The G-D Logic evident in BI's worldview: "services"

"Goods and services" reflects terminology representing G-D Logic, whereby service is seen in the context of goods as a byproduct of goods, i.e. "that which is not goods" (Miles and Boden, 2000:1-3). Reflecting on BI's worldview and the supporting literature and case study detail that resulted in it, insights emerge that demonstrate that BI operates from a G-D Logic lexicon that does not recognise "service" and is viewed from the context of the provider or production process.

This is evident in the use of "deliverables", as described above. It is also evident in statements from BI participants where a distinction is made between BI goods and services. Goods are referred to as the traditional physical products that are delivered (project plans, BI solutions, data, etc.) and services are referred to in the traditional sense of services – consulting, training, etc. or in terms of computing services such as SOA or web services.

Specifically in terms of BI's worldview, G-D Logic related to these insights is evident in BI's worldview elements, for instance:

- Ontology: Use of wording "deliverables" in descriptions indicating the understanding of BI.
- Praxeology: Focus is on the "deliverable" that results from technology solutions.

4.5.2 The shift to S-D Logic: BI as a service flow informed by S-D Logic

By recognising and understanding "service" as opposed to "services", there is an understanding of service as the application of competences (skills and knowledge) through deeds, processes and performances for the benefit of another entity or the entity itself (Lusch, Vargo, 2008; Vargo and Lusch, 2004b:324-335). There is also an understanding that service is provided through acts of service (i.e. the traditional services) as well as through goods (as per FP 3 (Vargo and Lusch, 2008b:7)). A benefit of understanding service in this way is that BI's focus can shift from the BI product or technology and its features (the goods) *versus* BI consulting and support (the services) to BI's actual offering (i.e. insight, intelligence, etc. used for decision-making) and the flow of service involved in creating this – whether this results from something that is tangible or intangible (e.g. a report or insight). Immediately use and purpose become the focus, rather than technology or the exchange. Service is understood as the fundamental basis of BI as BI is understood as a service flow – as per FP 1 and FP 9 (Vargo and Lusch, 2008b:7) respectively.

The shift to recognise service also represents a shift from thinking about BI narrowly in terms of IT-type services. Although these may have practical application within BI (e.g. web services) or may be seen as a means to achieve BI's purpose (Doan and Kosaka, 2011:5), an S-D Logic approach to BI ensures that BI is not driven or dominated by these fast-moving developments. Instead, the shift advocates that when BI is informed by S-D Logic, it develops in parallel with practical developments.

5. Conceptual approaches to apply S-D Logic to BI with the aim of contributing towards overcoming BI's prevailing challenges

Section 4 describes a shift from G-D to S-D Logic, identifying these shifts as potential new avenues to assist in resolving BI's prevailing challenges. Reflecting on S-D Logic literature to identify how S-D Logic can be applied to BI at a conceptual level, specifically in terms of how the shifts advocated in Section 4 above can be facilitated, a few principal concepts or sets of concepts emerge. Firstly, the concept of the BI value coin (5.1 below) and an adaptation of the ten FPs of S-D Logic for BI (5.2 below) form a theoretical basis to apply S-D Logic conceptually to BI. Secondly, from a pragmatic viewpoint, the guiding principles reflected in 5.3 (below) provide an approach to guide the practice of BI. Although 5.1, 5.2 and 5.3 may be applied together or individually, it is recommended that the pragmatic approach (the guiding principles) is underpinned by the theoretical basis (the BI value coin and the ten FPs). This ensures that the actions proposed through the guiding principles are understood in the context of S-D Logic. A summary of how these approaches relate to the proposed shifts and BI's challenges is reflected below in Table 21.

The aim of this section is to provide a conceptual foundation which can be used as a basis for future research to ascertain the feasibility of shifting to S-D Logic as well as a basis for practical application of S-D Logic to BI. The section on guiding principles (5.3) specifically discusses how the shift from G-D to S-D Logic may assist in overcoming BI challenges. This is also summarised below in Table 21. Section 7 then examines implications of such a shift that may be created.

Although it is possible to derive ideal worldview characteristics for BI from the description of the shifts that are advocated in Section 4 above and thereby formulate an "ideal BI worldview", this is considered an unrealistic or utopic approach. Added to which, as a worldview emerges from an individual or a group's collected views of reality, beliefs, actions, etc. over time (Peck, 1978:32-33), it is assumed that it cannot be pre-defined and imposed on an individual or group for successful adoption thereof.

Additional approaches also emerge in Service Science – specifically in Service Systems Theory – that may also be applied to BI. For example, BI may be seen as a Service System consisting of complex, dynamic arrangements of operand and operant resources in Service System entities which engage in dialogical, intense interaction to co-create mutually beneficial value (Spohrer *et al*., 2008:9). However, as this thesis' focus is on an S-D Logic approach to BI as a foundational step towards applying S-D Logic to BI, Service Science and Service System approaches are not discussed further. It is, however, recommended that future research considers this, as well as approaches that use Service Science and overlap both its philosophical (S-D Logic) and theoretical (Service Systems Theory) branches.

5.1 The "BI value coin"

Literature from Spohrer (2008a:417) provides an analogy that can be made applicable to BI and to the shifts proposed in Section 4 above. In terms of the proposed shifts, Spohrer's analogy is relevant to achieving value-in-use (4.1 – A), treating BI customer and BI provider and their activities as part of the same service flow rather than separate entities or activities (4.3 – C) and shifting from the focus on means, production and producer (4.4 – D).

Spohrer (*ibid*) identifies knowledge discovery and knowledge application as two sides of the same coin, stating that this can potentially be referred to as the innovation coin and that, for innovation to take place, both sides must receive effort and attention. Figure 18 (below) reflects Spohrer's innovation coin and the derived BI value coin, based on the innovation coin. Spohrer refers to *knowledge* discovery and *knowledge application* and the *innovation* coin. His terminology is adapted in the analogy as it is applied to BI. "Knowledge" is omitted, since it may be – for example – data and/or information that emerge in discovery and insight, intelligence and/or knowledge that are applied as a result thereof. The "innovation coin" is changed to the "BI value coin" as, by successfully combining BI discovery and BI application, the probability that the purpose of BI (its value) emerges is increased. Finally, the word "application" is replaced with "use" to avoid possible confusion relating to understanding "application" as a noun describing, for example, a BI technology application.

The BI value coin can be applied to BI to assist in a shift from G-D Logic characteristics to S-D Logic characteristics. First, consider Figure 19 (below) which juxtaposes the typical G-D Logic exchange process (Part 1) and the typical BI process (Part 2) to highlight their similarities. In doing this, Figure 19 highlights the G-D Logic inherent in the BI process in terms of (amongst other things) the neglect of use of BI, focus on the producer's production and distribution processes (collecting and processing data and information and developing BI technologies), the perception that value is achieved in exchange (at the handover point) and separation of BI customer and BI provider.

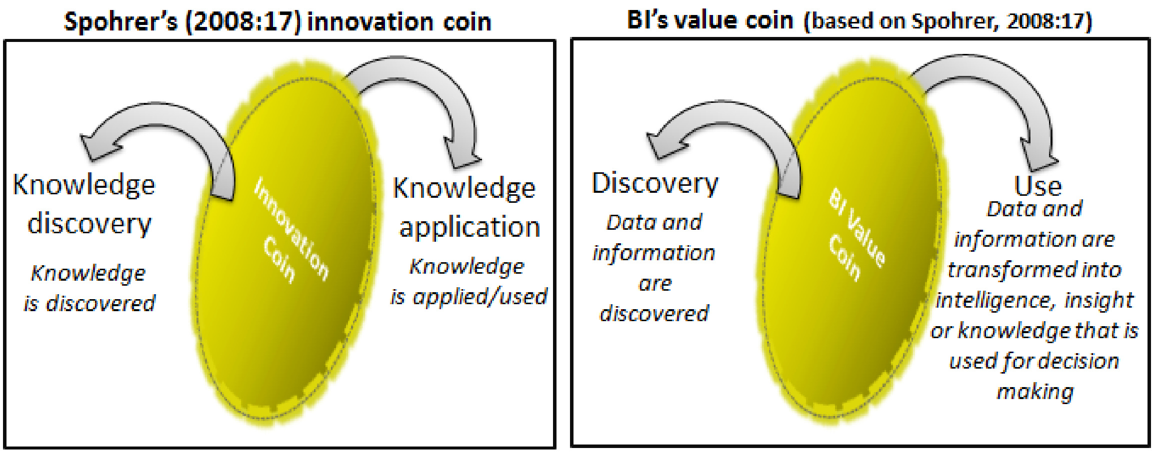


Figure 18: BI's value coin (based on Spohrer, 2008a:417)

Then consider Figure 19 which suggests an iterative BI process whereby a "discovery" aspect and a "use" aspect both receive attention. Figure 19 highlights the need for both the BI provider and the BI customer to focus on both discovery and use activities to be able to co-create value, based on the BI value coin. On the "knowledge discovery" side of the coin, BI activities may include, for example, data collection, data processing and application development. On the "knowledge application" side of the coin, BI activities may include application of and use of the data or application that has been discovered, e.g. decision-making based on actionable insight and intelligence. In line with this, Herschel and Jones (2005) state that in BI, intelligence is often defined as the discovery, explanation and use of hidden, inherent and decision-relevant contexts in large amounts of business and economic data.

Figure 20 also incorporates relevant S-D Logic FPs to show the BI customer's co-creation role (FP 6), that the BI provider can only offer value propositions and not value (FP 7), the service-centred and relational view (FP 8), the phenomenological determination of value by the BI customer (FP 10) and the creation of an operant resource such as intelligence/insight/knowledge upon use (FP 4).

This provides a conceptual basis to apply these FPs as well as the concepts highlighted through the BI value coin, i.e. value co-created through discovery and use, balanced customer-provider relationships and continuation of the service flow through discovery into use – and iteratively back again. In addition, this highlights that the BI value coin, as depicted in Figure 20, brings a new perspective to the BI process and not simply an iterative process and focus on the customer, which are not new approaches for BI – specifically in terms of the IS development involved in BI. Possibly the most significant of the concepts that the BI value coin highlights are: the service flow and the joint role and responsibility of the BI provider and BI customer in achieving value-in-use.

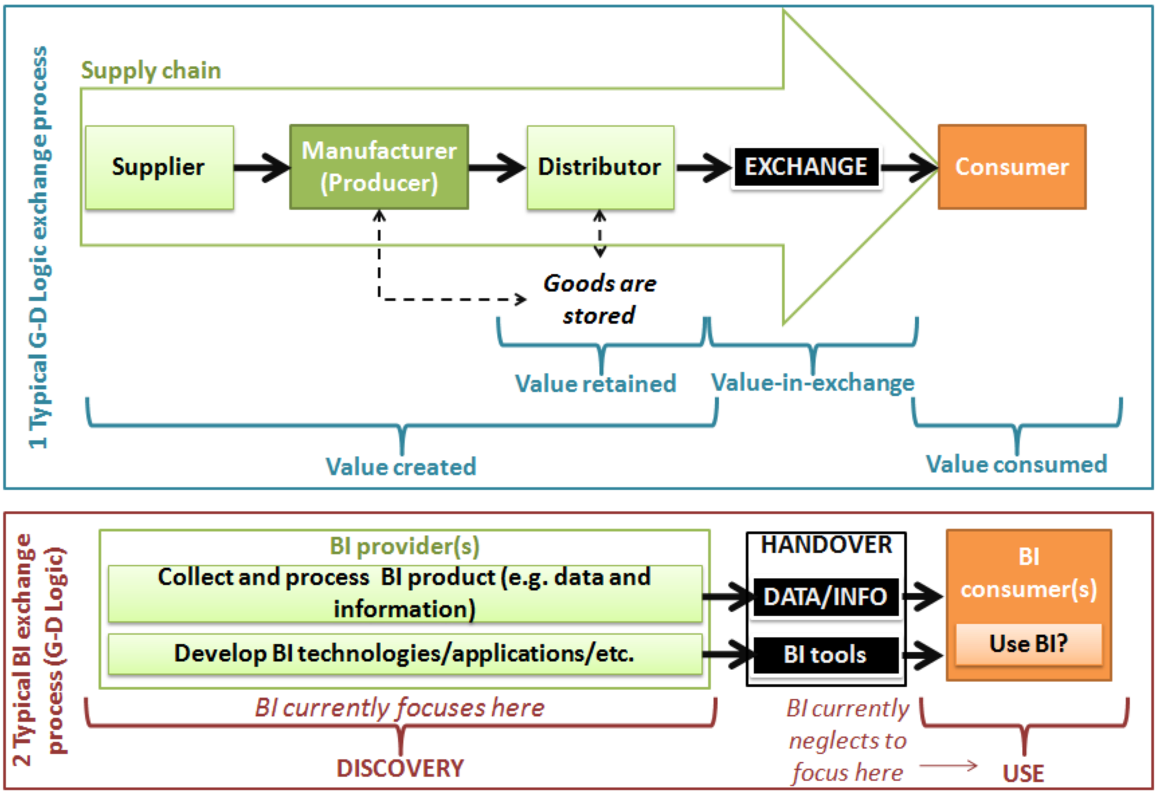


Figure 19: The typical G-D Logic exchange process and the BI exchange process in terms of discovery and application

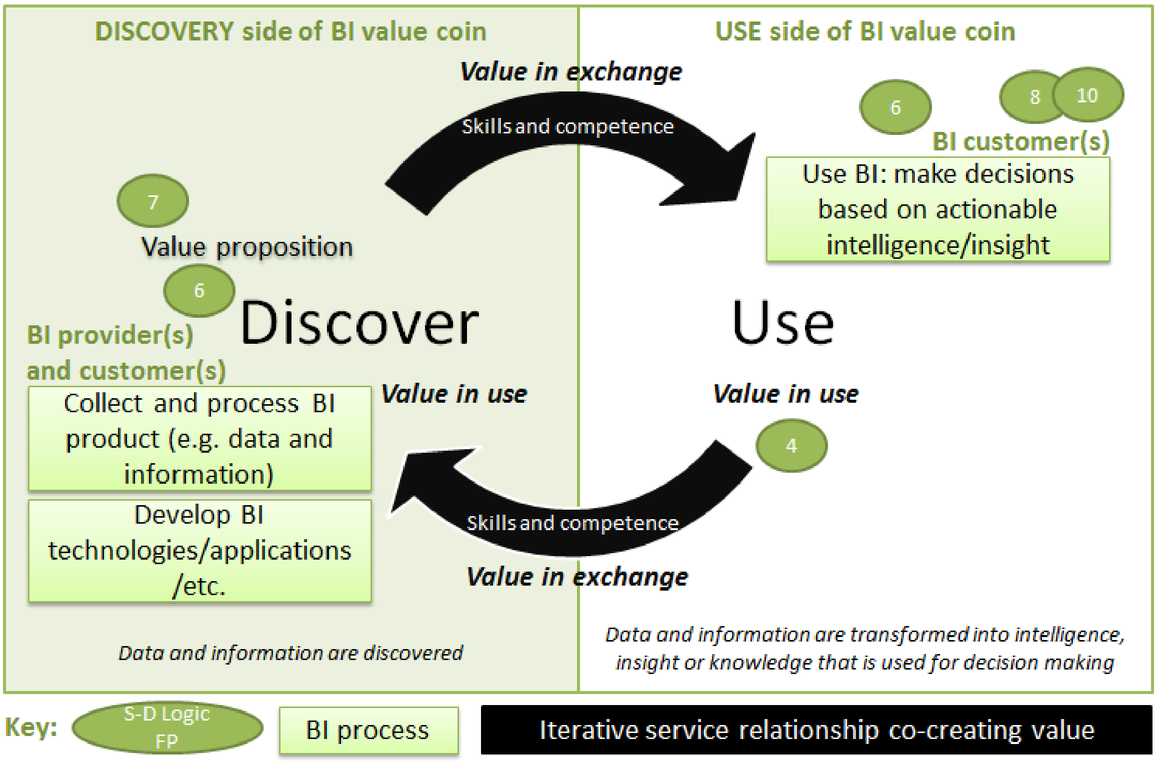


Figure 20: An S-D Logic view of the BI process (Based on Spohrer's (2008:14) knowledge discovery/application innovation coin and Vargo and Lusch's (2008:7) S-D Logic FPs)

5.2 The ten FPs of S-D Logic adapted for BI

As discussed in Chapter 3, Schultz and Gnoth (2008:129) apply the S-D Logic principles of exchange to the organisation, providing a revised list of FPs for the organisation. The same is now performed for BI, as reflected below Table 20. Section 4 (above) already associates S-D Logic FPs for exchange with the shifts proposed to move the dominant BI worldview from G-D to S-D Logic; these are referenced and reflected in the key below Table 20 and are also referenced above in Table 19, where they are reflected according to the shift. It is believed that each FP can be applied to BI at a conceptual level and that, by applying the FPs in this way, a foundation is created whereupon future research may be conducted to test – perhaps in a case study – which FPs are highly relevant or most beneficial for BI or whether one or more FPs may be applied in isolation while still benefitting BI.

Table 20: BI in the context of the ten FPs of S-D Logic (Vargo and Lusch, 2008b:7)

Key: Ref = reference to G-D Logic characteristic, namely:

A: Value-in-exchange

B: Compete through goods and their features

C: Separation of BI customer and BI provider

D: Focus on means, production and producer

#	S-D Logic FP	S-D Logic FP adapted for BI (BI FP)	Ref.
1	Service is the fundamental basis of exchange	Service (exchange) is the fundamental basis of BI	E
2	Indirect exchange masks the fundamental basis of exchange	Indirect exchange of BI technology products masks the fundamental basis of BI exchange	C, E
3	Goods are distribution mechanisms for service provision	BI products are distribution mechanisms for service provision	B
4	Operant resources are the fundamental source of competitive advantage	Operant resources – such as intelligence and insight (which are hard to copy) – are the fundamental basis of competing using BI	B, C
5	All economies are service economies	BI is a service economy consisting of service flows through which exchange takes place	E
6	The customer is always co-creator of value	The BI customer is always co-creator of value	A, C
7	The organisation cannot deliver value, but can only offer value propositions	The BI provider cannot deliver value, but can only offer value propositions	B
8	A service-centred view is inherently customer oriented and relational	A service-centred view is inherently oriented towards the oscillating BI customer-	C

#	S-D Logic FP	S-D Logic FP adapted for BI (BI FP)	Ref.
		provider relationship, including all entities involved therein	
9	All social and economic actors are resource integrators	All social, economic and technical actors are integrators of BI resources	D
10	Value is always uniquely and phenomenologically determined by the beneficiary	Value is always uniquely and phenomenologically determined by the BI customer (e.g. end-user, sponsor, bank customer, organisation, etc.)	A

5.3 Guiding principles to apply S-D Logic to BI

The BI value coin and the ten FPs of S-D Logic can be applied to BI, as indicated in Sections 5.1 and 5.2 above, providing a basic understanding of service flow, value-in-use and the core tenets of S-D Logic in terms of BI. However, for BI to shift successfully to an S-D Logic approach, it is anticipated that S-D Logic must also be applied practically. If this is not done, the conceptual foundation remains too vague and abstract for application in practice. For example, telling BI vendors or a BI department that the BI technology application they have developed is a distribution mechanism for their skills and competences will probably “be met with blank stares” – to quote O’Shaugnessy and O’Shaugnessy (2009:785-786). Although they (*ibid*) present a weak argument against S-D Logic – as discussed in Chapter 3 – they accurately draw attention to the need to position S-D Logic pragmatically.

Specific BI guiding principles are therefore formulated from a pragmatic basis. They are formulated based on S-D Logic concepts, principles, guidelines, findings of this thesis’ case study and the G-D to S-D Logic shifts identified specifically for BI (reflected in Section 4 above). Guidelines draw specifically from those formulated to apply S-D Logic to exchange from Lusch and Vargo (2006:415) and, separately, from Tanniru (2008:418) – both of which were discussed in Chapter 3 Part 3.

Guiding principles can be applied to a BI exchange by any individual, group or organisation (including BI providers and BI customers) that desires to shift to an S-D Logic informed BI worldview. S-D Logic is especially useful in a highly networked world (Lusch and Webster, 2011:129) such as that presented by BI. However, it is also broadly applicable and applicable to many levels (Gummesson, 2001:27; Schultz and Gnoth, 2008:129). In fact, it is applicable to any exchange, i.e. as stated in Chapter 3 – any interaction or relationship that consists of at least three components: two nodes (e.g. giver and receiver) and a thread (e.g. whatever is exchanged) (Schultz and Gnoth, 2008:129). Although the guiding principles may be applied at the level of an exchange, based on Shift E that recommends that the full service flow is recognised, it is recommended that guiding principles are applied to all BI exchange activities and by all entities involved throughout the BI service flow. However, as the scope of this thesis does not extend to the application and testing of the conceptual and pragmatic approaches suggested herein (i.e. Sections 5.1, 5.2 and 5.3), a comparison of the benefit of applying S-D Logic between – for example – a BI department and a BI vendor *versus* across a whole service flow is not measured. This is, however, another suggestion for future research.

The intention is not for the guiding principles to be used as a mechanistic set of steps applied rigidly, in isolation or applied to replace an engineering-centric IS project development methodology. In fact, this thesis proposes a shift away from the mechanistic and linear IS project development methodology where BI is perceived narrowly as an IS. This relates to the shift from a focus on means, production and producer to a focus on production and use activities and role players, i.e. the service flow or the whole BI value coin. Instead, the intention is for the guiding principles to facilitate this shift by guiding the actions of those practicing and studying BI so that the actions are congruent with S-D Logic principles. The guiding principles also highlight how S-D Logic may be applied to assist BI to overcome some of its prevalent challenges. This is summarised in Table 21 below and the potential advantages of shifting to S-D Logic are summarised in Table 22. Implications of the shift can be found in Section 7.

5.3.1 Guiding principle 1: Obtain clarity and knowledge of the BI service flow and the various environments this flows through

All individuals, groups and organisations involved in any type of BI exchange should ensure that they clearly understand the context of BI at the outset of any BI exchange. Firstly, in theoretical terms as provided in Sections on the BI value coin (5.1) and the ten BI FPs (5.2) and secondly, in the context related to the various environments that the service flows through. By understanding the theoretical terms, BI participants can contextualise BI exchanges in terms of where they fit on the BI value coin. Debates on scope and definition for EIS, MIS, DSS, etc. can thereby be avoided as it will be superfluous how these terms relate to each other or BI, based on the ability to see the scope and definition of the BI exchange based on whether it fits on discovery or use sides of the BI value coin.

Understanding the context related to the various environments entails effort to understand the full service flow, which entities and resources are or may be involved in this, the value networks, existing value propositions and relationships between entities, the operand to operant resource integration that does or may take place and – most importantly – the different business, economic, technical, social and managerial environments that the service flow crosses through. This involves a shift from defining and understanding BI just syntactically to defining, understanding and applying it semantically. In other words, it shifts from a dominant focus on the provider/production/means towards a balanced focus on the customer and other entities' environments, including the provider. When understanding the full service flow, BI participants can also understand the importance of both the discovery and use sides of the value coin, implying a shift to value-in-use.

By following this guiding principle, BI participants – both customers and providers – may be able to reduce the ambiguity in the BI environment by contextualising BI appropriately, increase the likelihood of value creation by focusing appropriately on discovery and use sides of the BI value coin and position themselves better to identify opportunities for value propositions through knowledge of all relevant environments. This assists to overcome current challenges where there is a dominant focus on technology, ambiguity in the BI environment and restrictive thinking of BI as an IS (or data or IT solution within an IS) only. It also assists BI participants to learn each other's environments and context which can assist to alleviate challenges where the full service flow is not understood resulting in a lack of understanding of the business environment and neglect of organisational inputs such as data, or in situations where personnel and/or sponsors focus only on delivery activities or technology without understanding the full process. Challenges related to separation of BI provider and BI customer may also be somewhat alleviated through this, as customer and provider can be brought together in learning the full BI service flow, which includes both customer and provider environments. It may potentially also expand the BI department's current focus on recruiting IS and IT professionals to consideration of professionals in the various aspects that the BI service flow touches, impacts and needs to integrate successfully with.

5.3.2 Guiding principle 2: Identify needs, skills and competence and accessible resources

By understanding the service flow, BI customers and BI providers should be able to position themselves to understand the role/s that they could potentially play within the full service flow and where they could potentially contribute to realising opportunities that meet specific needs (Tanniru, 2007:418). At this point, they should see themselves as resource integrators, understanding their role in the bigger picture of the service flow, focusing on the competitive advantage available through an operand-to-operant resource co-creation process rather than on selling tangible goods (Tanniru, 2007:418). They should start to see what needs they could potentially fulfill using, not only their resources, skills and competences but also those that they have access to or those that they could assist to develop (Tanniru, 2007:418). BI customers and BI providers should also start to see who may potentially benefit from these outcomes as well as who or what they need to collaborate with or integrate to be able to realise the outcome. Responsibility to perform this assessment lies with both the BI customer and the BI provider, e.g. a BI vendor is in a position to assess an organisation's potential ability to assist in value co-creation and the organisation – as the BI customer – is in a position to identify what it needs from the BI vendor and what it needs to be competent in so that it is not just a passive recipient.

It is at this stage and from this perspective that BI providers may be inclined to ask questions such as "what organisational competence can I help support?", "who may benefit from this?", "what BI resources do I have access to that can complement what the organisation aims to achieve?", "what don't I have (e.g. resources, skills, competence) that I need to integrate?". The BI customer should now identify BI needs in context of the organisation's competences, business processes and opportunities rather than in the context of intangible benefits linked to BI IT solutions. Both have a responsibility to look at the full service flow to comprehensively identify role players, resources, skills and competences that are needed to integrate resources to co-create the desired beneficial outcome.

At this point there is also a responsibility to assess the full service flow. BI providers and customers should be asking questions at this stage related to the ultimate outcome of the BI service flow rather than simply focusing on delivering a product or output. Ideally, the full service flow should not ultimately result in BI that is used to manipulate or dominate customers. BI is in a position of power where it collects data that can either be used to help the end customer, or harm and manipulate the end customer. It should follow from this that S-D Logic-informed professionals should not use S-D Logic principles to co-create outcomes that are ultimately harmful to an entity down the line in the service flow. Lusch and Vargo (2006:415) highlight the importance of transparency, symmetric information and seeing the customer as someone to collaborate with. It is believed that if this is practised by BI professionals who engage in BI exchanges that the outcome of these BI exchanges should also maintain these standards. BI customers and BI providers at Fortune Bank would need to consider shaping the Business Banking business strategy to focus on opportunities to extend the flow of service rather than target customers and "capture" the market, focusing on producing and using the employee as a means of production, as discussed in the axiology worldview element in Chapter 4 Part 3.

This guiding principle potentially can assist in overcoming challenges experienced later in the BI service flow whereby integration is overlooked, alignment is difficult or business, data or IT architecture expertise specific to the organisation's environment is unavailable or absent. It can potentially also assist relations between BI vendors as BI providers to the organisation's BI department and their BI customers as each entity's contribution can be clarified and recognised. Furthermore, issues of ownership and the capability to participate to co-create value are discussed and addressed before the relationship is entered into. This alleviates challenges currently experienced in BI whereby there are gaps in ownership or unavailable business representatives or sponsors to support the BI initiative.

5.3.3 Guiding principle 3: Invest in cultivating relationships to integrate resources and realise mutual benefit

Where BI providers are able to identify potential opportunities to co-create beneficial outcomes with BI customers, they should cultivate relationships with them (Tanniru, 2008:418). A long-term relationship should be the aim (Lusch and Vargo, 2006:415), although short-term or even once-off service relationships are not discouraged and can also benefit from an S-D Logic approach (Vargo, 2009b:375). Long-term relationships should be strived towards simply due to the fact that much time, effort and trust are invested in learning the BI customer and BI provider context and environment – as already discussed in guiding principle 1 (5.3.3) . Lusch and Vargo (2006:415) aptly use the word “investment” in this context, explaining how a “fountainhead of economic growth” can be established by growing these specialised skills and knowledge.

This guiding principle may potentially assist to overcome challenges related to the BI customer and BI provider relationship, e.g. separation of BI customer and BI provider and alignment. It may also extend to assist with integration and sponsorship challenges. For example, cultivation of relationships may even result in better awareness of BI needs upfront, so that when decisions are made where BI integration will be needed later, BI can be involved in these decisions.

5.3.4 Guiding principle 4: Engage in value propositions, linking investment and income to value propositions

At this point, the BI provider should be in a position to offer compelling value propositions to BI customers. Bear in mind that this may even entail a value proposition for the customer to define their own value proposition as service and technology innovation continuously evolve to bring customers the ability to define value wherever, whenever and however they want (Goul, 2010:26). Value propositions must meet specific needs (Tanniru, 2007:418), where both BI provider and customer (and other role players involved in the interaction) can receive benefit. On the one hand, the BI provider needs to understand the full service flow (discussed above in 5.3.1) to link the value proposition to the organisation’s competences. In other words, when the BI that is proposed is used, the aim is for the BI to assist the organisation to achieve in one or more of its competences (Davenport and Harris, 2007:6). On the other hand, the BI customer needs to link the investment that they will make in realising the value proposition to their organisational processes, to identify how they will use the BI that is proposed in the value proposition. The latter was identified in the case study: instances where BI is used are those where it is embedded in the organisation’s existing processes. This guiding principle is reflected in Figure 21 in terms of the BI value coin.

Figure 21 also reflects that financial feedback results from the point of exchange, but that value-in-use continues after this, providing further feedback. Tanniru (2007:418) identifies that financial performance is used to gauge marketplace feedback and, in accordance with this, improve future offerings and performance.

Linking BI investment to organisational competence and to the organisation’s processes may assist in overcoming challenges experienced where BI value is measured at the point of delivery of a BI IT solution – as well as current challenges in measuring BI ROI. At least through this approach, the focus is on how the BI is used – which is potentially easier to measure than the intangible benefits that BI vendors typically promote on their BI IT solutions.

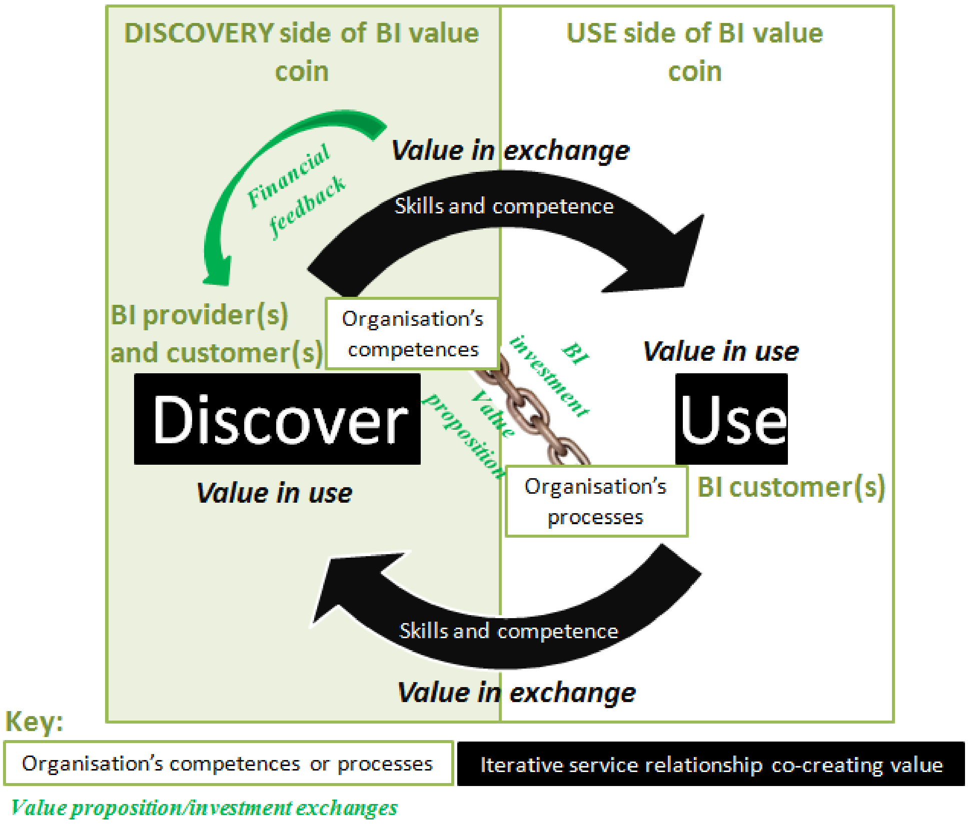


Figure 21: BI investment - guided by S-D Logic

5.3.5 Guiding principle 5: Complete value proposition activities, perform measurement and give feedback

From the point where the BI customer accepts the value proposition and the BI exchange is engaged in, the BI customer and provider enter a process whereby actions take place, followed by measurement of those actions. This is reflected below in Figure 22, which also reflects that BI customer and provider need to measure compliance – i.e. tests or checks that the value proposed is realised. It cannot be assumed that, just because an S-D Logic approach is taken, that value will automatically be created. Entities involved in the service flow may engage in value co-destruction whereby they engage in actions that result in destructive outcomes – either purposefully or negligently (Plé and Cáceres (2009:431-434)).

Quality is currently measured in activities on the discovery side of the BI value coin within the organisation using Service Management methodologies such as TQM, Six Sigma, etc. (discussed in Chapter 3) and at the point of exchange (as identified in the case study of Fortune Bank), however, BI's current worldview does not demonstrate that it measures quality at the point of use. Based on this, it is identified that a shift to an S-D Logic worldview will entail introduction of further quality measures – on both sides of BI's value coin. BSCs should be updated to reflect measurement of the use of a BI solution – and not just users' activity on a BI solution, but actually value achieved through the value proposition that is linked to the organisation's competence and realised through the organisation's processes.

Furthermore, as reflected in Figure 22, disputes could occur at either point in the exchange – discovery or use – and may occur between customer and provider or may be raised by a third party involved in the interaction (Spohrer and Kwan, 2009:10). Maglio *et al.* (2009:6-8) refer to the perfect *versus* the alternative scenario, where the latter is where disputes occur. They provide the Interact-Serve-Propose-Agree-Realise (ISPAR) process model whereby disputes can be handled. In the perfect scenario, a decision-tree flow of activities in an interaction reflect how a value proposal is communicated, agreement is reached and value is realised. In the alternative scenario, disputes arise as a result of the value proposal not being communicated or value not being realised. Following this, the alternative scenario identifies scenarios whereby – for example – there is a dispute or no dispute, resolution or no resolution, criminal activity and justice.

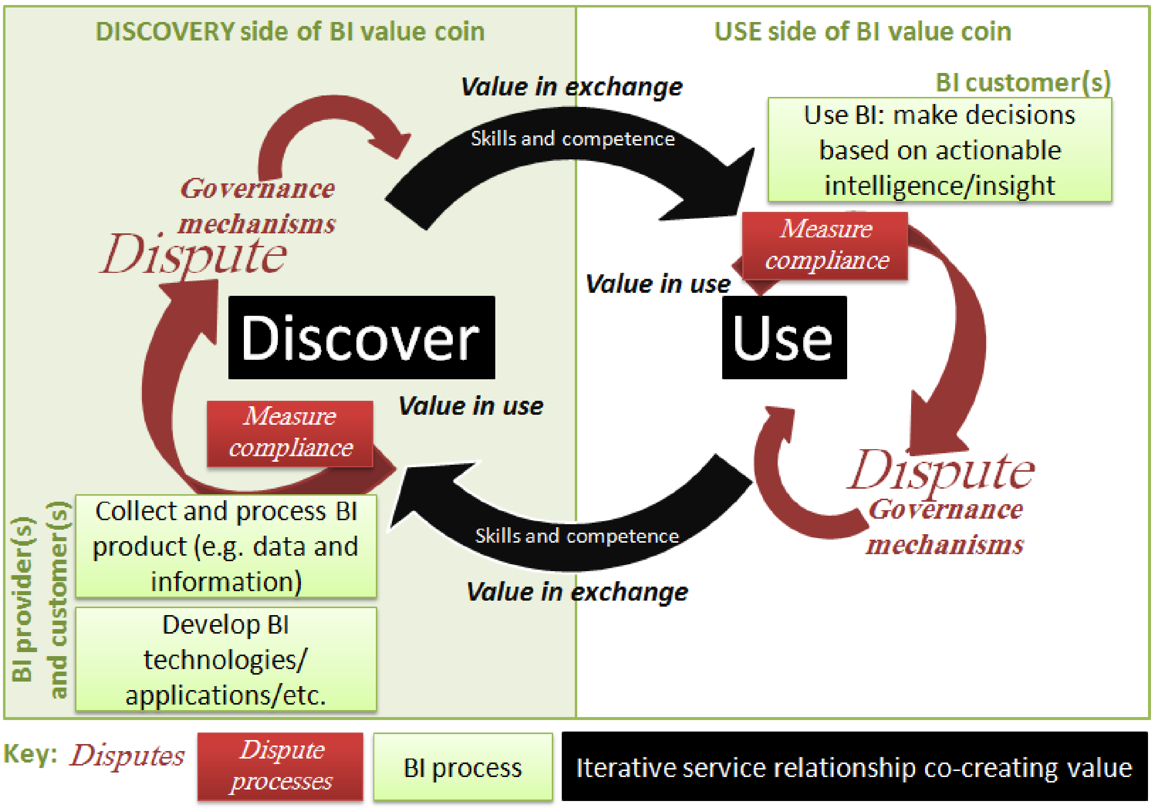


Figure 22: BI activities and actions - guided by S-D Logic

6. Opportunities to overcome BI's challenges

The guiding principles above (Section 5.3) recommend actions to shift from a G-D to an S-D Logic approach to BI. They also draw attention to the challenges that may potentially be overcome – or at least have their impact reduced – by taking these recommended actions. Table 21 reflects a summarised view showing the guiding principle and theoretical basis per shift, alongside references to the challenges that can potentially be overcome.

Each challenge raised previously and summarised in Chapter 4 Part 2 can potentially be overcome – or reduced – directly or indirectly through a shift from G-D to S-D Logic. This includes P1 "Specialist personnel are high in demand but short in supply", although it is identified that there is no direct G-D Logic characteristic that is evident in this challenge (raised above in Section 3). The rationale is that, in the longer term, an organisation adopting an S-D Logic approach to BI should build up dynamic value networks where entities integrate specialist skills and competence as operant resources within the value network, for a service for service exchange. This has the potential to change – for example – the traditional model whereby these specialist skills are exchanged for salaries. Although in a service for service exchange, skills and salary may still be exchanged, recognition of the exchange of competence for another's competence offers more flexibility and resource integrators in a dynamic network may have more opportunities for flexible resource sharing.

Table 21: BI challenges potentially addressed or assisted through the application of S-D Logic to BI

G-D to S-D Logic shift		Guiding principle	Theoretical basis	BI challenge potentially overcome
A	Value-in-exchange to value-in-use	1, 3, 4, 5	BI value coin BIFP 6, 10	U2, U4, U5-7, CSI3, CSU1, U10, CSU2, CSD2, CSD4, CSA1, O1, CSI2
B	Compete through goods and their features to competition through operant resources embedded in value networks	1, 2, 3, 4	BIFP 3, 4, 7	U4, U5, U7, U8, U10, CSU2, CSD4, A2, CSA1, I2, P2, CSP1, O1, CSI2, CSI3
C	Separation of BI customer and BI provider to a customer-oriented and relationship focus	3, 4	BI value coin BIFP 3, 4, 6, 8	U2, U3, U6, U8, D3, CSD1, I2, A1, A2, CSA1, CSA3-6, CSP3, CSI3
D	Focus on means, production and producer to a focus on both production and use activities and role players	1, 3, 5	BI value coin BIFP 9	U1-4, U9, CSU1, CSD1-4, A1-2, CSA1-2, CSA4, CSA5-7, D1, I1-3, CSI1-3, D2, P2, CSP1-3, CS01-3, 02, S1, CSS1-2
E	From "services" to "service" and BI as a service flow informed by S-D Logic	1, 2, 5	BIFP1, 2, 5	D2, CSD1-4, A1, CSA2, CSA4-7, I1, I2, CSI1-2, P2, CSP1, CSP3, CSS1-2, S1, CS01-3, O2,

A summary is presented in Table 22 listing examples of the potential advantages of shifting from G-D to S-D Logic for BI. Examples are based on the description of the conceptual approaches to apply S-D Logic to BI in Section 5 above and are listed per guiding principle.

Table 22: Potential advantages of following the guiding principles to apply S-D Logic to BI

Examples of potential advantages of applying S-D Logic to BI, per guiding principle
Guiding principle 1: Obtain clarity and knowledge of the BI service flow and the various environments this flows through
• Ambiguity in BI environment is reduced • BI provider is positioned to make compelling value propositions, which are more likely to be valued by the BI customer • BI customers are presented with value propositions that are more realistic to their environment, competence and needs

Examples of potential advantages of applying S-D Logic to BI, per guiding principle
• BI customer-provider separation is reduced as they learn each other's environments • Probability that BI is integrated successfully with the organisation's technical, data and managerial layers is increased, as these are investigated upfront • Probability that sponsors understand the full BI service flow increases through knowledge of the full service flow and environments • BI and other skills and competence that are needed are identified upfront
Guiding principle 2: Identify needs, skills and competence and accessible resources
• Accessible resources, their availability and accessibility are identified and planned for upfront, including business, data and IT architecture expertise to support the BI initiative • Roles and responsibilities are determined based on need, competence and skill, thereby avoiding conflict resulting from situations where this is unclear and boundaries are overstepped • Gaps in ownership (e.g. of data quality, business requirements) can be avoided as ownership is allocated upfront • Probability of success is increased as BI customers' capability to participate and co-create a beneficial outcome is ascertained upfront
Guiding principle 3: Invest in cultivating relationships to integrate resources and realise mutual benefit
• BI provider and BI customer separation is reduced through cultivation of relationships • Mutual benefit is identified early in the engagement, thereby creating incentive for BI provider and BI customer to participate in the relationship • BI customer and BI provider gain access through interconnected relationships to a dynamic service flow where specialist skills, people, technologies, etc. are integrated and potentially available to engage in exchange • Solid, long-term relationships and value networks creating operant resources that are difficult to simulate are developed, thereby improving the ability of those participating in these relationships and value networks to compete
Guiding principle 4: Engage in value propositions, linking investment and income to value propositions
• New ways to measure ROI are created as BI investment is linked to BI use and not intangible features and benefits of BI IT solutions • As BI is targeted at the organisation's specific competence(s), its purpose is clearly indicated • By linking BI investments to the organisation's processes where the BI investment is used, the probability that BI is used increases, as processes to use the BI are made clear from the start
Guiding principle 5: Complete value proposition activities, perform measurement and give feedback
• As BI customer and provider roles continuously change throughout the relationship, both have opportunity to give feedback on service and to improve the service • Using the ISPAR process model to handle disputes maps out perfect scenarios as well as dis-

Examples of potential advantages of applying S-D Logic to BI, per guiding principle
pute scenarios, enabling planning for both • BI provider BSCs are updated so that value is measured in use and not at the point of exchange, creating incentives to ensure value propositions are set up and then executed correctly to result in value upon use

7. Implications of and potential arguments against a shift from G-D to S-D Logic for BI

While G-D and S-D Logic are not new lenses, they have not yet been explicitly applied at a conceptual level to BI or a BI-related discipline (to the knowledge of the researcher). As reflected in the above sections, this offers an opportunity to examine BI from a fresh perspective wherein new insights to address BI's persistent challenges emerge or, more broadly, new insights to address persistent challenges related to information and intelligence for decision-making emerge. There are, however, arguments that may challenge this, as already discussed in the section on the G-D and S-D Logic debate in Chapter 3 Part 3. This section now examines such arguments in the context of applying S-D Logic specifically to BI. The aim is to highlight potential limitations so that they can be realistically acknowledged and mitigated by those practising or studying BI who wish to shift from G-D to S-D Logic.

7.1 The argument that S-D Logic is not a new perspective

The argument that S-D Logic in itself does not offer a fresh perspective may be based on the fact that many S-D Logic concepts are neither exclusive to nor invented by S-D Logic (Akaka, 2007:17), e.g. focus on use, customer and bringing customer and provider together. In fact, when considering BI specifically as a type of an IS (Bertstein, *et al.*, 2011; Euromed Marseille School of Management, 2011; Kelly, 2010), it is clear that concepts such as these are not new to ISs or to BI. Consider the examples of user-friendly IS interfaces or reports, collaboration with the end user or customer and joint application development involving various IS project stakeholders including end users, sponsors and other types of customers.

Believing that S-D Logic does in fact offer a new perspective – particularly for BI – the researcher draws attention to Akaka's (2007:18) counter argument in this regard. She (*ibid*) states that, while the individual concepts may not be new, it is the integration of these and other seemingly unrelated concepts within the frame of S-D Logic that provides a unified direction that makes S-D Logic unique and capable of offering a new perspective.

7.2 Arguments highlighting complications arising from the emerging nature of S-D Logic

Conversely, it may be argued that because S-D Logic is a new perspective, complications may arise when applying it to BI. S-D Logic is an emerging "pre-theory" (Vargo, 2011b:4) that is still fairly conceptual in nature and does not yet represent established scientific discourse that is unquestioningly accepted. While this highlights the opportunity for BI to contribute to S-D Logic as an open source body of knowledge (Vargo and Lusch, 2011a:1319), specific challenges also result from this and may potentially be carried over to BI when BI is informed by S-D Logic. In addition, as raised in the first paragraph of this section, there is currently no explicit evidence – to the researcher's knowledge – of application of S-D Logic to BI at a conceptual level. This perhaps compounds challenges resulting from S-D Logic's emergent nature when it is applied to BI. As a result, it is expected that that those applying S-D Logic to BI are likely to experience initial "teething problems" and will, like any pioneer of a new approach, bear more of the cost and effort of initial research than later adopters do.

"Teething problems" that are anticipated for BI are identified in some of the challenges raised for in S-D Logic in general. These include: ambiguity in terminology resulting in misuse of S-D Logic or misunderstandings (Hilton, 2008:105; Prahalad and Ramsaswamy, 2004; Zhao, 2008:415); residual G-D Logic connotations causing misunderstanding or inability to truly shift to S-D Logic (Normann, 2011:98); non-acceptance of S-D Logic resulting in arguments, debate and division (Randall, 2007:3) and; the need to refine S-D Logic to be more actionable, specific and measurable (Maglana, 2007; Prahalad and Ramaswamy, 2000; 2003; 2004:7).

BI may face additional challenges in terms of ambiguous terminology and residual G-D Logic connotations due to the influence that IT-type services have on BI. IT-type services fall within the scope of the practical developments of Service Science wherein it is established (in Sections 4.5 and 4.5 above) that a typical G-D Logic lexicon and approach are reflected, e.g. typically referring to and applying services rather than service and focusing on IT as a product or production process. In addition, further clarification may be needed within BI due the overlap BI has across technical and managerial aspects of practical developments within Service Science (Zhao, 2008:414). While comprehensive academic literature exists on each of these, there appears to be a need for further research on their overlap with each other, relationships and boundaries. Furthermore, there is evidence that these have not advanced at the same rate in terms of recognition, acceptance and use of S-D Logic, as evidenced by practical developments' noticeable use of G-D Logic terminology.

In light of this it is, however, still believed that S-D Logic is a viable approach for BI that offers opportunities to overcome existing BI challenges – but it is advocated that S-D Logic is adopted within BI in a realistic manner. It is advocated that S-D Logic is adopted with a realistic view of what it is and where it originated, i.e. as a conceptual framework emerging across various disciplines, offering a new perspective that can be applied to BI for BI practitioners and academics to see opportunities that are currently beyond the scope of their vision of BI. In terms of this, guiding principle 1 (5.3.1) highlights the importance of first obtaining clarity and knowledge of the BI service flow and the various environments this flows through. This provides adopters of S-D Logic with the opportunity to clarify concepts and terminology within, at least, their organisation or department that applies an S-D Logic approach.

7.3 The implication of significant paradigm shifts for participants in the BI service flow

S-D Logic presents significant paradigm shifts for those practising and studying BI that, if not successfully adapted to, could adversely impact the successful adoption of an S-D Logic approach to BI or the ability for S-D Logic to assist in overcoming BI's challenges. S-D Logic should be approached with awareness and cognisance of the key implications that it presents for BI, as raised above in Section 7.2. However, it is believed that it's worthwhile making these paradigm shifts as the benefits of making the paradigm shifts are likely to outweigh the effort and cost thereof.

Consider, for example, the high level of trust and symmetric communication that are needed to enable BI customer and BI provider to learn each other's environments and participate in co-creation of value. Although learning each other's environments as part of the full BI service flow is both advantageous and necessary (as indicated in Section 5.3.1 above), it presents a significant change with vast implications for BI customers and BI providers. For instance, an investment of resources' effort and time as well as potential disclosure of the organisation's Intellectual Property (IP), core competencies and possibly even the organisation's customers' data and information.

Additional implications of investing time and effort in this way may also result in, for example: longer-learning curves for new employees in BI provider and BI customer environments; resistance to allow new BI providers or BI customers to enter the BI value network due to rigid relationships or the establishment of cliques which may lead to future stagnation of long-term BI customer and BI provider relationships; or imbalance in the employee's work-life balance if capacity to learn other environments is not factored realistically into project schedules and capacity planning. In addition, significant investment is needed in the employee who learns multiple environments along with knowledge management practices to retain such knowledge when the employee leaves the organisation.

Another consideration is that it may not only be the BI department and their BI customers who need to shift to S-D Logic for an S-D Logic approach to be effective. Consider where the changes need to be made to performance measures such as BSCs. In an organisation such as Fortune Bank, where BSC performance measures filter from the organisation's strategy down to every level in the organisation, changes to measure value-in-use rather than value-in-exchange within BI may have to filter across many levels, potentially even upwards to strategic level. While this is a consideration that must be borne in mind by those shifting from G-D to S-D Logic for BI, it is beyond the scope of this thesis to explicitly determine whether organisation-wide change is most feasible for such a shift. Other examples of potential implications of shifting from G-D to S-D Logic are now reflected in Table 23, per role player. Role players are based on the two scenarios identified in the Case Study Introduction (Chapter 4 Part 1).

Table 23: Examples of potential implications of applying S-D Logic to BI

Key:
C/P – BI customer/provider *Scenario 1 or 2 (as per Case Study Introduction)*
C(V) – BI customer of a BI vendor *P(V) – BI provider that is a BI vendor*
P(D) –BI department as a BI provider *C(D) – BI customer of a BI department providing BI*

Implication – example of behaviour change that must take place with the shift from G-D to S-D Logic for BI	**Scenario 1**		**Scenario 2**	
	C(V)	**P(V)**	**C(D)**	**P(D)**
Focus shifts from BI technology: BI vendors' and BI providers' focus shifts to the capability to integrate skills, competence and resources to enable the BI customer to use BI. As the vendor/provider cannot provide a full service flow alone, dependencies are built on relationships with, for example, consulting firms, statisticians, users who already demonstrate capability to use BI and the BI vendor/provider becomes a BI resource integrator rather than an IT solution provider.		X		X
Revenue is earned based on realisation of value proposition and not sale of BI technology: BI vendors' and BI providers' earnings are linked to BI customer's use of the capability, i.e. realisation of the value proposition. Although this may result in increased earning potential for BI vendors/providers, it places a dependency on the BI customer's capability to co-create value. Furthermore, it should be borne in mind that ROI on BI is difficult to measure and may remain intangible, even when ROI is linked to value proposition/organisational competence.		X		X
The BI provider selects/accepts BI customers based on BI customer's potential to co-create value. This may mean that the BI provider turns some customers away until the BI customer has, for example, the business expertise or data knowledge needed in the exchange of skills and competence or identifies value propositions to assist them in creating the necessary resources, skills and competence. This may result in delays on starting BI initiatives, but compensates by avoiding delays and challenges later when necessary resources are available.		X		X
Cannot sell or implement "one size fits all" type of BI solutions: BI providers must investigate the specific BI customer environment and identify a value proposition. This implies an investment in learning the customer environment and an investment in identifying how the operant resource (not just the BI technology application or data solution) can best be created with that specific BI customer.		X		X
The point where BI value is measured changes on BI personnel's BSCs: from measuring value on a BI technology product that is delivered to measuring value-in-use and is present on BI provider *and* BI customer BSCs. This has the potential to become an organisation-			X	X

Implication – example of behaviour change that must take place with the shift from G-D to S-D Logic for BI	**Scenario 1**		**Scenario 2**	
	C(V)	**P(V)**	**C(D)**	**P(D)**
wide change.				
BI customer can no longer only accept responsibility during requirements gathering, UAT and training: An active role throughout the BI service flow is necessary to co-create value. The BI customer must accept responsibility to co-create value.	X		X	
BI customer must provide feedback during/after use: As the BI customer's experience is subjective, their potential biases or hidden agendas will influence feedback and must be kept in mind.	X		X	
Investment in learning others' environments: All role players involved in the service flow must learn each other's environments and understand the BI process and BI service flow. Potential implications arise as discussed above in this section, e.g. longer learning curve, long-term relationship, etc.	X	X	X	X

Based on the significant focus on BI technology and BI technology processes that is identified in BI's dominant BI worldview (Chapter 4 Part 3), the most significant paradigm shift is expected to be the shift from focusing on BI technology, processes and tangible technology outputs, to focusing on the BI service flow, wherein BI technology, people, processes and various other resources such as data, information, knowledge, etc. are integrated resulting in the co-creation of operant resources. Therefore, the current perceptions that are identified that BI is a technology, process, capability or product are not identified as incorrect but rather as incomplete. The shift to S-D Logic shifts the current perspective to understand that BI as a technology, process, capability or product is but one service entity, resource or component of the BI service flow.

7.4 The implication of the potential co-destruction of value

As discussed in guiding principle 5 (Section 5.3.5 above), it cannot be assumed that co-creation of value will always take place. Entities involved in the service flow may engage in co-destruction of value (Plé and Cáceres (2009:431-434), purposefully to serve themselves or for ill-intent or negligently. Measures suggested in guiding principle 5 aim to circumvent this implication for BI.

In addition, guiding principle 2 (Section 5.3.2) draws attention to BI customers' and BI providers' responsibility to consider the full service flow and the potential co-destruction that may take place should this be neglected. An example from the case study where consideration of the full service flow offers an opportunity is of Fortune Bank's organisational strategy (the Business Banking strategic measures) that reflects G-D Logic characteristics. Participants in the BI service flow may positively influence the organisation by using BI to change the organisation's G-D Logic outlook. This reflects the profound implication and potential for improvement that an S-D Logic approach to

BI presents, not just for BI exchanges but also for the full service flow across the organisation. Instead of targeting customers and treating the employee as a means of production, the organisation may apply S-D Logic to differentiate itself and present a new and compelling value proposition to its customers – thereby potentially achieving value for the ultimate customer and the organisation.

Other examples of co-destruction have already been raised and discussed in Chapter 3 Part 3 on G-D and S-D Logic's epistemology.

8. Conclusion

This chapter presents the culmination of this thesis' research, identifying how shifting BI's dominant worldview from G-D to S-D Logic can contribute to overcome BI's prevailing challenges. It starts by examining BI's dominant worldview through S-D and G-D Logic lenses. A pattern of G-D Logic is thereby identified, answering the research question "can a pattern be detected in BI's worldview characteristics revealing that BI's worldview is grounded in G-D Logic?". BI's challenges are then examined in terms of their relationship with BI's worldview and the G-D Logic characteristics that are evident in BI's worldview. This confirms that there is a relationship between BI's dominant worldview, its prevailing challenges and G-D Logic, answering the final research question of this thesis.

A conceptual shift from G-D to S-D Logic is then proposed through five key shifts that are described. BI's challenges are examined once again, this time in terms of how the proposed shifts can assist those practising and studying BI and what advantages or benefits it can result in for BI.

Rather than end at this point, conceptual approaches to apply S-D Logic to BI are suggested and described with the purpose of providing a foundation for future research. In terms of this, two theoretical concepts – the BI value coin and the BI FPs – are suggested as a base upon which pragmatic guiding principles can be applied. The BI value coin advocates that equal time and effort are spent on discovery and use activities and the BI FPs reflect core premises for BI, based on the ten foundational FPs of S-D Logic. BI's challenges are evaluated in terms of these conceptual approaches, confirming that the conceptual approaches and shifts to S-D Logic do offer new avenues and opportunities to overcome BI's prevailing challenges. Not to overlook realistic implications and possible arguments against the proposed shift from G-D to S-D Logic for BI, implications and potential arguments against such a shift are then examined.

CHAPTER 6: CONCLUSION

Overview of how research questions are answered, summary of contribution, recommendations for future research and an overall conclusion

1. Introduction

This chapter presents the conclusion to the thesis. It starts by examining key findings in terms of the secondary research questions that were asked at the outset of the research. The chapter then describes the key contributions that the thesis makes, building on the key contributions already identified in Chapter 1 in respect of existing research. Suggestions are then made for future research. Finally, this is followed by an overall conclusion, summarising the key finding of the thesis with reference to the core research question.

2. Key findings

Key findings are discussed within the structure of the research questions. Reference is made to the chapters in this thesis where questions are answered. The core research question is discussed last.

2.1 Core challenges experienced in BI

What are the core challenges currently experienced in BI?

The core challenges currently experienced in BI were investigated in the literature study in Chapter 3 Part 1 and again in the case study in Chapter 4 Part 2. Although the case study highlighted 24 detailed-level challenges in addition to the 25 detailed-level challenges that emerged in the literature study, it also supported the challenges identified in the literature study – presenting a strong correlation between the literature and case study findings on challenges.

The same main categories of challenges were identified in both the literature and case study, answering this research question on the core challenges currently experienced in BI. Core challenges currently experienced in BI are: using BI optimally; managing "big data"; integrating BI across many complex technology, data and business layers; aligning and balancing the needs of the various role players in BI; recruiting, retaining and using BI personnel and their skills effectively; getting the right sponsor in place; realising and measuring ROI; and operating in an ambiguous environment. The literature study's detailed challenges supporting this list were coded as: U1-U10; D1-D3; etc. The case study's detailed challenges supporting this list followed the same coding, except were prefixed with "CS" to denote "Case Study", e.g. CSU1, CSD1, etc.

Both the literature and case study also identified generic IS and IS project implementation challenges. After it was confirmed that these categories were identified in both literature and case study, they were excluded from the scope of the thesis – the focus of this thesis is BI's challenges rather than generic IS challenges. Core challenges and challenge categories were summarised to a more conceptual level for purposes of comparison with BI's dominant worldview in Chapter 4 Part 3 and with G-D Logic characteristics in Chapter 5.

2.2 Attempts made to address core challenges

What attempts have already been made to address BI's core challenges?

As with the question above, this research question is answered in the literature study in Chapter 3 Part 1 and again in the case study in Chapter 4 Part 2.

The literature study describes examples of attempts to address BI's core challenges as: Critical Success Factors (CSFs); Actor Network Theory (ANT); Multi-faceted solutions using CSFs; Critical Contextual Success Factors (CCSFs); BI maturity models (BI MMs); BI frameworks; and Business Intelligence Competence Centres (BICCs). It identifies that current attempts to overcome BI challenges are not entirely successful by highlighting restrictions or limitations of each attempt.

The case study identifies that current attempts seen in practice focus mainly on project and implementation activities involving implementing BI technology solutions. As with the literature study, case study participants identify measures such as BI best practices, BI frameworks and strategies, readiness and maturity assessments, etc. A key finding is that the BI customer and the BI provider are separated in their views of how to overcome BI's core challenges, both suggesting measures that fit within aspects of BI that they see only themselves to be involved in or to have control over. Another key finding is that attempts to address BI's core challenges that emerge through the case study – like those identified in the literature study – generally have limited success.

2.3 Characteristics of BI's worldview

What worldview characteristics emerge in terms of BI through perceptions, past and predicted behaviour, values, actions and source of knowledge of academics and practitioners studying and working in the field of BI?

BI's worldview is identified in the literature study in Chapter 3 Part 2 and in the case study in Chapter 4 Part 3. As with the questions above, the literature and case study both reveal insights in terms of BI's worldview characteristics that complement and support each other.

Worldview characteristics are described within the framework of the elements of a worldview based on the work from Apostel and van der Veken (1991); Funk (2001); Heylighen (2000); and

Vidal (2008:4-6). Elements consist of: ontology; explanation; prediction; axiology; praxeology; and epistemology. A summary of BI's worldview, referencing the literature and/or the case study as the source of each worldview characteristic, is reflected in Table 16 in Chapter 4 Part 3. It is not repeated here as a result of the length of this table.

A key finding is that BI is typically perceived in one or a combination of ways, namely, as a: technology; process; product; or capability.

2.4 Differences in worldview characteristics between BI customer and BI provider

> *Are there differences in the worldview characteristics (including perceptions) that are held by BI customers versus BI providers?*

Answers to this research question stem from Table 16 in Chapter 4 Part 3, where the literature study findings on BI's worldview characteristics (found in Chapter 3 Part 2) are consolidated and compared with those of the case study.

Some differences emerge in how BI providers and BI customers see and understand BI. BI providers' dominant perception is that BI is a technology or a process, with BI providers defining BI as a technology more than BI customers do. BI customers' dominant perception is that BI is a process. A key finding is that both BI customers and BI providers understand BI in terms of the organisation's processes and rules (syntactically) rather than in terms of the organisation's environment and context (semantically).

Another key finding is that BI providers (both BI vendors and BI departments) typically have IT, Engineering and Science backgrounds while BI customers (excluding the BI departments as customers of BI vendors) typically have Business, Finance and Accounting background. It is established that these diverse BI customer and BI provider backgrounds create a gap between BI customer and BI provider in terms of their competencies. In addition, BI customer and BI provider are observed to focus restrictively on their lack of knowledge of each other's expertise rather than on sharing their expertise.

These differences appear to affect the BI customer's participation in the BI process, as BI customers typically only participate in BI solution development when required to by a BI provider. They also appear to affect the BI provider's levels of frustration with the BI customer, resulting from the BI provider's perception that BI customers "meddle" and the BI provider's desire to spend more time on BI discovery activities.

2.5 A typical or dominant worldview for BI

> *Do the worldview characteristics identified for BI constitute a typical or dominant*

worldview that is currently held of BI by these academics and practitioners?

A dominant worldview is compiled in Chapter 4 Part 3 based on literature and case study findings. Each worldview element that emerges in the literature and case study is discussed and a summarised table is presented where worldview characteristics are listed per worldview element. Worldview characteristics are flagged to indicate whether the finding occurs in the literature or case study, or both the literature and case study. While some findings emerge in the case study alone and others in the literature study alone, literature and case study findings are largely congruent and do not contradict each other. A common or dominant worldview held by BI academics and practitioners can therefore be seen to emerge.

Further to this, although there are certain differences between insights to BI's worldview from BI provider and BI customer case study participants – as discussed in 2.5 above – it can also be observed that as these views do not contradict each other, they also contribute towards a common or dominant worldview for BI.

2.6 BI's dominant worldview grounded in G-D Logic

Can a pattern be detected in BI's worldview characteristics, revealing that BI's worldview is grounded in G-D Logic?

Chapter 5 addresses this research question by analysing BI's dominant worldview through S-D and G-D Logic lenses. This analysis reveals that G-D Logic is inherent in each of BI's worldview elements, confirming that there is a pattern whereby it can be seen that BI's dominant worldview is grounded in G-D Logic. G-D Logic characteristics are indicated in a summary view of BI's dominant worldview, where the G-D Logic characteristics that emerge in BI's worldview are grouped into five main categories. These are: value-in-exchange (A); compete through goods and their features (B); separation of BI customer and BI provider (C); focus on means, production and producer (D) and; services in the context of G-D Logic (E).

Each of these categories is discussed in terms of the BI worldview element wherein the G-D Logic emerges. Reference is made to G-D and S-D Logic literature, which is applied to the dominant BI worldview that was compiled in Chapter 4 Part 3 based on the literature and case study.

2.7 The relationship between BI's dominant worldview, its challenges and G-D Logic

Is there a relationship between BI's dominant worldview, its prevailing challenges and a grounding in G-D Logic?

This research question is addressed in two chapters – Chapter 4 Part 3 and Chapter 5. Both chapters confirm that there is such a relationship.

Chapter 4 Part 3 establishes that there is a relationship between BI's worldview and BI's prevailing challenges. BI challenges are tabulated (at a conceptual level, per worldview perception (technology, process, etc.)) and are linked to BI worldview characteristics (using the coded references for this, e.g. 1, 2, 3, etc.) as well as the detailed-level of BI's prevailing challenges (using these coded references, e.g. U1, D1, CSA6, etc.). As each challenge and worldview characteristic can be directly or indirectly linked in this way, this establishes that BI's dominant worldview contributes towards the occurrence of its prevailing challenges.

Chapter 5 then establishes that there are inherent G-D Logic characteristics in each of BI's worldview elements, from which it logically follows that this inherent G-D Logic contributes to the prevalence of BI's challenges. Chapter 5 then takes this reasoning further as it also examines BI's prevalent challenges using G-D and S-D Logic lenses. It does this once again at the conceptual level of the challenge, per BI worldview perception – as done in Chapter 4 Part 3. This analysis reveals that there are common G-D Logic characteristics in BI's dominant worldview and BI's prevailing challenges.

Chapter 4 Part 3 and Chapter 5 reflect this relationship at the level of BI worldview element and conceptual challenge and link to the detailed levels through the coded references to worldview characteristics and detailed level challenges. Appendix H reflects this at detailed levels of BI worldview characteristic and detailed level challenge.

2.8 New avenues to overcome BI's prevailing challenges

> *By shifting the worldview that currently dominates BI from a conceptual grounding in G-D Logic to a conceptual grounding in S-D Logic, are new avenues to overcome BI's prevailing challenges opened for those who practice or study BI?*

This is the core research question of this thesis. The answer to this question builds up through a number of chapters across the thesis. For instance, the worldview that currently dominates BI is identified in the literature study in Chapter 3 Part 2 and in the case study in Chapter 4 Part 3. Furthermore, the inherent grounding that this worldview has in G-D Logic is identified and described in Chapter 5. This core research question is, however, specifically addressed in Chapter 5 where new avenues to overcome BI's prevailing challenges are proposed in the form of the description of the conceptual shift from G-D to S-D Logic for BI. This is then substantiated with suggestions of a conceptual approach as well as a pragmatic approach to apply S-D Logic to BI.

The core research question is discussed again in the overall conclusion (Section 5 below).

3. Contribution

Although the contribution has already been discussed in Chapter 1, it is necessary to revisit the contributions and key insights to conclude this research.

3.1 Contributions identified in Chapter 1

Chapter 1 identifies key contributions that this thesis makes to existing research. These include: contributions towards understanding BI's specific challenges as well as understanding BI at a broader and more conceptual level; identification of a dominating BI worldview as a unique approach (to the knowledge of the researcher) to examine BI, providing novel insight to the discipline of BI and; analysis of the dominant BI worldview through G-D and S-D Logic lenses.

Contributions towards understanding BI's specific challenges are provided in the literature and case study on BI challenges in Chapters Three Part 1 and Four Part 2. The contributions towards understanding BI at a broader and more conceptual level as well as identification of a dominating BI worldview are provided through analysis of how BI is perceived, contextualised and what worldview characteristics emerge through the views and voices of academics and practitioners (including BI customers and BI providers). This is provided in the chapters on BI's worldview in Chapter 3 Part 2 and Chapter 4 Part 3. Finally, analysis of BI's dominant worldview through G-D and S-D Logic lenses is provided in Chapter 5, a theoretical foundation of G-D and S-D Logic is provided in Chapter 3 Part 3. A novel approach is used for the latter, namely, explanation of G-D and S-D Logic using the elements and framework of a worldview.

3.2 Additional contributions and key insights

In addition to these contributions, this thesis offers a few specific insights as contributions towards BI practice and theory. Firstly, the thesis draws attention to the fact that many of the BI challenges consistently raised in literature and practice (through the literature and case study) are in fact generic IS – or even IT – challenges. In doing so, it unearths the insight that BI is frequently understood narrowly (and restrictively) as an IS or an IT within an IS. This insight aligns with another key insight, namely that BI academics and BI practitioners tend to see BI in terms of four typical perceptions – technology, process, product or capability – and from the perspective of the organisation (syntactically) rather than in the context of the organisation's environment (semantically).

Secondly, by analysing BI's challenges, this thesis contributes a consolidated list of BI's challenges, an overview of current measures taken to address BI challenges and a comparison of BI challenges with BI CSFs (where CSFs represent one of these measures). While the list of BI challenges does not purport to be an exhaustive list, it provides a current view of challenges that BI and related disciplines face according to literature and practice. In terms of this, a key insight is that – at a conceptual level – BI and related disciplines, methodologies and solutions are primarily aimed at addressing the same long-standing managerial issues but do not consistently do so, resulting in challenges. Various tools, methodologies and even disciplines have emerged over the years which can be seen, at a conceptual level, to be aimed at these long-standing managerial issues, e.g. DSS, EIS, MIS, BI, analytics, etc. Examples of the long-standing managerial issues are: decision-making and analysis of the organisation to improve performance, save costs, compete, increase profits and predict trends. Organisations report that they are data rich but information poor, that they lack actionable information needed for decision-making and that they experience many challenges in this regard.

A third contribution emerges through analysis of BI's dominant worldview and challenges through G-D and S-D Logic lenses in Chapter 5. This contribution provides the insight that there is a relationship between BI's dominant worldview, its prevalent challenges and G-D Logic. More specifically, it provides the insight that there is an inherent G-D Logic in BI's dominant worldview which contributes to the prevalence of its challenges.

A fourth contribution in this regard is the thesis' recommendation of a conceptual approach to shift BI's dominant worldview from G-D to S-D Logic. The conceptual approach includes both a theoretical foundation (the BI value coin and the ten BI FPs) and a pragmatic set of guiding principles. Both the anticipated benefits and the potential implications of shifting BI's dominant worldview from G-D to S-D Logic are also discussed in this thesis as a contribution to literature and practice. The aim of this is that the recommended conceptual approach is applied and tested with these benefits and implications in mind. This provides scope for future research, discussed next.

3.3 Key academic contributions

This thesis is grounded within the domain of IS research and is conducted according to accepted IS research practices and methodologies. It is therefore necessary to clarify the key academic contributions that this thesis makes. Key academic contributions are identified as twofold, where both key academic contributions are seen to assist in developing a better understanding of the theory that underpins the BI domain.

Firstly, this thesis provides a novel perspective from which to view BI. As this is currently unavailable in the literature, it provides a new opportunity for BI discourse to move conceptually into this socio-technical domain. Secondly, from another angle, it extends S-D Logic discourse to the domain of BI, highlighting conceptual approaches to as well as implications of applying S-D Logic within this domain.

4. Future research

The following opportunities for future research are identified in this thesis:

- This thesis provides a conceptual analysis of BI through G-D and S-D Logic lenses as a foundational step to apply S-D Logic to BI. It is therefore recommended that future research uses this foundation to analyse BI in the context of G-D and S-D Logic at more detailed levels. Suggestions in this regard are:

  - Focus on individual S-D Logic FPs or groupings thereof in terms of how they can specifically be applied to BI, as recommended by Vargo (2012a). One suggestion is to focus on the co-creation of intelligence or insight as an operant resource within a complex value network to improve competitive advantage (FP 4). A second suggestion is to focus on involvement of the BI customer to co-create value (FP 6 and 10).
  - Investigate using the intelligence or insight that is co-created in the BI service flow to provide service to the customer of the organisation. For example, by mining customer data to better understand customer context and environment through data on customer interactions (amongst other things) with the aim of achieving effectiveness and sustainability rather than simply efficiency gains, as suggested by Vijayaraghavan et al. (2011:302-304).
  - Investigate whether any S-D Logic characteristics emerge in a dominant BI worldview in other environments or under other conditions than reflected in this thesis. If these do emerge, an interesting enquiry would be to investigate how to enhance S-D Logic characteristics in such an environment. It could also be interesting to analyse the resulting benefits or whether G-D and S-D Logic characteristics – assuming both emerge – can co-exist within a BI environment or organisation without resulting in the creation of separate factions or other tensions.
- An enquiry is suggested to investigate and compars what may be considered predecessor or related concepts or paradigm shifts such as customer-orientation, user-centric design or even service-oriented design and Software as a Service (SaaS) in context of the approach suggested in this thesis and in the context of S-D Logic. This may even be extended beyond BI and IS to the organisation, for example, consider paradigm shifts such as: from in-house specialisation of a function to outsourced services; or from mass production to mass customisation. Such an enquiry could provide a focused view of a specific paradigm shift in terms of what has already been performed, what is already un/successful and how lessons from this history can be brought forward (potentially from the IS or BI domain) into S-D Logic or the BI worldview proposed herein.
- This thesis identifies that the BI service flow spans the organisation and even extends beyond the organisation to suppliers, the organisation's customers, etc. An enquiry is suggested to determine whether the BI service flow can benefit from an S-D Logic approach if S-D Logic is applied only within a team, a department, the organisation or whether it must be applied across the full BI service flow to be effective. Another avenue of investigation may potentially be the supply chain, which may be seen to represent a series of business processes and organisational competences on which BI/data may be gathered and used (Luhn, 1958:315). Lusch (2011:15) suggests that IT is perhaps the meta-force altering business, society and the practice of Supply Chain Management (SCM). This can potentially be extended from IT to BI, specifically because of this relationship between BI, business processes/competences and the supply chain.
- Validation or testing of the conceptual approaches recommended in Chapter 5 to shift BI's dominant worldview from G-D to S-D Logic is not within the scope of this thesis. A suggestion

is therefore to test these. This could potentially be done in a case study in an environment where G-D Logic is identified as a significant influence, or in a comparative case study of a large and a small organisation. Such tests have the potential to confirm whether the benefits of making the paradigm shifts from G-D to S-D Logic outweigh the effort and cost thereof and may identify different opportunities or challenges subject to the size of the organisation.

- Further research into improving the ability to measure BI's ROI is recommended using the approach highlighted by S-D Logic and described in the guiding principles in Chapter 5. I.e. where BI customers link BI investments to their processes and BI providers link BI value propositions to the organisation's core competences.
- Research is suggested on the application of Service Science – including Service Systems Theory, S-D Logic and even the practical developments of Service Science – to BI. A suggestion is to examine the BI service flow as a Service System.
- Aspects of S-D Logic that could potentially be better understood by applying S-D Logic to BI present further research opportunities. For example, parallel processes whereby co-creation processes take place to turn an operand into an operant resource from an S-D Logic viewpoint alongside BI processes turning data into information, knowledge, intelligence, insight, etc.

5. Overall conclusion

This thesis started by asking the core research question:

> *By shifting the worldview that currently dominates BI from a conceptual grounding in G-D Logic to a conceptual grounding in S-D Logic, are new avenues to overcome BI's prevailing challenges opened for those who practice or study BI?*

It is now possible – based on the analysis and findings reflected in the preceding chapters – to conclude that new avenues to overcome BI's prevailing challenges are presented by shifting BI's dominant worldview from its conceptual grounding in G-D Logic to a conceptual grounding in S-D Logic. Preceding chapters reveal the G-D Logic inherent in BI's dominant worldview and how this contributes towards the occurrence of BI's prevailing challenges. As a result, key shifts are recommended for BI to shift from this G-D Logic to an S-D Logic. Advantages that this can potentially result in are identified along with analysis of how BI's prevailing challenges may be overcome through such a shift.

A recommendation is therefore made that the five key shifts from G-D to S-D Logic that are proposed for BI in Chapter 5 are made using the conceptual approach suggested. As identified in Chapter 5, this has the potential to assist those practicing and studying BI to overcome BI's prevailing challenges.

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APPENDIX A: GLOSSARY

Glossary of terms

1. Introduction

Table 24 provides a consolidated list of definitions for key terms that are relevant to this thesis. Although a number of definitions are available for each term, these definitions align to the way the term is used in this thesis, as a way of providing context and understanding for this thesis.

2. Glossary of terms

Table 24: Glossary of terms

Term	Definition
Analytics	Analytics is perceived in the same way as BI for the purpose of this thesis, i.e. as a series of exchange activities (or part thereof) that take place to enable actionable decision-making. A formal definition is: The extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions. Analytics may be input for human decisions or may drive fully automated decisions (Davenport and Harris, 2007:7).
Axiology	Theory of values. Provides direction, purpose, goals to guide actions, measure of value (Apostel and van der Veken, 1991).
Balanced scorecard	A strategic management system that connects activities to strategic goals and measures how they contribute to achieving those goals. Devised by management theorists Robert Kaplan and David Norton (Williams and Williams, 2007:200).
BI customer	Entities that seek to receive benefit (e.g. the ability to use actionable information/intelligence for decision-making) in exchange for reward, reimbursement or payment, through relationships they engage in with BI providers.
BI environment	All social, economic and technical resources and components that are directly or indirectly involved in the creation of data, information, knowledge and/or intelligence that is or may be used to inform and support decision-making. Although the BI environment may be contained within an organisation, it typically extends beyond the boundaries of the organisation, e.g. integrating external data, the organisa-

Term	Definition
	tion's environment as well as extending to include relationships with suppliers, customers, etc.
BI Guiding Principle (BI GP) (in terms of this thesis and S-D Logic)	A term used in the context of this thesis to refer to guidelines or values that can be applied to the practice of BI to assist BI to shift from an inherent G-D Logic to S-D Logic.
BI initiative (also see BI solution and BI project)	Also referred to by the researcher as a BI project or BI solution. See BI solution for definition.
BI market	Market (exchange) activities resulting in provision or acquisition of a solution, technology, process, tool, methodology, capability, etc. that enables an organisation to make decisions needed to conduct business. The BI market has BI customers (e.g. organisations purchasing BI solutions) and BI providers (e.g. vendors).
BI project (also see BI solution and BI initiative)	Also referred to by the researcher as a BI solution or BI initiative. See BI solution for definition.
BI provider	Entities that seek to receive reward, reimbursement or payment and aim to provide the BI customer with benefit.
BI solution (also see BI project and BI initiative)	An integrated set of resources and components (social, economic and/or technical) that jointly can potentially offer the opportunity for someone or something that uses it (i.e. this integrated set of resources and components) to gain access to data or information or to co-create data, information, knowledge and/or intelligence that may be used to inform and support decision-making. A BI solution may be created as part of a BI project or initiative. It is therefore also referred to as a BI project or BI initiative in this thesis by the researcher.
BI value coin	A concept based on Spohrer's (2008:17) "innovation coin" that is applied to BI in this thesis. In terms of this, "discover" and "use" are two sides of the same coin, both of which are necessary for the co-creation of BI value to be possible. Discover activities consist of any activities involved in acquiring, generating, processing data, information, intelligence, etc. or the activities involved in developing the applications, tools, etc. Use activities involve any activities that use this data, information, intelligence, etc. E.g. decision-making.
BI vendor landscape	A term often used to describe the technology landscape of BI, including, for example: the vendors and their characteristics, their products

Term	Definition
	and product packaging, etc. (InfoTech, 2012:3-9).
Big data	A term used to describe the massive volumes of structured, unstructured and semi-structured digital data that the organisation generates (McKinsey, 2011).
Business Intelligence (BI) Note: Although the intention of this thesis is not to provide another definition for BI, it is important that BI is understood as it is used in the context of this thesis.	As discussed in the Literature Study, BI may be understood from one or a combination of perspectives. For example, it may be understood to be a technology, process, product or capability. This thesis suggests that a broader view is taken and that BI is perceived as a service. In accordance with this, BI is seen as a series of exchange activities (services) performed by various human and technological actors, for the purpose of enabling informed and actionable decision-making. In terms of this view, BI is seen to include the following, insofar as these are involved in or contribute towards the exchange of information and intelligence that enable decision-making needed for the conduct of business: • the full BI process (from data collection, ETL up to presentation and decision-making activities); • the various terms that are used to describe more or less the same concept, e.g. market intelligence (or marketing intelligence), competitive intelligence (as stated by Venter and Tustin, 2009:89), customer intelligence, product intelligence, etc. and; • the various solutions, technologies and methodologies that may be used interchangeably to refer to BI or subsets/over-arching concepts of BI, e.g. DSS, EIS, MIS, reporting, analytics, CI, IM, CPM, etc. Although it is recognised that there are various debates on the relationship between these terms, this debate is not entered within this thesis.
Business Intelligence (BI)	As above (first definition in table).
Business Intelligence Competence Centre (BICC) (Also referred to as Centre of Excellence	A specialised unit or corporate team of cross functional members with specialised competences in interrelated disciplines, established formally or informally to conduct and support BI solutions, connecting the business and technical worlds of BI (Baars *et al*., 2009:2; Breddam and Day, 2008:6; Cognos, 2008:4; Eckerson, 2011; HP, 2009:5).

Term	Definition
(COE), Competency Centre or Centre of Knowledge)	
Centre of Excellence	See BICC.
Challenge	A new or difficult task that tests ability and skill (Hornby, 2005:231).
Competency Centre	See BICC.
Competitive Intelligence (CI)	CI is perceived in the same way as BI for the purpose of this thesis, i.e. as a series of exchange activities (or part thereof) that take place to enable actionable decision-making. A formal definition is: Actionable recommendations arising from a systematic process involving planning, gathering, analysing and disseminating information on the organisation's external environment for opportunities, or developments that have the potential to affect the organisation's competitive situation (Pelsmacker *et al*., 2005:607).
Corporate Performance Management (CPM)	CPM is seen to be part of the series of exchange activities that take place to enable actionable decision-making, as per the BI definition above. A formal definition is: All of the processes, methodologies, metrics and systems needed to measure and manage the performance of an organisation (Andersson, Franzén, Fries, 2008:2).
Customer Relationship Management (CRM) (Also referred to as Relationship Marketing)	CRM is seen to be part of the series of exchange activities that take place to enable actionable decision-making, as per the BI definition above. A formal definition is: A strategic approach concerned with creating improved shareholder value through the development of appropriate relationships with key customers and customer segments. CRM unites the potential of relationship marketing strategies and IT to create profitable, long-term relationships with customers and other key stakeholders. CRM provides enhanced opportunities to use data and information to both understand customers and co-create value with them (Payne and Flow, 2005:168).
Dashboard (also known as scoreboard)	A user interface that organises and presents information in an easy-to-read format – with visual similarities to a car's dashboard – by tracking and analysing key business metrics and goals. Dashboards and scoreboards enable proactive management via "what-if" analysis, customer segmentation, forecasting and analysing data from business

Term	Definition
	processes (Business Objects, 2008).
Data	A set of discrete, objective facts about events. In an organisational context, data is most usefully described as structured records of transactions (Davenport and Prusak, 1998:2). Raw facts about people, places, events and things of importance in an organisation. On its own, each fact is relatively meaningless (Whitten and Bently, 1998:21).
Data cleansing	The removal of inconsistencies, errors, and gaps in source data prior to its incorporation into data warehouses or data marts. Data cleansing facilitates data integration and improves data quality (Williams and Williams, 2007:201).
Data mart	An architectural extension of the data warehouse (Inmon, 1996:50). It is a data structure optimised for access. It is designed to facilitate access, through a single analytic application, to a specific set of end users who need to analyse specific sets of data (Williams and Williams, 2007:201).
Data mining (Also see Data mining software)	The discovery of meaningful new patterns, relationships and trends in large volumes of data stored in a database or data mart by using pattern recognition technologies and statistical and mathematical techniques (Mattison, 2001:181).
Data mining software (Also see Data mining)	Data mining software uses technologies such as neural networks, rule induction and clustering to discover relationships in data and make predictions that are hidden, not apparent, or too complex to be extracted using statistical techniques (Machanick, 2005:11).
Data warehouse	A data structure that is optimised for distribution. It collects and stores integrated sets of historical data from multiple operational systems and feeds them to one or more data marts (Williams and Williams, 2007:201). It provides central storage of data to support decision-makers in decision-making processes (Andersson, Fries, Johansson, 2008:3).
Decision Support System (DSS)	In terms of this thesis, DSS is perceived in the same way as BI, i.e. as a series of exchange activities (or part thereof) that take place to enable actionable decision-making. A formal definition is: A computer-based information system with the primary purpose of providing knowledge workers with information on which to base informed decisions (Mallach, 2000:13).
Discover/knowledge	See BI value coin and Innovation coin.

Term	Definition
discovery	
End user query and reporting tools	Tools that are designed specifically to support ad hoc data access and report building by even the most novice users (Machanick, 2005:11). These may refer to the collection of tools that analyse, query and present information targeted to support a business need (Kimball *et al*., 1998:21). These seen to be part of the series of exchange activities that take place to enable actionable decision-making, as per the BI definition above.
Epistemology	Theory of knowledge. Source of knowledge (Apostel and van der Veken, 1991).
Exchange	The act of giving and receiving (Hornby, 2005:506). The concept of exchange may be applied to the economic act of exchange, whereby exchange takes place for an economic purpose, e.g. an act of exchange in the market for financial gain. It may also be applied to a social exchange, e.g. within a family or group of friends – without financial gain or economic purpose.
Executive Information System (EIS)	In terms of this thesis, EIS is perceived in the same way as BI, i.e. as a series of exchange activities (or part thereof) that take place to enable actionable decision-making. A formal definition is: Data access and analysis tools that employ drill down, trending, and exception reporting navigation and analysis features (Machanick, 2005:11).
Extract, Transform, Load (ETL)	The process of extracting data from different sources, converting it into an appropriate format and loading the data into a data warehouse (Andersson, Fries, Johansson, 2008:3). This is seen to be part of the series of exchange activities that take place to enable actionable decision-making, as per the BI definition above.
Fact-based decision	Use of objective data, analysis and – wherever possible – scientific method to guide decision-making using a rational and fair-minded process that is not coloured by conventional wisdom or personal biases (Davenport *et al*., 2010:176).
Foundational Premise (FP) (in terms of S-D Logic)	The ten FPs of S-D Logic are concepts that underpin the S-D Logic mindset by establishing a framework for a service-centred mindset (S-D Logic, 2012).
G-D Logic	G-D Logic is a lens, mindset, worldview or philosophy according to which the notion of exchange is viewed. It is a term brought about by

Term	Definition
	Vargo and Lusch in response to their perception that a shift is needed from traditional manufacturing-oriented (Lusch *et al*., 2008:11) views of exchange. G-D Logic's focus is on production and distribution of saleable goods, embedded with utility and value during the production and distribution processes. It promotes value-in-exchange and a separation of producer and consumer (Gummesson, 1995:250; Vargo and Lusch, 2006:51; Normann, 2001:99; Vargo and Lusch, 2006:14). It focuses on the product (technology), means, producer and production (Vargo and Lusch, 2004a:8; Vargo and Lusch, 2006:18).
Guiding Principle (also see Principle and BI GP)	Any accepted principle or precept that guides an organisation throughout its life in all circumstances, irrespective of changes in its goals, strategies, type of work, or the top management (The Business Dictionary, 2012).
Information	Sets of data presented in a context. Information about the organisation and its environment (Williams and Williams, 2007:201). Data that has been processed or reorganised into a more meaningful form for someone. Information is formed from combinations of data that have meaning to the recipient (Whitten and Bently, 1998:21).
Information and Communication Technology (ICT)	Technologies that provide access to information through telecommunications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication mediums (Tech Terms, 2012).
Information Management (IM)	IM is perceived in the same way as BI for the purpose of this thesis, i.e. as a series of exchange activities (or part thereof) that take place to enable actionable decision-making. A formal definition is: IM consists of identifying what information is needed, how it should be gathered, how it should be organised, where it should be stored and who in the organisation should have access to it. The goal of IM is to maximise the usefulness of information resources and to assess these resources' value when making business decisions (Pirttimäki, 2007:3).
Information Systems (IS)	An integrated set of components for collecting, storing, and processing data and for delivering information, knowledge, and digital products (Encyclopedia Britannica, 2012). An IS may not necessarily include technology.
Information Technology (IT)	The technology used for the study, understanding, planning, design, construction, testing, distribution, support and operations of software, computers and computer related systems that exist for the purpose of

Term	Definition
	Data, Information and Knowledge processing. The industry that has evolved to include the study, science, and solution sets for all aspects of Data, Information and Knowledge management and/or processing. The department in an organisation that is held responsible and accountable for the technology used for planning, design, construction, testing, distribution, support and operations of software, computers and computer related systems that exist for the purpose of Data, Information and Knowledge management and/or processing (The International Foundation for Information Technology, 2012).
Information worker (also referred to as Knowledge worker)	Describes people with jobs that involve the creation, collection, processing, distribution and use of information (Whitten *et al*. 1986:40).
Innovation coin	Spohrer (2008a:417) explains that knowledge discovery (as part of the knowledge economy) and the application of knowledge to create value (as part of the service economy) are just two sides of the same coin (the innovation economy). He explains that activities on both sides have to take place for innovation to be possible – comparing these to two sides of a coin which he calls the "innovation coin".
Intelligence	Analysed information (Fuld, 1995:23). As an activity, it is the pursuit of a certain kind of knowledge. As a phenomenon, it is the resultant knowledge (Kent, 1966:vii). In terms of BI, various types of intelligence are identified. E.g. CI, market (or marketing) intelligence, customer intelligence, etc.
Knowledge	Experience, facts, rules, assertions and concepts about those subject areas that are crucial to the business (e.g. customers, markets, processes, regulations). Knowledge is a key resource in intelligent tasks such as decision-making, assessment, forecasting, design, planning, diagnosis and analysis (Parlby and Taylor, 2000). Data and information that are further refined based on facts, truths, beliefs, judgments, experiences and expertise of the recipient (Whitten and Bently, 1998:21).
Knowledge management	The identification, optimisation and active management of intellectual assets, either in the form of explicit knowledge held in artifacts or as tacit knowledge possessed by individuals or communities (Snowden,

Term	Definition
	2000:8-9).
Knowledge worker (also referred to as Information worker)	See Information worker.
Management Information Systems (MIS)	MIS is seen to be part of the series of exchange activities that take place to enable actionable decision-making, as per the BI definition above. A formal definition is: Information systems used to analyse and solve business and management problems (Andersson, Fries, Johansson, 2008:3; Laudon and Laudon, 2007:44).
Marketing Intelligence (also may be referred to as Market Intelligence)	Marketing Intelligence is seen to be part of the series of exchange activities that take place to enable actionable decision-making, as per the BI definition above. A formal definition is: The process of acquiring and analysing information in order to understand the market (both existing and potential customers); to determine the current and further needs and preferences, attitudes and behaviour of the market; and to assess changes in the business environment that may affect the size and nature of the market in the future (Cornish, 1997:147).
Metadata	Data about data (Goede, 2005:140), i.e. data describing data or content. All the information in the data warehouse that is not the actual data itself (Kimball *et al*., 1998:22).
Online Analytical Processing (OLAP)	OLAP is seen to be part of the series of exchange activities that take place to enable actionable decision-making, as per the BI definition above. It specifically refers to the general activity of querying and presenting text and number data from data warehouses (Kimball *et al*., 1998:21). Decision support software that allows the user to quickly analyse information that has been summarised into multidimensional views and hierarchies. OLAP tools are used to perform trend analysis on sales and financial information (PC Mag Encyclopedia, 2012).
Ontology	Model of reality (what is/what's perceived) as a whole (Apostel and van der Veken, 1991).
Operand resource	Resources that are tangible, static and upon which action must be taken for them to be of use (e.g. coal) (Lusch and Vargo, 2005:91-92).
Operant resource	Resources that are typically intangible, are dynamic and typically par-

Term	Definition
	ticipate in the value co-creation process (e.g. knowledge) (Lusch and Vargo, 2005:91-92).
Praxeology	Theory of actions. General principles according to which actions should be organised (Apostel and van der Veken, 1991).
Principle	A rule or general standard adhered to in most areas of human conduct. A principle can be an ethical declaration, as in “do unto others as you would have them do unto you” (Friedman, 2007:521).
Process Intelligence (PI)	PI is seen to be part of the series of exchange activities that take place to enable actionable decision-making, as per the BI definition above. A formal definition is: Analysis of data – through business process management and traditional BI techniques – to discover actionable business insights across business processes (Bosilj-Vuksic and Indihar-Stemberger, 2008:339).
Product intelligence	Information or intelligence pertaining to an organisation’s products.
Relationship Marketing	See Customer Relationship Management (CRM).
Reporting	Electronic or physical documentation providing relevant information on a particular topic. Reports can be standard or ad hoc. For example, monthly financial reporting on the health of the organisation.
Scoreboard	See Dashboard.
Service	In terms of S-D Logic, service is defined as the application of competences (skills and knowledge) through deeds, processes and performances for the benefit of another entity or the entity itself (Vargo and Lusch, 2004b:324-335; Lusch, Vargo, 2008).
Service computing	A domain of computer science and engineering in establishment as the disciplines expand their curricula to incorporate services (Spohrer and Maglio, 2008:242). It may be considered to be an extension of the object-oriented approach that attempted to make computing more manageable, collaborative and its components reusable.
Service management	A cross-industry discipline that focuses on the organisational, quality and customer perspective of service. It examines the activities and interactions between customers and providers, the contribution service makes in the customer’s world from the customer perspective and how this can be improved. Its use within operations management, supply change management and even IT is well-known. Within IT, where it is referred to as IT Service Management (ITSM), it structures the IT activities with technical and business users in the most optimal

Term	Definition
	way (Spohrer *et al.*, 2007:71; 2008:4)
Service orientation	The bridge between Service Management and Service Computing. It labels services as components with clearly defined behaviours and interactions. Service components are clearly defined, scoped, autonomous and decentralised so that they are able to interact with each of the other service components – at an agreed cost – through formal share schemas and contracts (Zhao, 2008:415).
Service science	A multidisciplinary research and education effort (some accredit this to IBM – e.g. Barile and Polese (2009:3)) to study the methodology and technology for service innovation, design and delivery (Lin and Chang, 2009:429). Service science studies the Service System.
Service system	Value co-creation configurations of people, technology, value propositions connecting internal and external systems and shared information (e.g. language, laws, measures and methods) (Maglio and Spohrer, 2008:18). Service systems are connected to each other in value networks, forming mutually-beneficial agreements with each other by means of value propositions (Spohrer *et al.*, 2008:9). Service systems exist in populations of Service Systems which, in turn, form part of a service ecology (also referred to as a service world or universe) (Spohrer and Kwan, 2009:3).
Service system entities	Dynamic configurations of resources, including at least one resource with rights (e.g. owned outright, leased/contracted, etc.) (Spohrer and Kwan, 2009:3). Service system entities may consist of people, technology, other internal and external Service Systems and shared information (Spohrer *et al.*, 2007:72; Spohrer and Kwan, 2009:2).
Service systems worldview	A view that the world consists of populations of normatively interacting Service System entities such as people, businesses, government agencies, nations, cities, hospitals, universities, etc. interacting via value propositions with the purpose to co-create value (although disputes do also frequently arise) (Spohrer and Kwan, 2009:2-4).
Service-Dominant (S-D) Logic	S-D Logic is a worldview, mindset or a lens through which exchange (service) can be viewed. It complements Service Systems theory and provides the philosophical foundation for Service Science. Its central tenet is that service is the basis of exchange. By this, what is meant is that when an exchange takes place, service is exchanged for service (Bastiat, 1848:161-162; Walras, 1894:225; Vargo, 2009b:374). S-D Logic perceives that exchange consists of a sequence of activities, i.e. a flow of service. Customer and supplier collaboratively interact with each other, and with other economic and social actors who are

Term	Definition
	also directly or indirectly involved in the exchange, to deliver a service (Vargo and Lusch, 2004b:324-335; Lusch and Vargo, 2008).
Spreadmart	A spreadsheet improperly used to house large amounts of important data (HP, 2009:7).
Structured Query Language (SQL)	Industry standard database access protocol introduced by researchers at IBM in the 1970s in the context of relational database management systems (Business Objects, 2008).
Use or knowledge application	See BI value coin and Innovation coin.
Value network	A connected community held together by competences, relationships and information (Lusch *et al*., 2009:22). A value network may also be referred to as a value constellation, Service System network or value chain. A value network is much the same as a social network, except that a value network extends to include organisations (Lusch and Vargo, 2006).
Value proposition	A reciprocal promise of value (Ballantyne and Varey, 2006:334-5), that leads to value co-creation (a win-win outcome) or disputes (either a lose-lose or lose-win outcome) (Spohrer *et al*., 2008:9; Spohrer and Kwan, 2009:4).
Worldview	A set of images (structures or schemas) and assumptions about the world (Kearney, 1984:10; 47). A conceptual framework through which perceptions are screened (Meehan, 1968:41).

APPENDIX B: INTERVIEW QUESTIONS

Interview questions used during Fortune Bank case study interviews

1. Introduction

The following sections provide the broad outline that was used as a basis to interview Fortune Bank staff members as part of the case study. The researcher played the role of the interviewer, conducting all the interviews herself. Questions are applicable to all respondents, except where this is specifically indicated to be otherwise. The questions served to provide guidelines, rather than as a rigid structure which may have imposed on the flow of the interview. An indication of the questions asked during the 2012 follow-up discussions is provided at the end of the list of original interview questions.

Questions reflected in tables below, where the whole row is grayed-out, were answered by the researcher before or after the interview. Informal guidelines that the researcher prepared before conducting the interviews are indicated in italics within this Appendix.

The purpose of the interviews was to gain an understanding of the interviewee's viewpoints and opinions on the questions listed below, to assist to answer the main research questions of the thesis.

2. Interview questions

Section A: Background and administrative details	
1. Date and time:	
2. Place:	
3. Interview type:	
4. Role:	

Section B: Personal details	
1. Name:	*Anonymous. Recorded for further questioning, if needed.*
2. Email address for feedback:	*Anonymous. Recorded for further questioning, if needed.*
3. Job Title:	
4. Role:	*For example Strategic; Operational.*
5. Department:	
6. Educational background:	*For example: environmental studies, accounting, business management, statistics, etc.*
7. Years working at the	

Section B: Personal details	
bank:	
8. Years working in related field elsewhere:	
9. Summary of BI experience:	*For example: When did you first start using BI? What for? How? Were you ever involved in providing BI? Explain.*

Section C: BI definition and context	
1. How do you define Business Intelligence?	*Use interview tools.*
2. How would you describe the "Business Intelligence process"?	*Use interview tools.*
3. Please indicate the relationship between terms: knowledge management; information management; analytics; customer relationship management; corporate performance management; business process management; customer, market, competitor, product intelligence; Decision Support System (DSS); Executive Information System (EIS); Management Information System (MIS); and BI.	*Use interview tools.*

Section D: History of BI	
1. What triggered the establishment of your department?	*Source FBCBI information from video. Gather information on the Retail BICC and GIBS Management Branch.*
2. When was it set up?	
3. How was it set up?	

Section E: Future of BI	
1. What do you envision for BI in the future?	*Not just technologies, requirements, ideology, etc.*
2. Give me your BI wish list. I.e. what would you like to get out of BI in the next two years?	*Anything – not just technology.*
3. How would you like to use BI in the future?	*From requirements to delivery to use.*

Section F: BI values and purpose	
1. What are Fortune Bank's values?	*Source from intranet.*
2. How is value measured?	*Source from BSCs.*
3. What is the purpose of BI?	*Benefits, aims, etc.*
4. Who should be using BI within the bank?	*For example departments, people.*

Section F: BI values and purpose	
5. How is BI used?	*Is it used as intended? How does your department use it?*
6. In your opinion, does BI achieve its purpose?	*Do you get the benefits out of BI that are promised?*
7. How high is BI on your score card or budget - i.e. what is its priority?	
8. What is currently more important than BI?	
9. Do you see this changing in the near future?	

Section G: BI actions and guiding principles	
1. What activities do you perform that involve BI?	*If interviewee works in BI, use interview tools (BI process).*
2. What interactions do you have with others in these activities?	*If interviewee works in BI, use interview tools (BI process).*
3. How are the interaction points governed?	
4. What are the key processes your department performs for BI?	*If interviewee works in BI, use interview tools (BI process).*
5. What are the support processes your department performs?	*If interviewee works in BI, use interview tools (BI process).*
6. What frameworks, methodologies or guidelines (if any) do you use to perform your work?	

Section H: Source of BI knowledge	
1. Where did the frameworks, methodologies and guidelines that you use originate?	*E.g. BI department head's framework, Kimball, etc.*
2. What minimum criteria (qualifications/skills) are applicable to new hires for your department?	
3. What characteristics do you specifically look for when hiring for your department?	

Section I: BI challenges	
1. What are the main challenges you experience in BI?	
2. Are these the same/different to challenges you've experienced in other but non-BI IS projects or initiatives?	
3. What lessons have been learned?	
4. Do you discuss or document lessons learned after a project/initiative?	*What's the culture? What do the guiding principles or project methodologies dictate?*

Section I: BI challenges	
5. What do you base your business decisions on?	
6. In meetings where individuals or groups present figures that contradict each other, what are decisions based on?	*In other words, where you are not allowed the luxury of going back and reconciling.*
Questions applicable to BI providers only:	
7. In your day-to-day job, what takes up most of your time?	*Use interview tools.*

Section J: Measures to overcome challenges	
1. What has been done to overcome challenges?	*Read challenges identified by the participant back to them if necessary.*
2. What would you do differently if you could start again?	
3. What frameworks or guiding principles are referenced when challenges are faced?	

Check whether respondents are prepared to schedule more time or whether they are available via email for clarification if needed.

Questions asked via email and telephonically in 2012 follow-up	
1. In your opinion, what has changed significantly since the beginning of 2009?	
2. What major challenges do you face in 2012?	
3. How does this compare with 2008 and 2009?	
4. Are there any new measures that you apply to overcome these challenges?	

APPENDIX C: INTERVIEW TOOLS

Examples of the tools used in the interviews in the Fortune Bank case study

1. Introduction and explanation

The following sheets provide the interview tools which were used during the researcher's interviews with Fortune Bank staff members participating in the case study. The tools were used to answer questions by means of a landscaping technique. The researcher used these tools, rather than simply asking interviewees to answer the questions orally, as a means to stimulate thought and creativity. An example of an interviewee's response is also provided below in Figure 23.

The researcher provided the interviewee with a blank A3 laminated sheet of paper along with individually cut out bubbles, boxes, diagrams and arrows – reflected on the upcoming pages. The cut outs were then used, in conjunction with a marker and prestick, which the interviewee used to answer the questions. Interviewees were encouraged to "play around" with the cut outs and move them around the A3, thinking about their answer before committing to a final answer. Interviewees were not restricted to the options available here, but could fill in anything on the A3 – or on the blank cut outs, which were also provided.

Responses (A3 with cut outs stuck with prestick to it and covered with highlighter markings and drawings) were photocopied by the interviewer after the interview so that the laminated cut outs and A3 could be used again after cleaning.

Figure 23 reflects one of the interviewee's responses to question two, "How would you describe the 'Business Intelligence process'?" as an example. The researcher has written next to unclear or illegible text to ensure that the diagrams remain clear. Deductions were made from these based on the interviewee's explanation of their diagram during and after compilation thereof, which the researcher made notes of and captured electronically immediately after the interview.

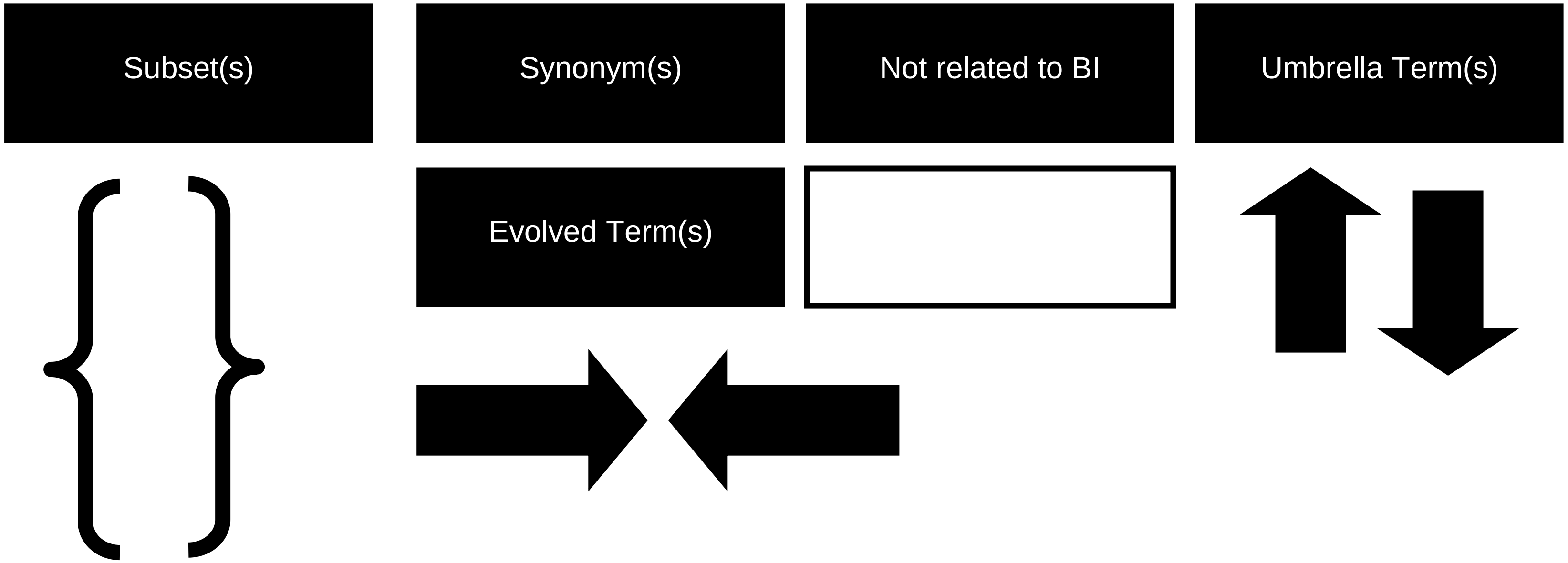
2. Examples of interview tools

The following sections reflect examples of the interview tools that were used. Take note that many of each of each type of cut-out were provided to interviewees, examples below just show one example of each type.

How to define and scope BI

- Key Performance Indicators
- Information Management
- Customer Relationship Management
- Analytics
- Business Intelligence Competence Centre
- Knowledge Management
- Score Card
- Business Process Manage-
- Executive Information System
- Business Intelligence
- Market Intelligence
- Product Intelligence
- Competitor Intelligence
- Management Information System
- Decision Support System
- Corporate Performance Management
- Dashboard
- Reporting
- Customer Intelligence
- Analysis

Terms in context



The BI process

Analyse Data

Perform Data Mining

Train Users of BI

Define and Own BI Processes

Provide Support and Resolve Que-

Manage BI Vendors

Prioritise BI Work and Projects

Establish Standards and Governance Princi-

Develop and implement BI Reports

Evaluate and Select BI Tools

Manage Meta Data

Manage BI Team Capacity

Perform Statistical Modelling

Perform Data Governance

Perform Data Quality Management

Define BI Strategy and Vision

Gather BI requirements

Blank bubble and responsibilities for the BI process

Responsibilities for the BI processes

Example of a response

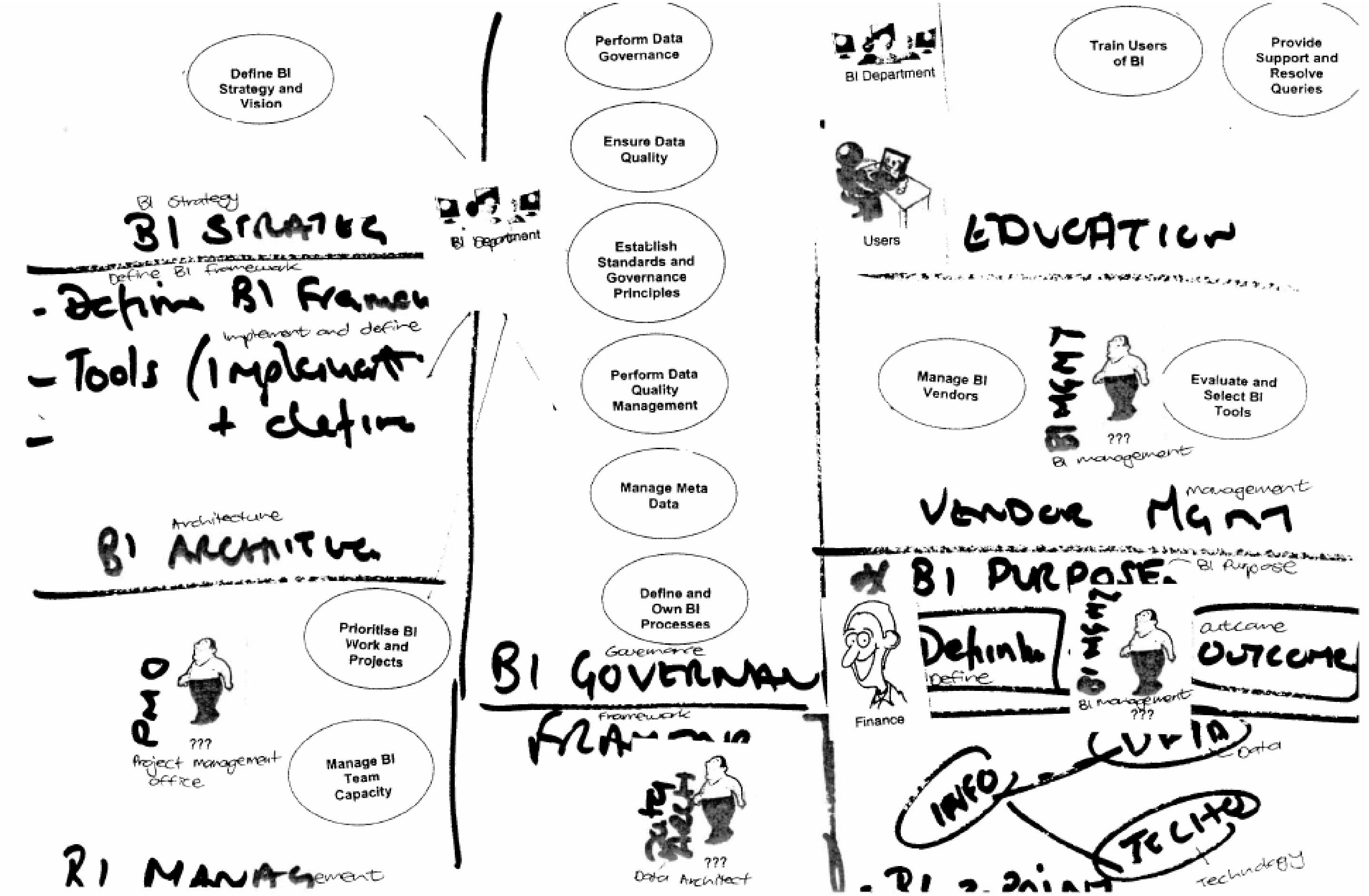


Figure 23: Example of interview response to a few questions using the landscaping interview technique

APPENDIX D: LIST OF ARTIFACTS

Artifacts used for the case study from Fortune Bank

Fortune Bank documentation that was relevant to the case study was analysed. The following types of documents were analysed:

- Project documentation for the BI Portal, CMIS and EDW Projects. This consisted of:
    - Budgets and financials
    - Functional specifications
    - Implementation plans
    - Project Initiation Documents (PIDs)
    - Project schedules
    - Scope of Work (SOW) documents
    - Strategies
    - Technical specifications
    - Test plans
    - User manuals
    - Etc.
- BI outputs such as BI applications, tools and reports. This includes:
    - Screenshots of the BI Portal – FBCBI's intranet delivery mechanism for its BI applications, tools and reports
    - Screenshots of the CMIS front-end
    - BI cube and system usage statistics
- Performance agreements
    - Balanced Scorecards for individuals
    - Service Level Agreements (SLAs) between departments and third parties
    - Work package agreements between project managers and resources
    - Etc.

APPENDIX E: INTERVIEWEE BACKGROUND AND PROFILE

Background, personal details and BI experience of interviewees and researcher

1. Introduction

Tables within this appendix reflect the details of the interview, interviewees and researcher. As the researcher was an observer and participant in the case study, she would have had an impact – both on the data gathered during the case study, as well as on the interpretation of this data before it is documented in this thesis. It is therefore necessary for the researcher's details also to be documented.

Table 25: Interview details

Interviewee identity:	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**	**N**
Date and time:	03/11/08 15:00 to 17:30	05/11/08, 16:00 to 17:00	06/11/08, 13:30 to 14:30	06/11/08, 11:30 to 12:30	12/11/08, 16:00 to 18:20	10/11/08, 10:00 to 11:00	10/11/08, 13:00 to 15:00	10/11/08, 11:00 to 12:00	13/11/08, 12:30 to 13:30	13/11/08, 10:00 to 11:30	17/11/08, 11:30 to 12:30	17/11/08, 16:00 to 17:00	03/12/08, 12:00 to 13:30 and 17/11/08, 15:00 to 16:00	17/12/2008, 10:00 to 11:00
Duration:	2.5 hours	1 hour	1 hour	1 hour	2 hours, 20 min	1 hour	2 hours	1 hour	1.5 hours	1.5 hours	1 hour	1 hour	2.5 hours	1 hour
Place:	Fortune Bank Offices, Johannesburg													
*** Primary role during interview:**	BI provider	BI customer	BI customer	BI customer	BI provider	BI customer	BI provider	BI customer	BI provider	BI provider	BI customer	BI provider	BI customer	BI provider
2012 follow-up:	Yes	No	Yes	Yes	No	No	Yes	Yes	No	No	Yes	No	No	Yes

* The primary role reflects Scenario 2 (as per Chapter 4 Part 1). All interviewees also answered questions based on their role as a BI customer of the BI vendors as a BI provider – i.e. Scenario 1, as per Chapter 4 Part 1.

Table 26: Interviewee and researcher fit within Fortune Bank

Identity	Job title	Organisational level	Role	Department
A	Information Centre (IC)/ Enterprise Data Warehouse (EDW) Data Specialist	Specialist	Operational	FBCBI
B	Head: Finance and Strategy	Executive	Strategic and Operational	Transactional Banking
C	Financial Officer: Margin Management and MIS	Specialist	Strategic and Operational	Corporate Banking
D	Financial Officer: Margin Management and MIS	Specialist	Strategic and Operational	Corporate Banking
E	Head: BI - Fortune Bank Corporate	Executive	Strategic and Operational	FBCBI
F	Head: Client Value Management (CVM) and Transactional Banking Sales	Executive	Strategic and Operational	Business Banking
G	Executive: Enterprise Business Intelligence	Executive	Strategic and Operational	EDW Interim Project Dept.
H	Chief Operating Officer (COO): Business Banking	Executive	Strategic and Operational	Business Banking
I	FBCBI Senior Management	Senior manager	Strategic and Operational	FBCBI
J	FBCBI Senior Management	Senior manager	Strategic and Operational	FBCBI
K	Divisional Director: Finance	Executive	Strategic	Corporate Banking

Identity	Job title	Organisational level	Role	Department
L	Executive EDW Projects	Executive	Strategic and Operational	EDW Interim Project Dept.
M	Senior Manager - Integrated Solutions	Senior manager	Strategic	Transactional Banking
N	Retail Integration Manager	Senior manager	Strategic and Operational	Retail BICC
Re-searcher	Senior Manager: BI Analytics	Senior manager	Strategic and Operational	FBCBI

Table 27: Interviewee and researcher educational and work experience details

Identity	Educational background	Years working at Fortune Bank	Years working in a related field elsewhere	Summary of experience
A	BSC Degree, specialising in mathematics and statistics	12	19	Computer programming, software design and database analysis/design
B	Engineering, MBA	7	No previous BI or related work	Strategy, finance and MIS
C	Finance	3	10	Finance and MIS
D	Accounting	3	9	Accounting and MIS
E	Programming, Chartered Accounting, MBA	10	8	Every role involved in BI solutions, reporting and MIS
F	Theology, political science, MBA	6	3	IT/Telecommunications Research, lecturing, MIS, BI
G	Accounting	5	10	Finance, MIS/BI

Identity	Educational background	Years working at Fortune Bank	Years working in a related field elsewhere	Summary of experience
H	Chartered Accountant	11	3	Finance, Information Management, MIS
I	Aero-space engineering	10	5	Engineering, programming, MIS and reporting
J	Computer Science	4	2	Programming, MIS, BI, reporting
K	BCom (Honours) and Chartered Accounting	7.5	5	Auditing, finance, MIS, reporting
L	BSC in Computer Science and a Master's of Commerce in General Business Management	15	5	Data management and processing, BI
M	Medicine (specialist), business, business and IT (technical)	3	No previous BI or related work	Strategy, technology, innovation, BI
N	BCom (Legal)	7	4	Data and MIS
Re-searcher	MCom in Informatics	4	5	Business analysis, management consulting, project management, BI

APPENDIX F: REQUEST FOR PROPOSAL

The RFP used by Fortune Bank and included in the case study (names have been changed and notes are added in italics)

Purpose: Fortune Bank's Corporate Business Intelligence Department invites you to submit a Request for Proposal (RFP) to partner with them in assessing the viability of a Fortune Bank Business Intelligence Competency Centre (BICC).

Submission Process: Please submit RFPs, responding to the questions listed below (adding anything else that you may see as relevant), via email to Lily@FortuneBank.co.za and Julio@FortuneBank.co.za. The following document types are acceptable: Word, PowerPoint, Excel, Visio, Adobe Acrobat PDF document.

Due Date: Submissions close on Friday, 27 February 2009 at 11:00 AM.

Background: Fortune Bank Corporate Business Intelligence (FBCBI) is exploring the viability of setting up a Business Intelligence Competency Centre (BICC). Currently FBCBI performs strategic, operational and project work, servicing the whole of Fortune Bank's Corporate business unit, based within Fortune Bank's Business Banking business unit. With a staff complement of 22 people, we are experiencing overflow of requirements compared to capacity and a number of challenges within our BI environment. A possible solution to this is to establish a BICC that services Fortune Bank Corporate.

Fortune Bank consists of eight business units, namely: Business Banking, Corporate Banking, Transactional Banking, Fortune Bank Africa (including both Corporate and Retail banking in five African countries), Shared Services, Property Finance, Small Business Services and Investment Services.

BI user levels range from top-level executives to users needing information at a detailed and transactional level. Users have varying skill levels in addition to varying BI requirements (e.g. some need reports, others dashboards, others data dumps, etc.) and varying access needs. Users perform various functions, e.g. finance, HR, IT, marketing, sales, etc. A single-entry point has already been established for the provision of BI material (reporting, applications, calculators, training material, etc.) in the form of a BI Portal and a SharePoint site for related documentation and collaboration/discussion.

The need for this RFP is twofold. Firstly, FBCBI needs to explore the viability of partnering with a BI provider to set up a BICC within Fortune Bank. Secondly, qualitative studies are currently being performed within FBCBI for the purposes of research and input to the BICC solution and a doctoral thesis using Fortune Bank BI as a case study.

Conditions: Decisions on the acceptance of a proposal are the right and responsibility of the FBCBI Departmental Head. The information and responses provided in the proposals may be quoted in the doctoral research, with reference to your organisation (however, should you wish to remain anonymous if quoted in the doctoral thesis please indicate this on your proposal).

Please respond to all questions:

Section A: Vendor details	
5. What is the name of your organisation?	
6. Do you operate nationally or internationally?	
7. Where is your head office located?	
8. How many staff members do you have in South Africa?	
9. How many people work at your organisation in total?	
10. What is your primary business?	
11. Do you have any partners who could assist you should you be selected as a result of this RFP?	

Section B: BI definition and context	
1. Please define the business intelligence process your organisation adopts.	
2. How do you define the term “business intelligence”?	*Question added by researcher*
3. What are the components of business intelligence?	
4. What “types of intelligence” does business intelligence consist of? I.e. what terms / subject areas do you include within the scope of business intelligence?	*Question added by researcher*
5. What are the main deliverables of business intelligence?	
6. Describe the relationship between the following: Decision Support System, Executive Information System, Management Information System and Business Intelligence.	*Question added by researcher*
7. Describe the overlap between the following and Business Intelligence: • Analytics • Customer Relationship Management • Information Management • Knowledge Management • Corporate Performance Management • Business Process Management • Customer, marketing, competitor, product intelligence	*Question added by researcher*

Section C: Business Intelligence Competency Centre (BICC)	
1. What is a Business Intelligence Competency Centre (BICC)?	
2. How would you set up a Business Intelligence Competency Cen-	

Section C: Business Intelligence Competency Centre (BICC)	
tre to service Fortune Bank? Please include the following in your response: • Product and service offering to Fortune Bank / main deliverables • Structure – including: resourcing, roles and responsibilities • Reporting lines (within BICC and within Fortune Bank) • Tools used to develop AND deploy BI (including technical partnerships) • Post implementation support strategy and mechanisms • Organisational culture changes • BICC interfaces with IT and the business • Self-service and BI delivery options for users • User community / user types that such a BICC would support	
3. Provide a high-level strategy to up skill and service BI super-users within the Business and ordinary BI report users within the business – ensuring acceptance and longevity of the BICC solution in the business. Both types of users are at various levels within Fortune Bank – from Executive, to Management, to Expert, etc.	

Section D: BI challenges	
1. Does BI consistently achieve its purpose?	*Question added by researcher*
2. What are the main challenges of BI?	*Question added by researcher*
3. How do you propose these challenges are addressed?	*Question added by researcher*

APPENDIX G: VENDOR PROFILES AND RATINGS

Summary of vendor profiles and ratings

1. Introduction

A summary of the backgrounds and profiles of the vendors – also referred to as the RFP/questionnaire respondents - is first provided, followed by a view of ratings of their responses to the RFP. Ratings serve to provide insight into how the questions were answered. RFP results and analysis are then provided. Vendors are referred to as "V1, V2", etc. in the text that follows.

2. Summary of vendors' profiles

Table 28 reflects the vendors' profile information which has a bearing on the case study. Where vendors provided their profile summary in their responses, this was used. In other cases, the researcher gathered the information from the vendors' official websites.

Table 28: Summary of vendors' profiles

Key:

V: Vendor

Ranges used:

- BI experience
- <= 0 to 5 years
- >= 6 to 10 years
- >= 11 to 20 years

> 21 years

- Staff complement
- <=50
- >=51 to 100
- >=101 to 500
- >= 500 to 1000

> 1000

V	Local or int-ernational	BI experi-ence	Staff comp-lement	Vendor focus	Partners
1	Local	<= 0 to 5 years	<=50	Data integration, data ware-housing, BI and performance management.	Lists two software vendors as partners.
2	Local and inter-national	> 21 years	> 1000	A large organisation that has a department dedicated to BI. The organisation as a whole provides hardware, software and consulting.	Over 50 partners – classi-fied as: niche players, data-base and data manage-ment, hardware and soft-ware partners.
3	Local	<= 0 to 5 years	<=50	IT (professional consulting and financial services), prop-erty, human resources and	Lists one hardware and one software vendor as part-ners.

V	Local or int-ernational	BI experi-ence	Staff comp-lement	Vendor focus	Partners
				recruiting.	
4	Local and inter-national	> 21 years	> 1000	Although BI is not their core focus, the vendor states that all aspects of decision-making are catered for by their product offering. This is a large organisation that has a department dedicated to BI. The organisation as a whole provides software.	Over 50 partners – catego-rised as: niche players, da-tabase and data manage-ment, hardware and soft-ware partners.
5	Local and inter-national	>= 11 to 20 years	> 1000	Focuses on BI, reporting, presentation (through dash-boards) and Online Analytical Processing (OLAP).	Over 150 partners – catego-rised as: system integrators, technology companies, em-bedded solution companies and companies that sell their products.
6	Local and inter-national	> 21 years	> 1000	Focuses on database man-agement systems, however, does develop and market other enterprise software products.	Over 50 partners – catego-rised as: system integrators, vendors specialising in plat-form technologies, software vendors and companies that sell their products.
7	Local and inter-national	> 21 years	> 1000	Offers Performance Man-agement (PM) solutions amongst a variety of enter-prise-wide solutions such as, amongst others, Customer Relationship Management (CRM), Product Lifecycle Management (PLM), supply chain, Supplier Relationship Management (SRM), gov-ernance, risk and compliance solutions and Enterprise Re-source Planning (ERP).	Over 150 partners – catego-rised as: software solution providers, value-added re-sellers, distributors, tech-nology and services part-ners.
8	Local and	> 21 years	> 1000	Core focus is BI and CRM.	Over 20 partners – catego-

V	Local or int-ernational	BI experi-ence	Staff comp-lement	Vendor focus	Partners
	international				rised as: technology, con-sulting, application and channel partners.

3. Ratings of vendor responses

Table 29: FBCBI's ratings of vendor responses

Key:

- V: Vendor
- ✓: Reflects that the vendor answered the question – completely, without being vague or ambiguous – but not necessarily that the answer is correct.
- X : Reflects a gap where the vendor did not provide an answer to the question.
- O: Reflects that the vendor provided an incomplete, vague or ambiguous answer.

#	Question	V1	V2	V3	V4	V5	V6	V7	V8
1	Please define the business intelligence process your organisation adopts.	✓	O	O	✓	✓	✓	X	✓
2	How do you define the term "business intelligence"?	✓	✓	✓	✓	✓	✓	O	✓
3	What are the components of business intelligence?	✓	✓	✓	✓	O	✓	X	✓
4	What "types of intelligence" does business intelligence consist of? I.e. what terms/subject areas do you include within the scope of business intelligence?	X	X	O	✓	O	✓	X	✓
5	What are the main deliverables of business intelligence?	✓	✓	✓	✓	✓	✓	X	✓
6	Describe the relationship between the following: Decision Support System, Executive Information System, Manage-ment Information System and Business Intelligence.	✓	✓	✓	✓	O	✓	X	✓
7	Describe the overlap between the following and Business Intelligence:								
	• Analytics	✓	✓	✓	✓	X	✓	X	✓
	• Customer Relationship Management	X	✓	✓	✓	O	✓	X	✓
	• Information Management	O	✓	✓	✓	X	✓	X	✓
	• Knowledge Management	✓	✓	✓	✓	X	✓	X	✓
	• Corporate Performance Management	O	✓	✓	✓	X	✓	X	O
	• Business Process Management	✓	✓	✓	✓	X	✓	X	O
	• Customer, marketing, competitor, product intelligence	X	O	O	O	X	✓	X	✓

#	Question	V1	V2	V3	V4	V5	V6	V7	V8
8	What is a Business Intelligence Competency Centre (BICC)?	✓	✓	X	X	✓	✓	X	✓
9	How would you set up a Business Intelligence Competency Centre to service Fortune Bank? Please include the following in your response:								
	• Product and service offering to Fortune Bank/main deliverables	✓	✓	✓	X	O	X	X	✓
	• Structure – including: resourcing, roles and responsibilities	✓	✓	O	X	O	✓	X	✓
	• Reporting lines (within BICC and within Fortune Bank)	✓	✓	✓	X	O	✓	X	✓
	• Tools used to develop AND deploy BI (including technical partnerships)	✓	✓	✓	X	✓	X	X	✓
	• Post implementation support strategy and mechanisms	X	✓	✓	X	X	X	X	✓
	• Organisational culture changes	X	✓	✓	X	X	X	X	✓
	• BICC interfaces with IT and the business	X	✓	O	X	X	✓	X	✓
	• Self-service and BI delivery options for users	✓	O	O	X	X	X	X	✓
	• User community/user types that such a BICC would support	X	O	✓	X	X	X	X	✓
10	Provide a high-level strategy to up skill and service BI super-users within the business and ordinary BI report users within the business – ensuring acceptance and longevity of the BICC solution in the business. Both types of users are at various levels within Fortune Bank – from Executive, to Management, to Expert, etc.	O	X	✓	X	O	✓	X	✓
11	What are the main challenges of BI?	✓	X	✓	✓	✓	O	X	✓
12	Does BI consistently serve its purpose?	✓	X	✓	✓	✓	✓	X	✓
13	What are the main challenges of BI?	✓	X	✓	✓	✓	✓	X	✓
14	How do you propose these challenges are addressed?	✓	X	✓	✓	✓	✓	X	✓

APPENDIX H: THE G-D LOGIC EVIDENT IN BI'S WORLDVIEW AND CHALLENGES

A summary of examples of G-D Logic characteristics evident in BI's worldview and challenges

Table 30: The G-D Logic inherent in BI's worldview characteristics

E	Worldview characteristic	G-D Logic characteristic
Ontology	40. BI operates from an ambiguous and unstable model of reality, where BI is perceived as a: technology, process, product and capability (one or multiple of these perceptions).	• Focus on means, production and producer (D)
	41. Although there is much debate, few people express concern about BI's ambiguity.	• N/A
	42. BI is defined as a technology by BI providers more than by BI customers. 43. BI vendors' dominant perception is that BI is a technology. Fortune Bank BI departments (as BI providers) view BI mostly as a process and product, but also as a technology. BI customers see BI mostly as a process.	• Separation of customer and provider (C) • Focus on means, production and producer (D) • Compete through goods and their features (B)
	44. A few individuals see BI as a process enabled by technology to understand the business, make informed business decisions and enable a strategic view.	• Focus on means, production and producer (D) • Compete through goods and their features (B)
	45. BI is generally understood (by BI providers and customers) to consist of a linear series of development or data processing activities up to the point of exchange (e.g. implementation/delivery), potentially including change management. Only a few individuals define BI beyond this point, these typically are BI customers.	• Value-in-exchange (A) • Separation of customer and provider (C) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E)
	46. BI is generally understood by BI customers and BI providers in terms of the organisation's processes and rules (syntactically) rather than in terms of the organisation's environment and context (semantically).	• Separation of customer and provider (C) • Focus on means, production and producer (D)
Past	47. No definitive explanation for uncertainty in BI perceptions.	• N/A
	48. BI emerged (to provide management and business support) from a hard (mechanistic, determin-	• Separation of customer and provider (C)

E	Worldview characteristic	G-D Logic characteristic
	istic) systems and Engineering background. 49. Fortune Bank BI departments were established by individuals with dominant IT backgrounds responding to business' need for information/intelligence. 50. BI vendors were established with an IT focus or by an IT organisation.	• Focus on means, production and producer (D)
Prediction	51. Technological advances are envisioned for the future. E.g.: customisation, enhanced technology characteristics and improved delivery mechanisms.	• Compete through goods and their features (B) • Focus on means, production and producer (D)
	52. FBCBI demonstrated a renewed technology focus by changing its name to BITS.	• Compete through goods and their features (B) • Focus on means, production and producer (D)
	53. BI customers are concerned about future technology solution's features and functions.	• Compete through goods and their features (B) • Separation of customer and provider (C)
	54. BI providers are concerned with collecting and managing greater volumes of data, expanding their BI target market (audience) and improving delivery mechanisms.	• Separation of customer and provider (C) • Focus on means, production and producer (D)
	55. BI providers wish to reduce time spent on data processing to be able to spend more time developing and automating BI technologies.	• Compete through goods and their features (B) • Separation of customer and provider (C) • Focus on means, production and producer (D)
	56. Frustration is experienced due to customer "meddling", but there is a desire to close the BI customer-provider gap through, e.g.: conversations in business jargon; a new type of BI resource (with expertise in business and IT); longer support periods to equip user.	• Separation of customer and provider (C)
	57. A return to focus on decision-making is expected – enabled by analytics.	• Compete through goods and their features (B)
	58. Data (enabled by technology) is the new driver of BI.	• Compete through goods and their features (B) • Focus on means, production and producer (D)
	59. Collaboration and interconnected solutions receive attention.	• Compete through goods and their features (B)

E	Worldview characteristic	G-D Logic characteristic
Axiology	60. Value is measured by the BI provider at the point of exchange of a tangible BI output.	• Value-in-exchange (A) • Compete through goods and their features (B) • Separation of customer and provider (C) • Focus on means, production and producer (D)
	61. BI's purpose is seen to be "inform decision-making" but value is measured according to cost, quality and schedule measures on the BI IT solution and implementation thereof. Furthermore, BI is aligned with marketing and banking strategies that target and acquire customers and markets.	• Value-in-exchange (A) • Compete through goods and their features (B) • Focus on means, production and producer (D)
	62. BI vendors don't typically receive feedback on use or performance of their BI solutions.	• Value-in-exchange (A)
	63. Fortune Bank targets customers, selling and marketing to them and optimises its processes to do this as efficiently as possible.	• Focus on means, production and producer (D)
	64. BI vendors promote and value intangible benefits or features of IT solutions, assuming "customer value" is the output of their software development process that takes place upon implementation (exchange) and can be defined unilaterally by vendor, upfront.	• Value-in-exchange (A) • Compete through goods and their features (B) • Focus on means, production and producer (D)
	65. BI values the BI environment and applications (neglecting use of BI).	• Value-in-exchange (A) • Focus on means, production and producer (D)
	66. BI's purposes are largely intangible, subjective and hard to measure (ROI).	• N/A
	67. BI is a top priority/value. BI is for all levels of the organisation ("everyone").	• Focus on means, production and producer (D)
Praxeolo-gy	68. Various strategies, CSFs, frameworks, etc. (grounded in IT) are provided by BI providers to manage, govern and guide the BI environment and its technologies.	• Separation of customer and provider (C) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E)

E	Worldview characteristic	G-D Logic characteristic
	69. BI's guiding principles are defined and implemented unilaterally by the BI provider, without interference or influence from the BI customer.	• Separation of customer and provider (C) • Focus on means, production and producer (D)
	70. BI consists of a linear series of activities in a software development process or a data warehousing process, guided by relevant IT/data methodologies.	• Focus on means, production and producer (D)
	71. The decision-making process is referred to, but not described. Focus is on delivery of BI technology solution and/or product and the activities to do this.	• Value-in-exchange (A) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E)
	72. BI customers don't typically participate in BI solution development unless required to by BI provider e.g. for requirements gathering, UAT, training.	• Separation of customer and provider (C) • Focus on means, production and producer (D)
	73. Agile development approaches are strived towards to increase collaboration within BI departments and to increase the BI department's productivity and deliver BI requirements at faster response rates.	• Focus on means, production and producer (D)
Epistemology	74. BI is informed by various disciplines, Science and business functions, but focuses on BI's IT and IS aspects, causing an imbalance. 75. BI providers (BI vendors and Fortune Bank BI departments) typically have a IT, Engineering and Science backgrounds while BI customers (excluding Fortune Bank BI departments) typically have Business, Finance and Accounting backgrounds.	• Separation of customer and provider (C) • Focus on means, production and producer (D)
	76. A limitation is identified in the gap between BI customer and provider competencies.	• Separation of customer and provider (C)
	77. When raising challenges, BI customers and providers restrictively focus on their lack of knowledge of the other's expertise rather than on sharing their expertise.	• Separation of customer and provider (C)
	78. BI flows across the organisation, irrespective of business function. BI providers and customers restrictively think of BI in terms of function, creating gaps where BI overlaps between business,	• Separation of customer and provider (C)

E	Worldview characteristic	G-D Logic characteristic
	BI and technical realm – e.g. business data ill-understood by all.	

Table 31: The G-D Logic inherent in BI's prevailing challenges

G-D Logic characteristics are based on the literature study in Chapter 3 Part 3. Sources include: Chesbrough and Spohrer, 2006:37; Edvardsson *et al*., 2011:540; Grönroos, 2000:24-25; Gummesson, 1995:250; 1998:247; Lusch and Vargo, 2006:19; Lusch, *et al*., 2008:6; Michel, *et al* , 2008:152; Nam and Lee, 2010:1764; 6:37; Normann, 2001:99; Spohrer *et al*., 2008:10; Vargo and Lusch, 2004a:5; 2006:18, 51; 2010:172a; Vargo, 2009a.

Ref	Challenge	G-D Logic characteristic
	Using BI optimally	
U1	• Volume of data that is processed is overwhelming	• Focus on means, production and producer (D) The dominant focus on production, the means and the provider leads to increased data processing (productivity, mass output, technology automation).
U2	• Unfamiliar territory for users	• Value-in-exchange (A) • Separation of customer and provider (C) • Focus on means, production and producer (D) As customer and provider are separated, the customer does not learn the provider's "territory". Ensuring that the user can use the BI provided is not a high priority, the focus is on implementing a BI solution (the point of exchange).
U3	• Poor or absent metadata and training	• Separation of customer and provider (C) • Focus on means, production and producer (D) The need for meta data and training are overlooked in favour of production of tangible outputs from the provider's viewpoint.
U4	• A gap between the BI application or output and human decision-making	• Value-in-exchange (A) • Compete through goods and their features (B)

Ref	Challenge	G-D Logic characteristic
		• Focus on means, production and producer (D) It is assumed that exchange is the end-point of the BI value chain, there may be post-implementation training and support, but this is limited and is usually limited to how to use the BI technology solution. This creates a gap where the user does not know how to ask questions or make assumptions using the BI that is implemented.
U5	• Adapting to use BI to make decisions	• Value-in-exchange (A) • Compete through goods and their features (B) BI providers do not "test" value propositions by ensuring that BI customers are capable to use the BI that is provided. The BI application or data that is exchanged becomes the focus rather than the use thereof, i.e. decision-making. Focus is on the product exchanged, not on ensuring adaptation takes place.
U6	• Providing BI that is relevant, timeous and valued by the user	• Value-in-exchange (A) • Separation of customer and provider (C) The BI provider independently determines value upfront, embedding it in the BI product which he/she predetermines will be valuable to the user (BI customer).
U7	• Providing BI that is valued by and suited to the organisation's culture	• Value-in-exchange (A) • Compete through goods and their features (B) BI value is linked to the BI product that is exchanged and not to the creation of an operant resource that the customer can play a role in co-creating (i.e. making it more likely that the product is valuable to the customer).
U8	• Catering for different user needs across the organisation	• Compete through goods and their features (B) • Separation of customer and provider (C) Instead of inviting customers to co-create by customising their own BI, similar solu-

Ref	Challenge	G-D Logic characteristic
		tions are often pushed down to all users – who actually have different needs.
U9	• Dominant focus on data processing reduces time/capacity for use	Same as U1.
CS U1	• BI providers aim to evolve to focus on BI development, still neglecting capacity for use	• Value-in-exchange (A) • Focus on means, production and producer (D) The focus is on the discovery side of the BI value coin, not on use.
U10	• Low use overlooked as use is often measured according to volume of software applications and licences sold	• Value-in-exchange (A) • Compete through goods and their features (B) Value is measured at the point of exchange (sale) of licences and not use. Focus is on the product that is exchanged. BI providers aim to sell greater volumes of units (i.e. products) to compete/gain market share/"capture" customers.
CS U2	• Low use overlooked as use/BI success is measured according to successful implementation of IS project or completion of data processing	• Value-in-exchange (A) • Compete through goods and their features (B) Although the BI project/implementation is successful, there may be no or low use of it – but value is measured incorrectly at the point it is exchanged, leading to incorrect measurement/overlooking low use.
	Managing "big data"	
D1	• The advent of unprecedented "big data"	Same as U1.
D2	• Storing and accessing big data spread across the organisation in various formats/sources	Same as U1. The dominant focus on producing mass volumes of data results n more data than can be used/managed.
D3	• Absence of information management methods, governance and data quality	• Separation of customer and provider (C) • "Services" in the context of G-D Logic (E) The full service flow is not understood (information is not managed throughout its lifecycle that extends through the service flow). Customers see BI as the provider's

Ref	Challenge	G-D Logic characteristic
		responsibility and domain, including data and data quality.
CS D1	• Managing customer demands for data from new and un-structured sources	• Separation of customer and provider (C) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) Challenges arise as new requirements fit outside the typical scope of the provider's capability, changing the "production line".
CS D2	• Ongoing data feeds and support long after deployment	• Value-in-exchange (A) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) When deployment (exchange) takes place, it is assumed that the BI project is complete. However, this implies that the full service flow is not understood, as ongoing data feeds and support are in fact necessary.
CS D3	• Gaps in ownership or responsibility for data or data quality	• Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) The joint responsibility to co-create a beneficial outcome is overlooked as BI is seen as the BI provider's responsibility; the full service flow is not understood.
CS D4	• Skills and competence on data are largely missing within the organisation, appointed business representatives do not understand the data or know where to source it	• Value-in-exchange (A) • Compete through goods and their features (B) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) Focus is not on the competence and skill to co-create an operant resource, but rather on production. Data and business process competence needed are often not integrated into the full service flow of BI. Value propositions are not offered where the capability to co-create value is first established before BI initiatives are started.

Ref	Challenge	G-D Logic characteristic
	Integrating BI across many complex technology, data and business layers	
I1	• Overlooking integration activities (BI fails to consider integration with organisation's ISs)	Same as CSD3.
CSI 1	• Failure to consider integration with BI upfront when acquiring/developing organisation's ISs	Same as CSD3.
I2	• Complexities related to the organisation's technology, data and business layers	• Separation of customer and provider (C) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) More emphasis is placed on the actual BI product or output than on integration with underlying data, infrastructure and business processes.
CSI 2	• Skills and competence on IS/IT architecture are largely missing within the organisation, appointed business representatives do not understand IS/IT architecture	Same as CSD4.
I3	• Complexities resulting from organisation-wide issues	Same as I2.
CSI 3	• More collaboration is needed than when implementing an IS/IT solution	Same as CSD4 and I2.
	Aligning and balancing the needs of the various role players in BI	
A1	• Misalignment between BI, IT and the business , BI vendors and the organisation and between departments and levels	• Separation of customer and provider (C) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) BI is perceived from the perspective of the BI provider as something that is delivered to a passive recipient, separated from the BI provider.
A2	• BI infrastructure is complex, expensive, takes time and cannot be used until most of it has been completed	• Compete through goods and their features (B) • Separation of customer and provider (C)

Ref	Challenge	G-D Logic characteristic
		• Focus on means, production and producer (D) Co-creation of value through use of a prototype as an operand resource (as input to value co-creation and source of competitive advantage (FP4)) is overlooked in favour of completing the BI production process quickly, which is seen to be more cost effective without customer interference. Value can be determined by the provider alone. The producer is able to independently make assumptions about the consumer's environment and how they will use/benefit from the BI product.
CS A1	• BI customers (of BI vendors) have negative impressions whereby BI vendors are seen to: "lock" them in, offer expensive solutions with costly dependencies on specialists and too many/intimidating features	• Value-in-exchange (A) • Compete through goods and their features (B) • Separation of customer and provider (C) • Focus on means, production and producer (D) Producers often perceive that they "capture the market" by producing and selling more outputs than their competitors and, through the sale of these (even locking customers in) make a profit. The exchange and not the relationship is the objective.
CS A2	• BI departments get frustrated with BI vendors who try to bypass them	Same as CSD3.
CS A3	• BI provider and customer are separated.	• Separation of customer and provider (C).
CS A4	• BI vendors expect the organisation's departments to collaborate and consolidate their BI requirements (this fails to happen)	• Separation of customer and provider (C) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) BI vendors see the organisation from their (the provider's) viewpoint rather than seeing the opportunity to assist the organisation to consolidate BI requirements. BI cus-

Ref	Challenge	G-D Logic characteristic
		tomers see their requirements in terms of a BI solution rather than the full service flow of BI across the organisation.
CS A5	• BI vendors express frustration when BI departments obstruct direct relationships with users	Same as CSA4.
CS A6	• Managing new customer demands (such as RTBI)	• Separation of customer and provider (C) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) Challenges are experienced in meeting new requirements that involve changes to what is often an inflexible "production line".
CS A7	• All role players needed in BI initiative are not successfully identified or brought in	• Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) The full service flow – including integration and use – is not understood. The focus is on producing a product or an output, rather than on the integration thereof.
	Recruiting, retaining and using BI personnel and their skills effectively	
P1	• Specialist personnel are high in demand but short in supply	N/A
P2	• A broad skill set is required	• Compete through goods and their features (B) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) BI resources are highly specialised in a BI solution or part of the process as a result of "complification". When the BI department, as a BI provider, does not successfully integrate the correct skills and competence (service), the absence of a broad skill set in individual resources becomes apparent and a challenge.
CS	• BI departments recruit IS and IT rather than BI profes-	• Compete through goods and their features (B)

Ref	Challenge	G-D Logic characteristic
P1	sionals/experts	• Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) Competence is sought in producing BI technology/data outputs (discovery side of the BI value coin) rather than in how to use BI (e.g. decision-making, statistical analysis, etc.) (the use side of the BI value coin).
CS P2	• Employee's work-life balance is overlooked in favour of completing BI deliverables	• Focus on means, production and producer (D) The employee is seen as a means to produce BI. Productivity and optimised outputs are sought after rather than benefit for all entities involved in the service flow.
CS P3	• Skills and competence to assist BI departments are large-ly missing within the organisation, appointed business rep-resentatives are not able to assist	• Separation of customer and provider (C) • Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) BI customer and provider are separated and do not switch roles. BI customers play the role of passive recipients. This separation means that BI customer and provider lose out on contextual knowledge and understanding of each other's environments and thereby lose the ability and willingness to assist each other in the full service flow.
	Getting the right sponsor in place	
S1	• Absence of a sponsor who understands BI	• Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) Focus is not on the service to co-create an operant resource, but on production, BI technology and its features. Production of an output or "deliverable" is seen as the end of the value chain rather than the full service flow. E.g. the sponsor thinks that BI is a "deliverable" that can be implemented and automatically results in use.
CS S1	• Sponsors who are "mislead" by BI vendors into believing BI is a "quick and easy" endeavor	
CS S2	• Sponsors who expect BI IT solution to provide for full BI requirement	
01	Realising and measuring ROI	• Value-in-exchange (A)

Ref	Challenge	G-D Logic characteristic
	• Realising and measuring ROI	• Compete through goods and their features (B) • Focus on means, production and producer (D) Value is measured at exchange and not upon use. Producer determines the value upfront. Value can be embedded in goods and is measured according to goods' intangible features.
CS 01	• BI success (value/return) is measured at point of delivery of BI project or data process, making ROI harder to calculate	
02	Operating in an ambiguous environment • BI is ill-defined and its environment is ambiguous • Treating BI the same as an IT project Resultant challenges: • Difficulties in raising BI specific challenges	• Focus on means, production and producer (D) • "Services" in the context of G-D Logic (E) BI is defined and scoped from the provider's point of view as an IS, as an IT component of an IS, or as an output of an IS (means, product and production). The focus is on BI technology and its features. The full service flow is not understood. The focus is on the BI IS/IT and not on the service flow involving different types of entities integrating many different types of resources.

CS 02	• BI is perceived narrowly as an IS or even more narrowly as a data or IT solution. This results in further challenges (already raised above):
	  • BI success is measured according to BI vendors' volumes of IT sales or IS project measures/data processing performance measures
	  • BI providers seek to recruit IS, IT and data professionals rather than BI experts
	  • More collaboration is needed than when implementing IS solutions, though this is not always acknowledged or performed	

CS 03	• Failure to recognise and address the fact that BI operates in an ambiguous environment results in further challenges (already raised above):	

Ref	Challenge	G-D Logic characteristic
	• Misaligned expectations • BI is defined and scoped narrowly as an IS solution (or more narrowly as data/IT)	