

**Factors Critical To The Success of Business  
Intelligence Systems**

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## SUMMARY

The thesis reports on research that investigated the critical success factors associated with the use of Business Intelligence as an extension of Enterprise Resource Planning (ERP) systems. Many companies have implemented ERP systems to enable them to better manage their core business processes and the associated transactions. To achieve a better understanding of these business processes companies are utilising Business Intelligence to analyse transactional data from their ERP system. The effective implementation and use of Business Intelligence can impact on a company's performance. Accordingly, the factors that contribute to the successful implementation and use of Business Intelligence are critical to its impact on a company. The research investigates important questions that relate to the critical success factors associated with the implementation of Business Intelligence as an extension of an ERP system, the relevance of such factors as an extension of ERP system and whether some factors are critical than others.

The research approach utilised both content analysis and interviews to investigate the research questions. The content analysis was performed on nearly ten thousand SAP related industry presentations to verify the Business Intelligence critical success factors that were previously identified from the research literature as well as identifying any new factors. Interviews were then conducted with four Business Intelligence industry practitioners to verify and further investigate the factors identified from the content analysis. The research approach of utilising content analysis of industry presentations supported by interviews of industry practitioners to investigate an information system's phenomena is unique. This approach demonstrates the value of industry presentations as a source of valuable insight.

There has been minimal research to date on the different aspects of Business Intelligence where it has been implemented as an extension of an ERP system. This research documents how different companies are integrating these different technologies as well as the associated critical success factors. The critical success factors identified include;

- Organisation Management Support, Governance, Reporting Strategy, Strategic Alignment, Champion, Identification of KPIs.

- Process *Project Management/Methodology, Project Scope, Testing, Team Skills, Involvement of Business and Technical Personnel, External Consultants, Interaction with Vendor (SAP), Adequate Resources, Change Management, User Participation, Training, Process Maturity, Knowledge Transfer*
- Technology *Data Quality, Business Content, Performance, Source Systems, Security, Technical*

Many of the Business Intelligence critical success factors identified in this research had not been identified previously and their identification can have a direct impact on the successful implementation of Business Intelligence for many companies.

The research resulted in the development of a Conceptual Framework which identifies the Business Intelligence critical success factors and the contexts that impact on them. These contexts determine the relevance of the different critical success factors to Business Intelligence use cases and implementation phases.

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## DECLARATION

“I, Paul Hawking, declare that the DBA thesis entitled Factors Critical to the Success of Business Intelligence Systems is no more than 65,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references and footnotes. This thesis contains no material that has been submitted previously, in whole or part, for the award of any other degree or diploma. Except where otherwise indicated, this thesis is my own work”.

**Signature:** ----- **Date:** -----



## **PUBLICATIONS FROM THESIS**

- Hawking, P., (2012), "Business Intelligence Excellence", *International Journal of Technology, Knowledge and Society*, 8(2), 91-100
- Hawking, P., (2011), "Towards Business Intelligence Maturity", *European Journal for Informatics Profession*, 12(3) July, 20-28
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- Hawking, P., Sellitto, C., (2010) "Business Intelligence (BI) Critical Success Factors", *Proceedings of ACIS*, Brisbane, (ERA Rating A)
- Hawking, P., Sellitto, C., (2010) "Critical Success Factors of Business Intelligence (BI) in an ERP Systems Environment", *Proceedings of CONFENIS*, Natal, Brazil





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## CHAPTER 1 - INTRODUCTION

The concept of using information systems to support decision-making has been a goal of companies since the introduction of business computer technology. Companies have increasingly identified the importance of information technology as an enabler to the achievement of their strategic objectives (Scott Morton, 1991). One type of information system with this specific goal was termed a “Decision Support System” (Holsapple and Sena, 2005 pp. 102). Decision Support Systems promised to provide managers with timely and relevant information in addition to analytical capabilities to assist effective decision-making. Alter (1980) identified three major characteristics of Decision Support Systems:

- Designed specifically to facilitate decision processes,
- Support rather than automate decision making, and,
- Ability to respond quickly to the changing needs of decision makers.

As the demand for information systems to support effective decision making have increased, so have the terms used to describe them: data warehousing, knowledge management, data mining, collaborative systems, online analytical processing, with Business Intelligence tending to encompass all (Gibson et al, 2004). Business Intelligence can be considered as the combination of processes and technologies to assist in decision making.

Gartner (2009), a leading business analyst firm, conducted a worldwide survey of 1,500 Chief Information Officers and identified Business Intelligence as the number one technology priority at the time. This level of importance is reflected in the forecasted Business Intelligence vendor revenue. Gartner (2012) indicated that Business Intelligence revenue reached \$12.2 billion in 2011 which reflected a 16.4 percent increase from 2010. Bhattacharjee (2010) predicted that the BI revenue would reach \$13 billion by 2013.

Although Business Intelligence is a priority for companies, similar to many other large information systems projects, the successful implementation and use of Business Intelligence can be impeded due to a number of factors (Chenoweth et al, 2006). Several researchers have attempted to identify these factors in order to facilitate the success of Business Intelligence projects. The factors include; organizational factors (alignment to strategy, management support, champion, resistance), systems factors (vendor selection, architecture, access tools, skill availability), project factors (resources, project skills, change management, end user training), data factors (source data quality, data stewardship, flexible enterprise data model) (Olszak and Ziemba, 2012; Yeoh and Koronios, 2010; Chenoweth et al, 2006; Sammon and Adam, 2004; Srivastava, and Chen, 1999). These factors are often referred to as Critical Success Factors. Rockart (1979 pp. 85) argued that

“Critical success factors are, ... the few key areas where *"things must go right"* for the business to flourish. ...As a result, the critical success factors are areas of activity that should receive constant and careful attention from management”.

### **Enterprise Resource Planning Systems**

Increasingly the predominant source of data for Business Intelligence in large companies is from an Enterprise Resource Planning (ERP) system. Many companies have implemented an ERP system to better manage their business processes through the automation and integration of business transactions (Davenport, 1998).

ERP systems evolved from Material Requirements Planning (MRP), Manufacturing Resource Planning (MRPII), Computer Integrated Manufacturing (CIM), and other functional systems responsible for the automation of business transactions in the areas of accounting and human resources (Klaue et al, 2000). The attempt to integrate all these systems coined the term ERP systems. ERP systems can be defined as information systems that are; integrated, modular, have broad business functional scope and are responsible for transaction processing in a real time environment (Hawking et al, 2006).

Due to the benefits of ERP systems, many companies consider them as essential information systems infrastructure to be competitive in today's business world and provide a foundation for future growth (Harris and Davenport, 2006). ERP systems are complex in nature and for many companies underestimating the impact these systems would have on their organization have caused them to initially struggle with their implementation. For some, the barriers associated with the lack of skilled resources and inexperience with projects of this scope were noted as being insurmountable (Calegero, 2000). Markus (2004 pp.5) concluded that ERP system implementations "are notorious for their implementation challenges and problematic organisational consequences". Subsequently, the failure to meet business deadlines and budgets and the inability to achieve business benefits from the new ERP system, may often result in substantial financial loss (Parr, Shanks & Darke. 1999).

In order to provide a foundation to help practitioners in their ERP implementations, numerous critical success factors and themes have been identified in the literature over the last ten years. These have included: top level management support and commitment to the change, clearly defined and implemented communication avenues, presence of a top level sponsor, avoidance of customisation, including key personnel on the project team, good project methodology with clear milestones, providing appropriate end user training with ongoing support, well written and complete needs analysis reports, organisational culture change and process reengineering (Ngai et al, 2008; Shanks et al, 2000; Holland and Light, 1999; Sumner, 1999; Summer, 2000).

Researchers have identified a range of factors which have contributed to the growth in the uptake of ERP systems that include; the need to streamline and improve business processes, better manage information systems expenditure, competitive pressures to become a low cost producer, increased responsiveness to customers and their needs, integrate business processes, provide a common platform and better data visibility, and, as a strategic tool for the move towards electronic business (Harris and Davenport, 2006; Davenport et al, 2003; Hammer, 1999; Somer et al, 2001; Markus et al, 2000).

Holland and Light (2001) developed a maturity model of ERP system adoption and then considered the impact of cost, entropy (level of disorder), complexity, flexibility and competitiveness would be impacted at each maturity stage. They identified three stages. In Stage One, companies are commencing their ERP implementation while at the same time managing their existing legacy systems. In Stage two, the implementation is complete across the organisation and the functionality is being adopted. In the third and final stage, the ERP system has been accepted and companies are investigating avenues for achieving strategic value from the additional functionality available in the ERP system. Other maturity models for ERP system usage have been proposed by Parthasarathy and Ramachandran (2008), Cap Gemini and Ernst & Young (2002), Deloitte Consulting (1998).

Davenport et al (2004) identified a list of benefits that companies might expect from their systems implementation. The top benefits identified related to effective decision-making and improved Business Intelligence. ERP system models identify the evolutionary nature of how companies use these types of systems to gain greater business value. Accordingly, to satisfy customer demands, ERP systems have evolved from a transactional focus to a more analytical strategic focus incorporating Business Intelligence functionality (Harris and Davenport, 2006). Much attention has been given to optimising business transactions and the associated processing of data however there is disappointment by top-level management as to the role that information technology plays in supporting decision making in organisations (Drucker, 1998). Many companies have implemented Business Intelligence solutions as an extension to their ERP system to facilitate improved reporting and better decision making (Harris and Davenport, 2006).

The growing importance of Business Intelligence has seen ERP system vendors extending their solutions to incorporate Business Intelligence functionality (META Group, 2004). The first stage of this has been the incorporation of data warehouse systems. Research to date on the factors that impact on the success of data warehouse systems have focussed on systems that have been independent of ERP systems. Although there has been wide research associated with ERP system's critical success

factors, there has been limited research associated with critical success factors of data warehouse systems in an ERP systems environment.

Hence the purpose of this research is to identify the critical success factors associated with Business Intelligence implemented as an extension of an ERP system. The thesis consists of seven chapters.

Chapter 1 – Introduction: This chapter provides a summary of the thesis, sets the foundations for exploring Business Intelligence and describes the chapter structure.

Chapter 2 – Review of Literature: This chapter provides an analysis of the available literature in regards to the research topic. It discusses the role of information technology and how it supports effective decision making in companies. The chapter introduces Business Intelligence and its various definitions. The value of Business Intelligence to companies is discussed with a number of examples provided. The research literature indicates that the value of Business Intelligence differs between companies depending on their previous experience with Business Intelligence. This previous experience can be mapped to Business Intelligence Maturity Models. The models provide a number of Business Intelligence related activities that are mapped to various maturity categories. Different Business Intelligence Maturity Models are discussed.

The chapter also discusses the issues associated with the use and implementation of Business Intelligence. Researchers have attempted to identify factors which contribute to the success of Business Intelligence. These factors are commonly referred to as critical success factors and their relevance to information systems is discussed. The critical success factors which have been identified pertinent to Business Intelligence are documented.

The chapter introduces ERP systems and their role in supporting a company's business processes and the value ERP systems provide. ERP systems are complex and encounter many implementation issues. The research associated with ERP systems and their critical success factors is discussed.

Many of the ERP systems from the different vendors are integrated with Business Intelligence from the same vendor. The transactional data from the ERP systems is sourced by Business Intelligence to facilitate analysis for better decision making. The research to date on the Business Intelligence critical success factors are related to Business Intelligence operating relatively independently of an ERP system. The lack of recognition of researchers of the interdependence of an ERP system and its associated Business Intelligence is a gap in the research literature.

A Conceptual Framework is developed from the literature which includes the identified critical success factors associated with ERP systems identified from previous research and those associated with Business intelligence. Three research questions are used to guide the study and include;

1. *What are the critical success factors associated with the implementation of a Business Intelligence as an extension of an ERP system?*
2. *Are the critical success factors of an ERP system implementation relevant to the implementation of a Business Intelligence which is implemented as an extension of an ERP system?*
3. *Of the identified critical success factors are some more critical than others?*

### Chapter 3 – Research Methodology

This chapter discusses the research approach adopted to investigate the research questions developed from the research literature. The chapter is introduced through a discussion of various research approaches used in the information systems discipline. A research design is proposed which adopts a qualitative iterative staged approach to investigate the research question. The research design consists of four stages;

1. Literature Review
2. Conceptual Framework
3. Content Analysis
4. Conduct Interviews



As mentioned previously a literature Review was undertaken of research associated with Business Intelligence, ERP Systems, Information Success, and Critical Success Factors. The analysis of the literature identified a gap in research resulting in the formulation of the Conceptual Framework and associated research questions.

A qualitative approach was used which utilised two sources of data; industry presentations and industry interviews. The results of the analysis of industry presentations allowed the revision of the initial Conceptual Framework. The revised Conceptual Framework was then further investigated and validated through the industry interview process. Each stage of the research built upon the findings of the previous stage and acted as input to the next stage. This was reflected through revisions to the Conceptual Framework.

The first stage of data collection used industry presentations related to Business Intelligence. These presentations were analysed using a content analysis approach similar to that proposed by Neuendorf (2002). The initial sample consisted of 9,868 industry presentations from 71 events, between 1999 to 2009. The industry presentations were analysed for the identification of Business Intelligence critical success factors.

The interviews in the second phase of data collection were based on the Responsive Interview approach (Rubin and Rubin, 2005). A series of questions were developed based on the revised Conceptual Framework. However, these questions were used as a guide rather than for a formal interview. This unstructured approach allowed the conversations to flow and move from one topic to the next.

#### Chapter 4 – Results: Analysis of Industry Presentations

This chapter discusses the findings associated with the content analysis stage of the research design. An analysis was conducted on an initial sample of 9,868 industry presentations from SAP related events. These presentations were examined as to their relevance to Business Intelligence resulting in the sample being reduced to 854 presentations (8.6% of original sample). These presentations were further analysed to

identify critical success factors. The sample was further reduced to 142 presentations from 110 different companies that included critical success factors.

In depth content analysis was undertaken on these 142 presentations allowing the study to identify the frequency of occurrences of the identified Business Intelligence critical success factors. All except one (Development Technology) of the Business Intelligence critical success factors identified in the Conceptual Framework were identified from the content analysis of industry presentations. The identified critical success factors were classified as either Organisation, Process, or Technology.

The study also found that many of the ERP system's critical success factors acknowledged in the research literature were identified as relevant to Business Intelligence when Business Intelligence is implemented as an extension of an ERP system. However, although these factors were common to both systems how they were applied and managed would differ between systems.

The content analysis indicated that the relevance of different critical success factors is dependent on their contexts. These contexts are what component for Business Intelligence is being implemented (Component) and how that component is intended to be used (Application). The final context is related to a company's previous experience or maturity using Business Intelligence (Temporal).

The chapter concludes with the Conceptual Framework being revised based on the findings from the content analysis.

### Chapter 5 – Results: Interviews

This chapter discusses the results of the next phase of industry practitioner interviews. The purpose of the interviews was to validate the Conceptual Framework and to determine whether some critical success factors were more critical than others.

Industry practitioners from four Australian companies were interviewed. Each interview was documented in terms of company background, Business Intelligence use, critical success factors and overall analysis.

The companies demonstrated differing levels of Business Intelligence and maturity. Two additional Business Intelligence critical success factors, *Process Maturity* and *Knowledge Transfer* were newly identified and added to the revised Conceptual Framework and the influence of Business Intelligence context (Component, Application, Temporal) was further reinforced. The revised Conceptual Framework was updated to reflect these findings.

#### Chapter 6 – Discussion and Contributions

This chapter discusses the contribution of the research noting that many of the Business Intelligence critical success factors originally identified in the Conceptual Framework were relevant to Business Intelligence implemented as an extension of an ERP system. The chapter then discusses how many of the ERP system critical success factors (*Management Support, Methodology, User Involvement, Team Composition, Change Management, Technology* ) were also applicable to information systems in general (Slevin and Pinto, 1986). These factors were common to information systems in general and to both ERP system and Business Intelligence.

The chapter discussion then focusses on Business Intelligence critical success factors that were identified from the content analysis and interviews that were not contained in the original Conceptual Framework. These included; *Security, Business Content, Interaction with Vendor (SAP), Reporting Strategy, Testing, Identification of KPIs, Process Maturity, Knowledge Transfer, Governance, Training, and Technical*.

The chapter concludes with the notion of how a factor may be critical to success for one company and not another, and that the difficulties with generalising critical success factors. This reinforces the relevance of the Critical Success Factor Context Framework developed from the research.

The chapter also discusses the contributions the research has provided to industry.

### Chapter 7 - Conclusion and Future work

The final chapter sums up the findings of the thesis and identifies possible limitations to the research. It also includes opportunities for future research which have evolved from this research.

## CHAPTER 2 - REVIEW OF LITERATURE

This chapter will introduce the concept of Business Intelligence, its value to the organisation, implementation issues and important critical success factors. It will then discuss the relationship between Business Intelligence and Enterprise Resource Planning (ERP) systems. ERP systems will be discussed in relation to their value, and implementation factors. At the conclusion of the chapter a comparison will be made between Business Intelligence critical success factors and those of ERP systems. This will provide the background to the research questions for the study reported in this thesis.

### Background

Since the start of business, companies have realised the importance of providing accurate and timely information for effective decision making. Aristotle Onassis, the famous Greek shipping tycoon once said “the secret of business is to know something that nobody else knows” (cited Lorange, 2001 p.32). Evans and Wurster (1997, p.72) in their paper on the Information Economics indicated that “... information is the glue that holds business together”. The consequences treating information as a strategic resource and corporate investment in enhancing information quality can result in companies gaining advantages in reputation and profitability (Loshin, 2003).

Throughout history companies have developed and implemented systems to facilitate the collection, processing and dissemination of information in an attempt to improve performance. The introduction of computer based technology to support these information systems has caused a revolution in information processing that has pervaded all facets of society. Companies have increasingly identified the importance of information technology (IT) in allowing them to achieve strategic objectives (Scott Morton, 1991). Accordingly, individual departments developed or purchased functionally specific IT applications to support their decision making processes related to their goals. Increasingly every function of a company utilises IT, from operational activities through to strategic planning. It is estimated that by the turn of the last century American companies were spending nearly 50% of their capital expenditure on IT (Carr, 2003). Peter Drucker (1998) believed that much of this IT was being used to produce data rather than information allowing companies to make effective decisions.

Just as there were many IT systems implemented to support the varying needs of business, the terms used to describe them also varied and included, Transaction Processing System (TPS), Management Information System (MIS), Executive Information System (EIS), Expert System (ES), and Decision Support System (DSS) to name a few. These systems evolved as end users realised the capabilities of IT and the type of decision making and their associated information requirements increased in complexity and latency. One of these systems, Decision Support Systems (DSS) promised to provide managers with timely and relevant information in addition to analytical capabilities to assist effective decision making. Alter (1980) identified major characteristics of DSS being:

- Designed specifically to facilitate decision making processes,
- Able to support rather than automate decision making, and,
- Able to respond quickly to the changing needs of decision makers.

The widespread adoption and use of IT to support various business processes has resulted in an exponential growth in the amount of data that is processed and stored. However, this ever increasing volume of data can act as an impediment to effective decision making (Davenport and Harris, 2007). Clearly the storing or processing of the data is not the problem but more the transformation of the data into a format that is suitable for decision making. Courtney (2001) makes a distinction between data, information and knowledge. Data relates to the raw facts or observations that are capture by the IT system. Information is where this data is put in context or interpreted. While knowledge refers to how this information is applied or acted upon. This difficulty in the transformation of data that allows effective decision making has caused disappointment in top level management as to the important role IT plays in this process (Drucker, 1998; Barone et al, 2010).

Traditional IT systems which support transaction processing (Online Transaction Processing Systems [OLTP]) are efficient at capturing data and processing this data into information. However, the ability of these systems to quickly provide flexible reporting functionality to better understand the information and its impact on the business is limited. Online Analytical Processing Systems (OLAP) were developed as a result of the need for flexibility when reporting changing business requirements and the availability of increased computing power. These systems provided multi-dimensional reporting which allowed the end user to quickly manipulate reports to generate the relevant user information (Chaudhuri and Dayal, 1997).

Codd et al (1993) characterised OLAP systems as providing; multi-dimensional conceptual view of data, link to a variety of data sources, easy for users to access and understand, multi-user support, intuitive data manipulation, flexible reporting, and analytical capabilities.

A data warehouse, as the name implies, provides a repository of data which acts as a source for multi-dimensional reporting using OLAP technology (Inmon, 1995).

The increased informational requirements and the availability of appropriate computing technology resulted in the evolution of existing IT systems and the emergence of new applications. These new solutions included Knowledge Management (KM), Data Mining (DM), Collaborative Systems (CS), Corporate Performance Management (CPM), Knowledge Discovery (KD) and Analytics, with the term Business Intelligence (BI) tending to be used to encompass all (Gibson et al, 2004; Gray, 2003a; Olszak and Ziemba, 2007; Cebotarean, 2011). Gray (2003) believes that BI is not a new technology but an evolution of previous systems used to support decision making. An international study of 472 organisations to determine the key information technology and management priorities identified Business Intelligence as a major requirement for these firms (Luftman and Zadeh, 2011).

## **Business Intelligence**

### ***Defining Business Intelligence***

Some researchers (Vitt et al, 2002 p.13) consider the term “Business Intelligence” to be relatively new with Howard Dresner, from the Business Intelligence vendor Hyperion, claiming ownership of the term (Smalltree, 2006). However, Luhn (1958 p.314) used the term more than 50 years ago with his dissemination of information technique:

“...the term *Business Intelligence System* should be defined ...as a collection of activities carried on for whatever purpose, be it science, technology, commerce, industry, law, government, defence, et cetera. The communication facility serving the conduct of a business (in the broad sense) may be referred to as an *intelligence system*. The notion of *intelligence* is also defined here, in a more general sense, as “the ability to apprehend the interrelationships of presented facts in such a way as to guide action towards a desired goal.”

Although it is possible to narrow down the origin of the term, a common definition is more elusive. Vitt et al (2002, p.13) define Business Intelligence as “...an approach to management that allows an organisation to define what information is useful and relevant to its corporate decision making.” Howson (2007, p.2) defined Business Intelligence as an activity that “...allows people at all levels of an organization to access, interact with, and analyse data to manage the business, improve performance, discover opportunities, and operate efficiently”. These definitions appear to ignore the role IT plays in Business Intelligence. Golfarelli et al (2004, p.1) defines Business Intelligence “...as information systems which processes data into information and then into knowledge to facilitate decision making”. Loshin (2003, p.4) believes that it is “a set of tools and methodologies designed to exploit actionable knowledge discovered from the company’s information assets”. Williams and Williams (2006, p.2) have provided a similar definition. Davenport and Harris (2007, p.7) believe that Business Intelligence encompasses analytics and is a “ ...set of technologies and processes that use data to understand and analyse business performance”. Clearly, the common theme embodied in Business Intelligence definitions is the combination of processes and technologies to assist in decision making.



Although there appears a common theme in the definitions this is of little use to companies when attempting to implement Business Intelligence solutions. A number of authors (Inmon et al, 1998; Davenport and Harris, 2007) further described Business Intelligence from an architectural perspective. Inmon et al (1998, p.13) introduced the concept of the “Corporate Information Factory” (Figure 1) to describe a logical architecture for Business Intelligence.

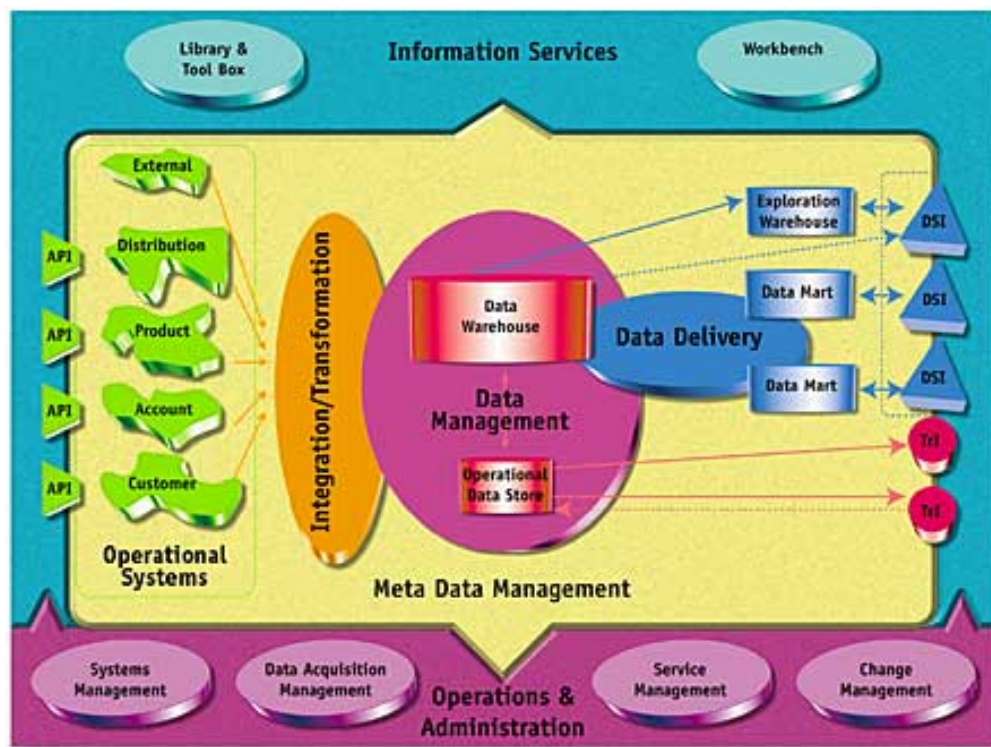


Figure 1 The Corporate Information Factory (Inmon et al, 1998, p.13)

The components of the Corporate Information Factory include:

- **Operational Systems:** are information systems responsible for the day-to-day operations of the business. They automate and manage transactions associated with the various business processes. The data within these systems are accessed via application programming interfaces (API's). They are also sometimes referred to as source systems. These heterogeneous source systems can utilise a variety of technologies in differing computing environments (Robertson, 1997)
- **Integration and Transformation:** is the process of capturing cleansing and transforming the data from the source systems. This standardises the data and enables the data from different source systems to be merged in preparation for analysis. The data is stored either in a Data Warehouse or an Operational Data Store (ODS). These

repositories vary in the type of data stored, the format it is stored in and the types of decisions supported. A data warehouse “...is a subject oriented, integrated, time-variant (temporal), non volatile collection of summary and detailed data used to support the strategic decision making process for the enterprise” (Inmon et al, 1998 p.8). While the ODS is “...a subject oriented, integrated, current-valued, volatile collection of detailed data used to support up-to-the-second collective tactical decision making process for the enterprise” (Inmon et al, 1998 p.7). The major difference between the two repositories is the level of data detail that is stored and the way the data is accessed.

- **Data Management:** is responsible for the management of data across the Corporate Information Factory. This includes the movement of data between the various components such as archiving, restoration etc.
- **Data Delivery:** allows end users to build and manage a subset of the data warehouse designed around a specific business function. This subset is referred to as a Data Mart.
- **Decision Support Interface (DSI):** provides the end user with tools to access and manipulate the data to facilitate decision making. The tools can include functionality to support; multi-dimensional reporting, OLAP, data mining, and data visualisation.

For the purpose of this thesis the definition proposed by Davenport and Harris (2007, p.7) “...set of technologies and processes that use data to understand and analyse business performance” will be adopted.

Davenport and Harris (2007, p.156-157) identified six key elements of the Business Intelligence architecture. These included:

1. **Data Management:** which defines how the required data is sourced and managed.
2. **Transformation Tools and Processes:** which defines how the data is extracted, cleansed, transformed and stored in databases.
3. **Data Repositories:** reflects how data is stored and transformed ready for use. This includes the metadata that describes the data. This includes data warehouse and data marts.
4. **Analytical Applications:** which provide the ability to manipulate the data for analysis and can include, OLAP, data mining and simulation tools.

5. Presentation Tools and Applications: are methods for end users to access and interact with the data.
6. Operational Processes: enable the administrative infrastructure such as security, error handling and audit control.

A major component of these elements is the role of the data warehouse. The data warehouse is a technology used to store information in multi-dimensional structures to facilitate analysis (Chaudhuri et al, 2011). However, a number of authors use the term data warehousing to go beyond the description of a technology and to describe a process similar to Business Intelligence (Srivastava and Chen, 1999; Sammon and Finnegan, 2000; Wixom, 2001; Leite Pereiraf and Becker, 2001; Shin, 2003; Hermann, 2004; Ang and Teo, 2000, Chenworth et al, 2006). For the purpose of this research data warehousing and Business Intelligence will be considered synonymous.

### ***Value of Business Intelligence***

Notwithstanding the differing structures of the BI environment, it still remains a high priority for many companies (Davenport, 2010; Foley and Manon, 2010). In a Cutter Consortium Report (2003) a survey of 142 companies found that 70% of the respondents were implementing data warehousing and Business Intelligence initiatives. Gartner, (2009) a leading business analyst firm, conducted a worldwide survey of 1,500 Chief Information Officers and identified Business Intelligence as the number one technology priority. This level of importance is reflected in the forecasted Business Intelligence vendor revenue. Palo Alto Management Group has predicted that the expenditure related to Business Intelligence sales, service and development reached \$113.5 billion by 2002 (Watson et al, 2002). Gartner (2012) indicated that Business Intelligence revenue reached \$12.2 billion in 2011 which reflected a 16.4 percent increase from 2010. Bhattacharjee (2010) predicted that the BI revenue would reach \$13 billion by 2013.

This increased expenditure on Business Intelligence is reflective of the level of impact these systems can have on a company's performance. IDC (1996), another analyst firm, found in a survey of 62 companies that there was an average 401 percent return on investment (ROI) over a three year period for Business Intelligence implementations. The Data Warehousing Institute (TDWI, 2005) identified a number of organisations such as Hewlett Packard and the

US Army NGIC had improved their performance through the adoption of Business Intelligence. Hewlett Packard found in 2004 that due to their Business Intelligence initiative, worker productivity increased and was valued at approximately \$10.6 million, whilst reporting costs were reduced by \$8.6million. The US Army NGIC found as a result of their Business Intelligence implementation, 10 trained analysts could complete as much work as 200 traditional analysts. Harrahs, a major hotel and casino owner in America, indicates that Business Intelligence contributed to improved performance and resulted in a \$235 million profit in 2002. Harrahs used Business Intelligence to better understand customers and their gambling habits (Williams and Williams, 2006). It was reported that Harrahs spent \$10million to build a 30 terabyte data warehouse as part of their Business Intelligence initiative (Lyons, 2004).

Davenport (2006) proposes that Amazon, Harrahs, Capitol One, and Boston Red Sox have dominated their areas of business due to the impact of Business Intelligence. There have been documented examples of where companies have used Business Intelligence effectively. For instance; Wal-Mart (Westerman, 2001), Amazon (Rundenstiener, 2000), Citigroup (Debreceeny et al, 2005) and TetraPak (Hawking and Rowley, 2011). Smith et al (2010) documented how Business Intelligence was used to support the recovery effort after Hurricane Katrina. One of the more publicised success stories of Business Intelligence is its implementation at Continental Airlines (Anderson-Lehman et al, 2004). Over a six year period the company invested \$30 million to implement their Business Intelligence initiative and achieved \$500 million in increased revenues and cost savings, an investment that had a ROI of more than 1000%. This level of Business Intelligence ROI is not unique. IDC (Morris, 2003) collected data from forty three companies in North America and Europe and found that twenty companies achieved a ROI of less than 100%, fifteen achieved an ROI between 101 and 1000 percent and eight achieved an ROI greater than 1000%. Lavalle et al. (2011) in a survey of nearly 3000 executives, managers, and analysts from more than 30 industries in 100 countries, found that the top companies applied Business Intelligence to support their decision making wherever possible, while lower performing companies use human intuition for decision making.

The literature identifies a number of benefits that can be achieved through the use of Business Intelligence and its components. These include improvements in the areas of:

- Decision Support – The focus of Business Intelligence is to organise and deliver information to support the decision making process in an organisation (Meyer and Cannon, 1998). Due to the large amounts of information, accumulated in today's organisations, traditional databases can be difficult to organise and provide access to data for decision making (Hwang et al, 2004). Business Intelligence provides the tools and techniques to integrate data from various sources making it available for analysis (Brohman and Parent, 2001). This enables companies to make decisions which allow greater insight into the company and are more strategic in nature (Harris and Davenport, 2007). It also allows end users to rethink how they solve problems. Indeed multi-dimensional analysis provides end users with the ability to manipulate data from various source systems in a way that was not previously available. Data mining enables the end users to discover relationships between performance factors which they were not previously aware of. This knowledge discovery and analysis flexibility can lead to better decisions that may result in significant revenue growth, cost reduction, enhanced customer satisfaction leading to an increase in profits (Watson et al, 2002).
- Information Analysis – Business Intelligence provides the ability to perform sophisticated analysis of data. The Business Intelligence environment allows for information from transactional systems to be replicated, standardised, integrated and stored for later analysis (Quaddus and Intrapairot, 2001). This allows decision makers to manipulate the information to enhance analysis without interfering with the transactional systems (Chaudhuri et al, 2011; McDonald et al, 2006). Information manipulation techniques include, slicing and dicing, pivoting, drilling across and down, and aggregation (Ramamurthy et al, 2007). In addition to manipulation techniques, Business Intelligence provides advanced statistical analysis tools for knowledge discovery and data mining (Song et al 2009; Ester et al, 1998; Cheng and Chang, 1996).
- Information Integration – Information stored across different heterogeneous systems makes it difficult to source, integrate and ultimately use this information for decision making. The Business Intelligence environment, in particular the data warehouse, provides the facility to overcome these issues. A data warehouse will minimise data

redundancies and inconsistencies by storing the data in a consolidated database which can be accessed for information analysis, thus improving the overall information quality (Chaudhuri et al, 2011; Popovic et al, 2010; Adelman and Moss, 2002;).

- Decision Efficiency – Decision latency refers to the amount of time taken to access the required information, so as to allow individuals to make a particular decision (Watson et al, 2006). This has become increasingly important in hyper-competitive markets where companies are looking for operational efficiencies (Harris and Davenport 2007). Business Intelligence can reduce decision latency by consolidating and integrating information from different functional areas and storing this information in structures which facilitate quick access and analysis. This has resulted in companies implementing “real time” Business Intelligence environments (CGI, 2004; 2005).

Although tangible benefits of Business Intelligence such as ROI and costs savings have been identified, a survey of 540 IT professionals found that the intangible benefits were just as important as and arguably more important than, the tangible benefits (Gibson et al, 2004). The top five intangible benefits identified included; better information, better strategies, improved tactics and decisions, and more efficient processes. The acknowledgement of tangible and intangible benefits is not unique to Business Intelligence. Previous research on Information Systems success have identified such factors as satisfaction of users (Melone, 1990), quality of service (Pitt et al., 1995), system usefulness (Davis 1989; Moore and Benbasat 1991). Delone & McLean (1992) classified Information Systems success measures into six categories, as presented in the model shown in Figure 2.

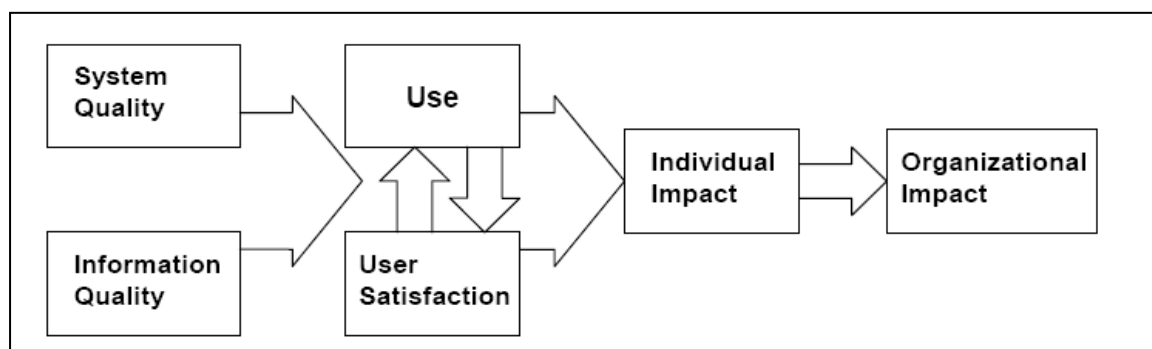


Figure 2 Delone and McLean's Model of IS Success (1992)

DeLone and McLean (1992, p.87) argued that when measuring Information Systems' success, researchers should "systematically combine" measures from their six Information System success categories. The categories include:

- System Quality which refers to the system meeting the requirements of the organisation such as reliability, response time and accuracy.
- Information Quality which refers to the quality of the system's output in the form of reports, information value and information attributes. Information attributes include accuracy, timeliness and relevance.
- Use which refers to the adoption and extent of use the system within the organization.
- User Satisfaction was identified as the most widely used single measure. Its emphasis centred on the responses of users with regards to the Information System and measures the degree of user contentment with the output of the system
- Individual Impact is related to the impact on individual performance and productivity.
- Organisational Impact assesses the impact of information systems on organisational performance. This could include operating cost reductions, overall productivity gains, increased revenues, and increased sales.

Seddon et al (1999), used the Delone and McLean (1992) model and critically argued that the model did not recognise the different stakeholders within an organisation that may have different opinions of the system. They proposed a two dimensional matrix for classifying Information System effectiveness measures. The dimensions included; the type of system being evaluated and the stakeholder whose interest in the system is being evaluated. Shin (2003) applied aspects of the Delone and Mclean (1992) model to identify measures of success in the Business Intelligence environment, more specifically the application of data warehousing. He also considered the users, their tasks, and the usage of the data warehouse which was supportive of Seddon et al's (1999) findings. Shin (2003) through a combination of interviews and surveys with various stakeholders within a company investigated a number of variables associated with user satisfaction in regards to the implemented data warehouse. These variables were categorised under system quality, information quality and service quality. It was found that user satisfaction was significantly impacted by system quality factors such as system throughput, data quality and the ability to locate data.

These findings were partially reinforced by a review of the literature conducted by Hwang and Hongjiang (2005). They identified the data warehouse success categories as; System Quality (ease of use, speedy information retrieval), Output Quality (increased information, better quality information), Individual Impact (improved productivity, better decisions), and Organisational Impact (improved business process, increased competitive position). Watson and Ariyachandra (2005) investigated the success of Business Intelligence based on various architectures implemented in 454 organisations. They identified success factors as; information quality (accuracy, completeness, consistency), systems quality (flexibility, integration, scalability), the impact on individuals (improved access to data, improved decision making), the impact on organisations (Business Intelligence use, accomplishment of strategic business objectives, improved business processes, improved cooperation across business units) implementation time (project on schedule), and implementation cost (cost of implementation, annual maintenance costs, on budget). Gorla (2003) adopted a much simpler measure of Business Intelligence success in terms of ease of use and usefulness. A number of authors believe that the measures of Business Intelligence success change as system implementation and usage evolves over time (Gibson and Nolan, 1974; Watson et al, 2001; Eckerson, 2006). This evolution is normally referred to as system maturity.

### ***Business Intelligence Maturity Models***

To assist companies to understand the implementation and use of Business Intelligence a number of differing maturity models have been proposed (Watson et al, 2001; McDonald, 2004; Hamer, 2005; Eckerson, 2006, ASUG, 2007; Hewlett Packard, 2007; Russell et al, 2010). Each model identifies distinct stages associated with a company's Business Intelligence growth. However, each model utilises different factors that are associated with different stages. Harris and Davenport (2007) created a model (Figure 3) to assist companies to understand the role of Analytics within Business Intelligence. The model mapped different analytical practices and the degree of intelligence supplied, as well as the corresponding impact on the organisation. The authors argued that Analytics is a subset of Business Intelligence.



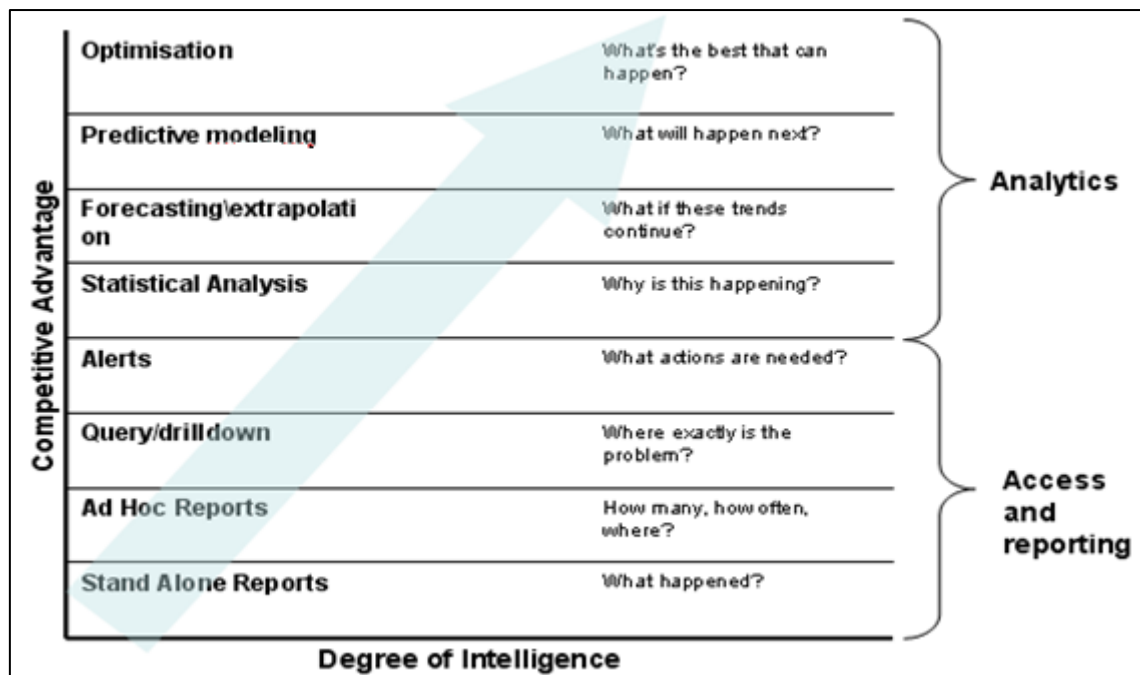


Figure 3 Business Intelligence and Analytics (Harris and Davenport, 2007)

Watson et al (2001) suggested that Business Intelligence is associated with an Initiation, Growth, and Maturity stage. These stages are based on factors that reflect; data, stability of the production environment, data warehouse staff, users of the data warehouse, impact on users' skills and jobs, use of the data warehouse, organizational impacts, costs of and derived benefits. Eckerson (2006) proposed a five-stage model based on project implementation factors such as scope, funding, data warehouse staff, governance, standards, architecture, executive perception, data latency, and business intelligence focus. The American SAP User Group (ASUG) (2007) model, developed as part of the user group's Business Intelligence benchmarking initiative, has stages that reflect Information Dictatorship, Information Anarchy, Information Democracy, and Information Collaboration. The factors evaluated to determine the stage of maturity include Information and Analytics, Governance, Standards and Processes, and Application Architecture. There are a number of other Business Intelligence maturity models identified from the literature. Table 1 summarises the identified Business Intelligence maturity models.

## Factors Critical To The Success Of Business Intelligence

Table 1 Business Intelligence Maturity Models

Author/Factors	Stages and Characteristics
ASUG (2007) Information and Analytics, Governance, Standards and Processes, Application Architecture,	<p><b>Information Dictatorship</b> Requirements are driven from limited executive group; IT driven BI governance; No or non-uniform standards and processes; BI “silos” for each business unit</p> <p><b>Information Anarchy</b> KPI’s and analytics are identified but not well used; Business driven BI governance evolving; Evolving effort to formalise standards and processes; Some shared BI applications across business units</p> <p><b>Information Democracy</b> KPI’s and analytics are identified and effectively used; Business governance with a Competency Centre developing; Standards and processes exist but are not uniform; Consolidation and upgrading of BI applications and architecture</p> <p><b>Information Collaboration</b> KPI’s and analytics are used to manage the full value chain; Enterprise wide BI governance with business leadership; Uniform, adhered and audited standards and processes; Robust and flexible BI architecture</p>
CGI (2004) Output, Impact, Technology,	<p><b>Reporting</b> Historic Data; Non-Actionable Data; Actual vs. Forecast/Budget; Disparate Data Stores</p> <p><b>Analysis</b> Trend Analysis; “What if” Scenarios; Actionable Data; Consolidated Data Warehouse</p> <p><b>Intelligence</b> Executive Dashboard; Threshold and Alerts; Business Logic Driven; Performance Metrics</p> <p><b>Real-time intelligence</b> Business Rule Validation; Enterprise Application Integration; Real-time Transactional Data Metrics</p>
Deng (2007) Organisational Impact,	<p><b>Data</b> Raw facts</p> <p><b>Information</b> Interpret; Understanding relations; Apply context; KPI, dashboard display</p> <p><b>Knowledge</b> Apply patterns; Understanding causes; Accumulate; Expert system</p> <p><b>Wisdom</b> Improve business processes; Make business decisions; Gain competitive advantage</p>
Eckerson (2006) Scope, Funding, Staff, Governance, Standards, Architecture, Executive Perception, Data Latency, Business Intelligence Focus,	<p><b>Prenatal</b> Standard static reports; Lengthy report development; IT responsible for report development; Individual development of spreadsheets starts</p> <p><b>Infant</b> Individual spreadsheets/databases (data marts) become wide spread; Lack of enterprise standards; Local control</p> <p><b>Child</b> Business focussed shared data marts developed; Departmental based; Interactive reporting tools (OLAP); Introduction of standards at department level</p> <p><b>Teenager</b> Standardisation across departments to assist with integration; Introduction of data warehouse technology at a functional level; Introduction of dashboards; Tactical reporting</p> <p><b>Adult</b> Data viewed as corporate asset; Single cross functional data warehouse (Enterprise Data Warehouse - EDW); Stewardship and Scorecards; Strategic reporting; Integration of external data into the EDW</p> <p><b>Sage</b> Interactive extranets; Utilising of web services to deliver data; Introduction of decision engines</p>

<p>Hamer (2005) Business Intelligence</p> <ul style="list-style-type: none"> <li>• Ambitions</li> <li>• Organisation</li> <li>• Architecture</li> </ul>	<p><b>Local</b> Static departmental reports; IT development of reports; No common architecture</p> <p><b>Coordinated</b> Limited consolidation of information; Introduction of standards; Centralised project bureau managed by IT; Standardised tools and infrastructure; Establishment of enterprise data warehouse</p> <p><b>Integral</b> Reports focus on optimising processes; Proactive; Cross functional BI; Multi-disciplinary project teams; BI activities under control of top management; Standardised policies and procedures; Consistent and shared metadata</p> <p><b>Intelligent</b> BI for partners and customers; BI for innovation; Shared service BI centre; BI supports strategy development; BI is supported by web services; Focus on total data quality management; Real time closed loop applications</p>
<p>Hewlett-Packard (2007) Business Enablement, Information Management, Strategy and Program Management,</p>	<p><b>Operation</b> Departmental development; Basic reporting; Executives and managers are report consumers; Poor report latency; Data warehouse with little integration; Lack of standards and processes</p> <p><b>Improvement</b> Introduction of dashboards and scorecards; Some budgeting, planning and forecasting; Executives and managers are report consumers; Increased automation in report development; Report latency improving; Vertical data warehouses are common; Taking advantage of BI capabilities offered by ERP vendors; Introduction of standards and processes; C level management involvement in BI decisions is limited</p> <p><b>Alignment</b> Use of KPI's and scorecards to measure performance; BI permeates all levels of the organisation; Integrated data across department boundaries; Introduction of enterprise data warehouse; Introduction of master data quality management; BI competency centre evolving; C level management engaged in BI</p> <p><b>Empowerment</b> BI is automated and embedded in business processes; Activity monitoring; Data governance introduced including master data management; Attempts to integrate unstructured and structured data; BI integrated with enterprise portal; BI part of all strategic initiatives; BI competency centre established; C level management sponsorship of BI portfolio</p> <p><b>Excellence</b> BI consider a differentiator; BI highly integrated throughout the company; Data governance and master data management established; Chief Analytics Officer position introduced</p>
<p>Macdonald (2004)</p>	<p><b>BI Infrastructure</b> Creation of enterprise and divisional or other data warehouses. Required, in order to set the foundation for an enterprise wide decision support system.</p> <p><b>Business Performance Management</b> Implemented to help executives and managers avoid information overload and focus on the key metrics. Some alert and notification capabilities offered.</p> <p><b>Decision Enablement</b> Automation of the decision process including alerts. Systematic rules used to make decisions based on data captured after past decisions stored in a knowledge repository.</p> <p><b>Business Activity Monitoring (BAM)</b> Builds on the Output Integration capabilities to send alerts and make decisions in real-time.</p>

McMurphy and Bertram (2007) Technology, Organisation, Business, Failure Modes,	<p><b>Opportunistic</b> No tools or standards; Report focused; Departmental based; Focused on process efficiency or cost reduction; No information governance or stewardship</p> <p><b>Tactical</b> Basic use of data integration tools; Multiple data warehouses; Multiple BI tools; Different levels of BI users; High level of BI skills; Localised data quality work; BI used to improve business effectiveness; Cross department approach</p> <p><b>Strategic</b> Enterprise data warehouse; Master data management; Data integration tools; Pervasive BI; BI competency centre; Executive level funding and sponsorship; Governance and stewardship; Supports business execution and management; BI extends to partners and customers.</p>
Watson et al (2001) Data Architecture, Stability of environment, Staff Impact on users' skills and jobs, Applications, Costs and Benefits, Organisational Impact,	<p><b>Initiation</b> Department based; Relatively small amounts of data; Limited skills of staff; Reports used by departmental analysts</p> <p><b>Growth</b> Standards and processes introduced; Internal skills available; Applications evolve based on data warehouse; Basic "what if" analysis; BI benefits recognised; Tactical impact</p> <p><b>Maturity</b> Enterprise data warehouse; Standards and processes established; BI staff experienced; BI is used throughout the organisation and by customers and suppliers; Reports pre-defined and Ad hoc; Data mining; Predictive modelling; Closed loop BI with operational systems</p>

These maturity models highlight various aspects of the implementation and use of Business Intelligence. A number of the models indicate that the introduction of a data warehouse is a significant stage in a Business Intelligence strategy (Macdonald, 2004; Eckerson, 2006; Hewlett-Packard, 2007; McMurphy and Bertram, 2007). Business Intelligence is an all-encompassing term used to describe the process and technologies to improve decision making. The Business Intelligence elements described previously identified a data extraction, data transformation and data storage functionality as essential components (Inmon et al, 1988, Davenport and Harris, 2007). The data warehouse supplies this functionality and for many companies and vendors data warehousing and Business Intelligence is considered to be the same. In a survey of Fortune 1000 chief information officers it was found that 90% of respondent organisations were developing data warehouses (Parker, 1994 cited McFadden, 1996).

The classic definition of a data warehouse is “...a subject oriented, integrated, time variant, and non-volatile collection of data in support of management’s decision making process.” (Inmon, 1995, p.31). Each characteristic is further elaborated as follows:

- Subject oriented refers to the way data is organised within the data warehouse. Each company has a number of key subject areas (customer, product, sales, repairs etc.) which inform key decisions in a company’s performance. The data which is pertinent to a subject area may be related to a variety of transactions and stored in different locations in the online transaction process (OLTP) systems (Inmon, 1995; Marco, 2000).
- Integrated refers to the ability of a data warehouse to combine data from various heterogeneous source systems. This means that the subject oriented data may exist in different source systems in differing formats. The provision of a consolidated and integrated data set ensures that all data has standardised naming conventions, measurement standards, encoding structures, and attributes (Inmon, 1995; Marco, 2000; Egger, 2004). This facilitates the provision of a “*single version of the truth*” for decision making.
- Time variant is one of the main differentiators between a data warehouse and transaction processing (OLTP) systems. OLTP systems are concerned with the day-to-day operations of the company. A data warehouse is more concerned with historical data that records trends and organisational changes over time (Inmon, 1995; Marco, 2000; Ramamurthy et al, 2008). The data warehouse data even though up to date when it is loaded it could contain data that is up to ten years old. The OLTP system contains current operational data and is usually stored up to ninety days (Gray and Watson, 1998).
- Non-volatile is a commonly used computer term to describe data that is static or unable to be changed. In an OLTP system the data is changed regularly; created, updated or deleted as transactions occur. In a data warehouse data is loaded on a scheduled basis with the previous data remaining unchanged. The data is then summarised or aggregated for decision making. This enables comparisons in data to be made over time (Inmon, 1995; Gray and Watson, 1998; Marco, 2000).

Hence the functionality that data warehouses offer make them an important component of a company's Business Intelligence strategy which is reflected in many of the maturity models (Watson et al, 2001; CGI, 2004; Macdonald, 2004; Hamer, 2005; Eckerson, 2006; McMurchy and Bertram, 2007; Hewlett-Packard, 2007; Chaudhuri et al, 2011).

Maturity models can provide a roadmap for companies to move forward however, a review of literature indicates that a significant number of companies often fail to realise expected benefits of Business Intelligence and sometimes consider the project a failure in itself (Chenoweth et. al., 2006; Hwang et al., 2004; Johnson, 2004; Arte 2003; Adelman and Moss 2002; Vatanasombut and Gray, 1999; Watson et. al., 1999; Wen et al., 1997; Kelly, 1997). Gartner in 2002 predicted that more than half of the Global 2000 enterprises would fail to realise the capabilities of Business Intelligence and would lose market share to the companies that did (Dresner et al, 2002). A survey of 142 companies found that 41% of the respondents had experienced at least one Business Intelligence project failure and only 15% of respondents believed that their Business Intelligence initiative was a major success (Cutter Consortium Report, 2003). Furthermore, Moss and Atre (2003) indicated that 60% of Business Intelligence projects have failed to achieve expectations due to poor planning, poor project management, undelivered business requirements or those that were delivered, being of poor quality. A number of authors believe that in many Business Intelligence projects the information that is generated is inaccurate or irrelevant to the user's needs or delivered too late to be useful (Ballou and Tayi, 1999; Strong et al., 1997; Sheina, 2007). A survey conducted by the National Computing Center, in the United Kingdom, found that the main driver for the implementation of Business Intelligence was improving the quality of decision making but the majority of respondents in the survey considered this expectation was not met (Sybase, 2006)

To ensure success, a number of researchers have attempted to identify the factors which contributed to the success of Business Intelligence system implementations and the associated benefit that are realised (Ramamurthy and Sen, 2008; Srikant, 2006; Solomon, 2005; Shin, 2003) Hwang et al, 2004; Boyer et al, 2010). These factors were often referred to as Critical Success Factors (CSF).

***Critical Success Factors***

The concept of identifying success factors in business was first noted by Daniel (1961). He discussed success factors at the macro level whereby each industry would have three to six important factors. The tasks associated with these factors would need to be completed exceedingly well for a company to be successful. Rockart (1979) through structured interviews with chief executives further developed the concept of critical success factors. In the interviews he identified the executives' information goals and the underlying critical success factors. He argued that:

“Critical success factors are, for any business, the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization. They are the few key areas where *things must go right* for the business to flourish. If results in these areas are not adequate, the organization's efforts for the period will be less than desired. As a result, the critical success factors are areas of activity that should receive constant and careful attention from management”. (Rockart, 1979 p.85).

Rockart (1982) further investigated critical success factors at a micro level in regards to the success factors that were associated with an information system. Through interviews with information systems executives he noted four common critical success factors applicable to the area of information systems:

- Service: factors that were associated with the provision of Information Systems' functions and stakeholder satisfaction with those services.
- Communication: factors that were associated with the communication between all stakeholders in terms of business requirements and Information Systems' services available.
- Human Resources: factors that were associated with the attraction and retention of staff with appropriate skill sets relevant to information systems implementation and use.
- Repositioning: factors that were associated with the move of information systems from having a purely “back office automation” function to one that provided value to the business.

Slevin and Pinto (1986) further refined the concept of critical success factors by identifying those factors that contributed to the successful implementation of information systems' projects. They subsequently developed the Project Implementation Profile (PIP) which used critical success factors that addressed the areas of:

- Project Mission: focused on the definition of project goals and direction.
- Top Management Support: the provision of resources, authority, and influence.
- Project Schedule/Plan: the development of a detailed specification and schedule for the project implementation.
- Client Consultation: adequate communication and consultation with the client.
- Personnel: the availability appropriately trained personnel involved in the implementation of the project.
- Technical Tasks: availability of the required technologies and expertise.
- Client Acceptance: final project was sold to the end-users.
- Monitoring and Feedback: provision of comprehensive information at each implementation stage.
- Communication: an appropriate network for all necessary information to circulate among all key players.
- Troubleshooting: an ability to handle unexpected crises and plan deviations.

Slevin and Pinto (1987) further suggested that for information systems project managers to oversee projects successfully they need to adopt both a strategic and tactical approach. The authors proposed ten project management critical success factors which fit into a strategic-tactical framework. The strategic phase focuses on the planning aspects of an information systems project and accordingly the critical success factors associated with this phase have greater emphasis at the beginning of the project. The critical success factors associated with the strategic phase include sound project mission, top management support, and project schedule outlining individual action steps for project implementation. The tactical phase of the project involves the performance of project activities. Accordingly the tactical critical success factors are important throughout the project. Critical success factors include communication with all affected parties, adequate skilled personnel, availability of the required technology and expertise, and monitoring, feedback and troubleshooting at each stage of the project. Although Slevin and Pinto (1987) distinguish between strategic and



tactical phases they believe that the phases are not independent of each other and strategy should be used to drive tactics. Projects that exhibit a high quality in both phases are more likely to be successful.

The concept of identifying critical success factors has been applied to a diverse range of business areas that include, the implementation of manufacturing resource planning (MRP) (Ang et al, 1995; Burns et al., 1991), supply chain management (Kim et al, 2011), quality management (Arumugam and Mojtahedzadeh, 2011; Black & Porter, 1996), customer relationship management (CRM) (Sanad et al, 2010; Medoza et al, 2007), strategic business alliances (Wittmann et al, 2009; Rai et al., 1996), data management (Guynes & Vancecek, 1996), knowledge management (Chang et al, 2008), e-learning (Lin et al, 2011; Selim, 2007), radio frequency identification devices (RFID) (Angeles, 2012) and strategic information systems planning (Ang & Teo, 1997). However, the identification of factors which are considered important for determining the successful implementation of Information Systems projects needs to be treated with caution. It is appropriate to determine what is deemed as “success”. Project management research often distinguishes between project success and business success (Pinto and Slevin 1988; Morris, 1996). Project success factors are usually given most attention in the literature and are commonly associated with the project’s objectives of being completed on time, within budget and scope (Atkinson, 1999). Business success is associated with the system realising the business goals it was designed to achieve. These are usually defined as part of the business case for implementing the system and are the driving factors for the project in the first place (HBR Press, 2011). These are reflected in the effective use of the system but are usually more difficult to assess.

### ***Critical Success Factors Associated With Business Intelligence***

As with other types of information systems the successful implementation and use of Business Intelligence can face a range of barriers (Chenoweth et al, 2006). Despite the recognition of Business Intelligence as an important area of practice and research, relatively few studies have been conducted to assess Business Intelligence practices in general and more specifically for the appropriate critical success factors (Yeoh and Koronios, 2010; Chenoweth et al, 2006; Sammon and Adam, 2004; Srivastava, and Chen, 1999; Mukherjee and Souza 2003; Arnott, 2008). The literature is noted for practitioner accounts of lessons learnt and guidelines for success, but there is limited academic research (Farley, 1998; Atre, 2003; Rowan, 2003).

Watson and Haley (1998) in a survey of 111 organizations found that Business Intelligence success factors included management support, adequate resources, change management, and metadata management. Farley (1998) identified that quick implementation, ability to adjust to business requirements, useful information, and ease of navigation as critical factors in a good data warehouse strategy. Chen et al (2000) in a survey of 42 end users found that user satisfaction was important for success. Sammon and Finnegan (2000) adopted a case study approach to identify the organizational prerequisites for successful data warehouse implementation. They identified the successful organisational factors associated with implementation as; business driven approach, management support, adequate resources including budgetary and skills, data quality, flexible enterprise model, data stewardship, strategy for automated data extraction methods/tools, integration of data warehouse with existing systems, and hardware/software proof of concept. Wixom and Watson (2001) studied 111 organisations and found that data and system quality impacted on data warehouse success with system quality being four times as important as data quality. They further identified that system quality was affected by management support, adequate resources, user participation and a skilled project team.

Atre (2003), from a practitioner's point of view, identified critical challenges for Business Intelligence success. These included; failure to adopt an enterprise wide approach, lack of management support and business involvement, lack of skilled resources, poor implementation methodology, poor data quality and analysis of requirements, poor metadata, and non-standardisation of tools. Mukherjee and D'Souza (2003) identified success factors

across the different phases of a data warehouse implementation. The factors they highlighted included; data quality, technology fit, management support, defined business objectives, user involvement, and change management. Little and Gibson (2003) through a survey of participants (functional managers/staff, IS managers/staff, and consultants) involved in data warehouse implementation to identify factors that contribute to implementation success. The factors identified include; Management support, Enterprise approach, Prototyping, Data warehouse use, Metadata, Sound implementation methodology, External support (consultants). Rudra and Yeo (2000) surveyed employees in an Australian public sector organisation. They identified data quality and data consistency as important factors in data warehousing. Joshis and Curtis (1999) in a conceptual paper proposed that success factors could be categorised as Project or Technical factors.

The methodological approaches adopted and the variables measured to identify critical success factors in implementations differ widely. Some studies measured implementation factors while others measured Business Intelligence success. A summary of factors noted in the literature can be found in Table 2. This Table identifies the authors, the method employed to identify the critical success factors and the factors identified.

Table 2 Business Intelligence Critical Success Factors

Author	Method Employed	Factors
Farley (1998)	Conceptual	Fast implementation, Ability to adjust to business requirements, Useful information, Ease of navigation
Watson and Haley (1997)	Survey of organisations	Management support, Adequate resources, Change management, Metadata management
Chen et al (2000)	Survey of end users	User satisfaction
Sammon and Finnegan (2000)	Case study of organisations to identify organisational success factors	Business driven approach, Management support, Adequate resources including budgetary and skills, Data quality, Flexible enterprise model, Data stewardship, Strategy for automated data extraction methods/tools, Integration of data warehouse with existing systems, Hardware/software proof of concept.
Little and Gibson (2003)	Surveyed organisations	Management support, Enterprise approach, Prototyping data warehouse use, Metadata, Sound implementation methodology, External support (consultants)
Mukherjee and D'Souza (2003)	Conceptual	Data quality, Technology fit, Management support, Defined business objectives, User involvement, Change management.
Rudra and Yeo (2000)	Survey of organisation	Technical factors (data quality and data consistency, etc.)
Joshi and Curtis (1999)	Conceptual	Project-related factors (project plan must match with business demands and the scope of project management), Technical factors (DBMS selection, data loading, and efficiency of data access, etc.)
Wixom and Watson (2001)	Survey of organisations	System quality, Management support, Adequate resources, User participation, Skilled project team.
Chenweth et al	Interviews within an	Management support, Champion, Architecture (data marts),

(2006)	organisation Adaptive structuation theory	Organisational Fit/User Acceptance
Atre (2003)	Conceptual	Enterprise wide approach, Management support and business involvement, Skilled resources, Implementation methodology, Data quality and analysis of requirements, Metadata, and Standarisation of tools
Yeoh and Koronios (2010)	Delphi and case studies	Vision and Business Case, Management and Championship, Teams, Project Management and Methodology, Change Management, Data and Infrastructure

Wixom and Watson (2001) measured both implementation factors and Business Intelligence success factors. Through a review of literature, survey of data warehouse conference attendees and interviews of data warehouse experts they developed a research model for data warehousing success. Their model (Figure 4) demonstrates the interrelationship between the various factors and their impact on implementation success and/or system success.

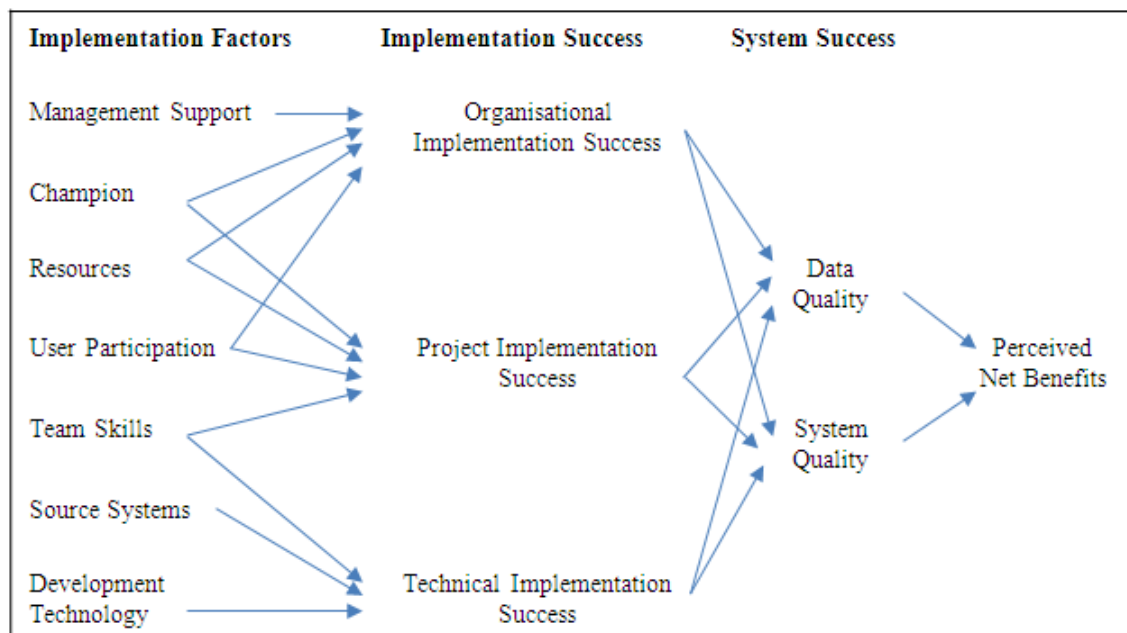


Figure 4 Research Model for Business Intelligence Success (Wixom and Watson, 2001)

The Wixom and Watson (2001) model captures many of the Business Intelligence critical success factors as identified by the research literature. It also identifies the overall contributions of these critical success factors to Business Intelligence success. Each of the factors is now further described.

### Management support

A common success factor associated with Information Systems projects is the commitment from top management to support the project. This factor is also essential to the success of any Business Intelligence project (Wixom and Watson, 2001; Hwang and Hongjiang, 2007; Watson et al. 2002; Sammon and Adam, 2004; Chenweth et al, 2006; Yeoh et al, 2006; Eckerson, 2005; Havenstein, 2006). Top management or executive support enables the smooth provision of required capital, human resources, and availability and coordination of other related internal resources needed for Business Intelligence implementation. A component of top management support is the role of an executive sponsor who is committed to the implementation and invests time and effort in guiding the projects development. This person will have a realistic understanding of the capabilities and limitations of the Business Intelligence solution. End users are more likely to accept a system if perceived to be supported by top management.

### Champion

A different type of sponsor is that of champions and is important to any Business Intelligence initiative. The champions are employees with a high level role within the company. They have the responsibility to support and promote the adoption of Business Intelligence amongst their peers. They facilitate the provision of information, assistance and political support to staff to embrace the Business Intelligence initiative. The champions have the respect of their peers and have a deep understanding of the need for and application of the Business Intelligence initiative. The involvement of champions in projects can help reduce the level of user resistance. They tend to have a close link with the project team and the developments undertaken so they can understand the benefits and impacts of the Business Intelligence initiative (Wixom and Watson, 2001; Hwang et al. 2004; Chenweth et al, 2006; Eckerson, 2005; Yeoh et al, 2006).

### Resources

The availability of appropriate resources is an important critical success factor. Traditional project resources involve people, time and money. Insufficient resources will negatively impact on the success on any Business Intelligence initiative (Herrmann, 2004; Eckerson, 2005). Business Intelligence projects tend to be time

consuming and human resource intensive, hence can become costly especially when many projects tend to utilise outside consultants to provide necessary resources (Hwang and Hongjiang, 2007). Adequate resourcing needs to be provided for the project team to achieve planned milestones and realize the business objectives of the project (Wixom and Watson, 2001).

### User Participation

The extent to which end users are involved in the development of a Business Intelligence solution and engaged in specific responsibilities and tasks related to the implementation will have a direct impact on its success (Wixom and Watson, 2001; Mukherjee and D'Souza, 2003; Yeoh et al, 2006). User participation ensures that user requirements are accurately captured and communicated to the project team. This is particularly important when the requirements for a system are initially unclear (Wixom and Watson, 2001). The end users who are part of the development process gain a better understanding and appreciation for the Business Intelligence system and its capabilities and application. Consequently user involvement can help manage their expectations, which in turn lead to greater user satisfaction with the Business Intelligence solution (Yeoh et al, 2006).

Clearly the adoption and acceptance of the Business Intelligence initiative by end users is critical to the project's success. Often when new systems are implemented that change users' work practices they are met with resistance. Although Wixom and Watson (2001) did not directly refer to effective change management as one of the implementation factors many other authors have (Adelman and Moss, 2002; Mukherjee and D'Souza, 2003; Williams and Williams, 2003; Gangadharan and Swami, 2004; Eckerson, 2005). An effective change management program is crucial in reducing end user resistance and thus increases the Business Intelligence adoption. The program should involve the communication of the business objectives of the project and the impact it will have on individuals. In addition, training needs to be developed and delivered to assist end users to understand the new solution and how to effectively use it (Foster et al, 2004).

Business Intelligence is designed to assist users in their decision making and therefore user participation in its development, user acceptance and effective use of the solution is essential to its success (Hwang et al, 2004)

### Team Skills

A critical success factor of any project is the skills of the people involved in the implementation (Sammon and Adam, 2004; Yeoh et al, 2006; Wixom and Watson, 2001). Business Intelligence implementation should be primarily a business driven project rather than a technological one (Sammon and Finnegan, 2000). Accordingly, the project team should be composed of personnel with a strong business background and knowledge complimented by those with the relevant technical expertise. In addition, the project team should contain members from different business areas to share ideas and increase the potential for standardisation especially if an enterprise wide data warehouse is part of the Business Intelligence initiative (Watson and Goodhue, 2002). These skills may need to be sourced externally through consultants if not available within the firm (Hwang and Hongjiang, 2007).

### Source Systems

The source systems provide the data to Business Intelligence systems for analysis and subsequently for decision making. These heterogeneous source systems and the data they store can seriously impact on the success of Business Intelligence projects (Hwang et al, 2004). Source systems are responsible for the management and automation of millions of transactions linked to a broad range of business processes. The quality of data stored in these systems can vary across source systems and accordingly increases the resources required to ensure accuracy and integration. For instance, customer data could exist in a number of systems and the data stored about the customer and its format could vary from system to system. This makes it difficult to integrate and compare such data used for decision making. The greater the extent to which data definitions and structures are standardized across source systems, the more likely an integrated data repository can be constructed to support a Business Intelligence solution (Wixom and Watson, 2001; Hurley and Harris, 1997). Indeed, a number of authors identify data quality as a factor in itself (Sammon and Adam, 2004; Solomon, 2005; Stanick, 2006; Yeoh et al, 2006; Hwang and Hongjiang, 2007). In addition to data

quality, authors also identify metadata management as a key critical success factors in Business Intelligence implementation and use (Adelman and Moss, 2002; Yeoh et al, 2006). Metadata includes the data definitions, valid values, business rules, data sources, security, timeliness and the owner of the data (Adelman and Moss, 2002). Adequate metadata management would facilitate better integration and analysis of the data.

### Development Technology

Wixom and Watson (2001) consider technology to include hardware, software, methods and programs used to complete the project. The selection of appropriate technology will impact on the efficiency and effectiveness of the Business Intelligence project, particularly if the tools are not well understood by the project team (Watson and Ariyachandra, 2005; Chenweth et al, 2006; Hwang and Hongjiang, 2007). Business Intelligence architecture, as outlined previously, requires integration of tools responsible for data extraction, transformation and loading, data-cleansing, storage, and multidimensional analysis. Other than these tools providing the necessary functionality there must be seamless integration between the Business Intelligence systems and the source systems, which provide the operational data for Business Intelligence analysis.

Other than the selection of tools, a sound and proven implementation methodology should be adopted. Adelman and Moss (2002) believe that traditional project management techniques will not work with Business Intelligence due to the dynamic nature of the solution. Authors recommend that Business Intelligence projects should be iterative in nature with a quick turnaround between requirements analysis and delivery of outcomes (Adelman and Moss, 2002, O'Donnell et al.)

A limitation of the Wixom and Watson (2001) research model is the lack of recognition of the strategic factors that influence the success of a Business Intelligence project. Although implied in the model other authors have emphasised the importance of organisational alignment (Williams and Williams, 2003; Chenweth et al, 2006), defined business objectives (Sammon and Adam, 2004; Watson, 2006; Hwang and Hongjiang, 2007), as well as an enterprise approach (Sammon and Finnegan, 2000; Little and Gibson, 2003) as success factors in a Business Intelligence project. Many of the Business Intelligence maturity models



noted the importance of Business Intelligence in supporting a company's strategic goals (McMurchy and Bertram, 2007; Hewlett-Packard, 2007; Davenport and Harris, 2007). Some researchers have stressed the importance of having a business plan that outlines the proposed strategic and tangible benefits, resources, costs, risks, and the timeline of the Business Intelligence project (Sammon and Finnegan, 2000; Hwang and Hongjiang, 2007). This business plan enables companies to focus their Business Intelligence development and align it with the corporate goals. Davenport and Harris (2007) believe that Business Intelligence can be a competitive differentiator for companies if appropriately aligned with corporate objectives. Accordingly it is important for companies to adopt an enterprise approach to their Business Intelligence strategy.

For the purpose of this research, the implementation factors as identified in the Wixom and Watson (2001) research model will be used as a starting point for the investigating Business Intelligence critical success factors. However, as identified in the literature Strategic Alignment factors need to be additional to the factors identified by Wixom and Watson (2001). Dinter et al (2011) for the purpose of their research extended the Wixom and Watson Model of Business Intelligence Success (2001) by including a strategic alignment perspective. Therefore the Business Intelligence critical success factors that will form the basis for this research will be those previously noted as being; Management Support, Adequate Resources, Champion, user participation, Team Skills, Source Systems, Development Technology, and Strategic Alignment. Table 3 lists these Business Intelligence critical success factors and the supporting research literature.

## Factors Critical To The Success Of Business Intelligence

Table 3 Business Intelligence Critical Success factors and Supporting research Literature

Business Intelligence Critical Success Factors	Description	Supporting Literature
<b>Management Support</b>	Commitment from top management to support the project	Watson and Haley, 1997; Sammon and Finnegan, 2000; Wixom and Watson, 2001; Adelman and Moss, 2002; Mukherjee and D'Souza, 2003; Little and Gibson, 2003; Sammon and Adam, 2004; Chenweth et al, 2006; Yeoh et al, 2006; Eckerson, 2005; Havenstein, 2006; Hwang and Hongjiang, 2007, Yeoh and Koronios, 2010
<b>Adequate Resources</b>	Adequate resourcing (People, Time, and Money) needs to be provided for the project team to achieve planned milestones and realize the business objectives of the project	Watson and Haley, 1997; Sammon and Finnegan, 2000; Wixom and Watson, 2001; Herrmann, 2004; Eckerson, 2005; Hwang and Hongjiang, 2007
<b>Champion</b>	Champions support and promote the adoption of Business Intelligence amongst their peers	Jensen and Sage, 2000; Wixom and Watson, 2001; Chenweth et al, 2006; Eckerson, 2005; Yeoh et al, 2006, Yeoh and Koronios, 2010
<b>User Participation</b>	The involvement of end users in the development and implementation of a Business Intelligence solution will have a direct impact on its success	Wixom and Watson, 2001; Adelman and Moss, 2002; Mukherjee and D'Souza, 2003; Yeoh et al, 2006; Hwang and Hongjiang, 2007, Yeoh and Koronios, 2010
<b>Team Skills</b>	The project team should be composed of personnel with a strong business and technical skills	Wixom and Watson, 2001; Adelman and Moss, 2002; Sammon and Adam, 2004; Yeoh et al, 2006 Hwang and Hongjiang, 2007, Yeoh and Koronios, 2010
<b>Source Systems</b>	The extent of heterogeneity of source systems and the quality of data they store can seriously impact on the success of Business Intelligence projects.	Sammon and Finnegan, 2000; Wixom and Watson, 2001; Rudra and Yeo, 2000; Mukherjee and D'Souza, 2003; Shin, 2003; Sammon and Adam, 2004; Solomon, 2005; Stanick, 2006; Yeoh et al, 2006; Hwang and Hongjiang, 2007; Joshi and Curtis, 1999; Rudra and Yeo, 2000; Marshall and Harpe, 2009
<b>Development Technology</b>	The selection of appropriate technology (hardware, software, methods and programs) will impact on the efficiency and effectiveness of the Business Intelligence project.	Watson and Ariyachandra, 2005; Chenweth et al, 2006; Hwang and Hongjiang, 2007, Wixom and Watson, 2001, Yeoh and Koronios, 2010
<b>Strategic Alignment</b>	The degree to which the implementation of Business Intelligence supports the corporate goals.	Williams and Williams, 2003; Chenweth et al, 2006; Sammon and Finnegan, 2000; Mukherjee and D'Souza, 2003; Sammon and Adam, 2004; Watson, 2006; Hwang and Hongjiang, 2007; Little and Gibson, 2003; Yeoh and Koronios, 2010

Many of the success factors identified from the literature in relation to the implementation of Business Intelligence are not unique to Business Intelligence. Many of these same success factors can also be applied to other information systems projects (Boynton and Zmud, 1984; Poon and Wagner, 2001; Karlsen et al, 2006) including the implementations of portals (Remus, 2006) customer relationship management (Mankoff, 2001; Kim et al, 2002), knowledge management (Wong, 2005), supply chain management (Ngai et al, 2004), geographic information (Crosswell, 1991) systems. However, one success factor is particularly unique to Business Intelligence. This is the need to integrate data from various source systems. The successful integration is dependent on the number and types of source systems, the quality of these systems, the accuracy of their data, the metadata of the data, as well as the ability for the Business Intelligence system to extract the required data from these source systems (Sammon and Finnegan, 2000; Wixom and Watson, 2001; Rudra and Yeo, 2000; Mukherjee and D'Souza, 2003; Marshall and Harpe, 2009). The modern day increase in the number and diversity of source systems has a direct impact on the importance of this success factor. Vosburg and Kumar (2001) suggest that one way of improving the quality of data sources is to integrate the heterogeneous sources through the implementation of an Enterprise Resource Planning (ERP) system.

### **Enterprise Resource Planning Systems**

A number of critical success factors have been identified in relation to the implementation and use of Business Intelligence (Table 3). Many of these factors are applicable to other information systems' related projects. However, the need for Business Intelligence to integrate data from a variety of source systems gives rise to a unique success factor. Vosburg and Kumar (2001) suggest that companies who implement an ERP system can greatly reduce the impact of this critical success factor. Much of the data analysed in a Business Intelligence environment is related to business transactions. An ERP system is responsible for automating and managing these business transactions and producing and storing the associated data. Hence, for many Business Intelligence initiatives an ERP system acts as source system for the data to be analysed.

The issue of integrating data and business processes from heterogonous systems increased in importance for companies as the number of different types of information systems grew. This lack of integration resulted in poor data quality, inconsistent data definitions and formats, disjointed and poorly defined business processes, poor information access due to a diversity of user interface design (Davenport, 1998). These inconsistencies resulted in a steep learning curve for users when they used the various systems. This lack of integration also hindered business process execution and affective managerial decision making (Davenport, 1998). To overcome this poor cross system integration companies attempted to incorporate increased functionality into stand-alone systems. This has seen the advent of functionally specific systems such as Financial Management Information Systems (FMIS), Human Resource Information System (HRIS), Material Requirements Planning (MRP), Manufacturing Resource Planning (MRPII), and Computer Integrated Manufacturing (CIM), (Klaue and Rosemann, 2000). Much of the functionality offered by each of these specific systems was eventually integrated into one system in the early 1990's which was referred to as an Enterprise Resource Planning (ERP) systems. ERP systems attempted to integrate all core business functionality into a single system with standardised definitions, user interfaces and a single database (Davenport, 1998). The ERP system vendors have also modelled and incorporated business processes into their systems based on a number of leading companies. This enabled the vendors to claim that their systems incorporated *best business practices* (Norris et al, 1998). Thus an ERP system can be defined as an information system that has

broad business functional scope, which is real time, integrated, modular, and responsible for managing and automating transaction processing across a company (Hawking et al, 2006).

Since the coining of the term, Enterprise Resource Planning systems, other terms have evolved from different vendors, analysts and academics to describe systems with similar characteristics. Davenport (1998) advocated that these systems are “business systems” rather than manufacturing or technical systems, and coined the term “Enterprise System” (ES). Klause et al (2000) conducted research using some of the leading academics and experts in the ERP systems field, and found that many of their respondents believed that the ERP system concept was dated and implied strong links with manufacturing and preferred the Enterprise Systems term. This term is also supported by Markus (2000a) who believed that the area has moved away from the original manufacturing concepts of the 1970s and now embraced enterprise-wide integration ideologies. However, many of the users of these systems still use the term ERP systems. For the purposes of this research the term ERP systems is used inter-changeably with the term Enterprise Systems (ES) and Enterprise Wide Systems (EWS).

### ***The Value of ERP Systems***

The improved business integration offered by ERP systems have enabled companies to gain efficiencies in their business processes and associated transactions in terms of timely and more accurate decision making (Davenport et al, 2003). Shang and Seddon (2000) classified the benefits that companies can gain from using an ERP system into Operational, Managerial, Strategic, Information Technology Infrastructure, and Organizational. Each benefits category is further discussed.

Operational: ERP systems automate the transactions which support many of a company’s core business processes. Traditionally these transactions may have been supported by a variety of different systems. The ERP system encapsulates these transactions in one system which increases the speed of processing and thus leads to an improvement in productivity (Davenport et al, 2003). This improvement in the speed of processing has a positive impact on organisational interactions, with customers, employees, suppliers and regulatory bodies. The integration of transactions into one system also improves the accuracy and quality of the associated business processes (Beccerra-Fernandez et al, 2005). The integration enables business processes to be re-designed which can result in a

lowering of labour and infrastructure costs (Sumner, 2004). IBM, after implementing an ERP system found that they were able to achieve greater efficiencies through only having to enter data once into a single system rather than many systems. The ERP system enabled IBM to respond faster to customer needs by moving products through the supply chain quicker (Beccerra-Fernandez et al, 2005). They were able to respond to customer billing enquiries in real time as compared to 15 to 20 minutes response time previously. Fujitsu through the implementation of their ERP system were able reduce the cycle time for quotations from 20 to 2 days (Jensen and Johnson, 1999)

Managerial: The consolidation of business process functionality into a single ERP system enables companies to eliminate aging legacy systems and their supporting infrastructure (Ross and Vitale, 2000; Shang and Seddon, 2004; Beccerra-Fernandez et al, 2005). Halliburton, a major energy services company, implemented an ERP system that allowed the company to eliminate 75 of their existing legacy systems (HSE Web Depot, 2004). BHP Steel estimated that the retirement of its legacy systems would provide a savings of \$AUD30million over ten years (BHP Steel, 1998). By reducing the number of legacy systems there is less need for diverse infrastructure complexity and thus, its management. The advent of Y2K issues resulted in the urgency for the reduction of legacy systems (Anderson et al, 2003).

The consolidation and integration of business processes into a single system improves the availability of data for decision making and planning (Davenport et al, 2003; Sumner, 2004). Worsley Alumina believed that their ERP implementation would improve decision making and make it more effective (Worsley, 1998). A number of companies indicated that due to their ERP system they were better able to manage inventory levels (Bingi et al, 1999; Palaniswamy and Frank, 2000). In a survey of 163 companies sixty percent indicated improvements in inventory management was a major benefit of their ERP system (Davenport et al, 2003). Companies also reported improved financial visibility (Jensen and Johnson, 1999; Chang et al, 2000)

Strategic: The purported operational and managerial benefits ERP systems provide companies with a foundation for strategic benefits. The efficiencies gained through the integration of business processes and their associated data provide greater visibility to corporate performance and in turn strategy performance. Anglo Coal through its ERP system integrated its maintenance processes to produce detailed information on costs which assisted the company to execute its strategy to become a low cost producer (Harris and Davenport, 2006). Compaq wanted to implement a make-to-order strategy by building computers after they were ordered by customers. They realised that this could not be achieved without the implementation of an integrated enterprise wide system. By introducing an ERP system, this strategy enabled the company to reduce cycle times from 45 days to less than a week (Davenport, 2000).

The consolidation of business processes into a single system as a result of the ERP system implementation reduces the information technology infrastructure and its complexity. This enhances the ability of companies to implement strategic initiatives in response to changing business conditions. Grainger and McKay (2007) identified the role ERP systems can have in facilitating company mergers and acquisitions. Nibco believed that their ERP system infrastructure would enable them to easily accommodate acquired companies as part of their long term growth strategy (Brown et al, 2003). The standardisation of business processes and the supporting information technology infrastructure is fundamental to companies operating in a global environment (Madapusi and D'Souza, 2005; Hawking, 2007). Dow Chemicals implemented an ERP system in an attempt to streamline global financial and administrative processes (Davenport, 1998)

ERP systems provide the foundation for adopting more strategic solutions associated with customer relationship management (CRM), supply chain management (SCM) and corporate performance management (CPM). The ERP system captures, processes and stores the data which these more strategic solutions rely on for input. For instance, CLP Power in Hong Kong initially implemented their ERP system in 1998. Subsequently in an attempt to improve customer interaction and service the firm implemented a CRM solution (Accenture, 2004).

The incorporation of open technologies into ERP systems such as Service Orientated Architecture (SOA) has also enabled companies to form strategic partnerships with their stakeholders and integrate business processes across organisational boundaries (Krafzig et al, 2004; Hagel and Seeley Brown, 2001). Proctor and Gamble have used SOA to underpin their “Responsive Replenishment” to collect data from their retail partners, even at the point-of-sale level, to replenish inventory automatically (Wood and Mattern, 2006).

### Information Technology Infrastructure

The number of legacy systems replaced by the ERP system reduces the overall information technology infrastructure complexity and costs of a business. As mentioned previously this provides the company with increased flexibility to adapt to market situations as well as providing a foundation for the implementation of more strategic solutions (Deloitte, 1999). Owens Corning, a glass manufacturing company, through the implementation of their ERP system replaced 211 legacy systems, resulting in improved efficiencies that enabled them to reduce their spare parts inventory by 50% and make expected savings of \$US65 million (Davenport, 1998).

### Organizational

It is suggested that ERP systems enable an organisation to become more focused and cohesive, better at learning about their needs and executing its strategy (Shang and Seddon, 2000). ERP systems enable a company to become process focused rather than functions being limited by departmental silos enabling cooperation between employees from different departments (Deloitte, 1999). Union Carbide, a chemical company, implemented an ERP system in the hope of changing its work practices and how the company was managed. Through the ERP system they wanted to provide low level management and workers with greater access to operational information to foster innovation (Davenport, 1998). Nibco, a valve manufacturer, found that their ERP system helped them to be more productive, with employees be able to work smarter rather than harder (Brown et al, 2003).



***ERP System Value Realisation***

Initially, for many companies the implementation of an ERP system was simply a technological solution to integrating disparate systems. This became more critical with the advent of Y2K (Deloitte, 1999; Donovan, 2000). Although this integration had a flow on effect in terms of business benefits, for many companies the extent of these benefits was unclear. Most companies were unsure whether they had made a positive return on their investment (ROI) primarily as a result of their failure to build a business case prior to implementation (Staehr, Shanks and Seddon, 2002). This was due to a number of factors such as the lack of business performance oriented metrics, uncertainty about the types of benefits achievable including intangible benefits (Donovan, 2000). However, companies that did develop metrics to evaluate the expected benefits of their ERP system, reported that they achieved the benefits significantly earlier than those that did not actively record data associated with derived benefits (Davenport et al, 2003).

A study conducted by Deloitte Consulting (1999) attempted to identify the benefits derived from ERP systems implementations. The research was conducted with 85 global companies that each had an annual revenue of over US\$1billion. These companies reported both tangible and intangible benefits. Tangible benefits included reductions in; inventory, personnel, financial cycle close, procurement costs, IT costs, transportation and logistics costs, and maintenance. There were also improvements in productivity, order management, cash management, on time delivery and revenue/profit. Intangible benefits included new and improved processes, as well as improvements in information visibility, customer responsiveness, cost reduction, process integration, data standardisation, globalisation, business performance and supply chain improvements.

A study by Davenport et al (2003) identified ten main benefits that were associated with an ERP system implementation. They interviewed analysts, experts and representatives from 28 companies, as well as validating their findings through surveying a further 183 companies. The benefits included improvements in; management decision making, financial management, customer service, inventory/asset management and retention, revenue and logistics as well as a reduction in headcount, cycle time, and physical resources. The system provided faster and more accurate transactions and increased flexibility to facilitate growth and expansion. It was also found that some benefits were realized much faster than others.

For example improvements in the speed and accuracy of transaction was achieved in one to two years post implementation while the full potential of increased revenue and headcount reduction took up to four years post implementation (Davenport et al, 2003). In a study, conducted by Accenture (Davenport et al, 2004) three value drivers for ERP systems were identified as being; Integrate, Optimise, and Informate

- Integrate: the value driver here is where a company is able to integrate their data and processes internally and externally with customers and suppliers.
- Optimise: the value driver includes the standardization of business processes incorporating best business practice.
- Informate: this value driver is related to the ability to provide context rich information to support effective decision making. The term Informate was later changed to Analyse (Harris and Davenport, 2006).

Harris and Davenport (2006) developed a model of the key factors that drive the realisation of business benefits (Figure 5). The model proposes that to drive corporate value, an ERP system should be implemented extensively throughout the company. To achieve this, there needs to be adequate investment in resources. The feature associated with experience relates to ERP system's maturity. Companies gain increased benefits over time as their knowledge and experience with these types of systems increases.

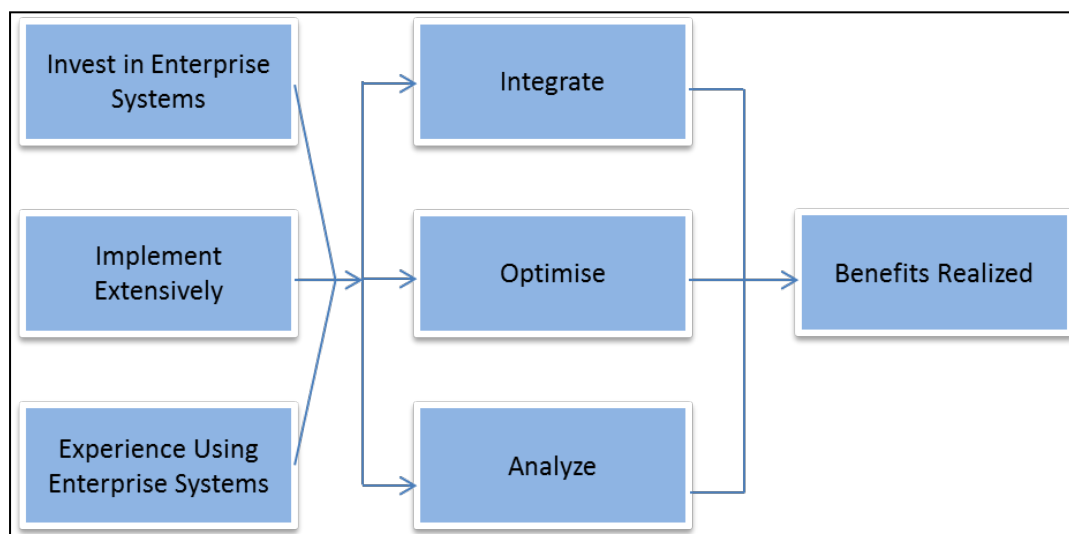


Figure 5 Key Factors Driving Realisation of Business Benefits (Harris and Davenport, 2006)

Harris and Davenport (2006) attempted to identify why some companies achieve far greater benefits from their ERP systems than others with the same system. The top three benefits identified were better management decision making, improved financial management and faster, more accurate transactions. It was found that while most ERP systems were originally justified on the basis of IT or operational cost savings, senior management's underlying objective was to improve the quality and transparency of information. They found that companies that placed an emphasis on the three value drivers (Integrate, Optimise and Analyse) performed better than companies that did not. The better performing companies developed distinctive capabilities which provided a market advantage. The more successful companies were also more likely to pursue and measure progress against clearly defined tangible benefits.

Many companies consider ERP systems an essential information systems infrastructure that allows them to be competitive in today's business world, as well as providing a foundation for future growth (Chou et al, 2005). A survey of 800 top US companies showed that ERP systems accounted for 43% of their information technology budgets (Somer and Nelson, 2001). Gartner estimated that the worldwide market for ERP systems would reach \$USD24.9 billion in 2012 (Hernandez, 2012). Researchers have identified a range of factors which have contributed to the growth in the uptake of ERP systems that include; the need to streamline and improve business processes, better manage information systems expenditure, competitive pressures to become a low cost producer, increased responsiveness to customers and their needs, integrate business processes, provide a common platform, enable better data visibility, and provide a strategic tool for the move towards electronic business (Davenport et al, 2003; Hammer, 1999; Iggulden, 1999; Somer and Nelson, 2001; Markus and Tanis, 2000).

### ***ERP Systems Implementation***

ERP systems are considered *off the shelf* packaged solutions. They are developed by vendors and sold as general purpose packages allowing the ERP system to be adapted to different types of companies operating in a variety of industries. ERP system vendors argue that the systems are built on best business practices and companies should implement the system with no code modifications (Sumner, 2000). This is referred to as *vanilla* implementation. It is an accepted strategy that "*vanilla*" implementations of ERP systems are much more likely to be more successful than implementations that require modifications to the systems fundamental

workings reflected by changes in the underlying source code (Vidyaranya and Brady, 2005). Modifications associated with such systems are costly additions to the purchase of the system and increases the time taken to implement (Bancroft et al, 1998; Brown and Vessey, 1999). The modifications are also not supported in future versions of the ERP system. Most ERP system implementations are not completely *vanilla* as some degree of customisation is undertaken to respond to essential business needs (Soh and Sia, 2005; Markus and Tanis, 2000). In a study by Davenport et al (2003) 47% of the respondents had customized their ERP system. However, limiting the modification of ERP systems has been identified as a critical factor both in ERP system project success and in a company's business success (Brehm et al, 2001). Royal Melbourne Institute of Technology's (RMIT) failed ERP system implementation of the student administration module, which cost the institution more than \$AUD45 million, was primarily due to RMIT not accepting the new system's incorporated *best practices*, preferring to extensively customise the system (Gray, 2003b).

One of the reported benefits of ERP systems is the replacement of legacy systems (Shang and Seddon, 2000). However, rarely do companies replace all their legacy systems. This may be due to either the ERP system not containing the appropriate functionality, project budgetary constraints or some legacy component upgrades is considered to be a future project (Deloitte, 1999). Accordingly, interfaces need to be developed between the ERP system and the existing legacy systems which adds to the complexity of any implementation.

ERP systems due to their broad functional scope are complex in nature and for many companies underestimating the impact these systems would have on their organization have caused them to initially struggle with their implementation (Barker and Frolic, 2003). For some, the barriers associated with the lack of skilled resources and inexperience with projects of this scope became insurmountable (Calegero, 2000). Themistocleous et al (2001) found that the majority of ERP system implementations generally incurred a cost overrun and were delayed. A Gartner Group survey conducted with 1,300 companies and found that 32% of ERP systems projects ran overtime (Hunter, 1999). A Standish Group report found ERP implementations took 2.5 times longer than companies expected and resulted in a significant shortfall in the promised benefits (Krumbholz et al, 2000).

A number of examples exist on how ERP system implementations can have a negative impact on business performance. Hershey Foods in 1999 attributed a 19 percent drop in third-quarter net income due to problems associated with its ERP system implementation. NASA blamed their financial shortfall to the conversion to its new ERP system causing the problems with the audit of its 2003 financial statements (Frieswick, 2004). Markus (2004 p.5) concluded that ERP system implementations “...are notorious for their implementation challenges and problematic organisational consequences”. Subsequently, the failure to meet business deadlines and budgets and the inability to achieve business benefits from the new system, may often result in substantial financial loss (Parr, Shanks and Darke, 1999). In 2003, Goodyear Tire and Rubber made a \$USD19 million adjustment to its operating income in one of its units due to factors related to its ERP system, including an inability to locate or re-create account reconciliations for prior years. The financial problems were associated with the implementation rather than the software itself (Bartholomew 2004).

An ERP system implementation involves a considerable cost to the company. The analyst firm, Meta Group, in a study of 200 companies found that on average ERP systems implementations cost approximately 1% of corporate revenues for large companies with 70% of the total cost going toward labour resources (Business Wire, 2003). Nestle’s Globe Project which was designed to standardize its global supply chain processes involving 230,000 employees cost in excess of \$US2.4 billion (Steinert-Threlkeld, 2006). Projects can vary in duration depending on the size of the organization, the complexity of processes, as well as degree of organisational change that is involved in the ERP system implementation. The Meta Group estimated that the average project duration was twenty months (Business Wire, 2003). In a study of 66 companies Soja (2004) found that 50% of projects had a duration of less than one year. Deloitte (1999) in a study, of 62 Fortune 500 companies involving 162 individuals, found that the average length of an ERP system implementation was up to four years. Importantly, the respondents were asked to identify the point when they considered their ERP systems implementation was complete. Nearly half of all respondents indicated that their ERP system implementation was never complete and that they considered it as an *ongoing journey*. An ERP system is designed to support many of a company’s core business processes. As business strategies and markets change the ERP system must be adjusted to reflect these changed requirements (Nicolaou, 2004).

Markus et al (2000) performed an analysis of companies that had implemented ERP systems in an attempt to identify problems encountered and benefits achieved. They also identified that an ERP system implementation does not end when it is turned on and people start using it (Go Live). They identified three distinct phases of the “ERP Experience Cycle” that included a Project, Shakedown, and Onward and Upward phase. These phases are described as follows:

Project Phase: In this phase the ERP system is configured and implemented throughout the company. Success is primarily gauged in terms of traditional project measures; of being on time and within budget.

Shakedown Phase: This phase involves the period between the ERP system “Go Live” and the system enabling users to perform their normal activities. The success of this stage is measured in terms of the time it takes to achieve normal or expected levels for performance in key areas of the firm. Some researchers have referred to this success as “stabilization” (Ross and Vitale, 2000).

Onward and Upward: The final phase, in which the initially identified business benefits are realized and future direction for business improvement is planned.

Due to the costs and risks associated with ERP systems implementations there have been numerous studies devoted to identifying the factors which contribute to achieving a successful ERP system implementation and ultimately leading to benefit realization (Bingi, 1999; Hammer, 1999; Holland & Light, 1999; Sharma & Godla, 1999; Esteves, 2000; Markus et al, 2000; Shang and Seddon, 2000; Sumner, 2000; Aladwani, 2001; Nah et al, 2001; Somers and Nelson, 2001; Allen, Kern, and Havenhand, 2002; Davenport, 2003; Yang and Seddon, 2004; Dowlatshahi, 2005; Yingie, 2005; Ngai, 2008; Buerud et al, 2011; Dezdar and Ainin, 2011). These factors are termed critical success factors and will be discussed in the next section.

***Critical Success Factors Associated With ERP Systems Implementation***

In order to provide a foundation to help practitioners in their ERP system implementations, numerous critical success factors have been identified in the literature. These include:

- top level management support and commitment to the organisational change,
- clearly defined and implemented communication avenues,
- presence of a top level sponsor,
- avoidance of customisation,
- including key personnel on the project team,
- good project methodology with clear milestones,
- providing appropriate end user training with ongoing support,
- well written and complete needs analysis reports,
- organisational culture change and process reengineering (Holland and Light, 1999; Shanks et al, 2000; Somers and Nelson, 2001; Summer, 2000; Buverud et al, 2011; Dezdar and Ainin, 2011).

Researchers have attempted to identify ERP system success factors relevant to specific industry sectors (Allen et al, 2002; Furumo and Perason, 2004, Fub et al, 2007), different countries (Yingjie, 2005; Soja, 2004; Colmenares, 2004; He and Brown, 2005) and the size of the company (Buonanno et al, 2005; Hung et al, 2004). A study conducted by Yang & Seddon (2004) identified the link between critical success factors and benefit realisation. They analysed key project success factors from sixty enterprise system implementations sourced from presentations obtained from an ERP vendor conference. An analysis of the ERP success factor literature identifies a number of common themes under which success factors can be categorized. These include Top Management, Project, Organisation, and System. Table 4 summarises the themes, the related ERP system critical success factors and the supported research. Each of these categories are now discussed.

**Top Management**

This theme includes success factors associated with Strategic Alignment, Leadership, and Support. Companies should have a clear, communicated business strategy and an IT strategy that is aligned with the business strategy. The goals and objectives associated with this strategy provide the foundation and focus for the ERP system implementation and its future direction. The business case for the implementation should include a clear statement of the project's mission and objectives and how the project aligns with the company's business

needs (Holland and Light, 1999; Nah et al, 2001, Yang and Seddon, 2004). This provides the justification for the investment in information technology and ERP systems implementation in particular.

The alignment of the ERP systems implementation strategy to the overall corporate strategy emphasises the importance of the project and which needs to garnish executive support. An ERP implementation is often one of the biggest projects in terms of organisational impact that many companies undertake. Accordingly, due to the changes that this type of project often brings about, executive support is essential (Davenport, 2000). One of the most identified critical success factor as documented by researchers, is that the project has support at the highest levels within the company. This support takes the form of providing commitment, vision, and leadership, as well as the necessary authority to allocate resources to ensure the project's success (Holland and Light, 1999; Markus and Tanis 2000; Parr and Shanks, 2000; Sumner, 2000; Nah et al, 2001; Somers and Nelson, 2001; Gable et al. 2002).

Another level of support comes through the provision of strong and committed leadership in terms of a project champion (Sumner, 2000). The project champion should be a high level executive sponsor who has the power to “champion” the implementation of the ERP system throughout the company. Some companies use a network of sponsors at different levels throughout the company to promote the implementation and facilitate organisational change (Parr and Shanks, 2000).

### Project

Many of the critical success factors associated with ERP system implementations projects are similar to those of other types of projects; project management, methodology, team composition, and the role of external consultants. ERP system implementations are complex in nature involving hardware, software, extensive resources and organisational issues. Effective project management has been identified as an significant critical success factor (Markus and Tanis, 2000; Parr and Shanks, 2000; Nelson and Somers, 2001; Yang and Seddon, 2004). This involves the development of a clear and defined project plan including objectives, strategy, scope and schedule. This is then supported by a sound project methodology defining the different phases of the implementation, the tasks involved and the associated deliverables.



The project team itself should be comprised of individuals that have different views and perceptions of the company in terms of the areas impacted by the implementation of the ERP system. This involves both technical and business expertise (Bingi et al, 1999; Allen et al, 2002). The complexity of ERP systems requires teams of individuals with varying expertise to solve problems and accordingly teamwork is often identified as a success factor (Nah et al, 2003). Often this expertise or experience with ERP system implementations does not exist within the company and has to be sourced externally. Hence, an important success factor is the selection, management and the transfer of knowledge from the consultants to staff within the company (Holland and Light, 1999).

### Organisation

As mentioned previously ERP systems implementations are complex and have a major organisational impact. Deloitte (1999, p7) consider that an ERP system implementation is essentially a *people project*” Notably, as many large companies have been working with ERP systems for a number of years, they have developed a significant level of implementation maturity (Stein and Hawking, 2001). However, in a study on benefit realisation, companies indicated that they did not achieve the level of benefits they had expected. The companies were asked to identify and rate the major barriers which prevented them from achieving the expected benefits. It was found that the main barriers were not technological but people related (Hawking and Stein, 2002). Accordingly many of the critical success factors identified under the organisation theme relate to the perceptions that people have about their changing environment and include; organisational culture, change management, systems training, and user involvement.

Companies that have a culture which emphasises the importance of learning, knowledge, performance measurement and have had experience in organisational change associated with large IT projects will find it easier to implement an ERP system (Allen et al, 2002). This is reflected in the recognition that training is an important factor as well as open and honest communication in lessening the resistance to change. A company that has a culture which has shared values, common aims and is open to change is conducive to success, while organisational cultures that are resistant to change, either through rewarding tradition or

fostering an environment of mistrust are likely to create an environment that can result in ERP systems implementation failures (John and Saks, 1996).

Change management has been identified as one of the key critical success factors associated with these types of implementations (Foster et al, 2004). Change management is a broad term, which encapsulates many activities and is interpreted differently from company to company. Foster et al (2004) in a change management survey asked companies that had implemented ERP systems, to identify what change management meant to them. From the responses, an aggregated definition was developed.

“Change management is defined as the process of assisting the organisation in the smooth transition from one defined state to another, by managing and coordinating changes to business processes and systems. It involves the effective communication with stakeholders regarding the scope and impact of the expected changes, to assist them to cope and adapt to the transition” (p.7).

ERP system implementations introduce large scale change. These changes impact on the way companies conduct business, as well as the way people perform their jobs. This can cause employee resistance and conflicts (Ngai et al, 2004). Sheth (1981) noted that there are two fundamental sources of resistance associated with change. The first source is *perceived risk* which refers to one's perception of the risk associated with the decision to adopt the ERP system. In other words how will this new system affect a particular person and their role within the workplace. The other source of resistance is *habit* which refers to current routine practices that an employee feels comfortable with. The impact of change is often associated with the loss an employee's control, routines, traditions and relationships, resulting in resistance to the change (Isabella, 1990; Kanter, 1995; Ross and Vitale, 2000; Klaus and Blanton, 2010).

An important component of a successful change management strategy is effective communication throughout the implementation process (Sarkis et al, 2003; Foster et al, 2004). Amoako-Gyampah and Salam (2004) identified effective communication as an important success factor that influences the acceptance of technology in an ERP system implementation. Bancroft et al (1998) suggest that the communication process should commence early in the ERP system implementation in an attempt to create an understanding

and acceptance of the project and its goals. A number of studies have identified the importance of involving users beyond the initial communication process (Somers and Nelson, 2001; Esteves et al, 2003; Zhang et al, 2003). Zhang et al (2003) identified two different perspectives of user involvement; user involvement in defining the company's ERP system needs and user involvement in the implementation of ERP systems. User involvement assists in capturing specification requirements as well as improving the understanding of users as to the role the ERP system will play within the company. The users involved in the implementation can act as change agents or champions to promote the ERP system to other users throughout the company.

Another related success factor identified by researchers is user training and education (Bancroft et al 1998, Al-Mashari et al, 2003; Amoako-Gyampah, and Salam, 2004). The role of education and training in an ERP system implementation is to increase the level of expertise and knowledge of the users. This involves both an understanding of the new system, as well as the processes that will change and how they impact on the user's job (Ngai et al, 2008). Training and education is not only focussed on using the new system, but also understanding the new processes and how they impact on their job. The use of training and education provides the opportunity to communicate the purpose and impact of the new system. The increased level of understanding can result in a reduction of user resistance to the new system.

Another success factor related to the Organisational theme is that of process maturity. This refers to where a company focussed on business processes is situated in terms organisational alignment, documentation, automation and performance indicators (Al-Mashari et al, 2003; Al-Mashari, 2001; Bingi et al, 1999). An ERP system forces companies to become process focussed (Sedera et al, 2003). Those that have already developed a process focussed culture will facilitate the implementation of the ERP system (Jayaganesh, 2009). This factor is related to the organisational fit of an ERP system which will be discussed in the next theme (System).

### System

A number of researchers have identified success factors associated with the selection of the appropriate ERP system (He and Brown, 2005; Davenport, 2003; Rosemann et al, 2005). Many vendors espouse the capabilities and functionalities of their systems to ensure its uptake. These systems are complex in nature and for companies new to the implementation of ERP systems the development and implementation of an effective selection process is often difficult (Somers and Nelson, 2004). A study of 180 IT executives in the Asia Pacific region found that if companies had a chance “to do all over again” the main factor they would change was related their selection of software vendors. Some respondents were dissatisfied with their existing software vendors (Accenture, 2004, p7). One aspect of this dissatisfaction is the capabilities of the ERP system while other issues include technical support, user training, alignment with corporate vision and direction (Verville and Halington, 2002; Ngai et al, 2008).

Another success factor under the system theme is the appropriateness of the ERP system to the “organisational fit” (Nah et al, 2003; Ngai et al, 2007). ERP systems integrate business processes which traditionally were supported by a number of legacy systems. An ERP system contains a collection of standardised business processes that impart *best practice* upon the organisation. The system allows for some configuration of these standard processes providing some flexibility to a company to support particular needs. However, even though there is always a degree of configuration, companies need to be willing to change their business processes to fit the ERP system in order to minimize the degree of customization (Holland and Light, 1999). The risk of not achieving the expected benefits increases as the degree of customisation increases (Davenport, 1998). Future ERP system upgrades become difficult as customisations that worked with previous versions of the software may not work with subsequent upgrades. Companies attempt to adopt a “*vanilla*” strategy which minimises the degree of customisation and select ERP systems which closely reflect their business process requirements (Themistocleous et al., 2001; Somers and Nelson, 2004; Law and Ngai, 2007).

Table 4 Critical Success Factor Themes

Success Factor Theme	Critical Success Factors	Supported Research
<b>Top Management</b>	Strategic Alignment Management Support Leadership (Champion)	Akkermans and van Helden, 2002; Aladwani, 2001; Al-Mashari et al, 2003; Al-Mashari, 2001; Allen et al, 2002; Bingi et al, 1999; Colmenares, L., 2004; Davenport, 1998; Donovan, 1999; Gable et al, 2002; Holland and Light 1999; Mabert et al, 2001; Magnusson et al, 2004; Mandal and Gunasekaran, 2003; Markus and Tanis 2000; Nah et al, 2001; Somers and Nelson, 2001; O'Leary 2000; Parr and Shanks, 2000; Sarker and Lee, 2003; Schneider, 1999; Skok and Legge, 2002; Sumner 2000; Umble et al, 2003; Yang and Seddon, 2003; Buvrud et al, 2011
<b>Project</b>	Management (Methodology) Team Composition External Consultants	Akkermans and van Helden, 2002; Al-Mashari et al, 2003; Allen et al, 2002; Colmenares, L., 2004; Gable et al, 2002; Haines and Goodhue, 2003; Holland and Light 1999; Mabert et al, 2001; Magnusson et al, 2004; Mandal & Gunasekaran, 2003; Markus and Tanis 2000; Nelson and Somers 2001; Parr and Shanks, 2000; Sarker & Lee, 2003; Skog & Legge, 2002; Sumner 1999; Umble et al, 2003; Yang and Seddon, 2003; Buvrud et al, 2011
<b>Organisation</b>	Culture (discipline) Change Management (communication) Training User involvement Process Maturity	Aladwani, 2001; Al-Mashari & Zairi, 2000; Al-mashari et al, 2003; Al-Mashari, 2001; Allen et al, 2002; Bingi et al, 1999; Bradford and Florin, 2003; Colmenares, L., 2004; Davenport, 1998; Esteves et al, 2003; Gable et al, 2002; Hall, 2002; Holland and Light, 1999; Hong & Kim, 2002; Krumbholz et al, 2000; Laughlin, 1999 ; Mabert et al, 2001; Magnusson et al, 2004; Mandal and Gunasekaran, 2003; Markus and Tanis, 2000; Nelson and Somers 2001; Palaniswamy and Frank, 2000; Parr and Shanks, 2000; Scott and Vessey, 2000; Skog and Legge, 2002 ; Soffer et al, 2003; Soh et al, 2000; Sumner, 1999; Umble et al, 2003 ; Yang and Seddon, 2003
<b>System</b>	Technology Organisational Fit	Akkermans and van Helden, 2002; Al, Mashari et al, 2003; Al-Mashari, 2001; Bancroft et al, 1998; Allen et al, 2002; Bingi, 1999; Brown and Vessey, 1998; Colmenares, L., 2004; Harrell et al, 2001; Holland and Light, 1999; Hong & Kim, 2002; Keller & Teufel, 1998; Koch et al, 1999 ; Mabert et al, 2001 ; Mandal and Gunasekaram, 2003; Magnusson et al, 2004; Nelson and Somers 2001; Parr and Shanks, 2000; Soffer et al, 2003; Umble et al, 2003; Yang and Seddon, 2003; Nah et al, 2003; Ngai et al, 2007

Although a number of critical success factors associated with ERP system implementations have been identified, some have been noted as being more critical than others. Parr et al (1999) using a detailed analysis of the critical success factor research literature found three major factors necessary for the successful implementation. These factors included management support, a project team with the appropriate balance of technical/business skills and a commitment to change by all stakeholders. However, Parr et al's (1999) findings were more concerned with project success rather than the business success. Business success is

associated with the system realising the business goals it was designed to achieve. Such factors are usually defined in the business case for implementing the system and therefore are the driving factors for the project in the first place. These are reflected in the effective use of the system but are usually more difficult to assess, as well as being usually achieved over time (Pinto and Slevin 1988; Morris, 1996; Deloitte, 1999; Harris and Davenport, 2006).

Markus and Tanis, (2000) identified a number of phases associated with an ERP system implementation project where the critical success factors vary in importance. Nah et al (2001) through a review of existing literature classified success factors relevant to the different phases of an implementation as identified by Markus and Tanis (2000).

### ***ERP System Maturity***

The Harris and Davenport (2006) model (Figure 3) discussed previously identified one of the pre-requisites for ERP system realisation was associated with experience in using the system. They also identified in their research that expected benefits don't all occur at once, but some are only achieved after a period of use of the system. The notion of different levels of experience with ERP system implementation and use is reinforced by Nolan and Norton (2000). These authors grouped ERP systems implementations into levels of maturity. They argued that when evaluating the costs of an ERP system implementation, the company's previous experience with ERP systems should be an important consideration. Their maturity classifications were,

- Beginning – implemented ERP system in the past 12 months,
- Consolidating – implemented ERP system between 1 and 3 years,
- Mature – implemented system for more than 3 years.

Holland and Light (2001) also developed a maturity model of ERP system usage and then considered how; cost, entropy (level of disorder), complexity, flexibility and competitiveness would be impacted at each stage. They identified three stages;

- Stage One: companies that are commencing their ERP system implementation while at the same time managing their existing legacy systems.
- Stage Two: the ERP system implementation is complete across the organisation and the associated business process functionality has been adopted.

- Stage Three: the ERP system has been accepted by the stakeholders and companies are investigating avenues for achieving strategic value from the additional functionality available through the ERP system and associated solutions.

Deloitte (1999) referred to the process of achieving additional benefits from an ERP system implementation as *second wave* implementations. They believed that a number of phases occurred post implementation. These phases included;

- Stabilise phase: companies familiarise themselves with the ERP systems implementation and master the changes which occurred.
- Synthesise phase: companies seek improvements by implementing more efficient business processes, add complimentary solutions, as well as to motivate people to support the changes.
- Synergise phase: is where process optimization is achieved through the implementation of the ERP system resulting in business transformation.

All the ERP system usage models identified reflect the evolutionary nature of how companies use these types of systems to gain greater business value. Furthermore, to satisfy customer demands, ERP systems have evolved to incorporate additional functionality. The original role of ERP systems was to integrate core business processes and the transactions and data which support them. As companies bedded down or stabilised their ERP system they often investigated how the system could be extended to support other business functions. Accordingly, the ERP system vendors expanded the functionality that was included in their original offering or version. The focus of the ERP systems also began to extend beyond company boundaries to provide support to integrate information from customers and suppliers in the form of supply chain management, customer relationship management, enterprise portals, mobile computing and e-business (Sharif and Irani, 2005). Gartner coined the term ERP II to describe this cross boundary extension of traditional ERP systems (Bond et al, 2000).

## Business Intelligence and ERP Systems

The growing importance of Business Intelligence has seen ERP system vendors extending their solutions to incorporate Business Intelligence functionality. The first noticeable evidence of this was the incorporation of data warehouse functionality (Hashmi, 2003). The META Group research found that 56% of companies who had implemented three or more modules of their ERP system planned to implement their ERP vendor's business intelligence solution within a two to three year time frame. This percentage increased to 63% when customers had five or more modules implemented (Schlegel, 2004).

ERP systems have extensive reporting features within each functional module such as financials and human resources. However, cross module reporting functionality is limited and ERP systems are also limited in providing decision support activities such as analysing historical trends and future planning (Raden, 1999; Radding, 2000; Gou et al, 2012). To overcome these reporting shortcomings companies implemented Business Intelligence incorporating data warehouse functionality which was offered by the ERP vendor (Stein and Hawking, 2002; Schlegel, 2004, Gou et al, 2012). ERP systems integrate and standardise the data while Business Intelligence facilitates the analysis. Although ERP systems and Business Intelligence systems, (incorporating data warehouses), are complimentary they are distinctly different as identified by Sammon et al (2003) and documented in (Table 5).

Table 5 Defining Characteristics of Data Warehousing and ERP Systems (Sammon et al, 2003, p157)

Information Systems Characteristics	ERP Systems	Business Intelligence (Data Warehouse)
<b>Focus/Origin</b>	Operational	Informational
<b>Benefit</b>	Efficiency	Effectiveness
<b>Design</b>	Implement Best Practice	Create Best Practice
<b>Development System</b>	Software Package	Evolving Concept
<b>Data Model</b>	Abstract	Concrete
<b>Characteristics of IS Project Implementation</b>	ERP (operational)	DW (informational)
<b>Project Complexity</b>	High	High
<b>Project Failure Rate</b>	High	High
<b>Clarity and Understanding of Project Initiative by Organisation</b>	Low	Low

Sammon et al (2003) identified that the implementations of both ERP systems and Business Intelligence are complex and often do not result in the expected benefits. Accordingly, there



are numerous studies focussing on the identification of the critical success factors associated with the implementation of ERP systems or Business Intelligence. However, the research to date identifying the factors that impact on the success of Business Intelligence have focussed on systems that have been *independent* of ERP systems. The literature has identified that ERP systems and Business Intelligence provide significant value for an organisation but at the same time are complex to implement and provide significant risk (Wixom and Watson, 2001; Sammon et al, 2003). Figure 6 identifies and summarises from the literature the critical success factors associated with both systems.

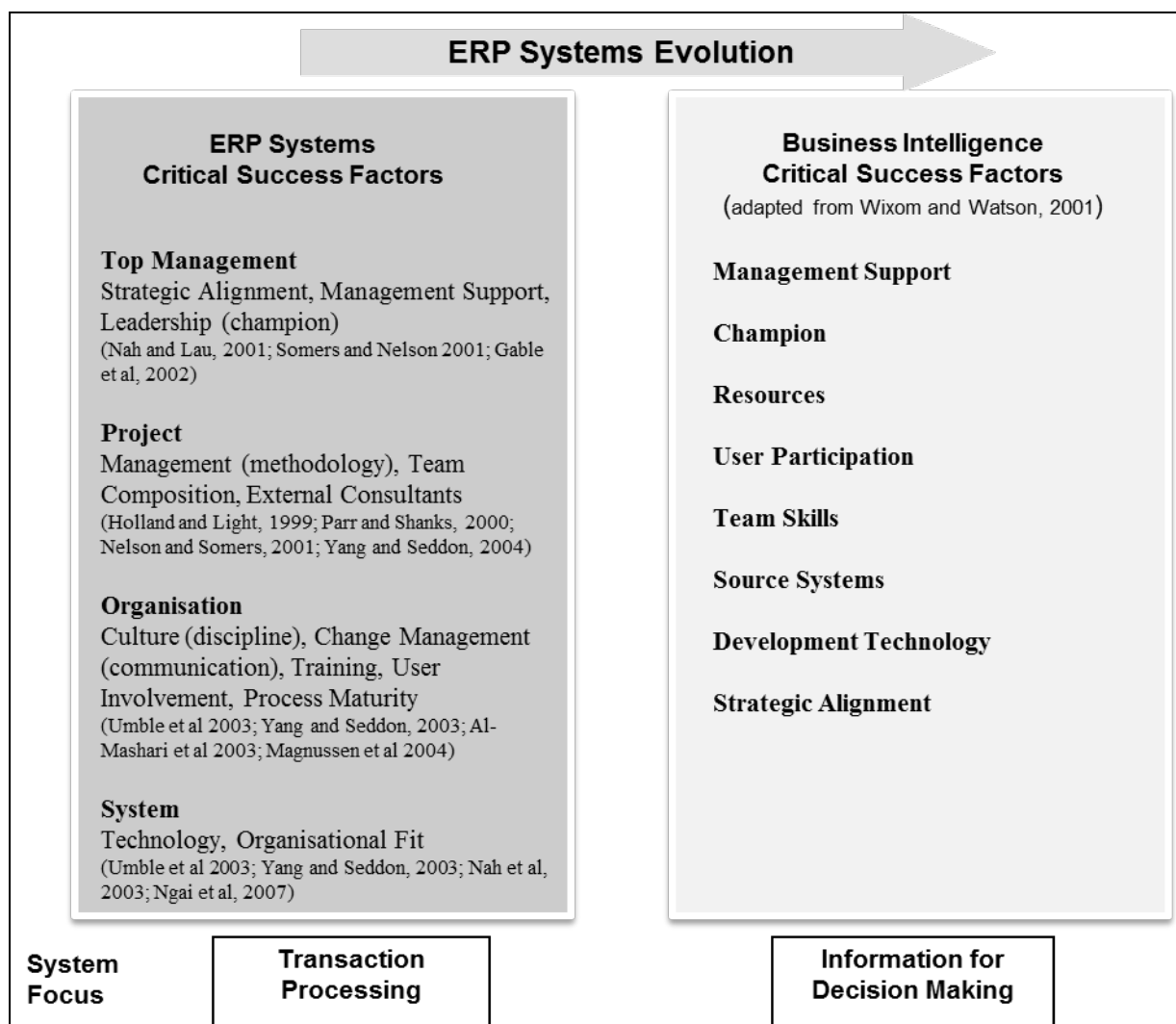


Figure 6 Critical Success Factors of Business Intelligence and ERP Systems

Many of these success factors are similar for both systems. However, at a more granular level the factors potentially differ due to the diverse nature of the two systems. For example, the makeup of the project teams and project methodologies would differ due the skills

required and the outcomes expected for each system. At a higher level, a main difference between the critical success factors of the two systems is the identification of source systems as a success factor for Business Intelligence. This success factor refers to the quality of the heterogeneous systems and the data contained. Such data is extracted into the data warehouse and forms the basis for analysis and reporting. The data from these systems needs to be extracted and integrated into standardised formats before it can be analysed (Wixom and Watson, 2001; Hurley and Harris, 1997). The increase in the number and diversity of source systems has a direct impact on the importance of this critical success factor.

One of the benefits of ERP systems which was previously identified was in regard to the standardisation and integration of data which supports the various business processes (Sumner, 2004). An ERP system provides the functionality to automate and manage a company's business processes and the associated transactions. The data which is used in these transactions is often used as the basis for Business Intelligence analysis. Prior to the implementation of the ERP system the data was stored in a variety of legacy systems. The ERP system replaces many of these disparate legacy systems (Deloitte, 1999). The Business Intelligence system now extracts the necessary data from the ERP system. Accordingly, the effort in integrating and standardising data for analysis is greatly reduced. This would appear to lessen the criticality of the source system success factor in relation to Business Intelligence (Mehrwald and Morlock, 2009).

The close relationship between ERP systems and Business Intelligence has seen ERP vendors develop Business Intelligence functionality as an extension of their ERP system. To facilitate the integration of the ERP system and its corresponding Business Intelligence system a number of pre-defined structures have been developed by the vendors and supplied to customers. These structures assist in the identification and extraction of data from the ERP source system as well as their storage and query and report structures in the Business Intelligence system (Schlegel et al, 2006; MacDonald et al, 2006). Furthermore, predefined structures also facilitate the Business Intelligence implementation process and assists companies to identify the analytical capabilities of their ERP/Business Intelligence environment based on experience gained from previous implementations. Although, these predefined structures assist in the implementation process they also change the nature of the implementation process compared to traditional Business Intelligence implementations from

non ERP vendors. ERP vendors argue that the adherence to these predefined structures in the implementation facilitates a successful implementation (SAP, 2004; McDonald et al, 2006; Hebseeba et al, 2012).

The increased emphasis by companies on the analysis of information to gain a competitive advantage has placed increased importance on Business Intelligence. Although these systems have been characterised by what might be complex and high risk implementations companies, still pursue the opportunities these systems provide (Davenport, 2010; Foley and Manon, 2010). Many of the Business Intelligence implementations currently being undertaken or proposed are as an extension of the company's ERP system. The research associated with this relatively new approach to Business Intelligence has been limited or under reported.

The critical success factors associated with ERP systems have been well documented and publicised. Many companies have undertaken a number of ERP system implementations and are familiar with the pitfalls due to their maturity (Stein et al, 2001). These have developed governance processes to facilitate a successful implementation and benefit realisation. These processes would ensure that issues associated with the ERP System critical success factors are addressed (Liu and Wen, 2013). There is no reason to believe that a company would not attempt to apply their established governance processes to future enterprise wide information systems implementation projects such as Business Intelligence.

However, there is minimal research on the critical success factors of Business Intelligence solutions implemented in these ERP systems environments. It cannot be assumed that the critical success factors associated with the Business Intelligence in a non ERP system environment can be applied to this situation as demonstrated by the changing nature of the source systems. The impact of the utilisation of predefined Business Intelligence structures that are provided by the ERP system vendor has not been noted in the research literature. At the same time due to the lack of research of critical success factors there is the risk that companies may assume that the factors which they are more familiar with in relation to their ERP system implementation are equally applicable to the Business Intelligence implementation. Some of these factors will be applicable but others may not. However, this assumption has not been investigated. Arguably, identification of critical success factors of

Business Intelligence in an ERP system environment will assist companies with these implementations. It will lessen the associated risks while at the same time increasing the possible benefit realisation. The research associated with this identification will form a foundation for further investigation of the adoption and extension of Business Intelligence in today's business environment.

### **Conceptual Framework**

The conceptual framework for this research has been based on a comprehensive analysis of the associated literature. A conceptual framework provides a guide to researches in investigating a phenomenon by clearly setting out their expectations (Carroll et al., 1998). Miles and Huberman (1984, p18), described the conceptual framework as:

“A conceptual framework explains, either graphically or in narrative form, the main things to be studied — the key factors, constructs or variables — and the presumed relationships between them”.

The conceptual framework in this study synthesises the critical success factors for ERP systems implementations and Business Intelligence systems implementations to investigate the appropriateness of these factors for Business intelligence systems implemented as an extension of an ERP system. This will also assist in the identification of any new factors which have not previously been identified. Figure 7 graphically represents the conceptual framework for this research.

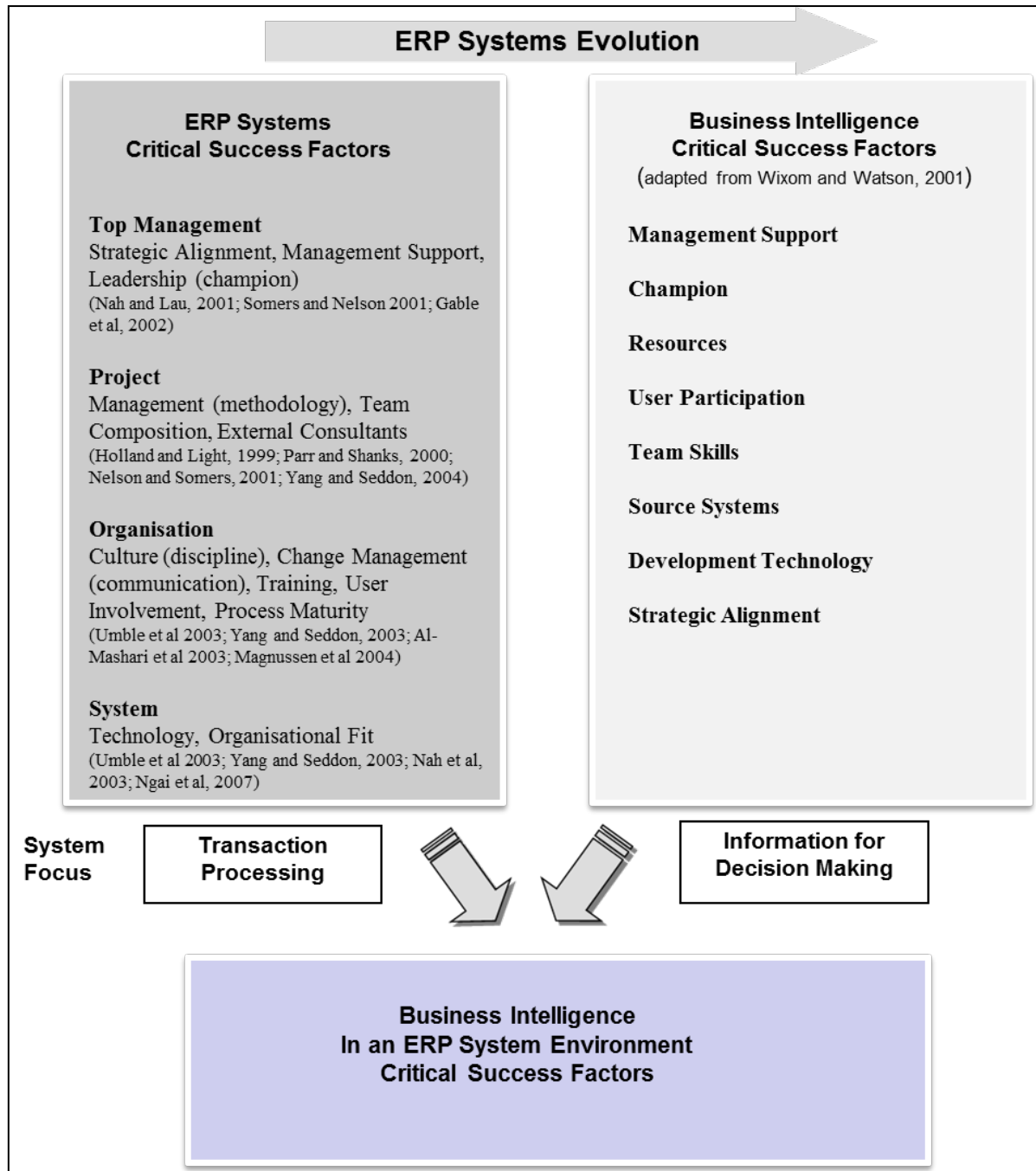


Figure 7 Conceptual Framework for the investigation of critical success factors of Business Intelligence in an ERP system environment.

The Conceptual Framework identifies the relationship between an ERP system and Business Intelligence. The ERP system is responsible for managing and processing transactions while Business Intelligence facilitates decision making, especially in regards to business processes and their associated transactions. The Conceptual Framework lists the critical success factors associated with the implementation of each system as noted by the research literature. The Conceptual Framework also illustrates that the critical success factors of Business

Intelligence implemented as an extension of an ERP system have not been identified in the research. This gap in the research literature forms the basis of this research.

### **Research Statement**

The objective of this research is to investigate “Critical Success Factors of Business Intelligence Systems Implementations In An ERP Systems Environment”. In detail, the research will analyse applicability of existing critical success factors associated with the implementations of each of these systems to the implementation of Business Intelligence as an extension of an ERP system. The aim is to categorise these factors and identify any new success factors not previously documented by academic literature.

### ***Research Questions***

In order to achieve the research objective, the following research questions are have been developed. The research involves two phases. The first phase involves the identification of Business Intelligence critical success factors. Phase two is focused of the investigation and prioritization of these factors.

#### Phase One:

In the first phase, the research seeks to answer the following question:

Question 1. *What are the critical success factors associated with the implementation of a Business Intelligence as an extension of an ERP system?*

This question by implication has an associated question.

Question 2. *Are the critical success factors of an ERP system implementation relevant to the implementation of Business Intelligence which is implemented as an extension of an ERP system?*

#### Phase Two

In the second phase, the research seeks to answer the following question:

Question 3. *Of the identified critical success factors are some more critical than others?*

The research will establish the relevance of existing ERP system critical success factors to Business Intelligence as well as the validity of existing Business Intelligence critical success

factors to Business Intelligence implemented as an extension of an ERP system. The research will also reveal factors that have not previously been identified. The clarification of critical success factors relevant to Business Intelligence implemented as an extension of an ERP system will assist practitioners in achieving successful outcomes in this type of implementations. Researchers will be able to utilise this research as a foundation for further research related to Business Intelligence.

## **CHAPTER 3 - RESEARCH METHODOLOGY**

The purpose of this research is to identify and investigate the critical success factors associated with the implementation of a Business Intelligence system in an ERP systems environment. The identification of these factors will result in the development of a model which represents the importance of these factors in systems implementations. The Literature Review, identified and discussed the various aspects of Business Intelligence and ERP systems including definitions, benefits of these systems and implementation issues. In addition, critical success factors associated with Business Intelligence and those associated with ERP Systems were identified and discussed. Based on the extensive literature review a Conceptual Framework was developed which provided the foundation for directing the research. This chapter describes the interpretivist research and the supporting methodologies used to undertake this study. The chapter starts with the epistemology, underlying theory and methods underpinning the research and justifies the selection of particular approaches. The second section of the chapter will discuss the research design and the different methods employed.

### **Introduction**

There are a number of philosophical perspectives or epistemologies that influence research. The more common ones include the positivist, interpretive and critical perspectives (Orlikowski and Baroudi, 1991). Each epistemology may utilise a variety of methods to understand a phenomenon but at the same time a particular method may be employed in research that reflects different epistemologies (Trauth, 2001). The study adopts an interpretative epistemology underpinned by a qualitative and quantitative data collection sourced from industry experts.

Interpretive researchers believe that to understand a phenomenon they must interpret the meanings that the participants in the study assign to the phenomenon (Orlikowski and Baroudi, 1991). These meanings can be accessed through the study of language, symbols, shared meanings, documents and other artifacts (Klein and Myers, 1999). Interpretive research in the discipline of information systems:

“...is aimed at producing an understanding of the context of the information system, and the processes whereby the information system influences and is influenced by the context” (Walsham, 1993, p.4-5).



Furthermore, the use of interpretive research in the information systems discipline has been widely accepted with papers utilising this approach appearing in premier journals and conferences (Davis et al, 1992; Klein and Myers, 2001; Trauth, 2001). In terms of this study, the research seeks to elicit multiple points of view to identify and understand the critical success factors associated with the implementation of a Business Intelligence system in an ERP systems environment.

Qualitative research methods originated in the social sciences to enable researchers to better understand cultural and social phenomena (Myers and Newman, 2007). This type of research approach allows the researcher to develop an understanding of the meaning of others' experiences (Strauss and Corbin, 1998; Windschitl, 1998). Accordingly, qualitative research has been widely accepted throughout the information systems discipline. Indeed, researchers have adopted a variety of approaches such as action research (Lau, 1997; Baskerville and Wood-Harper, 1998), case study (Curtis et al, 1988; Cavaye and Cragg, 1995; Cavaye, 1996) and ethnography (Myers, 1999) to better understand the different aspects of information systems.

This research encompasses a multi-method approach utilising a variety of instruments to investigate the phenomenon. It will use a combination of content analysis and interview methods. The content analysis will utilise Business Intelligence industry presentations and the interviews will involve industry experts that are currently involved in different aspects of Business Intelligence implementations. Mingers (2001) argues that the combining of research methods can provide richer and more reliable results. The value of combining research methods is often discussed in terms of combining both qualitative and quantitative methods and is referred to as mixed method approach (Gable 1994; Myers, 1997, Mingers, 2001; Tashakorri and Teddlie, 2002; Cresswell, 2009). The literature discusses different techniques for combining research methods (Tashakorri and Teddlie, 2002; Cresswell, 2009), whilst Cresswell (2009) has identified alternative strategies for the mixed method approach. McKendrick (1999) proposes that multi-method research can encompass a range of research strategies.

*“ it may be used over the course of a research project; and it may breach the qualitative/quantitative divide or it may be practised within each camp.” (p. 41)*

These strategies can be based on data collection related to the;

- Timing (whether data collection occurs sequentially or concurrently),
- Weighting (the weighting of the results from each phase of data collection), and
- Mixing (the level of integration of different research methods).

Brewer and Hunter (1989, p. 17), believe that the value of combining research methods is a “...fundamental strategy to attack a research problem with an arsenal of methods that have non-overlapping weaknesses in addition to their complementary strengths”.

Gable (1994) evaluated a number of different research methods including case study and survey approaches based on the features of Controllability, Repeatability, Deductibility, Generalisability, and Discoverability (CRDGD). Chan (2004) further elaborated on each of these CRDGD characteristics in his research. Controllability refers to the extent that a researcher can control the environment in which the research is undertaken. Repeatability refers to the extent that similar results can be achieved utilising the same methodology in a similar environment. Deductibility refers to the extent that logical research findings can be determined in a controlled way. Generalisability refers to the extent that the research findings can be applied in a variety of settings. Discoverability refers to the extent that new findings and or theories can be discovered.

Chan (2004) used content analysis to extend Gable's (1994) work. A summary of Gable's (1994) and Chan's (2004) work relating to the strengths of different methods is represented in Table 6.

Table 6 Relative Strengths of Case Study, Survey and Content Analysis Methods (Gable, 1994 adapted by Chan 2004)

Characteristic	Case Study	Survey	Content Analysis
Controllability	Low	Medium	High
Repeatability	Low	Medium	High
Deductibility	Low	Medium	Medium
Generalisability	Low	High	Low
Discoverability	High	Medium	Low

The multi-method approach has been utilised previously by researchers in the information systems discipline to study a variety of phenomena (Kaplan and Duchon, 1998; Birbek and Stewart, 2004). Gable (1994) used a combination of surveys and case study to investigate the success factors of consultants that were engaged in information systems projects. Poon and Swatman (1996) used a similar multi-method approach to investigate internet usage by small businesses. Esteves and Pastor (2004) designed a study to investigate ERP systems critical success factors using a combination of surveys and case studies. Sehgal et al (2004) investigated user empowerment and enterprise system success utilising case study, content analysis and survey methods.

The proposed research will utilise a multi-method approach utilising both content analysis and interview methods. Combining both these methods strengthens any inherent weaknesses these methods have, if they were to be used individually. This study also used a phase approach as described by Creswell (2009). This is whereby data collected in the first phase of the research is used to inform the second phase of the research. Creswell (2009) identified this approach as sequential explanatory design. It is used to further explain and elaborate the data collected in the previous phases of the research. The research approach undertaken is further explained in the next section on research design.

### **Research Design**

In this research, the phenomenon studied was the identification and investigation of the critical success factors of Business Intelligence implemented in an ERP systems environment. The research design consisted of six broad stages. The first stage involved a review of literature and the determination of research questions and objectives. The second stage involved the development of a conceptual framework from the research literature. The third stage used the conceptual framework and the associated critical success factors as a foundation for content analysis of historical data. The findings of this third stage were used to inform/revise the initial conceptual framework. The fourth stage utilised the critical success factors, identified through content analysis by exploring the relationship between these factors and their importance in industry. This was further investigated through interviews with a variety of industry experts that were asked to comment on the critical success factors. The outcome of this stage was used to further refine the conceptual framework. The fifth and final stage articulates the implications of the findings with respect to industry and research. The research design is depicted in Figure 8.

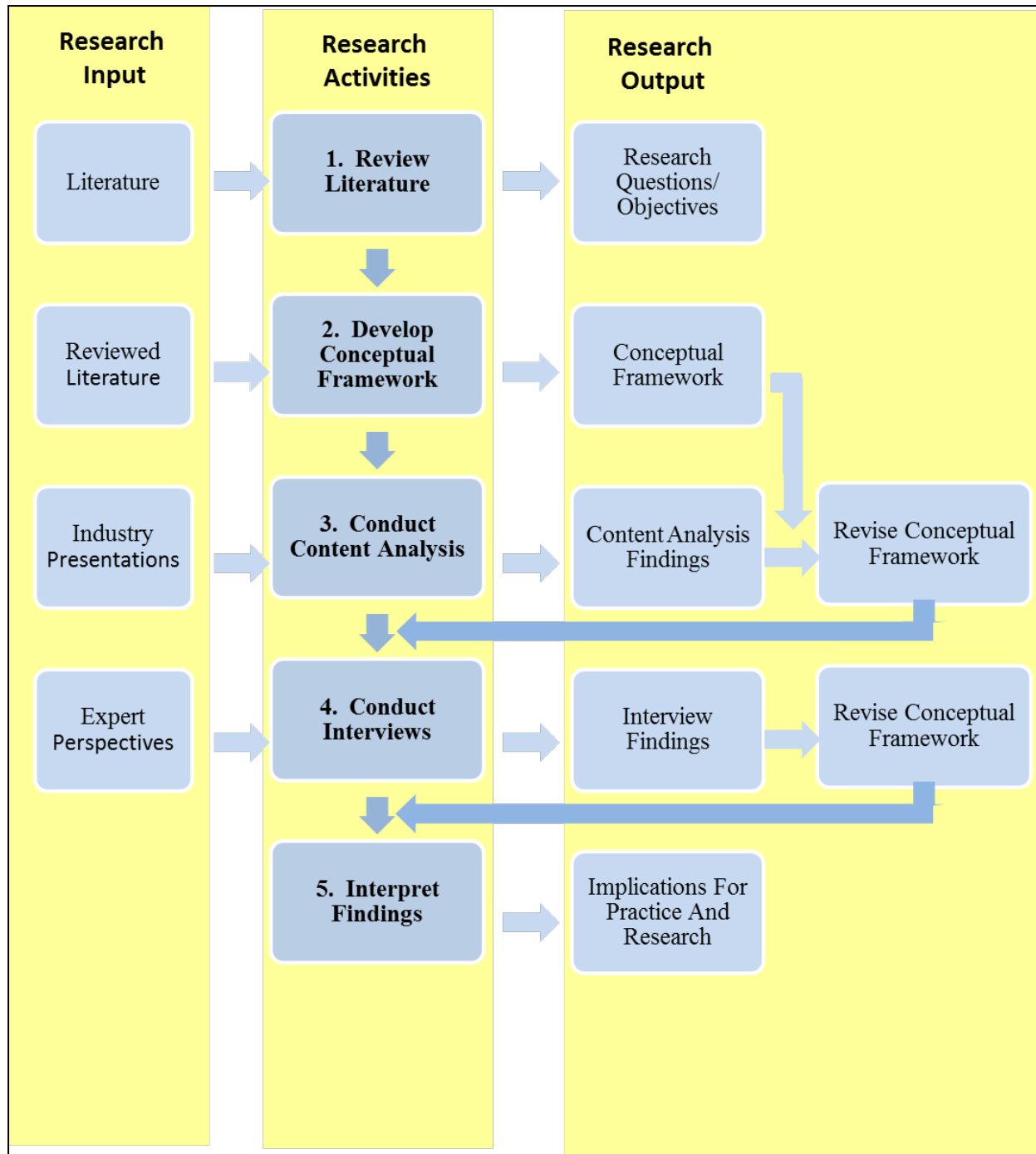


Figure 8 Research Design: different stages used in this study.

### ***Stage 1: Literature Review***

The literature review is an essential phase of any research (Hart, 1998). The knowledge gained from previously conducted research in an area provides the researcher with an increased understanding of how the subject has evolved, what is already known about the topic, what aspects of the topic have the potential for further exploration, and how else this knowledge could be applied in different contexts to gain new insights.

A review of the relevant literature was undertaken that encompassed issues such as the evolution of Business Intelligence, the value it provides to companies, different Business Intelligence maturity models, and different aspects of Business Intelligence systems implementation including associated critical success factors. The literature review discussed the different aspects of ERP systems such as their value and benefits, implementation issues including associated critical success factors. The final component of the literature review discussed the relationship between an ERP system and Business Intelligence and how companies are now implementing Business Intelligence systems as an extension of their ERP systems. The research literature to date associated with the identification of Business Intelligence critical success factors has been in relation to stand alone Business Intelligence systems. This ignored the possible influences on Business Intelligence systems implemented as an extension of an ERP system. This highlighted the gap in the literature as to the relevance of previously identified critical success factors associated with Business Intelligence systems implementations which were not extensions of existing ERP systems.

### ***Stage 2: Conceptual Framework***

The conceptual framework represents the researcher's aims, understanding and theoretical foundations. The framework guides the researchers by clearly setting out their expectations while remaining flexible to unanticipated outcomes (Carroll et al., 1998). Miles and Huberman (1984) described the purpose of a conceptual framework.

“A conceptual framework explains, either *graphically* or in *narrative* form, the main things to be studied — the key factors, constructs or variables — and the presumed relationships between them”.

The conceptual framework for this research was developed from a comprehensive literature review (Figure 7). This framework included critical success factors associated with the implementation of Business Intelligence systems and those related to ERP system

implementations. These critical success factors are summarised in Table 7. The critical success factors assisted in the investigation of these critical success factors in the implementation of Business Intelligence systems as an extension of an ERP system. The research also identified any new factors not previously documented.

Table 7 Conceptual Framework Critical Success Factors

Critical Success Factors	
ERP System	Business Intelligence
<b>Top Management</b> Strategic Alignment, Management Support, Leadership (champion) <b>Project</b> Management (methodology), Team Composition, External Consultants <b>Organisation</b> Culture (discipline), Change Management (communication), Training, User Involvement, Process Maturity <b>System</b> (Technology, Organisational Fit)	<b>Management Support</b> <b>Champion</b> <b>Resources</b> <b>User Participation</b> <b>Team Skills</b> <b>Source Systems</b> <b>Development Technology</b> <b>Strategic Alignment</b>

### Stage 3: Content Analysis

The critical success factors applicable to Business Intelligence were investigated using a content analysis approach. The content analysis was conducted on industry presentations related to Business Intelligence. Holsti (1969, p. 14) defined content analysis as;

“..any technique for making inferences by objectively and systematically identifying specified characteristics of messages”.

Krippendorff (2004, p. 18) further clarifies the definition by indicating that the inferences are made from “...from texts (or other meaningful matter) to the contexts of their use”. He used the term “meaningful matter” to expand what is traditionally considered as text. He considers “*texts*” to include “...works of art, images, maps, sounds, signs symbols, and even numerical records ...provided they speak to someone about a phenomena” (p. 19).

Both definitions emphasise the importance of the repeatability and objectivity in this research method. This is achieved by explicit rules and procedures that are applied to all aspects of

the content analysis. (Krippendorff, 2004). Indeed, the literature supports Krippendorff's (2004) view of content not being limited to text as suggested by Holsti (1969). Content analysis techniques have been utilised to yield inferences from symbolic, pictorial, verbal and communication data such as books, magazines, newspapers, movies, television and web sites (Hara et al, 2000; Riffe et al, 2005; Liu and Chen, 2005; Semetko and Valkenburg, 2006).

In the discipline of information systems, the content analysis method has been used: to analyse newspaper employment classifieds to determine IT job requirements (Todd et al, 1995), to determine the effectiveness of electronic communication (Abbasi and Chen, 2008), to understand the uptake and impact of Business Intelligence (Jourdan et al, 2008), to determine the importance of information technology in corporate strategy (Lacity and Janson, 1994) and to determine the success factors of IT outsourcing (Koh et al, 2004). Yang and Seddon (2004) utilised content analysis to identify critical success factors and benefits associate with ERP systems. They utilised transcripts and webcasts from presentations at an ERP system's vendor conference (Seddon et al, 2010). The industry presentations provide important research artefacts which have not previously been analysed. These artefacts recorded stakeholder experiences in the implementation of ERP systems. Drawing from the work of Seddon et al (2010) this research utilised content analysis to identify the critical success factors associated with the implementation of Business Intelligence systems in and ERP system environment.

Krippendorff (2004) discusses three different categories to encapsulate the variety of content analysis techniques employed by researchers.

1. *Pragmatical content analysis*. This approach classifies content according to probable cause and effects. An example of this approach in this study would be recording the frequency that an issue is presented which is likely to positively influence the audience in regard to Business Intelligence.
2. *Semantical content analysis*. This approach classifies content according to their meanings. An example of this approach in this study would be recording the frequency Business Intelligence is referred to irrespective of the words or images that are used to make the reference to it. Semantical content analysis is comprised of three sub-categories.
  - a. *Designation analysis*; refers to the frequency that objects related to the primary content analysis are referred to. These objects could refer to concepts, people, things or groups. This can be referred to subject-matter analysis. An



example would be analysing the frequency of references to Business Intelligence implementations.

- b. *Attribution analysis*; refers to the frequency that certain characterizations are referred to. Characterizations would include to references to benefits, performance, failure or success in relation to Business Intelligence.
  - c. *Assertion analysis*; refers to a combination of the two previous approaches. In other words the frequency with which certain objects are characterized in a particular way. An example of this approach in this study would be the frequency of successful Business Intelligence implementations are referred to. This is sometimes referred to as thematic analysis.
3. *Single-vehicle analysis*. This approach classifies content according to psychophysical properties of the content. An example of this approach in this study would be recording the frequency the term “Business Intelligence” appears.

Although the categories identified by Krippendorff (2004) discuss content analysis in terms of counting or frequency of content there are differing views whether content analysis is a qualitative or quantitative method (Berelson and Lazarsfeld, 1948; Holsti, 1969; Mingers, 2003; Krippendorff, 2004). Holsti (1969, p121) believes that labelling content analysis as qualitative is “...somewhat misleading because data coded in this manner may be presented quantitatively”. Krippendorff (2004) believes that labelling content analysis as quantitative restricts content analysis to numerical counting exercise. The usefulness of classifying content analysis as either a qualitative or quantitative method is questioned by researchers (Carney, 1972; Krippendorff, 2004). Krippendorff (2004) argues that both methods are complimentary and both are indispensable. “Ultimately, all reading of texts is qualitative, even when certain characteristics of a text are later converted into numbers” (Krippendorff, 2004, p. 16). Hence, the content analysis undertaken in this research can be classified as both a qualitative and quantitative approach. From a qualitative perspective the researcher draws inferences about the meanings of messages conveyed through texts and images contained in industry presentations. From a quantitative perspective each inference made in regard to Business Intelligence systems success factors is counted and quantified in terms of frequencies based on counts.

A number of researchers propose differing approaches to undertaking content analysis research (Neuendorf, 2002; Wimmer and Dominick, 2003; Krippendorff, 2004). Carney, (1972) believes that there is no one ideal way to carry out content analysis. Krippendorff (2004) identified six questions that must be asked in every content analysis:

- 1) Which data are analysed?
- 2) How are they defined?
- 3) What is the population from which they are drawn?
- 4) What is the context relative to which the data are analysed?
- 5) What are the boundaries of the analysis?
- 6) What is the target of the inferences?

Neuendorf (2002) provides a step by step approach to content analysis. The step by step approach communicated via a flow chart encompasses content analysis involving both human and computer coding. She emphasises, that if human coders are going to be utilised then reliability becomes a priority. This study adopts a similar approach to content analysis as identified by Neuendorf (2002) and is illustrated in Figure 9.

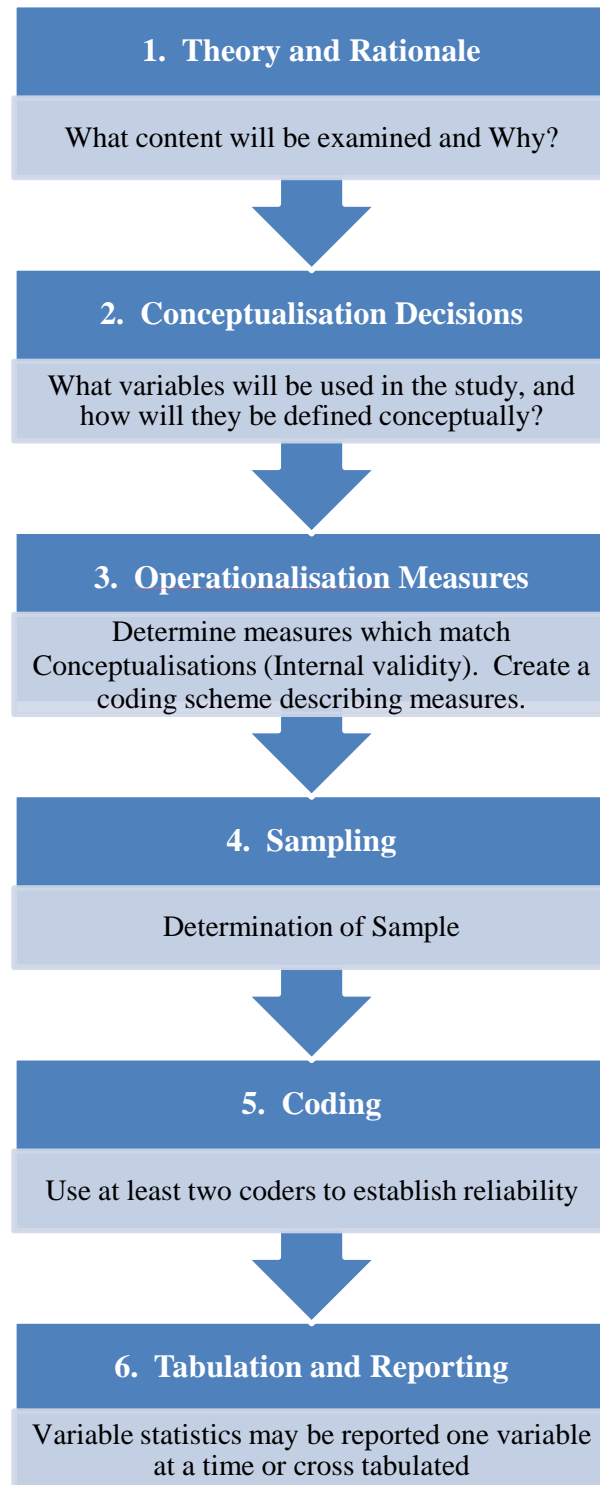


Figure 9 Content Analysis Stages used in this study (adapted from Neuendorf, 2002)

Each step in the adapted Neuendorf (2002) approach utilised in this studied is elaborated on below.

### 1. Theory and Rationale

What content will be examined and why?

Researchers have utilised a variety of methods to identify critical success factors associated with ERP systems or Business Intelligence systems. These include either surveys (Bhatti, 2005; Colmenares, 2004; Nah et al, 2003), interviews (Bradley, 2005; Ross and Vitale, 2000) case studies (Allen et al, 2002; Boon et al, 2004;) or a combination there of (Loh, 2004). For many practitioners involved in the implementation and use of ERP systems or Business Intelligence systems they often gain their knowledge from industry conferences and the associated presentations. Krippendorff's (2004) broad definition of texts referring to artefacts that provide meaning about phenomena would support the appropriateness of applying content analysis to industry presentations. Previous researchers have realised the potential of industry presentations as sources of information for research (Yang and Seddon, 2004; Seddon et al, 2010).

#### Industry presentations

Industry presentations refer to presentations by industry practitioners involved in the implementation, use, and maintenance of Business Intelligence systems in an ERP systems environment. These could include presentations from users of the systems, system vendors and or implementation partners. Customers attend industry conferences to listen to presentations in an endeavour to get a better understanding of the functionality of the system, future directions and developments, implementation and usage issues. Presenters are usually provided with guidelines from the event organisers as to how their presentation should be structured and formatted to ensure consistency and provide value to the attendees. The presentations vary in length from twenty to sixty minutes and contain an assortment of information. These presentations could include supporting material such as a; web cast, PowerPoint slides, transcripts, audio recording or any combination of these. The industry presentations are distributed electronically by the organising body and are freely available to attendees or associates.

To illustrate the scope and richness of the data available from the industry presentations, a presentation analysed for this research has been included. The presentation concerns John Keells Holdings. Ramesh Shanmuganathan, Executive Vice President and Chief Information Officer at John Keells Holdings PLC presented at the SAP Summit in Mumbai in 2008. John Keells Holdings PLC is Sri Lanka's largest listed company. They implemented the SAP ERP system financial module in 2003, human resources in 2006 followed by SAP Portals and Exchange Infrastructure. They implemented the SAP Business Intelligence system in 2007. The presentation, titled "Business Intelligence Adoption Strategy for a Diversified Conglomerate", discusses John Keells Group's information technology strategy and roadmap. As part of this they discuss their Business Intelligence and Corporate Performance Management (CPM) initiatives. Slide 25 titled "Critical Success Factors" lists the success factors of their Business Intelligence initiative. These factors are listed in Figure 10.

## Critical Success Factors



- Executive Sponsorship & business/IT leadership ☒
- Business led with IT's stewardship ☒
- Empowering the end user with the right set of tools rather than dependency on IT ☒
- Clearly defined business needs & performance indicators ☒
- Proven functional & technical capability and maturity of the product ☒
- Right Partner with the correct attitude, expertise, experience and the commitment to see the project to the end ☒
- Building internal capacity for self sustenance, both at power user and core user levels ☒
- Clearly documented policies for usage, information retention, capacity planning to derive a sustainable business case ☒



**Highly energized and committed team**



Figure 10 Slide 25 in the John Keell's Group Presentation at SAP Summit 2008

## 2. Conceptualisation Decisions

What variables will be used in the study and how they be defined conceptually?

A Conceptual Framework (Figure 7) was developed through a comprehensive analysis of the available literature. This framework identified critical success factors associated with the implementation of ERP systems and those associated with the implementation of Business Intelligence systems. Although it is unclear as to the applicability of these factors to the implementation of a Business Intelligence system in an ERP systems environment it would be reasonable to expect that some of the identified factors would apply.

In terms of analysis, it is often considered that content analysis is performing a word frequency count (Stemler, 2001). However, this ignores the use of synonyms. Weber (1990) discusses the role of categories in content analysis to overcome the issue of synonyms. “A category is a group of words with similar meaning or connotations” (p37). This concept is sympathetic with Krippendorff’s (2004) use of referential coding units.

Wimmer and Dominick (2003) believe that “...unless a clear set of criteria and procedures are established that fully explains the sampling and categorization method, the researcher does not meet the requirement of objectivity and the reliability of results may be called into question” (p.141). In accordance with these guidelines the industry presentations were initially analysed looking for occurrences of ERP system or Business Intelligence system critical success factors identified in the Conceptual Framework (Table 8). All other factors included on the same slide were recorded. In addition, all factors that appeared on slides which the presenter identified as *success factors*, *lessons learnt*, or *things which should be considered* were also be recorded.

Table 8 Conceptual Framework Critical Success Factors

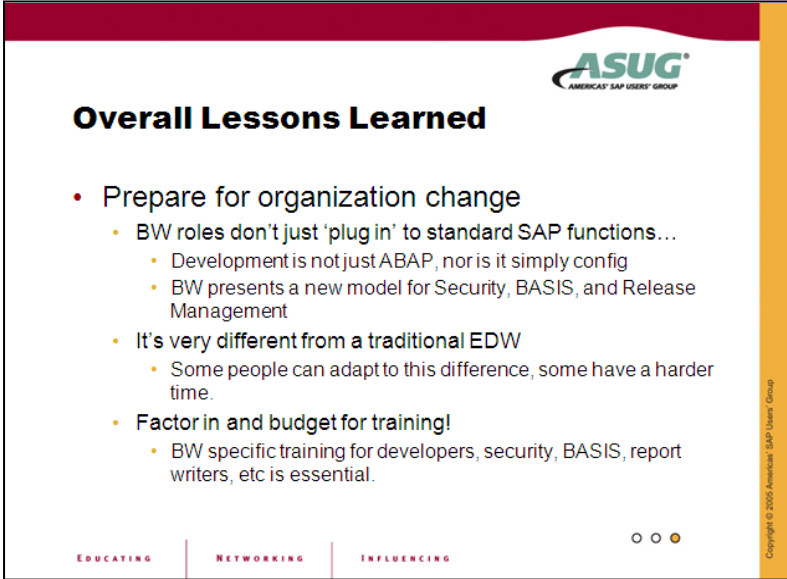
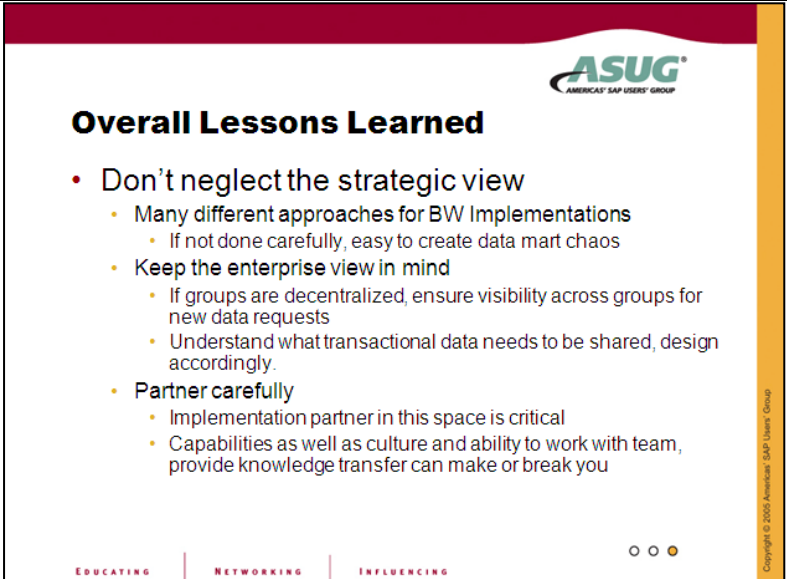
Critical Success Factors	
ERP System	Business Intelligence
<b>Top Management</b> Strategic Alignment, Management Support, Leadership (champion) <b>Project</b> Management (methodology), Team Composition, External Consultants <b>Organisation</b> Culture (discipline), Change Management (communication), Training, User Involvement, Process Maturity <b>System</b> (Technology, Organisational Fit)	<b>Management Support</b> <b>Champion</b> <b>Resources</b> <b>User Participation</b> <b>Team Skills</b> <b>Source Systems</b> <b>Development Technology</b> <b>Strategic Alignment</b>

The coder categorised factors which were not previously been identified through the literature. There were no rules as to how new categories are established resulting in researchers making subjective choices as to the precise makeup and definition of relevant categories to suit the problem under investigation (Carney, 1972; Wimmer and Dominick, 2003). However, all categories should be mutually exclusive in that a factor should only be able to be classified under one category (Carney, 1972)



Initially industry presentations related to the implementation and use of Business Intelligence systems in an ERP systems environment were identified. These presentations were then analysed in relation to the identification and frequency of the critical success factors identified in the conceptual framework. Any new factors not noted in the conceptual framework but clearly identified in the presentation as critical success factors, lessons learnt from the implementation, challenges or barriers to success were also noted and analysed. For example a presentation related to PacifiCorp and was presented at the American SAP User Group Conference in 2005. PacifiCorp, a subsidiary of Scottish Power, is a regional power provider supplying western USA (Utah, Oregon, Washington, Wyoming, Idaho and California). They implemented the SAP ERP system in 1998 and then implemented SAP Business Intelligence system (Business Warehouse –BW) in 2002. The presentation titles “Learning to Crawl with BW”, covered PacifiCorp’s experiences in getting started with SAP

BW, organisational and technical background of the project and its context, the BW project, lessons learned and future directions. The slides (slides 31 to 36) related to lessons learned. These lessons were recorded as there is a relationship between the lessons and critical success factors of the implementation. Table 9 displays the industry presentation's lessons learned and the identified Business Intelligence critical success factors..

Table 9 PacifiCorp Industry Presentation and identified Business Intelligence Critical Success Factors.

Presentation: Learning to Crawl with BW, PacifiCorp	Critical Success Factors
 <p>Slide 35</p>	<p>Security planning</p> <p>Change management</p> <p>Training</p>
 <p>Slide 36</p>	<p>Strategic alignment</p> <p>Partner selection</p>



 <h2>Overall Lessons Learned</h2> <ul style="list-style-type: none"> <li>• Keep in mind overall infrastructure dependencies             <ul style="list-style-type: none"> <li>• Dependencies on R/3 plug-in, WebAS, Portal, as well as BW specific support packs are key</li> <li>• Factor in time for support pack updates, refreshes, etc.</li> <li>• While BW is isolated from R/3, the dependencies are huge and need to be factored in from a release management as well as support pack dependency perspective.</li> </ul> </li> <li>• Learning curve is steep for ALL groups (Dev, Functional, BASIS, Security)             <ul style="list-style-type: none"> <li>• Do what you can to optimize your training!</li> </ul> </li> </ul> <p>EDUCATING   NETWORKING   INFLUENCING</p> <p>Copyright © 2005 American SAP Users Group</p>	<p>Plan infrastructure dependencies</p> <p>Adequate training</p>
<p>Slide 37</p>	
 <h2>Overall Lessons Learned</h2> <ul style="list-style-type: none"> <li>• Do what you can with Business Content             <ul style="list-style-type: none"> <li>• A new team can activate and load Business Content for relatively easy win...</li> <li>• It's rarely the complete solution, however.</li> </ul> </li> <li>• Ideally start with low data volume...             <ul style="list-style-type: none"> <li>• As data volumes grow, so too does infrastructure cost and complexity.                 <ul style="list-style-type: none"> <li>• Often at a pace you may not have anticipated...</li> </ul> </li> </ul> </li> </ul> <p>EDUCATING   NETWORKING   INFLUENCING</p> <p>Copyright © 2005 American SAP Users Group</p>	<p>Utilise Business Content</p> <p>Test with low data volumes</p>
<p>Slide 38</p>	

### 3. Operational Measures

Determine measures that match the Conceptualisations.  
Create a coding scheme describing measures

This step involves how content is to be observed and recorded. Babbie (1995, p5) referred to this process as “...the construction of actual, concrete measurement techniques”. Krippendorff (2004, p97) believes that researchers draw distinctions between different content, “information bearing instances”. He refers to these instances as units and further elaborates “... units are wholes that analysts distinguish and treat as independent elements”. They are considered to be mutually exclusive.

Recording units are specific segments of content that are distinguished for separate description, transcription, recording or coding, classification and categorising (Weber, 1990; Krippendorff, 2004). Others have described recording units as “things to be counted” (Carney, 1972, p.39). Researchers (Holsti, 1969; Carney, 1972; Weber, 1990; Wimmer and Dominick, 2003) have identified a range of possibilities for recording units. These could include; a single word, or symbol or phrase, sentences, paragraphs, theme, character in a story, and or interactions. According to Krippendorff (2004) single words, text segments, photographic images, minutes of video recordings, scenes in fictional television programmes, and web pages can be classified as units. A unit can be anything that could have a distinct meaning to an analyst.

“The choice of units is always dictated by the purpose of an analysis”  
(Krippendorff, 2004, p. 108).

This study will measure content in terms of its meaning in regards to the critical success factors identified as per the literature review. In the industry presentations this content could be a single word such as “training” or a text segment related to training or a slide containing different aspects of training. Krippendorff (2004) would classify this type of coding unit as a referential unit.

Each presentation was treated equally in terms of weightings of success factors. Frequencies of different factors were recorded. Frequencies in content analysis are used in two different ways. The first, which Holsti (1969) describes as “appearance”, refers to the presence or absence. In other words “.. the coder is faced with a simple dichotomous decision: does the

content unit appear or not” (Holsti, 1969, p.121). The second application of frequency in content analysis is used to identify the intensity, importance or emphasis to which a factor appears in the content (Holsti, 1969; Krippendorff, 2004). According to Holsti (1969) the widely used method of measuring the characteristics of content is the use of frequency. A measure of frequency measures how many times a recording unit appears. “Every occurrence of a given attribute is tallied (Holsti, 1969, p.122). Although the frequency of factors were recorded the weighting or prioritisation of these factors were verified in phase two of the study through interviews with industry experts.

#### 4. Sampling

##### Determination of the sample

SAP is the leading vendor of ERP systems with more than 92,000 customers worldwide (SAP, 2010) and accounts for 27% of the ERP systems market (Pang et al, 2007). Since 1998 SAP has offered a Business Intelligence system as an extension of their ERP system (Reed, 2008). In 2010 Gartner ranked SAP as the market leader in Business Intelligence solutions with 23.4% of the market (Sommer and Sood, 2010). SAP provides a broad range of solutions to its customers which extend their ERP system’s functionality. One of the most common solutions implemented post ERP systems is Business Intelligence system (Hawking et al, 2006). The ERP system improves the management and integration of business processes. The Business Intelligence system enhances the ERP system’s reporting capabilities as well as integrating data from remaining legacy systems. SAP solutions due to the broad functional scope and level of integration are complex and continually evolving. To assist companies to understand the implementation and use of these solutions a number of communities have developed which enable an exchange of knowledge (SAUG 2010; SCN, 2010). This exchange often occurs through presentations at industry conferences, user group events, SAP events, and commercial events. The limitations to the research associated with only using SAP related events will be discussed in a later chapter.

These conferences enable practitioners to come together to share their knowledge and experiences. It also allows SAP to update partners and customers on new solutions and improvements to existing solutions. As mentioned previously SAP solutions are complex and therefore there are a large number of conferences that discuss issues associated with this

complexity. The industry presentations of these conferences will make up the sample for this research. This sample is suitable due to the market penetration of this vendor and the large number of related conferences and associated industry presentations concerning the implementations of SAP ERP systems and Business Intelligence systems. More specifically industry presentations collected from a number of SAP related events over the past ten years will be analysed. These events vary in size, speaker selection, delivery mode and body responsible for organizing the event. The initial sample consisted of many thousands of industry presentations. This initial sample was reduced to only include industry presentations related to Business Intelligence systems. SAP's Business Intelligence solution which is referred to as Business Information Warehouse (BW) contains a number of associated modules (Strategic Enterprise Management (SEM), Business Planning and Simulation (BPS), Business Integrated Planning (BIP), Advanced Planner and Optimiser(APO) Business Explorer(Bex)) each with a unique title which may have changed over time. These terms that are associated with SAP Business Intelligence are defined in Appendix 1. The industry presentations were then selected for analysis if the identified Business Intelligence terms or associated acronyms appear in the title or abstract of a presentation. In addition all presentations which are part of a conference which has a Business Intelligence system focus were also included. The Business Intelligence system related presentations were downloaded and catalogued using EndNote. Details concerning presentation title, presenter, SAP event, location and date were recorded.

### **Data Sources**

As mentioned previously the SAP related conferences or events differ in their content, audience, and scope. A description of the different conferences that are included in the sample follows:

#### **1. User Group Events**

These events are organised by SAP User Group organisations. User groups are supported by SAP but operate independently. They are predominately made up of and managed by employees from SAP customers. Events conducted by the American SAP User Group (ASUG) and the SAP Australian User Group (SAUG) were used as a source for industry presentations. Both user groups allow members to join under different categories. The majority of members are companies that are using at least one SAP solution. This includes

universities that incorporate SAP solutions in their curriculum as part of the SAP University Alliance Program. There is an additional membership category that allow for SAP partner companies to join. These are companies that are involved in the implementation, development and maintenance of SAP solutions. The final membership category is for individuals who want join the group. All membership categories have associated membership fees which are charged on an annual basis.

Both user groups conduct a number of events throughout the year including web casts, regional meetings, special interest group (SIG) meetings, solution focused events and culminating in an annual event. The ASUG annual event involves approximately 500 presentations attracting more than 12,000 attendees while the SAUG annual event has approximately 60 presentations attracting more than 600 attendees. All presentations are available through the user groups web sites for their members. Members of the SAUG are entitled access to the ASUG web site as part of their membership.

The industry presentations usually vary in length from thirty to sixty minutes in length and utilise Microsoft PowerPoint as a presentation tool. Some of these presentations are also recorded in terms of audio or video. The majority of presentations are from member companies who present on their experiences with the implementation and use of SAP solutions. The format of the presentation is usually a couple of slides about the company's products or services and demographics. Then there are slides related to their SAP solution in terms what has been implemented, why it was implemented, what has been achieved, and how it was implemented. The last few slides include learning's and future directions. Partners usually present on their area of expertise and sometimes support this through case studies of projects they have been involved in. SAP conducts presentations related to their solutions, future directions and services they offer. Most events include keynotes from leading industry figures or analyst on topics not directly related to SAP solutions but rather issues which influence the selection, positioning, implementation and or use of SAP solutions.

User group presentations tend to include both positive and negative customer experiences. Part of the user groups' charter is to act as a conduit between their members and SAP. This includes customer concerns and proposed development requests for changes to SAP solutions.

The user groups vary slightly in how they decide which topics and presenters are to be included in their events. ASUG publish a call for presentations to their members for each event. Presenters submit a synopsis of their proposed presentation which is then reviewed by a panel to determine its suitability for the event. SAUG adopt a more focussed approach. Information is collected in terms of topics of interest from members, advisory board, SAP and academia. A draft agenda for an event is developed and then appropriate speakers are sourced. Both techniques for developing events are reflective of the culture of the members. ASUG receives a large number of submissions from members to present while in Australia there is a greater reluctance to present.

### 2. SAP Events

These events are conducted by SAP, the ERP systems vendor. They also vary in size and focus. The major events are the Sapphire and Summit conferences with some of these conferences having up to one hundred presentations and more than ten thousand attendees. The presentations tend to have a marketing focus and are made up of SAP employees, partners and reference customers. The presentations are related to solutions and services which SAP want to position in the marketplace and therefore have a positive spin. The presentations are usually web cast and are available through SAP's web site.

### 3. Commercial Events

Companies design, organise and conduct these events with the purpose of making a commercial return. These events tend to focus around a particular solution such as Business Intelligence or Plant Maintenance in an attempt to differentiate themselves from the SAP and User Group events. The presentations are made up of SAP employees, partners and customers. The customer presentations are usually about their experiences using a particular solution. Often the presentations have a more operational or "*how to*" focus. The presentations are available to attendees via the conference CD.

Table 10 lists the sources of industry presentations sampled for this phase of the study. It includes the year, event name, organising body, event type, location, and the number of presentations.

Table 10 Research Data Sources

Year	Conference	Organiser	Event Type	Location	Number of Presentations
1996	Sapphire Conference (Australia)	SAP	Vendor	Brisbane	42
1999	3rd International SAP Utilities Conference	SAP	Vendor	Dusseldorf	46
1999	SAP Insurance Status and Strategy	SAP	Vendor	Hamburg	49
2000	mySAP Business Intelligence Conference	SAP	Vendor	Hamburg	69
2000	Sapphire Conference Australia	SAP	Vendor	Brisbane	141
2001	ASUG Annual Conference and Vendor Fair	ASUG	User	Miami Beach	200
2002	ASUG Annual Conference and Vendor Fair	ASUG	User	Anaheim	200
2003	ASUG Annual Conference and Vendor Fair	ASUG	User	New Orleans	584
2003	SAUG Melbourne Plenary	SAUG	User	Melbourne	20
2004	ASUG Annual Conference	ASUG	User	Atlanta	550
2004	Customer Relationship Management Forum	ASUG	User		82
2004	Enterprise Resource Planning Forum	ASUG	User		573
2004	Extended Supply Chain Management & Manufacturing	ASUG	User	Orlando	200
2004	SAUG Melbourne Plenary	SAUG	User	Melbourne	21
2004	Technology Forum	ASUG	User	Dallas	257
2005	ASUG Annual Conference and Vendor Fair	ASUG	User	Anaheim	688
2005	ASUG Public Sector Symposium	ASUG	User	Washington	20
2005	Best of Sapphire 05	SAP	Vendor		10
2005	Center of Excellence Symposium	ASUG	User	Chicago	23
2005	CRM Forum	ASUG	User	Philadelphia	89
2005	HCM & Financials Forum	ASUG	User	Phoenix	97
2005	SAP Business Intelligence and Analytics Conference	SAP	Vendor		62
2005	SAP TechEd '05	ASUG	User	Boston	25
2005	SAUG Melbourne Plenary	SAUG	User	Melbourne	22
2005	SAUG Summit	SAUG	User	Sydney	75
2005	SCM&PLM Forum	ASUG	User	Atlanta	160
2006	ASUG Annual Conference	ASUG	User	Orlando	919
2006	Centre of Excellence Symposium	ASUG	User	Phoenix	16
2006	CRM Forum	ASUG	User	Tuscan	54
2006	Enterprise Asset Management Symposium	ASUG	User	Baltimore	25
2006	Human Capital Management Symposium	ASUG	User	Phoenix	28
2006	March Upgrades Symposium	ASUG	User	Austin	14
2006	Mastering Business Intelligence	Eventful Management	Partner	Melbourne	28
2006	mySAP ERP Upgrades Symposium	ASUG	User	Atlanta	26
2006	Optimizing Your Support Symposium	ASUG	User	Baltimore	27
2006	Products, Processes and Projects Symposium	ASUG	User	Dallas	32

## Factors Critical To The Success Of Business Intelligence

2006	Public Sector Symposium	ASUG	User	Washington	20
2006	SAP Business Forum 2006	SAP	Vendor	Estoril	35
2006	SAP World Tour 06	SAP	Vendor	Numerous	71
2006	SAUG Melbourne Plenary	SAUG	User	Melbourne	20
2006	SAUG Summit	SAUG	User	Sydney	79
2006	SCM Forum	ASUG	User	Denver	103
2007	ASUG and SAP Events	ASUG	User	San Francisco	178
2007	ASUG Annual Conference	ASUG	User	Atlanta	668
2007	ASUG Events in Orlando	ASUG	User	Orlando	120
2007	June SAP ERP Upgrade Symposium	ASUG	User	Philadelphia	26
2007	mySAP ERP Upgrade Symposium-February	ASUG	User	Denver	29
2007	SAP ERP Upgrade Symposium	ASUG	User	Dallas	26
2007	SAP International Utilities Conference 2007 Online	SAP	Vendor	Amsterdam	59
2007	SAP Summit '07 Online -	SAP	Vendor	Mumbai	161
2007	Sapphire Conference Americas	SAP	Vendor	Atlanta	264
2007	Sapphire Conference Europe	SAP	Vendor	Vienna	203
2007	SAUG Brisbane Plenary	SAUG	User	Brisbane	21
2007	SAUG Canberra Forum	SAUG	User	Canberra	12
2007	SAUG Melbourne Plenary	SAUG	User	Melbourne	21
2007	SAUG Summit	SAUG	User	Sydney	60
2008	ASUG Annual Conference	ASUG	User	Orlando	549
2008	ASUG Business Management Event	ASUG	User	Dallas	167
2008	ASUG Operations Optimization Event	ASUG	User	Nashville	248
2008	ASUG SAP ERP Upgrade Symposium	ASUG	User	Toronto	28
2008	March SAP ERP Upgrade and Enterprise SOA	ASUG	User	San Diego	26
2008	Reporting and Analytics	Wellersley	Partner	Las Vegas	22
2008	SAP Summit India	SAP	Vendor	Mumbai	140
2008	SAP World Tour 08	SAP	Vendor	Singapore	32
2008	Sapphire Conference Americas	SAP	Vendor	Orlando	247
2008	Sapphire Conference Europe	SAP	Vendor	Berlin	203
2008	SAUG Brisbane Plenary	SAUG	User	Brisbane	22
2008	SAUG Canberra Forum	SAUG	User	Canberra	13
2008	SAUG Melbourne Plenary	SAUG	User	Melbourne	22
2008	SAUG Summit	SAUG	User	Sydney	52
2009	ASUG Annual Conference	ASUG	User	Orlando	447
ASUG – American SAP User Group, SAUG – SAP Australian User Group					



## 5. Coding

Use at least two coders to establish reliability

Krippendorff (2004, p.84) describes the process to recording/coding as bridging “the gap between unitised texts and someone’s reading of them, between distinct images and what people see in them”. Recording refers to the formal statement of experiences by coders after they have observed the content. Coding is the transcribing, recording, categorising and interpreting units of analysis identified in the study (Krippendorff, 2004).

Reliability is an issue in any research and researchers make subjective choices as the criteria of reliability which is appropriate to their research (Unerman, 2000). Reliability refers to whether a researcher can rely on the results which they have established (Krippendorff, 2004). “A study is reliable when repeated measurement of the same material results in similar decisions or conclusions” (Wimmer and Dominick, 2003, p156).

Silverman (2006, p403) cited Hammersley, (1992, p67) as saying; “Reliability refers to the degree of consistency with which instances are assigned to the same category by different observers or by the same observer on different occasions”. Holsti (1969) believes that “...defining an acceptable level of reliability is one of the many problems in content analysis” (p248). However, Silverman (2006) argues that the analysis of text in content analysis provides a level of inherent reliability as the data is readily available. The issue of reliability is then only associated with the categories used and the assigning of text to these categories.

Some researchers argue that using a single coder is suffice to achieve reliability (Ahuvia, 2001). Milne and Adler (1999) believe that well specified categories and rules reduce the need for multiple coders. However, other researchers believe that the use of multiple coders and high levels of agreement between coders suggests a reliability of results (Milne and Adler, 1999; Gardner and Wong, 2003). In accordance with these guidelines the researcher acted as a single coder. To ensure reliability a second coder was used. The coders undertook training as to the selection and categorisation of factors. Two coders simultaneously analysed a sample (10%) of the industry presentations. The sample size was chosen due to the large number of presentations to be analysed and the time required. The coders analysed the sample content based on the previously identified measures. Inter-coder reliability was deemed suitable where both coders agreed on a response. This approach was similar to one adopted by Gardner and Wong

(2005). A single coder (researcher) then performed the content analysis on the remainder of the sample.

### 6. Tabulation And Reporting

Variable statistics may be reported one variable at a time or cross tabulated

A table was produced which recorded the various critical success factors and categories and associated frequencies. These frequencies were then used to rank the identified critical success factors. It was assumed that the level of frequency of a particular critical success factor reflected its importance as compared to other factors.

#### *Revise Conceptual Framework*

At completion of the content analysis phase the identified critical success factors were used to modify the Conceptual Framework. This new framework formed the basis for the next phase of the research that used industry experts to comment on the findings. An important factor of any research is its validity.

“Validity is the quality of research results that leads us to accept them as true”  
(Krippendorff, 2004, p313).

In other words, validity refers to the extent to which the measures adequately reflect what humans agree on as the real meaning (Neuendorf, 2002). Wimmer and Dominick (2003) claim that the validity of research findings are influenced by interpretations and judgements of the researcher. To further enhance the findings of the industry presentations the next phase of the research involved industry practitioners reviewing the critical success factors noted from the previous stage and the revised conceptual framework.

***Stage 4: Conduct Interviews***

The previous content analysis phase has identified critical success factors of Business Intelligence in an ERP systems environment. This next phase was designed to complement the previous phase by seeking validation by industry of the identified critical success factors and further elaborating on the role and impact of these factors. This was achieved by conducting interviews with industry practitioners who had experience with Business Intelligence in and ERP systems environment.

Researchers consider interviews as one of the most common and one of the most important data gathering methods in qualitative research (Rubin and Rubin, 2005; Myers and Newman, 2007). Researchers have used a variety of interview techniques to investigate a phenomena (Elmes et al, 2005; Hayes and Walsham, 2001; Ng, 2001; Wixom and Watson, 2001). Fontana and Frey (2000) outline three different interview techniques. They are:

Structured Interview This type of interview involves the use of a complete script that is prepared and piloted beforehand. Interviewers follow the script without variation. These types of interviews are often used in surveys where the interviews are not necessarily conducted by the researcher.

Semi-structured or Unstructured Interview This type interview involves an incomplete script or a script that acts as a guide. The researcher may have prepared some questions prior to the interview, but there is the opportunity to develop further questions during the interview process. Usually the researcher is the interviewer.

Group Interview In a group interview two or more people are interviewed at once by one or more interviewers. This type of interview can be structured or unstructured.

Rubin and Rubin (2005) in their book, “*Qualitative interviewing: The art of hearing data*” identified a further interview type which they referred to as a “Responsive Interview”. This involves people being selected to be interviewed due their specialised knowledge about the research problem. The interviewer adopts a semi-structured interview approach and develops further questions based on the interviewee’s answers. This continues until the researcher understands the question from the interviewee's point of view.

These various interview techniques have been used extensively in the information systems discipline to investigate different phenomena. Madhavan and Theivananthampillai (2005) used semi-structured interviews to investigate business process re-design in enterprise systems projects. Shakir and Viehland (2004) investigated the business drivers for enterprise systems implementations by using semi-structured interviews with people from different aspects of the ERP system ecosystem. Sammon and Finnegan (2000) investigated data warehousing implementation using semi-structured interviews. Bradley (2005) used sixty eight questions in a structured interview format to investigate ERP systems critical success factors. The structured interview technique was also used to investigate an ERP systems implementation at Texas Instruments (Sarkis and Sundarraj; 2003). Kumar et al (2002) also investigated aspects of ERP systems utilising structured interviews. Wixom and Watson (2001) used structured interviews in combination with other research methods to investigate the critical success factors of data warehousing. Shin (2003) also investigated critical success factors of data warehousing but utilised unstructured group interviews to collect information from management and business users. Group interviews were also utilised by Strong et al (2003) to investigate organisation control and ERP system implementation.

Although the use of interviews in research is common, a number of researchers have suggested that this techniques should be treated with caution (Fontana and Frey, 2000; Heiskanen and Newman, 1997; Myers and Newman, 2007). Myers and Newman (2007) identified from the research literature a number of potential problems with interviews. These included:

- *Artificiality of the interview* – A technique often used by media, whereby the interviewer interrogates a complete stranger to create opinions under time pressure.
- *Lack of trust* – This relates to where the interviewer is a complete stranger and how much they can be trusted is unknown. Due to this lack of familiarity the interviewee

may limit the amount and type of information they divulge and thus providing an incomplete picture.

- *Lack of time* – Inadequate time to conduct interviews may impact on the extent of information attained. It may also lead to the creation of hasty opinions.
- *Level of entry* – This relates to organisational culture and politics and how this can impact on the interview process. Interviewing particular individuals or people in certain roles or levels within an organisation may limited access to other individuals. For example interviewing union members may bar access to management and vice versa.
- *Elite bias* – The researcher may be encouraged to interview only certain people due their high status. This could provide an incomplete picture as data from lower status or less articulate individuals will be omitted.
- *Hawthorne effects* – This recognises the possible impacts of the interviewer's presence on the interview. The presence of the researcher can impact on the dynamics of social settings. This can manifest itself in the previously identified problem of "Lack of trust".
- *Constructing knowledge* – Interviewees often want to appear knowledgeable and accordingly need to construct a story that is logical and consistent for the benefit of the interviewer. Therefore interviewers may not realise that, as well as gathering data, they are also actively constructing knowledge (Fontana & Frey, 2000).
- *Ambiguity of language* – The intent of the question and the meaning of our words can be ambiguous for the interviewees and thus leading to misinterpretation.
- *Interviews can go wrong* – Interviews by their very nature involve interpersonal interactions. This can lead to tensions that can influence the interview outcome.

In the final analysis, the qualitative interview is a negotiated accomplishment shaped by the social and cultural context of the interview (Fontana & Frey, 2000). When used to its full potential, the qualitative interview is a very powerful data gathering technique.

Interviews in the second phase of data collection were based on the Responsive Interview (Rubin and Rubin, 2005) approach. A series of structured questions were developed based on the revised Conceptual Framework. However these questions were used as a guide rather than for a formal interview. This unstructured approach allowed the conversations to flow

and move from one topic to the next. This gave the interviewee some ability to direct the conversation. The questions enabled the researcher to seek certain information if it had not been covered in the conversation.

Each interview started with an overview of the research and the interviewee's role in the data collection process. All interviews were recorded for later reference.

### *Interview Sample*

The research design was based on validating and exploring the various Business Intelligence critical success factors through interviewing industry practitioners. Implicit with the notion of industry practitioners is that the interviewees should have considerable experience implementing and using Business Intelligence in an SAP environment. This experience should enable the interviewees to have a better understanding as to the factors that influence Business Intelligence success. It was assumed that individuals from companies which had been using Business Intelligence for more than four years and had implemented an extensive range of Business Intelligence functionality would be considered experienced. In accordance with this assumption, project managers, IT managers, or Business Intelligence managers would be selected for interview. It was also assumed that practitioners that had presented at an industry event would have the necessary experience and seniority.

All companies that had presented on a Business Intelligence related topic at any of the SAP Australian User Group (SAUG) events in 2011 were identified and shortlisted. Each company's presentation was sourced and assessed as to their Business Intelligence history and the range of functionality implemented. Initially an email invite was sent to six presenters outlining the research and inviting them to be part of an interview. Four companies agreed to be interviewed. The interviews occurred over a two month period and were conducted on location at each of the companies.

The interview phase of the research satisfied the Victoria University's ethics guidelines.

## CHAPTER 4 – RESULTS: ANALYSIS OF INDUSTRY PRESENTATIONS

### Introduction

The purpose of this research was to identify the critical success factors associated with the implementation of Business Intelligence as an extension of an ERP system. The research involved a multi-phased approach utilising qualitative methods. A review of the current and relevant research literature was conducted. This formed the basis of a conceptual framework which identified the critical success factors associated with ERP systems and those associated with Business Intelligence. The framework was used to inform the first phase of the research which involved the content analysis of industry presentations. The specific research questions for this phase of the research were:

Question 1. *What are the critical success factors associated with the implementation of a Business Intelligence as an extension of an ERP system?*

This question by implication has an associated question.

Question 2. *Are the critical success factors of an ERP system implementation relevant to the implementation of a Business Intelligence which implemented as an extension of an ERP system?*

The remainder of this chapter will present the critical success factors identified as a result of the content analysis phase. The identified critical success factors allows the Conceptual Framework to be revised so as to inform the next phase of the research involving the interviews of industry practitioners.

### Analysis of Industry Presentations

#### *Sample*

The sample for the content analysis was comprised of 9,868 industry presentations sourced from a total of 71 SAP related industry events (Table 10). These industry presentations were sourced from conference sites on the internet and conference CD's. Over time the availability of industry presentations increased which was invariably due to the increased

number of ERP systems users and adopters. In late 1999, SAP had more than 11,000 customers (SAP, 2000) and this increased to 89,000 by the end of 2009 (SAP, 2010b). Due to this increase in the number of customers there was a significant increase in the number of SAP related events. For example, the SAP Australian User Group conducted two single day events in 1999 (SAUG, 1999) whilst in 2009 they conducted more than 40 events (SAUG, 2009). These events varied in duration from morning meetings to three day events. Another reason for the increase in the number and availability of presentations was the increase utilisation of the World Wide Web to distribute the industry events' presentations. Figure 11 provides a graphical visualisation of the number of industry presentations per year over the sampling period. The decrease in the number of industry presentations in 2009 is due to the data collection for the sample ended in May 2009.

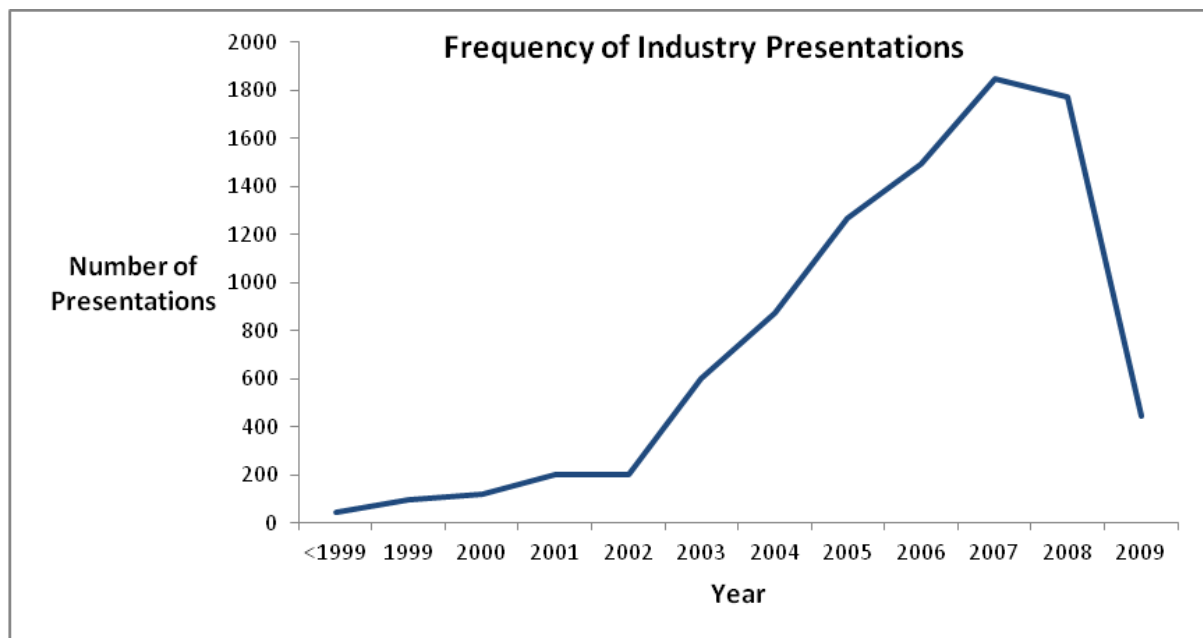


Figure 11 Frequency of Industry Presentations Over The Sample Period

The SAP related industry events are conducted throughout the world and the industry presentations in the sample were from Australia (9%), USA (81%), Asia (3%), and Europe (7%). The low number of events conducted throughout Asia could be reflective of the relatively small size of the SAP customer base in this region in addition to the lack of English language. Although a high number of SAP events were conducted in Europe over the sample period, these events were not able to be used as many were not in English.



The SAP events were conducted by SAP, SAP partners or SAP user groups. SAP partners reflect hardware, software and or service companies who derive income from SAP related activities. Table 11 provides a breakdown of the sample by event organising body.

Table 11 SAP Events and Presentations Sampled

Organising Body	Events	Presentations	% of Total Presentations
User Group (SAUG and ASUG)	52	7,984	80.9%
SAP	17	1,834	18.6%
Partner	2	50	.05%
	<b>TOTAL</b>	9868	100%

The majority of industry presentations used for this study came from SAP user group events (73.2%) in the USA (94.2%) and Australia (5.8%). The main reason for the large sample associated with the user groups is that one of the objectives of user groups is to promote the exchange of knowledge amongst their members (SAUG, 2010). Accordingly the frequency of events and the event size in terms of the number of presentations are significant. The American SAP User Group (ASUG) annual conference is one of the many events the user group conducts each year and has in excess of 400 presentations. The SAP Australian User Group (SAUG), on a smaller scale, organises approximately 35 events per year. Some of these events are forums and don't involve any formal presentations (SAUG, 2008).

There were a limited number of industry presentations from SAP partner organised events (0.05%) due to copyright limitations. Many of the SAP partner events are commercial events designed to make a profit and therefore the industry presentations are only available to attendees. Due to this restriction, industry presentations could only be sourced from two SAP partner organised events.

The 9,868 sampled industry presentations included all aspects of SAP solutions including solution functionality, system implementation and use, as well as future directions. The sample was then analysed as to their relevance to Business Intelligence.

### **Identification of Business Intelligence Related Presentations**

To assist with the selection of industry presentations relevant to Business Intelligence a list of SAP related Business Intelligence terminology was compiled from SAP solution website -

[www.sap.com](http://www.sap.com), and the SAP's Help Portal – [help.sap.com](http://help.sap.com) (Appendix 1). Industry presentations which included any of these terms in their title were selected as part of an initial sample (N=704). Many of the events provided conference agendas with a short abstract describing the content of the presentation. Any abstract which included relevant Business Intelligence terminology was also selected for initial consideration. Some events classified industry presentations into topic streams. All presentations that had been classified into a Business Intelligence related stream, by conference organisers, were also selected. A few of the events were advertised as Business Intelligence events (mySAP Business Intelligence Conference Hamburg, 2000) and all presentations from these events were also selected. In total, 854 Business Intelligence industry presentations were selected representing 8.6 percent of the original sample. The selected industry presentations were entered into EndNote, including the presentation, event details, and hyperlink to the associated file to facilitate further analysis.

The results indicated that the frequency of Business Intelligence related presentations tended to increase over time (Table 12). There was a drop in Business Intelligence related presentations in 2002 as data could only be sourced for one conference in that year.

Table 12 Frequency of Business Intelligence Industry Presentations Over Time

Year	<1999	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Business Intelligence Presentations	1	4	51	20	7	49	91	148	131	144	195	13

The increase in number of Business Intelligence industry presentations over the sample period could be explained from two perspectives. Firstly the frequency of SAP related events have increased and accordingly, the number of industry presentations related to Business Intelligence has also increased. This probably reflects the increased SAP customer base and increased functionality of the SAP Business Intelligence solutions. Secondly, there has been increased interest in Business Intelligence since 1999. This is reflective of the ERP systems maturity as identified by the various maturity models (Deloitte, 1999; Holland and Light, 2001; Harris and Davenport, 2006). These authors argued that once companies had implemented and “*bedded down*” their ERP system that they extended the impact of the system by implementing add on solutions such as Business Intelligence.

The Business Intelligence industry presentations were analysed, in accordance with the research methodology (content analysis), to identify critical success factors. The industry presentations were initially analysed for occurrences of ERP system or Business Intelligence system critical success factors identified in the Conceptual Framework reproduced in Table 13. All references to any other factors included on the same slide as the Conceptual Framework critical success factor were recorded. In addition, all factors which appeared on slides that were identified by the presentation's descriptions as success factors, lessons learnt, best practice or any other attribute associated with success were also recorded. In this manner, the presentations that included Business intelligence critical success factors were reduced to a final 142 presentations. This represents 1.4 percent of original sample (N=9,868) and 16.8 percent of the Business Intelligence presentations (N=854). Across these 142 presentations 110 different companies are noted.

Table 13 Critical Success factors for Analysis

Critical Success Factors	
ERP System	Business Intelligence
<b>Top Management</b> Strategic Alignment, Management Support, Leadership (champion) <b>Project</b> Management (methodology), Team Composition, External Consultants <b>Organisation</b> Culture (discipline), Change Management (communication), Training, User Involvement, Process Maturity <b>System</b> (Technology, Organisational Fit)	<b>Management Support</b> <b>Champion</b> <b>Resources</b> <b>User Participation</b> <b>Team Skills</b> <b>Source Systems</b> <b>Development Technology</b> <b>Strategic Alignment</b>

The critical success factors identified in each presentation were subsequently recorded and the frequency of each critical success factor for all industry presentations was calculated. The content analysis for each industry presentation can be found in Appendix 2.

### Identification of Critical Success Factors

A broad range of critical success factors were identified from the content analysis phase of the research (Table 14). A number of these critical success factors were already identified in the Conceptual Framework developed from the research literature. In addition to the critical success factors identified in the Conceptual Framework there were a number of additional factors that were not identified not previously documented. The content analysis also revealed that some critical success factors associated with ERP systems in the Conceptual Framework were also associated with Business Intelligence.

Table 14 Critical Success Factors Identified From Content Analysis

Conceptual Framework - Critical Success Factors				
Critical Success Factor	ERP System	Business Intelligence	Frequency	% of Sample
User Participation	✓	✓	42	30
Team Skills (Team Composition)	✓	✓	42	30
Involvement of Business and Technical Personnel			37	26
Change Management	✓		37	26
Management Support	✓	✓	33	23
Training	✓		32	22
Data Quality			27	19
Project Management (Methodology)	✓		24	17
Project Scope			21	15
Testing			20	14
Adequate Resources		✓	18	13
Governance			17	12
Strategic Alignment		✓	16	11
External Consultants	✓		15	10
Security			14	10
Business Content			13	9
Interaction with SAP			12	8
Performance			8	5
Reporting Strategy			6	4
Source Systems		✓	5	4
Champion	✓	✓	4	3
Identification of KPIs			3	2

<b>Culture (discipline)</b>	✓		0	0
<b>Process Maturity</b>	✓		0	0
<b>Organisational Fit</b>	✓		0	0
<b>Technology</b>	✓		0	0
<b>Development Technology</b>		✓	0	0
<b>Technical</b>			71	50

The critical success factors which appeared most frequently in the industry presentations were *Team Skills* and *User Participation* (30%). The majority of the critical success factor research in the literature review identified these two factors in relation to Business Intelligence (Table 3) and ERP systems (Table 4). Although 70% of the sample did not identify these two critical success factors it does not mean that the presenters did not consider these factors to be important. The industry presentations covered a broad range of topics about different aspects of Business Intelligence implementation and use. Accordingly, the level of technical detail varied between presentations. It would be expected that a presenter would discuss the success factors that were most critical to the Business Intelligence issues they were discussing. For example the presentation by Anderson and Yung (2007 ASUG Conference - Appendix 2) on “How Allstate Utilises Information Broadcasting to Publish Workbooks to SAP NetWeaver Portal” discusses technical and performance issues associated with this topic. They did not identify *Team Skills* or *User Participation* as an issue on this project. This may have been due to the fact these critical success factors were not relevant to this project. Alternatively the level of Team Skills or User Participation was inherently adequate and therefore did not seem to be an issue.

*Team Skills* and *User Participation* critical success factors are applicable to both ERP systems and Business Intelligence. It could be assumed that Team Skills are the same as the Team Composition factors for ERP systems in the Conceptual Framework. However, it cannot be assumed that these factors have the same implications for both systems. For example, the *Team Skills* critical success factor would encompass different skill sets for ERP systems as compared to Business Intelligence. There would be similar generic skills such as problem solving and communication, etc, however there would be specific skills for each system implementation. For example, a skill specific to SAP Business Intelligence is the knowledge of the Extended Star Schema for which the SAP Business Intelligence is modelled

on (Egger, 2004). Alternatively both systems rely on the use of Master Data but how this data is utilised varies between systems (McDonald, 2006).

A common theme amongst the presentations that identified *User Participation* as a critical success factor was associated with ensuring proper requirements had been ascertained and preparing the users for change. For example, a presentation from Spectrolab, titled “BW Reduces Our Total Cost of Information Ownership - A Success Story”, included the following statement “Do regular “show and tell” with the business owners to ensure buy-in and to highlight potential pit-falls early. Users do not know what to expect and the sooner they see the better as it reduces rework and re-design.” (Keon, 2003 – Appendix 2).

A significant number of presentations (26%) identified the *Involvement of Business and Technical Personnel* as a critical success factor. In the first instance it appears that this factor was not identified in the conceptual framework. However, it could be interpreted that this factor is related to *Team Skills* and provides more granularity as to the type of skills required. For instance the presentation from Caltex that relates to Expanding SAP BI Capability (de Santis, 2007, Appendix 2) includes a slide titled “Lessons Learned: Good” which identifies the importance of an “Integrated multifunction team”. This team should include “Back end (technical focus on data extraction and storage)” and Front end (business focus on report requirements)”. Koerner (2008, Appendix 2) believes that Business Intelligence projects rely too heavily on technical people and that these project members should not be relied upon to understand business processes and the associated data. These presentations support the notion that *Involvement of Business and Technical Personnel* factor is associated with the Business Intelligence *Team Skills* factor and the ERP systems *Team Composition* factor. Both these critical success factors could be considered as a subset of another factor documented in the Conceptual Framework, *Adequate Resources* (13%).

*Adequate Resources* can refer to both infrastructure (hardware and software) and personnel. The majority of presentations identified *Resources* in terms of personnel. In the presentations related to a Business Intelligence upgrade at Saudi Aramco (Khalil, 2003, Appendix 2) the type of personnel resources were specified; 35 Business Information Warehouse experts, 5 Basis, 2 Authorization, 3 Complementary. A related critical success factor that was identified but not related to Business Intelligence in the Conceptual Framework was *External*

*Consultants* (10%). Often companies do not have adequate *Resources* internally and have to rely on implementation partners and or individual consultants. The use of *External Consultants* was identified as a critical success factor in the ERP systems literature and was included as subset of *Project* critical success factors in the Conceptual Framework. The selection and management of these external resources can impact on the Business Intelligence project's success. A number of presentations referred to the importance of knowledge transfer from the external resource to company employees. In the presentation on Business Intelligence at OfficeMax (Hung and Daryapurkar, 2004, Appendix 2) the company identified as one of the lessons learnt as "Partner consultants with team members to ensure knowledge transfer".

A different aspect of external resources which was identified in the content analysis was *Interaction with Vendor (SAP)* (8%). This factor was not previously identified in the Conceptual Framework that was derived from the general literature. SAP is the software vendor but also offers a consultancy service and tools to assist with implementations. The presentations identified different services and skills provided by SAP that contributed to the Business Intelligence project. It would be expected that the required skills and level of interaction with the vendor (SAP) and implementation partners would vary depending on the Business Intelligence maturity of the company. If the company had conducted a number of Business Intelligence implementations and upgrades previously, then they would be less reliant on external assistance.

*Change Management* was identified as a critical success factor for ERP systems in the Conceptual Framework. Many researchers and practitioners would argue that this is one key critical success factor in any implementation (Aladwani, 2001; Davenport et al, 2004; Foster et al, 2004). However, the literature did not identify this factor as being important to Business Intelligence and accordingly it was not identified in the Conceptual Framework associated with Business Intelligence. The results from the content analysis indicated that 26% of the presentations identified *Change Management* as a critical success factor. This may be explained by the essential role this factor has in accordance with ERP systems implementations. Companies that had already implemented an SAP ERP system would be aware of the importance of *Change Management* (Foster and Wilson-Evered, 2006). Hence, there would have been no reason for them to think that *Change Management* was any less

critical to their Business Intelligence implementation, this factor being implicit in their project methodology. For example in a presentation about Business Intelligence at the Disney Corporation (Lowery, et al, 2008, Appendix 2) it was proposed that companies should not underestimate the impact of minor changes to end users.

Previously it was mentioned that *User Involvement* can facilitate *Change Management*. Foster et al (2004) in a study of ERP customers found that many firms struggle to get *Change Management* right. Some view *Change Management* as no more than training while others adopt a more holistic approach where *Change Management* incorporates training, communication and User Involvement. This is reinforced in the presentation by Meluso and Gondesì (2009, Appendix 2) who listed one of the Key Learnings in their Business Intelligence project as the Formulation of an Effective Change Management Strategy. They indicated that this strategy should include, communication, training and user involvement. Therefore the *User Involvement* success factor identified in the Conceptual Framework may be considered as a component of *Change Management*. However researchers and practitioners would argue that *Change Management* should be a succinct activity in its own right requiring a strategy and supporting resources.

*Change Management* on large IT projects can have a different meaning than preparing end users for change (IBM, 1980). However, from a technical perspective *Change Management* also refers to the documenting and managing the change technical objects between the development and production environments (IBM, 1980). End users could eventually be impacted by these changes depending on the type of changes that occurred. All the presentations except one (Barba, 2009 –Appendix 2) referred to the non-technical perspective of *Change Management*.

Associated with the *Change Management* critical success factor is the *Training* critical success factor. As mentioned previously, many would consider this as a component of a *Change Management* strategy. *Training* was identified from the literature as being an ERP systems' critical success factor and accordingly was incorporated in the Conceptual Framework. The content analysis identified that 23% of the sample identified that *Training* was a critical success factor for Business Intelligence. Companies tend to understand the importance of these factors in their implementation (Booth and Cade, 2007, Appendix 2).



However the type of training would vary between ERP systems and Business Intelligence. ERP systems end user training would be associated with business processes and the associated transactions (SAP, 2011). While Business Intelligence end user training would be associated with accessing and navigating reports (SAP, 2011).

*Management Support* was identified in the Conceptual Framework as being relevant both to ERP systems and Business Intelligence. The content analysis reinforced the importance of this factor with 23% of the sample identifying it as a factor important with regard to Business Intelligence. One of the roles of management is to implement the company's strategy (Drucker, 1976). The strategy's success is dependent on a combination of having the correct business processes, appropriate human resources and supporting tools (Heesen, 2011). Furthermore, Heesen (2011) believes that Business Intelligence systems are one of those tools necessary to measure and understand corporate performance. Accordingly the success of Business Intelligence implementations requires *Management Support*. This support takes the form of providing commitment, vision, and leadership and the necessary authority to allocate resources to ensure the project's success.

The *Strategic Alignment* (Strategy) critical success factor identified in the Conceptual Framework is associated with *Management Support*. *Strategic Alignment* was defined as the degree to which Business Intelligence supports the corporate goals (Williams and Williams, 2003). Many of the Business Intelligence Maturity Models identified the strategic alignment of the Business Intelligence initiative as characteristic of the more matures stages (ASUG, 2007; McMurchy and Bertram, 2007; Hewlett-Packard, 2007; Hamer, 2005; Eckerson, 2006; Deng, 2007). Eleven percent of the sample identified *Strategic Alignment* as a critical success factor. This relatively low percentage may reflect the level of maturity for Business Intelligence in the sample. As companies become more mature this critical success factor becomes more crucial. This reasoning could also be applied to a factor which was identified which was not contained in the Conceptual Framework, the *Identification of Key Performance Indicators* (KPI's) (2%). KPI's are indicators of strategic performance and therefore could be considered a subset of *Strategic Alignment*. Many of the maturity models referenced previously indicated that the identification and use of KPI's are indicative of more mature Business Intelligence usage.

One critical success factor that was identified in the Conceptual Framework as being related to both ERP systems and Business Intelligence was that of a *Champion*. However, only 3% of the content analysis sample identified this factor. In regards to ERP systems this factor was a subset of *Management Support*. One reason why this factor may have not have been directly referred to in the industry presentations is that it is inherent to a project. As companies Business Intelligence maturity evolves some critical success factors may be taken for granted as long as the project is successful. Arguably only when projects are less than satisfactory, critical areas (factors) which could be improved upon are identified.

*Data Quality* was identified in the content analysis (19%) as an important critical success factor for Business Intelligence although, it was not a component of the Conceptual Framework. A number of other authors identified *Data Quality* as a critical success factor for Business Intelligence (Yeoh and Koronios, 2010; Atre, 2003; Mukherjee and D'Souza, 2003; Rudra and Yeo, 2000). Gartner asserted that the majority of Business Intelligence projects would achieve limited acceptance due to data quality issues (Hostmann, 2005).

The *Source Systems* factor which was identified by Wixom and Watson (2001) and incorporated in the Conceptual Framework is related to *Data Quality*. The *Source Systems* success factor refers to the quality of the heterogeneous systems and the data they contain. This data is extracted into the data warehouse and forms the basis for analysis and reporting. The data from these systems needs to be extracted and integrated into standardised formats before it can be analysed (Wixom and Watson, 2001; Hurley and Harris, 1997). Therefore the *Data Quality* critical success factor could be considered as a component of the *Source Systems* success factor. However, only 4% of the sample identified *Source Systems* as a critical success factor in the content analysis. This low incidence could be related to the reduction in the number of heterogeneous systems, due to the use of the SAP ERP system, that the data is extracted from. The use of an ERP system facilitates the quality of data it contains through strict business rules and a single database (Magal and Word 2011). Companies often need to load additional data from the remaining legacy systems. Colombo and Gold (2007, Appendix 2) in their presentation listed lessons learnt in technical design; "External data is often dirty, needing extensive reloading process, and it is difficult to detect inconsistencies". Due to the integrative nature of SAP ERP system, data tends to be more

accurate than heterogeneous systems data, however it does guarantee that the correct data is extracted for Business Intelligence to support decision making (Vosburg and Kumar, 2001).

Associated with the *Source System* critical success factor is the *Development Technology* success factor identified in the Conceptual Framework. However, none of the content analysis sample identified this factor. As mentioned previously a component of Business Intelligence success is the ability to interact with source systems to extract the relevant data. The *Development Technology* would be used to develop the necessary extractors for this data extraction. However, Business Intelligence systems implemented as part of an ERP systems environment would not have this same dependency on the quality of the *Source Systems* or the *Development Technology*. In the sample, the Business Intelligence system and the ERP system are from the same vendor and the Business Intelligence system is developed as an extension of the ERP system. The majority of the data required by the Business Intelligence for analysis would reside in the ERP system. Accordingly, the Business Intelligence has been designed to interact with the ERP system as efficiently as possible to enable the extraction of the necessary data. This reduces the requirement for *Development Technology*.

The *Project Management/Methodology* critical success factor was identified as relevant to ERP systems from the literature and accordingly included in the Conceptual Framework. However, the literature did not identify this factor as being critical to Business Intelligence success. The content analysis identified this factor relevant (17%) to Business Intelligence. Although this factor is important to both ERP systems and Business Intelligence, the implementation methodologies of each system are distinctly different due to the nature of each system (Kale, 2000; Egger, 2004). ERP Systems are complex due to their level of integration. The impact on the organisation is significant as their implementation results in the removal of many legacy systems and the automation of many core business processes enterprise wide. The requirements are usually clear before the actual implementation. Furthermore, ERP systems project and its methodology are very structured due to the interdependency of activities and their impact on a project's final success. In contrast a Business Intelligence project's requirements are often "Ad Hoc" and developed over time. The Business Intelligence project adopts a prototype methodology which evolves over time as new requirements are established (SAP, 2011). Another factor which was identified and not included in the Conceptual Framework was *Project Scope* (15%). *Project Scope* refers to

the extent of the work to be undertaken as part of the Business Intelligence project (Cho et al, 2001). Accordingly, it is closely related to *Project Management/Methodology* and could be considered a subset of this factor (Ibbs and Kwak, 2000).

Many of the presentations in the content analysis sample (12%) identified *Governance* as a critical success factor. This factor was not identified in the Conceptual Framework for either ERP systems or Business Intelligence. The *Governance* factor was used to identify management practices associated with the use of Business Intelligence. A presentation from John Keells Holdings (Shanmuganathan, 2008, Appendix 2) discussed the importance of "...Clearly documented policies for usage, information retention, capacity planning to derive a sustainable business case". A presentation by Thrasher and Wagner (2007, Appendix 2) identified one of the lessons learned in regard to Business Intelligence adoption was Data Governance. They considered this to include the creation of policies and their subsequent communication and adherence. Many Business Intelligence Maturity Models identify *Governance* as an aspect of maturity (ASUG, 2007; Hewlett-Packard, 2007; McMurchy and Bertram, 2007; Eckerson, 2006; Hamer 2005; Watson et al, 2001). The identification of this success factor in the Maturity Models implies that as companies' Business Intelligence usage becomes more established that this factor becomes more relevant. The models discuss the importance of developing standards and policies to ensure that best practices are repeated in subsequent Business Intelligence projects.

Another Business Intelligence critical success factor that was identified from the content analysis but not included in the Conceptual Framework was *Security* (10%). The *Security* factor is primarily concerned with end user authorisations. The rigidity of an ERP systems project facilitates the security model for end user access which are determined and tested prior to the project going live (SAP, 2011). While the Business Intelligence project is more dynamic as requirements evolve so do the end user authorisations also change as demands alter. Many of the presentations emphasised the importance of establishing a broad security model at the start of a project which could be modified as needed. In a presentation from Allegheny Energy (King and Yelamaneni, 2009, Appendix 2) the company noted that an integrated security model for reporting will reduce the need to develop individual manual authorizations. SAP's ASAP project methodologies for ERP systems and Business Intelligence includes guidelines and tools for the development of appropriate security models

(SAP, 2011). Accordingly the *Security* critical success factor could be considered as a subset of the *Methodology* critical success factor.

Another critical success factor that was identified from the content analysis but not included in the Conceptual Framework was *Testing* (14%). SAP's ASAP Methodology emphasises the importance of testing. The ASAP Methodology is divided into five phases: Project Preparation, Business Blueprint, Realisation, Final Preparation, and Go Live and Support. The ASAP Methodology provides guidelines, tools and accelerators in each phase to facilitate best practice implementation. In relation to *Testing* the Realisation phase includes activities related to defining system test plans, data test plans, data access test plan, and authorisation test plan. In the Final Preparation these different test are conducted (SAP, 2011). It is interesting to note that SAP have attempted to capture best practice in their ASAP methodology that companies still identify *Testing* as a critical success factor. The type of testing that would be required for an ERP system implementation would differ to that required for a Business Intelligence implementation. For example in the Realisation Phase the *Testing* includes; unit testing, scenario testing, and integration testing. The Final Preparation Phase includes; volume tests, stress tests, and administrative tests (SAP, 2011). In addition the ERP system has built in functionality to enhance data quality. The Business Intelligence tool does not have this functionality.

As mentioned previously, a Business Intelligence project is ongoing as new reporting requirements are established. Each new requirement would need a range of testing before it could be released to the end users (McDonald, 2006) In a presentation from Rockwell Collins (Arthur and Kennis, 2007, Appendix 2) in a slide titled Lessons Learned the company stressed that companies should not underestimate their testing requirement. The presentation notes:

“Plan your detailed unit/integration/functional/regression test requirements well in advance – For financial customers, do we need to reconcile to the penny? We spent thousands of dollars looking for a penny or two. Accuracy and precision were critical to our customers.” (Arthur and Kennis, 2007, slide 27, Appendix 2).

Another Business Intelligence critical success factor which was identified from the content analysis was *Business Content* (9%). This factor was not identified in the Conceptual Framework. *Business Content* is a role based, pre-configured set of SAP Business Intelligence information models (McDonald, 2002). For a particular reporting requirement a company implements the necessary pre-configured metadata and structures contained within Business Content. The use of Business Content is designed to facilitate the implementation of SAP Business Intelligence. The SAP Business Intelligence system implementation methodology (ASAP) stresses the importance of using Business Content (SAP, 2011). The improved speed of implementation can reduce the overall project costs (Bertschinger and Hinnerkorts, 2000 – Appendix 2).

McDonald (2002) list a number of benefits associated with the use of Business Content some of which were noted in the presentations:

- Reduces the number of skilled resources that are required on the implementation.
- Allows for the incorporation of “best practice” in Business Intelligence system reports and underlying structures (Schoupe, 2005 – Appendix 2; Smith, 2005 - ).
- Provides a standard environment which facilitates support from SAP.
- Provides documented information models (Scotvold, 2004 – Appendix 2).
- Improves the quality of implementation by the provision of tested standardised structures (Cherian and Swarthout, 2007 – Appendix 2).
- Provides a platform for further development.

A presentation from Graphic Packaging (Cherian and Swarthout, 2007, Appendix 2) indicated that Business Content saved considerable time. While in another presentation from Inforte (Cuchna and Guess, 2004, Appendix 2) it was suggested that companies should focus on the best fit between *Business Content*, business opportunity and business benefit. In a presentation by Integrity Media (Maravilla et al, 2004, Appendix 2) identified *Business Content* as one of the “*best practices*” in the Blueprint phase of the ASAP methodology. This implies that this critical success factor has a temporal aspect. In other words it is more critical at particular time in a Business Intelligence implementation. None of the previous research literature related to Business Intelligence critical success factors identified Business Content as a factor. Although this factor is SAP specific factor, none of the research

literature identified the importance of pre-configured structures in any Business Intelligence implementations.

### **Revisiting The Research Questions**

The purpose of this research was to identify Business Intelligence critical success factors where Business Intelligence is implemented as an extension of an ERP system. Accordingly, research questions were developed and investigated in this first phase of data collection using content analysis of industry presentations. These research questions were:

Question 1. *What are the critical success factors associated with the implementation of a Business Intelligence as an extension of an ERP system?*

Question 2. *Are the critical success factors of an ERP system implementation relevant to the implementation of a Business Intelligence which is implemented as an extension of an ERP system?*

Each research question and associated findings will be discussed.

#### ***Question 1.***

*What are the critical success factors associated with the implementation of a Business Intelligence as an extension of an ERP system?*

The industry presentations reflected a practitioner's point of view in terms of Business Intelligence critical success factors. Presentations focussed on a particular aspect of Business Intelligence that the presenter's company was using. The type of Business Intelligence activities and the associated success factors varied across the presentations. Initially the Conceptual Framework was used as a basis to identify the critical success factors. The content analysis identified a number of Business Intelligence critical success factors which are fully listed in Table 15. The Table also includes factors identified as part of the content analysis that were not previously included in the Conceptual Framework.

Table 15 Business Intelligence Critical Success Factors

Critical Success Factor	Frequency
User Participation	42
Team Skills	42
Involvement of Business and Technical Personnel *	37
Change Management	37
Management Support	33
Training	32
Data Quality *	27
Project Management/Methodology	24
Project Scope *	21
Testing *	20
Adequate Resources	18
Governance *	17
Strategic Alignment	16
External Consultants *	15
Security	14
Business Content *	13
Interaction with Vendor (SAP) *	12
Performance *	8
Reporting Strategy *	6
Source Systems	5
Champion	4
Identification of KPIs *	3
Technical *	71

\* Factors not identified in the Conceptual Framework

It cannot be assumed that the critical success factors with the higher frequency have a greater impact on Business Intelligence success than those with lower frequencies. The high frequency demonstrates that an increased number of the presentations samples considered a particular critical success factor important enough to mention in relation to their particular project. However, any factors (eg Development Technology) identified in the Conceptual Framework which were not identified in the content analysis were removed from the list of factors as the sample indicated that these factors did not impact on the success of their project.



Many of the identified critical success factors are closely related and could be considered as a subset or a more granular version of a macro or overarching factor. For example, some presentations identified critical success factors at a high level; *Team Skills* (de Santis, 2007, Appendix 2). While other presentations were more specific about the types of skills required (Khalil, 2003, Appendix 2). In the Conceptual Framework the ERP system critical success factors are grouped into related categories. If the identified Business Intelligence related factors were grouped together then that would impact on the frequency of the superior factor. A number of authors who have previously conducted research on Business Intelligence critical success factors have attempted to group these factors into categories. For instance, Sammon and Finnegan (2000) categorised factors as System, Data, Skills Organisational or Project Management. Mukherjee and D'souza (2003) used the categories of Technical, Management, Goals And Objectives, User, Organisation or System. Yeoh and Koronios (2010) used the categories of Technology, Organisational or Process. Table 16 identifies the critical success factors categories and factors as identified by the researchers. The grouping of factors into categories appears to be very subjective.

The grouping of critical success factors into categories attempts to demonstrate a relationship between the factors and assists in understanding the broad areas these factors impact. However, the more detail or granularity that is provided with each factor the better understanding of how the factor impacts on Business Intelligence success. This can assist an understanding of how a company can focus their efforts and resources to address the different factors. The critical success factor context can also facilitate this understanding.

Reviewing the various authors it became evident that the Yeoh and Koronios (2010) approach is most appropriate to group the identified Business Intelligence critical success factors identified in this study. Table 16 illustrates the categories and the associated critical success factors.

Table 16 Business Intelligence Critical Success Factor Categories And Related Factors as per Yeoh and Koronios (2010)

Critical Success Factors Category	Related Critical Success Factors
<b>Organisation</b>	Management Support
	Governance
	Reporting Strategy
	Strategic Alignment
	Champion
	Identification of KPIs
<b>Process</b>	Project Management/Methodology
	Project Scope
	Testing
	Team Skills
	Involvement of Business and Technical Personnel
	External Consultants
	Interaction with Vendor (SAP)
	Adequate Resources
	Change Management
	User Participation
	Training
<b>Technology</b>	Data Quality
	Business Content
	Performance
	Source Systems
	Security
	Technical

Although these Business Intelligence critical success factors can be categorised as per Yeoh and Koronios (2010) the content analysis identified different levels of granularity in regards to these factors. For example one presentation discussed the importance of the right skills on the project team (Beavers et al, 2006 – Appendix 2). While another presentation went into more detail and discussed the importance of having a combination of business and information technology skills on the project team (Koerner, 2008 – Appendix 2). At an even more granular level, in a presentation from Sony Canada (Oliveira, 2006, Appendix 2) it was suggested that the project manager should have specific vendor knowledge (SAP) and be familiar with the company's business processes.

The concept of granularity also applied to the presentation topics in terms of the degree of detail. At a high level Spectrolab (Abrahamyan, 2006, Appendix 2) documented how a small company can benefit from Business Intelligence. While at a more granular level a presentation from IBM (Agarwal, 2008, Appendix 2) discussed how SAP Business Intelligence can support Human Resource reporting and Allstate Insurance (Anderson and Yung, 2007, Appendix 2) presented on how it “Utilizes Information Broadcasting to Publish Workbooks to SAP NetWeaver Portal”. As would be expected, the more granular a presentation topic was, the more specific were some of the critical success factors. For example, one key learning in the Allstate Insurance presentation was to make sure there was enough storage capacity for the portal. The availability of storage capacity is critical to this application of Business Intelligence. Clearly companies which were interested in information broadcasting using portal technology would identify with this content as being extremely valuable. Conversely companies who were not implementing this functionality would not find this critical success factor relevant. The content analysis identified that particular components of SAP Business Intelligence such as extraction, transformation and loading (Atherton, 2008, Appendix 2), the Business Intelligence Accelerator (Brookshire and Bandla, 2006, Appendix 2) or Strategic Enterprise Management (Braun and Irgit, 2003, Appendix 2) had specific critical success factors. These factors, although important, were categorised as *Technical* due to their specific context and level of detail.

### ***Critical Success Factor Context***

The context of Business Intelligence critical success factors can be noted from the Component, Application and Temporal perspectives. The Component context refers to which aspect of Business Intelligence is being adopted while the Application context refers to the business situation in which the Business Intelligence component is used. The Temporal context refers to a company's previous experience with Business Intelligence. These context perspectives are explained in the following section.

### ***Component Context***

Business Intelligence contains a broad range of functionality grouped within different components which companies choose to implement. These components could range from Strategic Enterprise Management (SEM), Data Mining, or different reporting tools. Many of these components are defined in the Business Intelligence Terms (Appendix 1). Content analysis identified that some critical success factors are specific to a particular functional component, whilst other critical success factors could be generalised across all components. For example in a presentation from Hungarian Oil and Gas (Braun and Irgit, 2003, Appendix 2) related to the use of Strategic Enterprise Management (SEM) they identified *Change Management*, *Involvement of Business and Technical Personnel* and *Business Content* as some of their success factors. These critical success factors were also identified in other presentations about different Business Intelligence components. However, the Hungarian Oil and Gas presentation also identified version management as a key factor in the project. This factor could be considered to be a subset of *Project Management/Methodology* but the presenters felt it was important to identify this level of detail in regards to their project. Similarly, in a presentation from Allegheny Energy (King and Yelamaneni, 2009, Appendix 2) related to self-service reporting they identified that the assigning of development roles to business process was a key success factor. This factor could be considered to be a subset of the previously identified *Security* critical success factor. The Component context would enable the project team to identify certain factors related to the functional component they were implementing.

The term, Component Context, describes which functional components of SAP Business Intelligence are being implemented and is important in identifying the relevant critical success factors.

*Application Context*

The same functional component of SAP Business Intelligence can be applied to a variety of business scenarios. For example, the extraction, transformation and loading (ETL) of data in Business Intelligence can be specific to certain types of data (master data or transaction data) that originate from certain types of source systems (SAP, Oracle, flat file etc.). ETL would have common critical success factors no matter what type of data or source system. However, there would be some specific critical success factors for each scenario. The term, Application Context, is proposed to describe how a particular functional Business Intelligence component is to be utilised or applied. For example, the Component Context would be SAP Business Intelligence reporting while the Application Component would describe how reporting is used in regard to Sarbanes Oxley accounts receivables (Kode, 2007, Appendix 2), sales and controlling (Loeser and Schafer, 2005, Appendix 2) or unspecified requirements (Rille, 2005, Appendix 2). The critical success factors could vary depending on how a component is applied. Another example in the presentation from the Los Angeles Community College District (Rille, 2005, Appendix 2) on the Business Intelligence reporting component and how it used for unspecified requirements they identified one of the key lessons was to build cubes rich in attributes. This factor was not mentioned in the other reporting related presentations.

The Application Context provides a greater level of granularity of the Component Context to better understand the Business Intelligence project undertaken.

*Temporal Context*

The content analysis revealed that some Business Intelligence critical success factors were applicable depending on the level of Business Intelligence maturity of the company. For example, the *Governance* critical success factor was identified as an important aspect of more mature Business Intelligence usage (ASUG, 2007; Hewlett-Packard, 2007; McMurchy and Bertram, 2007; Eckerson, 2006; Hamer 2005; Watson et al, 2001). Some presentations identified critical success factors which were relevant to different phases the SAP's ASAP methodology as being more relevant in mature Business Intelligence companies. For example, the *Testing* was a critical success factor relevant to the Realisation phase of the ASAP Methodology (SAP, 2011). The identification of the Temporal context is consistent

with the work of Esteves and Pastor (2001), who found that different ERP systems critical success factors were more important in different phases of the ASAP methodology.

The notion that the impact of different critical success factors are dependent on the level of Business Intelligence maturity and or a particular phase of the ASAP methodology provides a Temporal Context to these factors. In addition some presentations discussed the first implementation of SAP Business Intelligence (Abrahamyan, 2006; Manrique, 2003, Appendix 2) while others were related to upgrades (Lowery et al, 2008; Meluso and Gondensi, 2009, Appendix 2). A company which had been through a number of ERP upgrades and gained the associated experience, may find some success factors more critical while other factors might not be mentioned as they would be accepted as the standard approach to a project.

The Context Framework (Component, Application and Temporal) of Business Intelligence critical success factors provides a deeper understanding of the impact and relevance of a critical success factor in different phases of an implementation. Figure 12 displays the relationship between the Component, Application and Temporal in the Context Framework for Business Intelligence critical success factors.

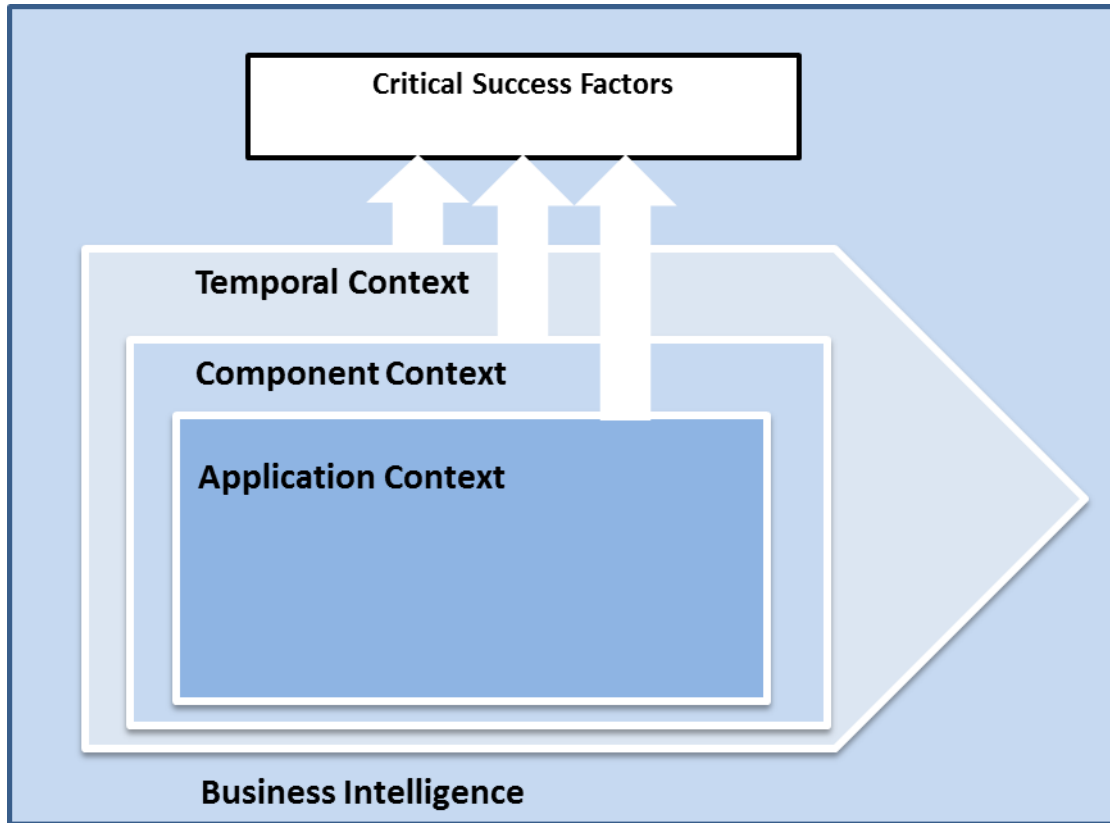


Figure 12 Context Framework of Business Intelligence Critical Success Factors

Figure 12 illustrates that Business Intelligence has a number of aspects which influence an implementation and these aspects influence the critical success factors. The applicability of the use of Context Framework in regards to Business Intelligence critical factors will be investigated further in the next phase of the research.

**Question 2.**

*Are the critical success factors of an ERP system implementation relevant to the implementation of Business Intelligence which is implemented as an extension of an ERP system?*

Many of the ERP system's critical success factors in the Conceptual Framework were identified as relevant to Business Intelligence success (Table 14). The critical success factors; *User Participation, Team Composition, Change Management, Management Support, Training, Methodology, Strategic Alignment, External Consultants* and *Champion* were common to both ERP systems and Business Intelligence. These factors would also apply to most IT projects. Slevin and Pinto (1986) identified critical success factors of Information Systems' projects. These critical success factors encompass the factors that were common to both ERP systems and Business Intelligence identified in this study. Table 17 categorises the critical success factors and descriptions as identified by Slevin and Pinto (1986) to the critical success factors common to both ERP systems and Business Intelligence.

Table 17 Comparison of Information Systems, ERP systems and Business Intelligence Critical Success Factors

Information System Critical Success Factors (Slevin and Pinto, 1986)	Identified Common Critical Success Factors To Both ERP Systems And Business Intelligence
<b>Project Mission:</b> focused on the definition of project goals and direction.	Strategic Alignment, Methodology
<b>Top Management Support:</b> the provision of resources, authority, and influence.	Management Support, Champion
<b>Project Schedule/Plan:</b> the development of a detailed specification and schedule for the project implementation.	Project Management/Methodology
<b>Client Consultation:</b> adequate communication and consultation with the client.	Project Management/Methodology, User Involvement
<b>Personnel:</b> the availability appropriately trained personnel involved in the implementation of the project.	Team Composition/Team Skills
<b>Technical Tasks:</b> availability of the required technologies and expertise.	Team Composition/Team Skills, External Consultants
<b>Client Acceptance:</b> final project was sold to the end-users.	Change Management, User Involvement
<b>Monitoring and Feedback:</b> provision of comprehensive information at each implementation stage.	Methodology
<b>Communication:</b> an appropriate network for all necessary information to circulate among all key players.	Champion, Change Management
<b>Troubleshooting:</b> an ability to handle unexpected crises and plan deviations.	Project Management/Methodology



ERP systems and Business Intelligence can be broadly classified as Information Systems and therefore similarities in critical success factors would exist. At a high level all projects to be successful require Management Support, Team Skills, Methodology, Change Management etc. The implication and application of these critical success factors would vary depending on the type of information system implemented. For example, *Team Skills* required for the implementation of a plant maintenance system would be different for those required for the implementation of a student administration system. The type of system and the Context Framework (Component, Application, Temporal) will influence the applicability of each success factor.

Accordingly even though most of ERP system critical success factors appeared to be relevant to Business Intelligence it does not mean that the factors are applied in the same way. For example, an ERP system by its very nature is an enterprise wide implementation which impacts on most of a company's business processes. Business Intelligence, as depicted in the maturity models (ASUG, 2007; Eckerson, 2006; Hamer, 2005), is initially implemented at the department level. Accordingly the type of *Management Support* required for a Business Intelligence project would differ to that which is required for an ERP systems project. Previously it was discussed how *Project Management/Methodology* and *Team Skills* differ between ERP systems and Business Intelligence projects. The proposed Context Framework enables practitioners and researchers to gain a deeper level of understanding of each critical success factor as they apply to a particular information system implementation project.

There were four ERP systems critical success factors (Culture, Organisational Fit, Technology and Process Maturity) that were identified in the Conceptual Framework which were not found relevant to Business Intelligence after undertaking the content analysis. The Culture factor reflects a company's willingness to implement and adopt change (Allen et al, 2002). A company that has a culture based on shared values, common aims and is open to change is conducive to success, while organisational cultures that are resistant to change either through rewarding tradition or fostering an environment of mistrust are likely to create an environment that can lead to implementation failures (John and Saks, 1996). Arguably, even though Culture was not identified in industry presentations as a Business Intelligence critical success factor there is a close relationship between Culture and Change Management.

Another ERP system critical success factor which was not identified relevant to Business Intelligence was Organisational Fit. ERP systems are responsible for automating and managing a company's business processes. Organisational Fit refers how well the ERP system business process functionality suits the strategic direction of the company (Nah et al, 2003; Ngai et al, 2007). Business Intelligence provides an environment to report and analyse data from various processes. It needs to provide a flexible environment to cater for current and unknown future processes. Accordingly, it is understandable why Organisational Fit would not be a critical success factor for Business Intelligence.

Related to Organisational Fit is another factor found to be not relevant to Business Intelligence, Process Maturity. Process Maturity refers to the organisational alignment, documentation, automation and identification of performance indicators associated with a business process (Al-Mashari et al, 2003; Al-Mashari, 2001; Bingi et al, 1999). Process Maturity is important to the success of an ERP system as the system is implemented to support these processes. Business Intelligence can be used to support the management of business processes through the reporting of process indicators. These process indicators can be used to analyse the performance of the company through key performance indicators (KPI's). The *Identification of KPI's* was a Business Intelligence critical success factor as identified by the content analysis. Additionally, KPI's are used as a measure of corporate strategy and therefore related to the Business Intelligence *Strategic Alignment* critical success factor. Process Maturity was identified in the content analysis but is implicit or a contributing factor to other Business Intelligence critical success factors.

### Revised Conceptual Framework

A Conceptual Framework was developed from the literature review to identify critical success factors associated with ERP systems and those associated with Business Intelligence. The content analysis supported some of the previously identified Business Intelligence critical success factors but also identified some that were not previously documented. The research also revealed that the context of a critical success factor was important in understanding its relevance to different Business Intelligence projects. The Conceptual Framework was revised to include new critical success factors and also show the relationship between the different contexts (Component, Application and Temporal). Figure 13 depicts the revised Conceptual Framework which has been revised to include the Business Intelligence critical success factors and the different Contexts which impact on these factors.

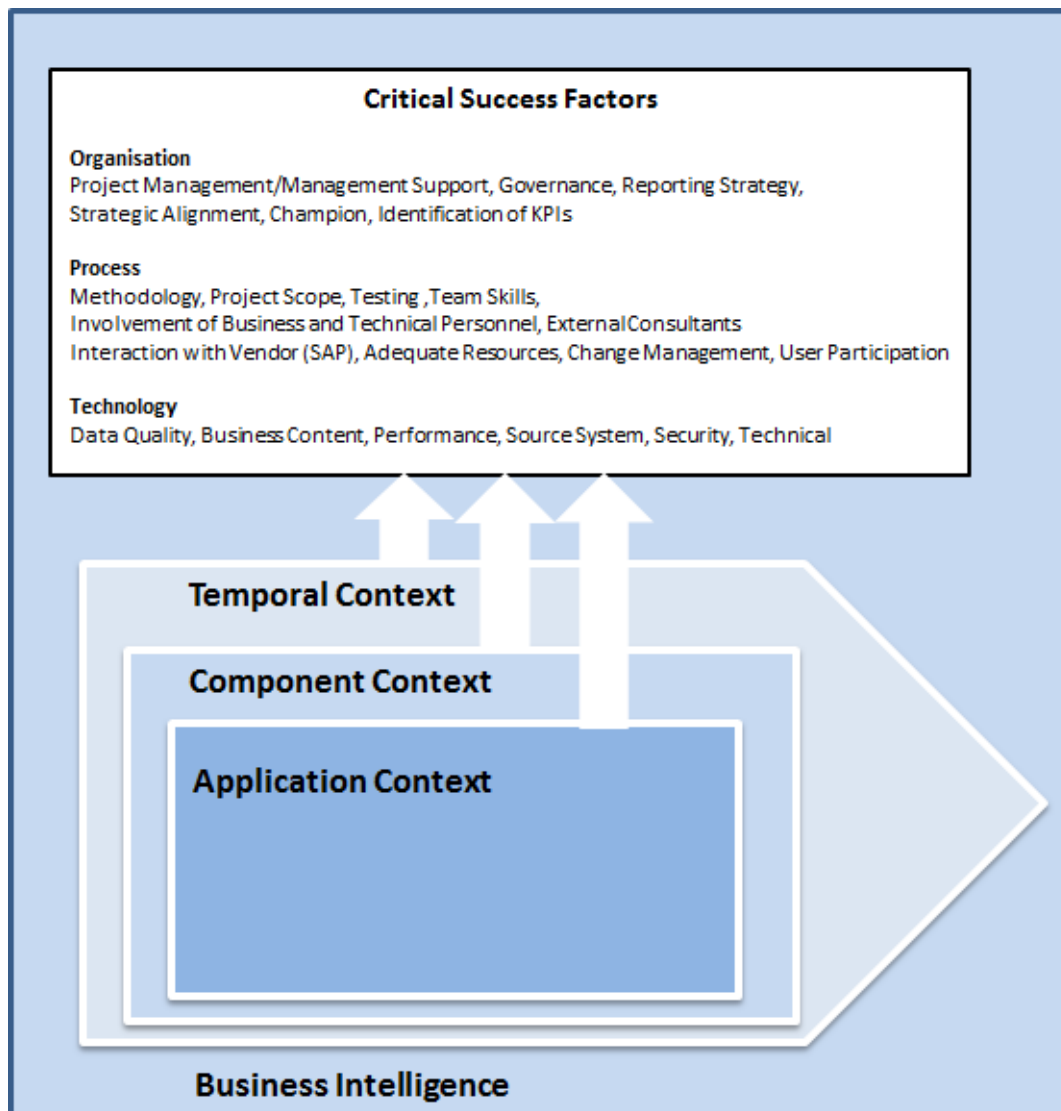


Figure 13 Revised Conceptual Framework

### Summary

A Conceptual Framework was developed from a review of current research literature. The Conceptual Framework identified the key factors and the relationships between them which would form the basis of this research. Based on the Conceptual Framework a number of research questions were developed which were to be investigated. The first phase of data collection involved the content analysis of industry presentations. These industry presentations were analysed in an attempt to answer the following questions:

1. *What are the critical success factors associated with the implementation of a Business Intelligence as an extension of an ERP system?*
2. *Are the critical success factors of an ERP system implementation relevant to the implementation of a Business Intelligence which is implemented as an extension of an ERP system?*

The analysis of the industry presentations substantiated a number of the critical success factors identified in the Conceptual Framework. It also identified some Business Intelligence critical success factors that had not been previously identified.

The analysis also identified a number of contexts that impact on the relevance of a critical success factor on a particular Business Intelligence initiative. These contexts, Temporal, Application and Component, form the Critical Success Factor Context Framework. The Conceptual Framework was revised to incorporate the Business Intelligence critical success factors identified as well as the influence of the Critical Success Factor Context Framework (Figure 13). The revised Conceptual Framework will be further investigated in the next phase of the research.

## CHAPTER 5 – RESULTS: INTERVIEWS

### Introduction

The research is designed to identify Business Intelligence critical success factors where Business Intelligence is implemented as an extension of an ERP system. A Conceptual Framework and research questions were developed from a review of literature. Industry presentations were analysed using content analysis to identify relevant Business Intelligence critical success factors. The results from the content analysis phase enabled the Conceptual Framework to be revised. The next phase of the research was designed to answer the final research question;

### *Question 3.*

*Of the identified critical success factors are some more critical than others?*

### Interviews

Business Intelligence industry professionals were interviewed from four different companies in regards to their company's Business Intelligence initiative and associated critical success factors. The remainder of this chapter documents the outcome of these interviews and their impact on this research.

### Company A

#### *Interview Process*

Initial contact was made by email with the Business Systems Integration Consultant for Company A to request their involvement in the research study. This person had presented numerous times at SAP Australia User Group events on different aspects of Business Intelligence at Company A. She agreed to be interviewed and supplied some background documentation as to their Business Intelligence initiative. She also sent a follow up email requesting that the Asia Pacific Business Intelligence Manager be also part of the interview. This was agreed to as it contributed to the richness of the information gained through the interview process. The interview was conducted over a two hour period and all conversations were recorded for reference and integrity.

### ***Company Background***

Company A is a consumer products company focussing on health and hygiene products. The company is a Fortune 150 and operates in 55 countries, involving more than 55,000 employees and has revenues in excess of \$US18.2 billion (Jacques, 2008). The company has divided its operations into four geographic regions; Asia/Pacific, Europe, North America, and Latin America to service the 150 countries where its products are sold. In 2000, Company A began to implement SAP's ERP system to support its global operations. The staged implementation included modules to support the core financial, sales and distribution, materials management, and production planning processes. These processes were designed on a global template and were supported by a single data centre in Wisconsin. As part of the ERP system's implementation Business Intelligence (BW) and Advanced Planner and Optimiser (APO) were also implemented. Customer Relationship Management (CRM) was implemented in 2004. Company A has approximately 41,000 SAP users globally (Jacques, 2008).

The SAP Business Intelligence implementation was designed to support customer interaction, supply chain and finance processes. A Business Intelligence system was implemented for each of the four regions and another to consolidate the information globally. These were implemented based on a standardised template to facilitate the consolidation of information. By 2007 these Business Intelligence environments were storing 21 terabytes of data and were growing by 500 million records per week (Anonymous, 2007)

### ***Interview - Business Intelligence Initiative***

The interviewees indicated that by 2007 the Business Intelligence implementation was facing a number of issues. Although the business Intelligence was implemented based on a standardised template there was inconsistent master data issues across the regions which were unforeseen. This problem was exacerbated through poor Business Intelligence governance in and across the regions. End users perceived the data to be inaccurate and did not adequately understand how to use the reporting tools. The volume of data being extracted from source systems, stored and analysed was degrading query performance. They provided the example of end users at Company A who complained that responses to queries were taking too long and, in many cases, timing out or reports were not arriving at all. This resulted in end users doubting the validity of the data which was presented to them, some users developing "work-

arounds” such as downloading data from the ERP system to Microsoft Excel, editing and reformatting.

The loss of faith in the Business Intelligence solution resulted in management questioning the value proposition of their SAP system and the information technology staff being asked to continually re-evaluate alternative Business Intelligence solutions. Company A had invested significantly in their ERP system and needed to leverage this investment in improve their decision making. The capability of Business Intelligence to deliver reliable information across organizational, geographic, and systems boundaries was viewed critical to Company A’s ability to deliver on its global business plan. Accordingly, in 2008 the company developed a Business Intelligence Strategy. The interviewees provided some documentation related to the company’s Business Intelligence Strategy and then discussed different aspects of it.

The strategy had four key elements:

- Business Strategy Alignment – this involved aligning the information technology portfolio to business objectives, goals and strategies
- Technology and Innovation – developing a portal for all reporting and analytical needs, leverage intuitive BI toolsets and expand self service capabilities, develop processes and automation to enhance data accuracy.
- Capability – developing training strategies to build Business Intelligence capability
- Execution, Governance and Resource Management – aligning and governing Business Intelligence to information technology business portfolio.

#### *Business Strategy Alignment*

According to the interviewees the company realised that part of the issues with end users’ experiences was the poor performance of their Business Intelligence implementation. The amount of information they were storing and analysing was increasing rapidly which was impacting on performance. There were also higher expectations for data to be reportable in near real time. The company had created a number of structures (aggregates) in their Business Intelligence environment. The aggregates provide some improvement in performance but the nightly data loads took much longer and eventually would not be sustainable. They considered implementing their Business Intelligence on a more powerful

technology platform in terms of processing power and storage but this was deemed to be too expensive.

In 2007, SAP in conjunction with their hardware partners were developing an in-memory technology appliance to radically enhance the performance of their Business Intelligence. The interviewees conducted a proof of concept for the Business Intelligence Accelerator (BIA) with Hewlett Packard and decided to implement the technology. It was expected that the return on investment would be attained in less than a year. Both SAP and Hewlett Packard assisted with the BIA implementation to use Company A as a case study for future marketing.

The implementation of the BIA had a significant impact on Company A. There was a 60% increase in Business Intelligence query performance with some queries being 120 times faster. The nightly load process of data was reduced by several hours as the need for aggregates, and their associated overheads, no longer existed. A change management issue which they did not expect was to educate end users that the data was correct. When a report traditionally took 20 minutes to run and after the implementation of BIA took only 5 seconds end users assumed not all the data had been reported. An end user communication strategy was developed to set expectations and to build upon enthusiasm for future Business Intelligence projects.

### *Technology and Innovation*

The interviewees indicated that as the Business Intelligence Strategy was being developed, the company realised that there was a number of issues associated with end user experiences associated with reporting. The company in an endeavour to improve the appearance of Business Intelligence reports had purchased another Business intelligence tool (Business Objects) for the presentation of reports. This created confusion with the end users as there were a number of reporting portals. The end users had a choice of Business Intelligence reporting tool (Business Explorer) or Business Object's reporting tools (Crystal Reports, Web Intelligence, Xcelsius Dashboard) and or ERP system reports. Many end users found the Business Intelligence reporting had limited functionality, but at the same time they indicated that they were unaware of the functionality available.



They believed the one thing that all the reporting environments had in common was lack of supporting documentation. This included lack of meta-data about the report and the associated reporting area. There was also lack of quick reference and training guides. All these issues led to end users dissatisfaction and lack of acceptance of Business Intelligence. The solution was the development was a single portal or all reporting needs including management reporting and integrated dashboards. The portal was referred to as iVIEW. The purpose of iVIEW was to improve the discovery and use of information available through the different reporting tools. This would proactively provide an environment to monitor the company's performance.

iVIEW enabled information from various sources to be presented in a single environment. This was facilitated through single sign-on to the underlying systems. The portal was configured for role based reporting. This enabled end users to quickly access the reports most relevant to their daily tasks. At the same time there was the functionality to view the entire reporting catalogue. This was supported with advanced portal search functionality. In addition there were links to report documentation and quick reference guides. The iVIEW was also used for messages and announcements.

Company A developed standardised guidelines and templates for report development to reduce the development process and facilitate use.

*“Everyone in our Business Intelligence team including staff in China attended training on reporting best practices. From this training a reporting guidelines document was produced to ensure reporting standardisation.”* (Business Systems Integration Consultant)

This standardisation included layout, use of graphics and visualisations, terminology and colours. As part of the standardisation a decision was made not to use pie charts for data visualisations as recommended by Stephen Few (2006). The iVIEW had two main focusses, self-service reporting and management reporting. Self-service reporting was utilised Web Intelligence and Crystal Reports for the provision of information. Crystal Reports was used to provide pre-formatted reports with grouping and drill down functionality. These reports were all sent (broadcasted) to targeted users as a result of certain business events. The Web

Intelligence tool enabled end users analyse the data through a number of different views. Traffic light visualisations were used to highlight exceptions and opportunities. There was also the opportunity for end users to perform ad hoc reporting with the underlying data. The Web Intelligence tool enable end users to generate a series of Microsoft PowerPoint slides based on reports to be used in presentations.

Management reporting was achieved through the use of data visualisations and guided analytics via a dashboard (Xcelsius). High level key performance indicators (KPI's) were graphically displayed on the dashboard. Different visualisations were used to highlight KPI exceptions. These exceptions could be further analysed by drilling down to Web Intelligence or Crystal Reports. The management reporting facilitated decision making through the provision of accurate information and the ability to analyse KPI's in detail. Many of the Business Intelligence processes were automated for updating of information available via the iVIEW. This reduced the manual effort involved and the level of inaccuracies. Prior to the implementation of the iVIEW, the management report for North Asia took 20 days to generate. It now takes 24 hours. The impact of the Business Intelligence project can be summed up by the Asia Pacific Director of Capability and Strategy:

*“Brilliant, for the first time I have access to the information I need in a format that that I can use at a press of a button”* (Business Systems Integration Consultant)

### *Capability*

Another one of the key elements of the Business Intelligence Strategy was to develop training strategies to build the Business Intelligence capability. Prior to the development of the Business Intelligence strategy the interviewees estimated that more than 300 reports had been developed which users were not accessing. In addition, the end users if they ran reports were not aware of the related data that could be further analysed in a different reporting tool. It was identified that to effectively implement the Business Intelligence Strategy that the skill sets and capabilities of functional and technical analysts and end users would need to be improved. This led to the development of the Capability element of the Business Intelligence Strategy.

The objectives of the training were to eliminate skill based barriers for the provision of the correct information to support decision making. The enterprise reporting and analytics capabilities needed be raised to a level comparable with transactional capabilities. Processes and procedures needed to be developed to ensure that end users knew how to use a particular reporting tool when it was made available to them. The supporting educational materials were designed and developed so they could be easily updated as new SAP reporting solutions were implemented.

Company A investigated three different options for the delivery of training. Firstly they looked at sending staff to SAP to undertake Business Intelligence training. The cost associated with this in terms of fees, travel, accommodation and time away from families was deemed to be too expensive. The second option was to employ a trainer to customise SAP course materials and deliver to employees on site at Company A. Although cheaper than the first option it was considered expensive due to the level of customisation required. The final option was to develop in-house training, which was the option adopted. Due to diverse range of staff involved in Business Intelligence and the amount of time required to complete all the training it was decided to analyse the SAP training materials to determine which knowledge was appropriate to different types of users. This enabled the company to develop role based training.

The Business Intelligence training roles were of several different types and included:

- IT – data warehouse technical development and support teams, IT data warehouse functional analysts
- Business Information Consumers – report developers, business leads, end users, power users, reporting key users
- Management – layer 4 and 5 executives

A blended approach to training was implemented. This involved a combination of instructor led training, self-paced learning, computer based training and web based instruction. Pre and post quiz were conducted to evaluate the level of knowledge attained by the participants. Additionally as part of each employee's quarterly performance review management were to assess if the newly attained Business Intelligence was being applied in the workplace.

In 2012, Company A has approximately 4,000 Business Intelligence users globally who run approximately 350,000 queries per month.

### *Analysis of Interview*

In the interviews key Company A Business Intelligence employees were asked to comment on the factors they considered critical to the Business Intelligence projects they were involved in. In regard to the implementation of the Business Intelligence Accelerator (BIA) appliance a number of factors were identified. The employees believed that the project was a success due to the level of *Management Support*. A proof of concept was undertaken which determined that the BIA would enhance the performance of the Business Intelligence environment. The BIA is quite expensive and was not identified as a line item in the budget. Upper *Management Support* was required to make the extraordinary purchase of the BIA. In addition extra funds were required for resources to implement the BIA.

Another factor which was identified that contributed to their BIA project success was the level of *Interaction with Vendor (SAP)*. The BIA was a relatively new technology and thus there was a shortage of skilled resources available to assist with the implementation. Both SAP and Hewlett Packard had a vested interest in the success of the project so Company A could be used as a marketing case study. Both vendors provided skilled resources and troubleshooting support to the project. The *Team Skills* identified critical to the project were a Business Intelligence architect, a Business Intelligence hardware engineer and a BIA consultant. It was also identified as important to include a *combination of IT and Business personnel* on the project. These personnel assisted in identifying priority reporting and performance bottlenecks.

Previously it was mentioned that a *Change Management* strategy was important to the project's success. The main objective of the Change Management was not about informing end users about changes to reports or user interfaces. This is because from an end user's perspective the only thing that was impacted by the implementation of the BIA was the speed of the reports. There were a number of success factors that were identified that were specific to the BIA. In a presentation by Brown-Forman they considered that BIA as a critical success factor in itself (Brookshire and Bandla, 2006, Appendix 2). In the content analysis phase of the research these type of specific success factors were classified as *Technical*.

The interviewees identified different success factors for the projects associated with the Technology and Innovation element of Company A's Business Intelligence Strategy. These projects were related to making end user experience more effective and satisfying. The *Business Intelligence Strategy* was considered to be an important success factor for these projects as it provided an ongoing reference to ensure that the projects were aligned to the business strategies. Associated with this was the development of a *Reporting Strategy* which provided guidelines to standardise report development. The visualisations and guided analytics was a significant benefit as their development was based on management decision making workflow. The interviewees also provided a number of success factors specific to the use and development of each reporting tool. As mentioned previously these would be classified as *Technical* success factors. Implicit to the success of the overall *Business Intelligence Strategy* and its associated projects was *Training*. Although not specifically mentioned it was a component of the Capability key element of the Business Intelligence Strategy.

Using the revised Conceptual Framework as a basis, the researcher asked the interviewees about critical success factors that had not been mentioned. It soon became apparent that they agreed that each factor that was mentioned was important. However, it can be assumed that the factors that they identified in regards to the Business Intelligence projects they were involved in were more critical than those not mentioned. Another reason why many of the factors in the revised Conceptual Framework may not have been specifically mentioned may relate to the Business Intelligence maturity of the company. The company has undertaken a number of Business Intelligence projects since 2000. Earlier projects did not achieve the benefits they had expected and in 2007 they decided to develop a Business Intelligence Strategy. From a Business Intelligence Maturity (Table 1) perspective the company could be considered as mature. In the ASUG Business Intelligence Maturity Model (2007) they could be classified as being in the Information Collaboration category. This is characterised by; KPI's and analytics are used to manage the full value chain, Enterprise wide Business Intelligence governance with business leadership exists, Uniform, adhered and audited standards and processes, and Robust and flexible BI architecture. In the Eckerson Maturity Model (2006) they could be classified as having reached the Adult category. This category is characterised by; Data viewed as corporate asset, Single cross functional Enterprise Data

Warehouse (EDW), Stewardship and Scorecards, Strategic reporting, Integration of external data into the EDW.

Company A's level of Business Intelligence Maturity would impact on the factors that they identified as critical to the success of the various Business Intelligence projects. As a company moves through the various stages of Business Intelligence maturity it would be reasonable to expect that experienced or lessons gained from one project would be used to improve future projects. Over a period of time some of the more obvious critical success factors, such as those which are applicable to any information systems project, may be considered standard operation practice for a company. For example if an appropriate *project methodology* has been developed then this methodology would be adopted in future projects.

**Company B*****Interview Process***

Initial contact was made by email with the Business Intelligence Manager for Company B to request their involvement in the research study. This person had presented numerous times at Australian and International SAP related events on different aspects of Business Intelligence at Company B. He is also responsible for organising the Business Intelligence Special Interest Group for the SAP Australian User Group. He agreed to be interviewed and supplied some background documentation to their Business Intelligence initiative. The interview was conducted over a 1.5 hour period and all conversations were recorded for reference and integrity.

***Company Background***

Company B is Victoria's largest electricity distributor. It supplies electricity to approximately 700,000 customers in regional and rural centres in central and western Victoria, and Melbourne's outer western suburbs. The company is also responsible for the supplying of electricity to more than 310,000 customers in Melbourne's central business district and inner suburbs. The company had a profit of nearly \$100 million in 2010 and employed 3,000 employees.

The company has extensive infrastructure to enable the supply of electricity. This infrastructure which is mainly overhead includes approximately one million poles carrying 170,000 kilometres of cable over a supply area more than 250,000 square kilometres.

A challenge which the company continually faced was the need to maintain electricity supply to customers via an infrastructure which required continual maintenance. It was important to optimise the maintenance and the associated costs. This was becoming more and more difficult as the company had numerous disparate systems which hindered the integration of information and business processes. The integration of business processes was also a major issue as they lacked standardisation. The number of supporting information technology systems and their associated costs had increased significantly. There was also the impending problem of Year 2000 approaching which may have required many of these systems to be re-implemented.

The decision was made to implement SAP's ERP system's Enterprise Asset Management (EAM) functionality to address many of the issues. To further support the company's needs

additional functionality was implemented over a ten year period. The ERP system functionality includes:

- Works Management
- Asset Management
- Resource Planning and Scheduling
- Logistics
- Financials/Accounts Payable/Accounts Receivable
- Human Resources/Payroll/Employee Self Service

The SAP ERP system was configured to best support the requirements of the electricity utility business. Significant benefits were identified in terms of improvements in productivity, reductions in inventory and improvements in management decision making. Another unexpected benefit was the ability to sell the SAP “best practice” template (Works and Asset Management) which they created to support utility companies. The template has been successfully deployed in three electricity utilities and a gas distribution utility in the United Kingdom.

### ***Interview - Business Intelligence Initiative***

Even though the company had implemented the SAP ERP system they were still finding it difficult to retrieve information for reporting. The main reason for this is that the ERP system had not replaced all their legacy systems. The interviewee indicated that information from the remaining legacy systems was required to be integrated with the information from the ERP system for reporting purposes. The company invested in two different Business Intelligence environments, SAP and Business Objects to solve this problem.

These two systems, although providing some improvements, also caused a number of issues.

*“We wanted Business Objects to provide the reporting layer of our Business Intelligence. But we purchased Business Objects before SAP purchased the company so the systems were not easily integrated”* Business Intelligence Manager

Employees needed to retrieve reports from both systems and there was limited integration of information between the two. This made it difficult for consolidation, planning and



forecasting resulting in monthly key performance indicator reports being developed in spread sheets. It soon became evident that many of developed Business Intelligence reports were not strategically aligned and a reporting environment to support executive decision making was inadequate.

#### Information Management Strategy

In 2008 the company decided to develop an Information Management Strategy underpinned by Business Intelligence. The main goals of the strategy were to:

1. Implement a single Enterprise Data Warehouse to facilitate the storage and analysis of both operational and strategic operation. This would enable a “*single version of the truth*” to be achieved.
2. Strategically align reporting to ensure that only relevant and intelligent data is reported on.
3. Improve financial information and data to support consolidation, planning and forecasting
4. Ensure that the right information is provided to the right people at the right time through the provision of web based information delivery through portals.
5. Retire Business Objects to consolidate report environments and reduce IT costs.

The Information Management Strategy had six key components;

- Information Hierarchy
- Reporting Strategy
- Governance Model
- Application Strategy
- Business Intelligence Architecture
- Technology strategy

#### Information Hierarchy

The interviewee indicated that the Information Hierarchy was designed to determine the information requirements to support decision making of the various stakeholders. This was achieved through a top-down approach where information requirements were *strategically aligned*. The identified performance measures would enhance visibility and accountability which would influence and change behaviour. There were two related aspects to the information definitions requirements; Performance Management information (Grow The

Business) and Decision and Operation Support information (Manage The Business). The Performance Management information aspect was related to performance measures supporting value-based management utilising a Balance Scorecard approach. Accordingly the key performance measures were related to financial and non-financial performance (Financial, Assets, Customers, Processes and People). The information requirement was for aggregated high level information to support decision making.

The Decision and Operation Support information was focussed on operational efficiency. This information was business process centric and obtained from the associated transactions. These transactions were supported by SAP and non-SAP systems.

*“There was an information requirement for the information to be real time and detailed.”* Business Intelligence Manager

One of the expected benefits from the identification of these informational requirements was the creation of a shared common data source. This would provide more efficient access to information and the creation of reports facilitating effective decision making.

The company identified a number of dependent factors that were required to enable the success of the Information Hierarchy requirements. These requirements were concerned with performance management and operations management support. It was considered essential that all levels of management were supportive of the proposed information hierarchy to ensure its adoption across the company.

*“A crucial aspect of this was the identification and validity of the performance measures.”* Business Intelligence Manager

The use of the measures was dependent on the availability and reliability of data to calculate these measures. This was to be achieved by the creation of a central repository for storing data by subject area. To ensure there was a change in corporate behaviour business processes and supporting technology would need to be aligned to the strategic objectives. The interviewee stressed the importance of change management to ensure staff understood the expectations and this was reinforced through the staff appraisal and compensation schemes.

### Reporting Strategy

The Reporting Strategy provided guiding principles and processes for the development and delivery of information to end users. The strategy had three aspects: Enterprise Requirements, Efficiency and Preferences, and Technical Requirements. The Enterprise Requirements provided guidelines as to priority and criteria for report development. The criterion was based on a business justification and the relationship to performance measures.

*“It was important that the reports developed were not clones of the reports in the old system.”* Business Intelligence Manager

It was perceived important to manage the information requirements of users in an endeavour to promote the new reporting systems. The Efficiency and Preference aspect of the Reporting Strategy was related to the report design and distribution. This involved the level of information detail in each report and the level of interactivity required for analysis. Report design and visualisation guidelines were developed to assist with standardisation and facilitate end user learning. The frequency of when the information was required was determined. This influenced how the report was distributed and when the information needed to be updated. The Technical Requirements were related identifying and defining the technical infrastructure required to support the Reporting Strategy.

A key requirement of the Reporting Strategy was the development and distribution of *strategically aligned* reports to the appropriate decision makers. This requirement was dependent upon a number of factors for success. Firstly, using the Information Hierarchy as a reference *key performance indicators* or measures needed to be identified for the different end users. This initially required a *combination of information technology and business* staff to be involved in the project.

*“The business people on the team were seen as the reporting experts.”*  
Business Intelligence Manager

To facilitate the change management required to implement the new reports and the business process changes it was considered important to encourage *user involvement* in the design process.

### Governance Model

The Governance Model of the Reporting strategy identified the information governance roles and responsibilities. It would also facilitate the linkages between the business and information technology. The roles within the Governance Model included; Business Process Champions, SAP Business Intelligence Technicians, Business Analysts and Implementation Partners when required.

The company identified a number of factors which needed to be considered to ensure the success of the Governance model.

*“The Business Intelligence Steering Committee is responsible for the data governance process and associated business rules”*. Business Intelligence Manager

Also it was considered important to provide *training* to the business users in Business Intelligence analysis processes. One of the responsibilities of the governance team was to develop a process to evaluate which reports were needed by end users and management. This required extensive *user involvement*.

To act as reference for the evaluation of reports an information model that reflected end users' needs was deemed essential. Alternatively, it was also deemed important to document whenever reporting needs were not met and the possible reasons for this shortcoming. These shortcomings were considered in the design of future reports.

### Application Strategy

The Application Strategy was responsible for providing a Business Intelligence environment to deliver consistent and high quality information to information technology applications and business users. This included the implementation of an Enterprise Data Warehouse (EDW) with Subject Area Repositories to store data that supports the various business units. This

would ensure consistency of information across the various reporting tools. These repositories would then be accessed by user friendly reporting tools. Also an executive information application such as dashboards would be developed that would enable users to drill down to greater level of detail as required. The Subject Area Repositories would ensure consistency of information and *data quality* across the various reporting tools. All these reporting tools would be accessed through a single common environment.

*“We decided to that to provide this single environment we stopped using Business Objects reporting tools.”* Business Intelligence Manager

The Enterprise Data Warehouse provided a standardised Business Intelligence environment which reduced duplicate processes while minimising the handling of data and improved overall data integrity. It enabled those previously responsible for collecting and transforming the data to spend more time on data analysis. There was also a reduction in costs in moving from multiple fragmented reporting systems to a single standardised environment. Part of this standardisation was achieved through the use of SAP’s *Business Content*.

#### Business Intelligence Architecture

The Business Intelligence architecture would be designed based on the principles of scalability and reusable architecture to facilitate future business needs such as mergers and acquisitions. It was considered essential to manage data and query capacity to avoid *performance* issues.

The Implementation Strategy was designed on a top down and adopted a phased incremental approach. Although there were long term goals, there were also a number of “quick wins” identified. The company acknowledged that unknown reporting requirements exist and requirements would evolve over time. An initial priority was the establishment of the Subject Area Repositories to provide a “single eversion of the truth”. A longer term priority was the implementation financial budgeting, planning and consolidation functionality.

The companies now have a Business Intelligence environment that stores 5 terabytes of data which is extracted from 14 sources systems and it accessed by 630 users. The companies are concerned about the growth of their Business Intelligence environment especially with the

upcoming additional load of storing data from smart meters. They have recently purchased SAP's in-memory Business Intelligence solution to provide an environment for moving forward.

### *Analysis*

The companies developed an Information Management Strategy to address many of the shortcomings their existing Business Intelligence environment and how it supported decision making. The Information Management Strategy was made up of a number of components (Information Hierarchy, Reporting Strategy, Governance Model, Application Strategy, and Business Intelligence Architecture). The interview revealed that each one of these components had factors which contributed to their success or were considered dependencies. Table 18 lists the success factors for each component.

Table 18 Information Management Strategy Components Success Factors identified from interview

Component	Success Factor
Information Hierarchy	Management Support Strategic Alignment Identification of Key Performance Indicators Change Management
Report Strategy	Strategic Alignment Identification of Key Performance Indicators Involvement of Business and Technical Personnel User Participation
Governance Model	Training User Participation
Application Strategy	Data Quality Business Content
Business Intelligence Architecture	Performance

Each component of the Information Management Strategy had a different focus and therefore it would not have been unrealistic to expect that the relevance of different success factors would vary between each component. The interviewee (the manager) was asked to identify the factors which contributed to their success in regards to Business Intelligence. He indicated that a Business Intelligence *Strategy* is extremely important to focus people's efforts and underpin associated decisions. The strategy needs to have executive management buy-in and sponsorship. He also identified the importance of a flexible and scalable technology landscape to support the reporting requirements of the company. Associated with

this is the quality of the source systems where the Business Intelligence information is extracted from. A number of examples were provided of the negative impact of poor quality source systems have on Business Intelligence.

The only reference in the interview specifically to the Business Intelligence implementation was the importance of the availability of appropriate technical resources. The interviewee specified that having Business Intelligence resources, Administration resource, SQL resource, and Subject Matter resources contributed to the success of the project.

The companies have been using Business Intelligence for more than a decade. Originally, the ad hoc approach to Business Intelligence resulted in it not providing the expected benefits. Key performance indicators (KPI's) were identified but not well used and there was an evolving effort to formalise standards and processes. SAP and Business Objects Business Intelligence tools were used across the organisations. The way Business Intelligence was implemented and used was characteristic of an early stage of Business Intelligence maturity (Information Anarchy) according to the ASUG Business Intelligence Maturity Model (2007).

In 2008, the companies develop and implemented an Information Management Strategy supported by Business Intelligence. Performance measures and KPI's were defined and used to manage and change behaviours throughout the companies. A flexible Business Intelligence environment was implemented enterprise wide and was managed by a Business Intelligence governance committee. According to the ASUG Business Intelligence Maturity Model (2007) this new environment would be considered very mature (Information Collaboration).

## **Company C**

### ***Interview process***

Initial contact was made by email with the Business Intelligence Manager for Company C to request their involvement in the research study. This person had presented at SAP Australian User Group events and manages Business Intelligence Special Interest Group. He agreed to be interviewed and supplied some background documentation to their Business Intelligence initiative. The interview was conducted over a 1.5 hour period and all conversations were recorded for reference and integrity.

### ***Company Background***

Company C is the world's second largest food company, producing products in approximately 170 countries with some of these products being produced for more than one hundred years. The company globally has more than 140,000 employees and has annual revenues of approximately \$54.4 billion. In Australia the company operates five manufacturing plants and employs approximately 3,000 employees. In 2010 the company acquired ACME. Company C's operations are split into a number of autonomous regions.

In one of the largest global ERP implementations Company C implemented SAP's ERP systems to replace many of its legacy systems and to standardise its business processes. By 2008 the ERP system had 11,000 users, stored 7 terabytes of data and linked to 1,750 other applications. In addition Company C implemented SAP's Master Data Management and NetWeaver solution to facilitate the integration of legacy systems. This project was ongoing due to the need to incorporate systems from merged and acquired companies. For example in 2010, ACME's ERP system (SAP) was merged with Company C's. There was a need to integrate data from SAP ERP, legacy systems, and external systems for effective decision making.

### ***Business Intelligence Initiative***

In Asia Pacific ACME first implemented SAP's Business Intelligence solution in 2002. The company had Business Intelligence system in Australia responsible for Japan, Australia and New Zealand and another Business Intelligence environment for India. In 2009 the company decided to consolidate both these environments into a new Business Intelligence environment to support 400 users. It was realised that an important requirement of the project would be the standardisation of master data. The company employed an external consultancy firm to



develop a master data management solution which would underpin Business Intelligence and ensure *data quality*.

While the ACME was implementing the new Business Intelligence environment, with another external consultancy firm, they were purchased by Company C. The acquisition by Company C required that ERP system needed to be merged with ACME's ERP system as it was more mature. There was also the need to merge Business Intelligence environments. This was not a major issue in the Asia pacific region as Company C had a limited Business Intelligence environment in the region. It was decided to merge Company C's data via the master data management solution to ACME's new Business Intelligence environment. This would add an additional 145 users to the system. Another reason to merge Company C's Business Intelligence with ACME's was that ACME had implemented SAP's Integrated Planning and was in the process of implementing SAP's Business Intelligence Accelerator (BIA) to improve query performance.

The main focus of ACME's Business Intelligence was finance and human resources. Other areas of the organisation showed a willingness to take advantage of Business Intelligence however poorly defined and inconsistent *key performance indicators* limited its success. As a result most of the discussion about reports was not about performance but about the correctness of the measure. It was felt that Business Intelligence was underutilised as the majority of the reports were operational in nature. It was felt that this was a reflection of the process maturity.

The company has established a *governance* committee which act as a "pipe line" as to which reports are developed based on the supplied business case. There is no formal Business Intelligence strategy. The company has three significantly different Business Intelligence environments globally. Although there is a Business Intelligence environment to support Asia Pacific many of the Asian countries attempt to implement alternative Business Intelligence environments.

The implementation of the new consolidated Business Intelligence was described as “lean” implementation in terms of staffing as it relied on *external consultants*.

*“If we want to talk about critical success factors then the lean team of two from Company C could be consider one”.* Business Intelligence Manager

The consulting partner provided the necessary *team skills* to ensure the project was a success in terms of the consolidation of data and users from the existing Business Intelligence and implementing BIA. The project was considered a success, however issues later arose due to the use of minimal internal resources. There was a lack of knowledge transfer between the external consultants and the internal Business Intelligence staff.

*“The biggest of lack of success factor was the knowledge transfer between the lean internal team and external consultants.”* Business Intelligence Manager

Additionally, the internal Business Intelligence staff resources were under resourced. This limited the potential for future innovations.

Once the project was completed the company contracted a different external consulting company to provide the ongoing Business Intelligence support. This included reporting requirements which were outside of scope and ongoing maintenance issues. The consulting company was referred to as offshore outsourcer. Since then a number of issues have arisen as to the quality and type of support provided.

*“Was the project a success? Yes in what it delivered but now as we want fine tweaks or enhancements we are struggling because of the lack of knowledge transfer both directions.”* Business Intelligence Manager

There was a feeling that the consultants had a poor understanding of the company and its business processes. There were also issues concerning the skills of some of the consultants.

### ***Analysis***

The company is highly successful global company gaining revenue from many iconic brands. The company views Business Intelligence as important and funds it accordingly. However the lack of a global approach and Business Intelligence Strategy limits in success in the Asia Pacific region. A lot of the interview was focussed on the frustration with the external

consultant company providing ongoing support. It was believed that this was hindering the potential of Business Intelligence in the company. Additionally the lack of standardised key performance indicators resulted in an ad hoc approach to report development. This supports the importance of the ERP system critical success factor, Process Maturity. This factor was not identified as relevant to Business Intelligence from the content analysis.

From a Business Intelligence Maturity (ASUG, 2007) perspective the company would be considered to be at the Information Anarchy stage. Where KPI's and analytics are identified but not well used; Business driven BI governance evolving; Evolving effort to formalise standards and processes; Some shared BI applications across business units.

When asked about critical success factors of the Business Intelligence it was felt there was more lack of success than success. This was explored further in terms of traditional critical success factors and the interviewee felt they were too high level to provide value to companies. He emphasised that *Knowledge Transfer* should be considered as a critical success factor. This was indicative of the support issues he was having with the most recent Business Intelligence project.

### **Company D**

Initial contact was made by email with the Business Intelligence Solution Manager for Company D to request their involvement in the research study. This person had presented at SAP Australian User Group Business Intelligence Special Interest Group. He agreed to be interviewed and supplied some background documentation to their Business Intelligence initiative. The interview was conducted and all conversations were recorded for reference and integrity

### ***Company Background***

Company D is a leading beverage and food company supplying many of Australia and New Zealand's favourite brands. The company supplies beer, spirits, wine, milk, fresh dairy foods, juice, cheese and soy beverages. It is Australia's largest dairy food and juice company. The company was formed in 2009 after the parent company, merged its Company D business with the recently acquired national food company. Company D has more than 25 manufacturing sites in Australia, New Zealand, Singapore, Indonesia, and Malaysia employs approximately 8,000 people resulting in \$5billion revenues annually.

In 2006, the national food company was facing a series of challenges. Their information systems landscape was complex and expensive with a number of functional gaps. These challenges had been exacerbated by a number of mergers and acquisitions resulting in the necessary integration of disparate systems and landscapes.

To mitigate the risks associated with these challenges the company developed an IT strategy. This strategy was a 3 to 5 year plan to strategically align their information technology landscape. This included managing their ICT portfolio and developing and investment plan for the future. One of the goals was to standardise technology and application platforms to facilitate business process integration and better manage information, communication and technology costs.

A decision was made to implement SAP's ERP system to consolidate and integrate many of their core business processes. The implementation of the ERP system was part of their Total Business Transformation (TBT) program.

The goal of the transformation program was to meet customer and supplier expectations through improved business processes which would provide ongoing value. The ERP system would provide the infrastructure to support the improved business processes. The organisation and employees would be aligned to new business processes.

The SAP implementation included SAP's ERP system, supply chain management (SCM), customer relationship management (CRM), and business intelligence solutions. These solutions would support the national food company's five core processes: order to cash, data to decision, procure to pay, hire to retire, and planning to manufacturing. The implementation occurred in five stages over a two year period. Each implementation stage was determined by the divisions impacted. In 2008 the national food company acquired a dairy company which required integration of the new company's system into the newly implemented SAP environment.

### ***Business Intelligence Initiative***

The interviewee indicated that their corporate strategy is based on the the national food company's Information Technology strategy. This strategy defined eight key themes to underpin their management information reporting. These themes included:

1. *Information Collaboration:* This involved the planning, forecasting and replenishment with key customers and suppliers. As part of this strategy external data from customers and suppliers would be intergrated with the national food company's data to provide improved visibility and a single version of the truth. Reporting and analysis would be based on cascading internal KPI's and external benchmarks.

*"There was an expectation that the use of these KPI's and benchmarks would facilitate the sharing of best practices bewteen customers and suppliers."* Business Intelligence Solution Manager

2. *Integrated Budgeting, Planning and Forecasting process:* The Business Intelligence infrastructure needed to provide visibility to the strategic objectives and desired results which reflected national food company's vision. These objectives and results would influence the business plan which translates objectives into a program of

initiatives that are linked to an enterprise value driver planning model, with results tied to national food company's key performance metrics.

3. *Cascading Performance Measures integrated into Management Reports:* All KPI's would be aligned to the corporate strategy and top level KPI's would cascade throughout the organisation. At the lower levels KPI related transactional data would be captured and rolled up to the higher level corporate KPI's. This would be facilitated by the corporate wide standardisation of definitions and measurements. This would enable cross function and unit comparisons. Organisational KPIs are to be aligned to personal KPIs and incorporated in performance development plans.
4. *Single Version of the truth:* This would involve a common standardised enterprise data set, sourced from all relevant transactional systems, summarised and stored in an enterprise data warehouse. The data set would be described in common business language, through standardised planning, reporting and analytical information views. Business units would be accountable to maintain high standards of information integrity through articulated and concise business rules, logic and reference data.
5. *Detailed multidimensional analysis:* This analysis would provide key insights around areas such as Brand Contribution, Trade Spend, Customer Profitability and Trend Analysis. The analytical capabilities would enable end users to quickly drill down to the underlying transactions in operational systems to better understand performance. Company-wide standard definitions would enable information to be accessible across the organisation. *One Foods* would provide a united information standard for business functions and units. This would facilitate knowledge sharing and learning of best practices across the organisation.
6. *Ability to perform "What-If" analysis:* What-if analysis and scenario planning tools would be used throughout the planning, analysis and forecasting processes to model business scenarios using information sourced from the standardised data. Models used for analysis are aligned with the enterprise value driver model, combining financial and non-financial metrics.

7. *Multiple Delivery Mechanisms:* An online portal would be implemented to provide a single interface for all reporting needs via personalised dashboards and exception reporting. Information would be available to end users through both push (email, dashboard and alerts) and pull (ad hoc analysis) methods. This information would be as close to real time as possible and would be accessible through a variety of mediums including mobile.
8. *Information Drill down capability:* The technical infrastructure would facilitate the access to cascading levels of data, stored in source systems, that can be drilled into and analysed to provide management information.

*“The CEO wanted to be able to drill down from his dashboard to view performance or each business unit.”* Business Intelligence Solution Manager

To assist with the implementation of their Information Technology strategy a Business Intelligence Competency Centre (BICC) was established. This structure reported to the Finance Department and was comprised of business process owners and power users. It was responsible for developing standards and prioritising reporting development. It was designed to manage the interaction between the business and IT.

In 2009, while the national food company was in the process of implementing their Information Technology strategy, the company was purchased by its parent company. In the previous year the parent company has also purchased Company D who had built their Business Intelligence environment on Business Objects solutions. Initially there were discussions about whether or not to standardise their Business Intelligence environments across the company using SAP or Business Objects. This became a moot point as SAP acquired Business Objects. The decision was made to use SAP Business Information Warehouse (BW) as the enterprise data warehouse and Business Objects tools for reporting and analysis needs.

The newly amalgamated company, Company D, faced a number of issues in regards to their Business Intelligence. The decision to standardise across the company on Business Objects solutions meant that there were significant change management issues. Staff needed to be

educated about the functionality of the new tools. It was considered that proper skills were an important critical success factor. It was priority for the company to have business users to understand their reporting needs and how to use the available tools to analyse data. This would enable Business Intelligence to be a business driven initiative rather than IT driven. Company D also considered important to their success was the availability proper technical Business Intelligence skills in the project team.

Another issue Company D was facing was that data warehouse was growing at a rate of a terabyte each quarter. This growth rate was detrimental to reporting performance and impacting on user satisfaction. Some reports were taking up to forty minutes to appear on screen while users had expectations of results appearing in under ten seconds. A decision was made to purchase “add on” infrastructure referred to as the Business Intelligence Accelerator (BIA). This in-memory technology provided significant improvements in reporting with some queries demonstrating a one thousand times increase in performance. Other than improvements in performance the BIA provided a number of benefits. The previous processes required to maintain performance were no longer required. In addition users were accessing more reports and undertaking more extensive analysis of data. Accordingly their reporting design requirements changed. For example key end users receive text messages to their mobile phones with their KPI’s figures each day. They then have the opportunity to access the reporting environment to drill down for further analysis on a KPI. The requirement for interactive dashboards displaying key information has also increased.

Company D are in the process of upgrading to the latest versions of the SAP enterprise data warehouse (version 7.3) and the SAP Business Objects reporting Tools (version 4). They expect this will provide further enhancements to their Business Intelligence. They currently have six hundred Business Intelligence users.

### *Analysis*

The company has experienced a number of mergers and acquisitions in its history. The company believes that the implementation of their ERP system has facilitated the mergers and acquisitions by providing a stable standardised infrastructure. They also believe that the development of an IT Strategy by the national foods company provided a foundation and guidelines for the development of their Business Intelligence while the mergers and



acquisitions were occurring. In terms of Business Intelligence Maturity, Company D would be considered as having a mature Business Intelligence environment. The company utilises KPI's and analytics to manage their value chain. Through their Business Intelligence Competency Centre they provide enterprise wide governance and leadership based on standardised processes and standards. Their Business Intelligence environment has been developed on a robust and flexible infrastructure. These Business Intelligence characteristics are indicative of the Information Collaboration stage of the ASUG Business Intelligence Maturity Model (2007).

In terms of critical success factors the interviewee was asked as to what advice would he give companies about factors that contributed to Business Intelligence success. The Interviewee emphasised the importance of engaging business personal in the in the development and implementation of Business Intelligence. At Company D this has been partly achieved through the development of the Business Intelligence Competency Centre which acts as a conduit between business and IT. Another critical success factor that was identified was the availability of appropriate skills. The availability of skills referred to skills of the project team and skills of end users. The critical success factor was important to the company at the moment as the company was implementing the latest version of SAP Business Information Warehouse and Business Objects. These are relatively new releases and therefore the availability of skills would be limited.

### **Research Question**

The purpose of this research was to identify Business Intelligence critical success factors where Business Intelligence is implemented as an extension of an ERP system. Accordingly a number of research questions were developed and investigated in the first phase of data collection using content analysis of industry presentations. The Conceptual Framework was revised based on the findings of the first phase of data collection (content analysis). The second phase of data collection involved a number of interviews to investigate the following question:

### ***Question 3.***

*Of the identified critical success factors are some more critical than others?*

Business Intelligence practitioners from four different companies were interviewed with regards to the Business Intelligence initiatives in their companies to document the factors they considered contributed to the success of these initiatives. The companies represented in the sample represented a number of industry sectors including consumer products, food and beverages, and utilities. Although the companies were from different industry sectors they all faced similar issues associated with Business Intelligence. The companies were attempting to develop and implement strategies to maximise the impact of Business Intelligence with respect to their company's performance. Three of the companies were implementing Business Intelligence as a result of a broader information management strategy. While, the fourth company, Company C, without a clear strategy was attempting to consolidate their Business Intelligence initiatives.

All the companies could be considered as having mature Business Intelligence initiatives. Three of the companies (Company A, Company B, and Company D) could be classified at the highest level of maturity as per the ASUG Business Intelligence Maturity Model (2007). Company C would be considered less mature than the other three companies due to their lack of a Business Intelligence strategy.

All companies identified critical success factors relevant to their Business Intelligence. The interview phase of data collection reiterated the relevance of many of the critical success factors identified in the Conceptual Framework. A semi structured interview approach was

utilised to identify and discuss the critical success factors. The interviewees were asked to describe the company's Business Intelligence and then prompted to identify associated critical success factors. The number of critical success factors and their impact differed significantly between interviewees. The viewpoints captured demonstrated how different critical success factors were more important to the companies depending on which aspect of Business Intelligence they were implementing or had recently implemented. For example, Company D was in the process of upgrading to new versions of Business Intelligence software and therefore emphasised the importance of having the right *Team Skills* on their project. Company C was experiencing Business Intelligence issues associated with the outsourcing of the associated support and development. Accordingly the critical success factor which was most pertinent to them was *Knowledge Transfer*.

This concept of different critical success factors being more relevant to different aspects of Business Intelligence was supported by Company B. They identified different critical success factors relevant to different aspects of their Information Management strategy (Table 19).

Table 19 Company B Information Management Strategy Components Success Factors

Component	Success Factor
Information Hierarchy	Management Support Strategic Alignment Identification of Key Performance Indicators Change Management
Report Strategy	Strategic Alignment Identification of Key Performance Indicators Involvement of Business and Technical Personnel User Participation
Governance Model	Training User Participation
Application Strategy	Data Quality Business Content
Business Intelligence Architecture	Performance

There was a lack of recognition of critical success factors amongst the interviewees when the same aspect of Business Intelligence was discussed. Company A identified performance issues with their Business Intelligence. They decided to purchase the Business Intelligence Accelerator (BIA) infrastructure which had not been budgeted for. This extraordinary purchase required *Management Support* and accordingly this was identified by the company

as a critical success factor. When the company decided to purchase the BIA it was a relatively new technology and thus there was a shortage of skilled resources and knowledge resources available to assist with the implementation. Accordingly, Company A identified *Interaction with Vendor (SAP)* and *Team Skills* as critical success factors. It is interesting to note that both Company C and Company D had also implemented the BIA but did not identify any critical success factors associated with this implementation.

The interview phase of the research supported the identification of the new Business Intelligence critical success factors from the content analysis phase as identified in the revised Conceptual Framework. These newly identified critical success factors include: *Involvement of Business and Technical Personnel*, *Change Management*, *Data Quality*, *Training*, *Identification of Key Performance Indicators*, *Performance*, *Business Content*, *Interaction with Vendor (SAP)*, *Reporting Strategy*, *Training*, *External Consultants*. The interview phase also identified two critical success factors that had not been previously identified; *Knowledge Transfer* and *Business Intelligence Strategy*. Table 20 summarises the Business Intelligence critical success factors that were identified in the interview phase of the research. It also attributes these critical success factors to the associated company.

Table 20 Identified Business Intelligence Critical Success Factors from the Interview Phase

Critical Success Factor	Company	Components of the Revised Conceptual Framework
Management Support	Company B, Company A	✓
Identification of Key Performance Indicators	Company B, Company D	✓
Training	Company B	✓
Data Quality	Company B	✓
Performance	Company B	✓
Strategic Alignment	Company B,	✓
Involvement of Business and Technical Personnel	Company B, Company D, Company A	✓
User Participation	Company B	✓
Business Content	Company B	✓
Change Management	Company B, Company A	✓
Interaction with Vendor (SAP)	Company A	✓
Team Skills	Company A, Company D, Company C	✓
Knowledge Transfer	Company C	New
Business Intelligence Strategy	Company A	New
Reporting Strategy	Company A	✓
Training	Company A	✓
External consultants	Company C	✓

Many of the Business Intelligence Critical Success Factors identified in the Conceptual Framework were supported by the interview phase of data collection however there were some factors that were not mentioned. These factors include; *Champion*, *Project Management*, *Governance*, *Methodology*, *Project Scope*, *Testing*, *Adequate Resources*, *User Participation*, *Business Content*, *Source System*, and *Security*. Although these factors were not mentioned it became evident after the first interview that if asked about the importance of any of these factors then the interviewee would agree that they were important. It appeared that the lack of recognition of a particular factor was not related to its greatest importance, but more so in regards to the most recent Business Intelligence initiative. This reinforces the importance of the context of different critical success factors and the way they inform Business Intelligence initiatives.

The purpose of this research question was to allow the researcher to identify if some critical success factors are more critical than others. It became evident from the interviews that a firm's implementation experience was important in determining which factors were important to them for success. All case study companies could be considered relatively mature when it came to the implementation and use of Business Intelligence. Each company's Business Intelligence project differed as to what aspects of Business Intelligence was being implemented. Accordingly the companies emphasised different critical success factors. Therefore the criticality of these success factors would be dependent of the context of the Business Intelligence implementation. As previously identified these contexts would include the Temporal, Application and Component aspects of the implementation.

### ***Revised Framework***

The Conceptual Framework (Figure 14) was revised to incorporate the critical success factors of *Knowledge Transfer* and *Process Maturity* as identified by Company C. Both these critical success factors would be categorised as process related in the Conceptual Framework. As mentioned previously no critical success factors were removed from the Conceptual Framework as all factors were considered important depending on the Business Intelligence Critical Success Factor Context Framework.

The framework lists the Business Intelligence critical success factors as identified from the data collection; content analysis of industry presentation and interviews of industry

professionals. These critical success factors were categorised as being related to either Organisation, Process or Technology. The relevance of critical success factors to a company's Business Intelligence is influenced by the context of the Business Intelligence. There are three different types of context which have been identified. Temporal Context refers to the company's experience or maturity with Business Intelligence. Related to this experience is the type of Business Intelligence project being undertaken - new implementation or upgrade. The Component Context refers to which component of Business Intelligence is being referred to. This could be a Business Intelligence module or an aspect of a particular module. The Application Context refers to how the Business Intelligence component is applied in terms of its use. These three contexts impact on the relevance of each critical success factor to a particular Business Intelligence scenario.

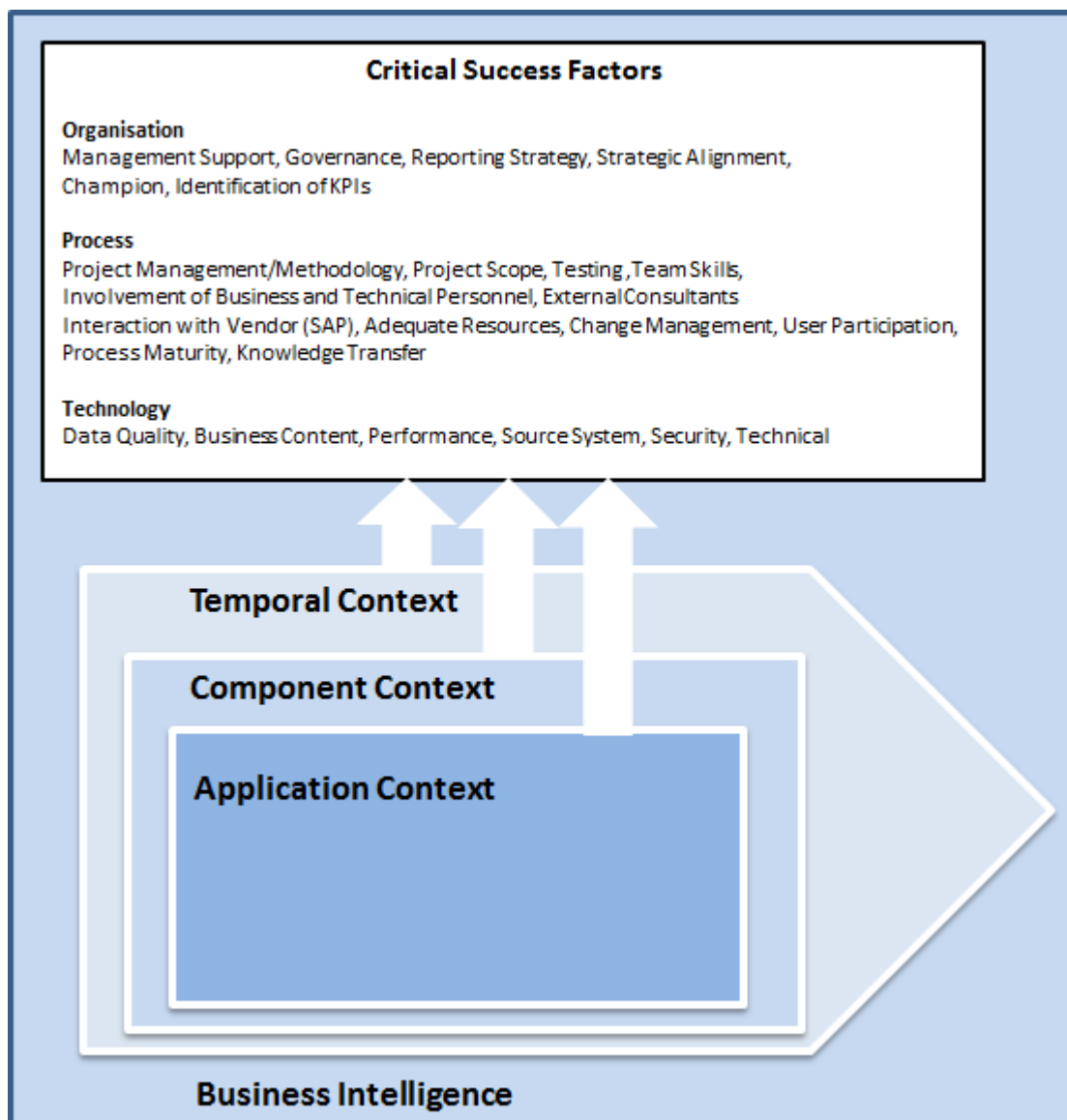


Figure 14 Revised Conceptual Framework Post Interview Phase

**Summary**

This chapter documented the interview data collection phase of the research. The Conceptual Framework was revised to reflect the findings of the content analysis phase of data collection. The Revised Conceptual Framework was used as a basis for the interview phase. This phase was designed to investigate the importance of the identified critical success factors. Business Intelligence practitioners from four companies were interviewed in regards to their business Intelligence initiatives and the associated critical success factors. Two critical success factors, *Process Maturity* and *Knowledge Transfer* were identified and added to the Conceptual Framework and the influence of Business Intelligence context was further reinforced.

## CHAPTER 6 - DISCUSSION AND CONTRIBUTIONS

The purpose of the research was to identify the critical success factors of Business Intelligence implemented as an extension of an ERP system. A Conceptual Framework was developed from the research literature that identified critical success factors associated with ERP systems and those associated with Business Intelligence. Based on the Literature Review a series of research questions were developed. These research questions were investigated using a two phased approach that included content analysis Business Intelligence industry presentations and interviews with industry practitioners. The content analysis of approximately 10,000 industry presentations was conducted to validate the critical success factors identified in the Conceptual Framework and identify any factors that had not been previously identified. The interviews, conducted with Business Intelligence practitioners, were based on the findings of the content analysis and the revised Conceptual Framework so as to verify the factors and to determine their criticality.

The original Conceptual Framework identified the following Business Intelligence critical success factors; *User Participation, Team Skills, Management Support, Resources, Strategic Alignment, Champion, and Development Technology*. The research found that all these factors except *Development Technology* are applicable to Business Intelligence implemented in an ERP system's environment. The lack of emphasis on *Development Technology* may be explained by technological relationship between Business Intelligence and the ERP system. Both solutions were developed by the same vendor, SAP. It would be expected that the vendor would ensure that there would be seamless integration between the two solutions to facilitate the extraction of information from the ERP source system for analysis in Business Intelligence. This is seamless integration supported through the development of SAP's *Business Content*.

The Conceptual Framework also identified the following ERP system's critical success factors; *Strategic Alignment, Management Support, Champion, Methodology, User Involvement, Team Composition, External Consultants, Process Maturity, Culture, Change Management, Training, Technology, and Organisational Fit*. The research found that many of these ERP system's critical success factors contained in the original Conceptual Framework were identified as also applicable to Business Intelligence. The *Technology*,



*Organisational Fit, Process Maturity and Culture* critical success factors were not identified as applicable to Business Intelligence.

Many of the ERP system critical success factors (*Management Support, Methodology, User Involvement, Team Composition, Change Management, Technology*) were also applicable to information systems in general (Slevin and Pinto, 1986). However, although these factors were common to information systems in general and to both ERP system and Business Intelligence it does not necessarily mean that the way they are managed in an ERP system is applicable to Business Intelligence. For example, SAP's implementation Methodology (ASAP) for ERP systems and Business Intelligence differ (SAP, 2011). The methodologies are comprised of the same five stages (Project Preparation, Blueprint, Realization, Final Preparation, and Go Live and Support). The activities associated with each stage differ significantly between ERP systems and Business Intelligence.

There were a number of Business Intelligence critical success factors that were identified from the content analysis and interviews that were not contained in the original Conceptual Framework. These were; *Involvement of Business and Technical Personnel, Data Quality, Project Scope, Testing, Governance, Implementation Partners\Consultants, Security, Business Content, Interaction with Vendor (SAP), Performance, Reporting Strategy, Identification of KPI's, Knowledge Transfer, Process Maturity and Technical*. The *Technical* critical success factor is a grouping of detailed specific factors. It refers to factors that are related to a specific Business Intelligence situation and therefore is difficult to generalise to other Business Intelligence scenarios.

Many of the Business Intelligence critical success factors identified were not contained in the original Conceptual Framework as identified by previous research. Table 21 contains the identified critical success factors and the supporting research.

## Factors Critical To The Success Of Business Intelligence

Table 21 Business Intelligence Critical Success Factors and Supporting Research

Critical Success Factor	Supporting Research
User Participation	Mukherjee and D'Souza (2003), Wixom and Watson (2001)
Team Skills	Wixom and Watson (2001), Arte (2003), Yeoh and Koronios (2010)
Involvement of Business and Technical Personnel	Arte (2003)
Change Management	Watson and Haley (1997), Mukherjee and D'Souza (2003), Yeoh and Koronios (2010)
Management Support	Watson and Haley (1997), Sammon and Finnegan (2000), Little and Gibson (2003), Mukherjee and D'Souza (2003), Wixom and Watson (2001), Chenweth et al (2006), Arte (2003)
Data Quality	Sammon and Finnegan (2000), Mukherjee and D'Souza (2003), Rudra and Yeo (2000), Arte (2003), Yeoh and Koronios (2010)
Methodology	Little and Gibson (2003), Arte (2003), Yeoh and Koronios (2010)
Project Scope	Joshi and Curtis (1999)
Adequate Resources	Watson and Haley (1997), Sammon and Finnegan (2000), Wixom and Watson (2001)
Source Systems	Joshi and Curtis (1999), Wixom and Watson (2001)
Strategic Alignment	Little and Gibson (2003), Mukherjee and D'Souza (2003), Joshi and Curtis (1999), Chenweth et al (2006), Arte (2003), Yeoh and Koronios (2010)
Implementation Partners\Consultants	Little and Gibson (2003)
Champion	Chenweth et al (2006), Yeoh and Koronios (2010)
Performance	Joshi and Curtis (1999)

There were a number of Business Intelligence critical success factors that were identified in this research which had not been previously identified by the literature. These include: *Security, Business Content, Interaction with Vendor (SAP), Reporting Strategy, Testing, Identification of KPIs, Process Maturity, Knowledge Transfer, Governance, Training, and Technical.*

Although these factors appear to be unique they could be consider as a sub set of previously identified factors. It can be assumed that there is a relationship between the *Identification of KPI's* and *Process Maturity*. An aspect of *Process Maturity* is the measurement of process

performance through process indicators. These process indicators can act as input to Key Performance Indicator calculations (Hagemann Snabe et al, 2008). The level of *Process Maturity* is a reflection of *Strategic Alignment* and therefore the *Identification of KPI's* and *Process Maturity* critical success factors could be considered as a sub set of the *Strategic Alignment* critical success factor.

Business Intelligence *Governance* refers to ongoing management of Business intelligence projects to ensure improved corporate performance (Williams and Williams, 2006). It involves the people, committees, and processes to facilitate the success of Business Intelligence. The *Governance* involves the development of procedures and policies to address, *Strategic Alignment*, funding, project prioritisation and *Data Quality* (Watson and Wixom, 2007; Hawking and Rowley, 2011). Therefore a related critical success factor would be *Strategic Alignment*. For example, at Company D a Governance Committee was used to prioritise report development. Company B developed a Governance structure that involved the various stakeholders for Business Intelligence to ensure their Information Strategy was properly implemented. Many companies have developed structures for Business Intelligence Governance such as a Business Intelligence Competency Centre or a Business Intelligence Centre of Excellence which are characteristic of the more mature phases of Business Intelligence usage (ASUG, 2007; Eckerson, 2006).

Associated with the *Governance* of Business Intelligence and its ongoing success is the development of an effective *Reporting Strategy*. This strategy assists with the prioritisation of report development and the adherence to standards for report design and usage. Both Company A and Company B had developed a *Reporting Strategy* as part of their overall Business Intelligence Strategy. The *Reporting Strategy* provided guidelines for standardised report development and was considered a critical success factor.

*Change Management* was documented in the previous literature as being important for Business Intelligence (Watson and Haley, 1997; Mukherjee and D'Souza, 2003; Yeoh and Koronios, 2010). *Change Management* involves the preparation of the various stakeholders for the expected changes and to assist them to cope and adapt to the transition. Implicit in the process is effective communication. Communication has been noted as a critical success factor for information systems in general by a number of early researchers (Rockart, 1987;

Slevin and Pinto, 1986). The purpose of communication in many cases involves *Knowledge Transfer* so as to understand what changes are occurring, why these changes need to occur, how they will impact, and what needs to be accomplished to ensure the successful change (Reiss, 2012). *Training* is considered one of the mediums for effective *Knowledge Transfer* (Simon et al 1996; Lee and Lee, 2009). Company A identified *Training* as an important component of the change process to successfully implement their Information Management Strategy.

Vendor approaches, such as SAP's ASAP Methodology has been developed to facilitate the implementation and upgrade of various SAP solutions including Business Intelligence. The ASAP Methodology is comprised of five stages. Each of these stages contains activities and tasks supported by a range of tools and documentation. There are activities in the methodology which address the importance and role of *Change Management*, *Knowledge*, and *Training* in the project. Therefore it could be argued that these critical success factors are a sub set of project *Methodology*. Similarly *Security*, *Business Content*, and *Testing* are addressed in the ASAP methodology. *Security* and *Testing* critical success factors would be applicable to many other information systems projects. However, *Business Content* is specific to SAP Business Intelligence projects.

SAP Business Content are pre-defined information models which can be utilised in a Business Intelligence implementation. These models include a number of structures that support the decision making process for a particular business process or industry sector. The *Business Content* can be implemented in a standard format or configured to suit specific situations. There are a number of significant advantages of using *Business Content*. *Business Content* has been developed in consultation with customers and thus reflects standard requirements. The proposed technical structures facilitate the integration between the SAP data warehouse and the source systems as well being optimised for both data storage and analysis. These features can significantly shorten the implementation process and contribute to its success (SAP, 2008).

The content analysis phase of the research identified a broad range of Business Intelligence critical success factors. However, none of the sample identified all factors as being relevant to their Business Intelligence situation. In the content analysis phase of industry

presentations the presenters only identified the factors that were relevant to the aspect of Business Intelligence that they were presenting about. In the interview phase, with practitioners the interviewees discussed those factors which were most relevant to them at the time of the interview. This was evident when three companies had implemented the Business Intelligence Accelerator and only one of these companies identified factors associated with this implementation. This does not mean that the factors that were not mentioned were not relevant. However in some companies this may be the case. If a company has always had the appropriate level of *Management Support* this would not be noted as an obvious critical success factor. Indeed, how would they know that lack of *Management Support* could negatively affect a project? Alternatively a company may have assumed that *Business Content* is part of the standard SAP Business Intelligence implementation strategy and therefore have always used it. Would they then identify *Business Content* as a critical success factor if it is standard implementation practice?

It appears that critical success factors have evolved over time as a response to projects that have not realised their expected benefits. In other words what could they have done better to ensure success? Alternatively once a critical success factor has been identified and appropriately addressed it may become common practice for future projects and not consider as a factor. The Business Intelligence Maturity Models support the notion that critical success factors in one stage may not be relevant in future stages (ASUG, 2007; Eckerson, 2006). This reinforces the Temporal aspect of critical success factor context where a factor may only be relevant in one stage of a project or a company's Business Intelligence journey.

There has been considerable amount of attention given to critical success factors by industry and academia over the past 40 years. Slevin and Pinto (1986) listed factors which they considered contributed to information systems success. Many of the research publications identified similar factors associated with ERP systems (Holland and Light, 1999; Shanks et al, 2000; Somers and Nelson, 2001; Summer, 2000). Critical success factors for ERP systems have been well documented but companies continually struggle to realise expected benefits from these systems (Kocakülâh, and Willett, 2011; Bartholomew 2004; Markus, 2004). Although there was not the same extent of research, a similar situation applies to Business Intelligence. A range of Business Intelligence critical success factors have been

identified however many Business Intelligence projects struggle to realise the perceived benefits originally proposed (Isik et al 2011; Sheina, 2007).

There are two aspects that may explain this situation. Firstly which critical success factors are relevant to a particular situation? As previously discussed much of the literature have generalised critical success factors to a macro level which describes the factor by two or three words. For example this research identified *Business Content* as a critical success factor. *Business Content* are standardised predefined Business Intelligence structures which facilitate implementations. A number of industry presentations suggested the use of *Business Content* as important. However, the quality of *Business Content* varies between the different functional areas. Jones (2008) suggests that *Business Content* will address between 50% to 70% of a company's needs. This will depend on the availability of the *Business Content* and degree of customisation in the ERP system. However, *Business Content* is based on SAP ERP system structures and is limited when it comes to other source systems. So the identification of *Business Content* as a critical success factor is only a starting point for companies. Arguably, the company needs to understand the *Business Content* structures available for the Component of Business Intelligence they are implementing, and how these structures would support the Application of this Component. This reinforces the role the proposed Critical Success Factor Context Framework (Figure 14) would have in the applicability of the various critical success factors. The framework provides a level of detail for each critical success factor to enable companies to determine its relevance.

The second aspect of the value of critical success factors is that once critical success factors have been identified, it is important to know how they are best managed. As discussed the management of each factor would be dependent on its context (Temporal, Component and Application). However, the context would not be the only variable which impacts on the management of critical success factors. These factors are not managed in isolation to normal corporate activities. It would be expected that factors that impact on a company's operations and performance would also impact on the effective management of the Business Intelligence critical success factors. Weiner (1981) identified environmental, organisational and leadership factors that influenced corporate performance. The impacts of these influences on the management of critical success factors would contribute to the difficulty of identifying

best practice. It would be up to each company to decide what is best practice for them in managing the Business Intelligence critical success factors relevant to their situation.

### **The Contributions Of The Research**

This research makes a number of contributions to both academia and industry in regards to better understanding critical success factors and their application to Business Intelligence. These contributions will be discussed in the following pages.

#### ***Contributions to Industry***

Companies are increasingly using Business Intelligence to improve their decision making and corporate performance. Many companies are implementing Business Intelligence as an extension of their ERP system to provide seamless integration between the systems responsible for managing the business process transactions and the system used to analyse business process performance. Companies are continually seeking ways to improve the effectiveness of their Business Intelligence initiatives.

The role of critical success factors in Business Intelligence implementations has been well documented. But to date the research has primarily focussed on Business Intelligence critical success factors where the Business Intelligence environment has been independent of an ERP system. It can not be assumed that previously identified critical success factors are relevant to Business Intelligence implemented as an extension of an ERP system. There was a gap in the research literature in regards to this.

This research identified a number of critical success factors. Some of these were already identified in the previous Business Intelligence research and this study adds further weight to their importance. While other critical success factors that had been previously identified (*Development Technology*) were found not be relevant. Some of the identified Business Intelligence critical success factors (*Change Management, Training, Project Management/Methodology, External Consultants, Process Maturity*) had been previously identified as relevant to ERP systems. The research identified some specific factors relevant to Business Intelligence such as *Involvement of Business and Technical Personnel, Data Quality, Project Scope, Testing, Governance, Security, Business Content, Interaction with Vendor (SAP), Performance, Reporting Strategy, Identification of KPI's, Knowledge Transfer* all which were not previously identified in the research.



The research provides industry with a list of Business Intelligence critical success factors to consider. This list may contribute to improved Business Intelligence initiatives. Indeed, practice has demonstrated that even though critical success factors exist for different information systems that these systems often do not achieve their perceived objectives and realise associated benefits. This is often related to how relevant a particular factor is to the current project, and if relevant how a company adequately adopts and addresses the issues relevant to this factor.

A major contribution of the research was to develop a framework to assist companies to determine the relevance of different critical success factors to their Business Intelligence initiative. The Business Intelligence Critical Success Factor Context Framework (Figure 14) provides industry with a tool to assess the relevance of different critical success factors. The framework evaluates critical success factors from three different contexts; Temporal, Component, and Application. These three different contexts can also be used to understand the maturity of a particular Business Intelligence initiative. This would assist companies when they are comparing their Business Intelligence against other companies' Business Intelligence initiatives. The application of the Temporal, Component and Application contexts could also be used to facilitate the understanding of other information systems including ERP systems.

The research contributes to the practitioner literature on the identification of Business Intelligence critical success factors. It provides companies with a list of factors and framework to better understand their applicability. This improved understanding can contribute to the success of Business Intelligence initiatives.

### ***Contributions to Research***

There has been considerable amount of research literature to date identifying the critical success factors associated with different information systems. Over the last decade most of this research has focussed on the critical success factors related to the implementation and use of ERP systems. Many companies extended the effectiveness of their ERP systems through the implementation of Business Intelligence. The research related to Business Intelligence critical success factors has been conducted on Business Intelligence not implemented as an extension of an ERP system. There was a gap in the literature in regard critical success

factors of Business Intelligence implemented as an extension of an ERP system. This research contributes to research by addressing this gap. The research validates some of the existing Business Intelligence critical success factors while at the same time identifying some new and previously not reported factors. Additionally, SAP is the leading vendor of ERP systems and Business Intelligence and none of the previous literature identified the critical success factors of SAP Business Intelligence.

Clearly the research may encourage other researchers to investigate the critical success factors of other information SAP solutions that are implemented as an extension of the SAP ERP system. These would include SAP Supply Chain Management, SAP Customer Relationship Management, SAP Product LifeCycle Management, and SAP Supplier Relationship Management.

One of the outcomes of this research was the development of the Critical Success Factor Context Framework (Figure 14). This framework provides researchers with a basis to further investigate and understand ICT related critical success factors. To date critical success factors have been considered equally applicable to all companies with a particular information system. The Critical Success Factor Context Framework can enable researchers to revisit much of the critical success factor research literature to gain a better understanding of the environments in which the critical success factors were determined. There is the opportunity for future research on the applicability of the Critical Success Factor Context Framework to different information systems.

This research used an appropriate methodology to utilise industry presentations to gather data. A review of literature was used to develop a Conceptual Framework and associated research questions. These research questions were investigated utilising content analysis of industry presentations. This enabled the Conceptual Framework to be revised. Interviews with industry practitioners enabled the findings of the content analysis and the revised Conceptual Framework to be verified. This methodological approach can be utilised by other researchers to investigate other ICT related phenomena.

This methodological approach builds upon the work by Yang and Seddon (2003) and Seddon et al (2010) in utilising industry presentations as a source of data. However, unlike the work

of these authors which focussed on industry presentations from one vendor sponsored event, this research sourced industry presentations from a diverse range of events. This research further reinforces the value of industry presentations as a source to understand information systems phenomena. The information technology and communications (ICT) industry is a rapidly changing industry which often makes it difficult for researchers to keep up to date of the latest developments and how they are applied to industry. Industry conferences are a mechanism to provide an insight to the latest developments. In addition it is often difficult for researchers to conduct research with large global companies due to restrictions of access to senior personnel and geographic limitations. Hence, industry presentations can provide an insight to ICT issues adopted by these leading companies and issues they face.

There is the opportunity for future research to validate the use of industry presentations as sources of data to investigate different phenomena.

## CHAPTER 7 - CONCLUSION AND FUTURE WORK

There has been extensive research dedicated to the identification of critical success factors in an endeavour to improve the success rate of various information systems. To date most of the research associated with the identification of Business Intelligence critical success factors has been associated with Business Intelligence implemented in a relatively stand-alone environment (Wixom and Watson, 2001; Chenweth et al, 2006; Yeoh and Koronios, 2010). Past research has tended to overlook the possible impact an associated ERP system may have on the proper implementation of Business Intelligence and accordingly the associated critical success factors. This research investigated the critical success factors associated with Business Intelligence when it is implemented as an extension of an ERP system. The research validated the applicability of a number of previously identified Business Intelligence critical success factors as well as proposing a number of new ones not previously identified. The research also identified the importance of considering the context in which a Business Intelligence critical success factor is applied. Accordingly, the Critical Success Factor Context Framework was developed to assist researchers and industry practitioners to better understand the relevance of different Business Intelligence critical success factors.

### Findings

The thesis addressed three research questions developed from the previous literature.

Question 1. *What are the critical success factors associated with the implementation of a Business Intelligence as an extension of an ERP system?*

The study identified a number of critical success factors related Business Intelligence implemented as an extension of an ERP system. Some of these factors had previously been identified from the literature while others were identified as a result of this research. The critical success factors were categorised as to being related to either Organisation, Process, or Technology. The identified critical success factors are:

- *Organisation Management Support, Governance, Reporting Strategy, Strategic Alignment, Champion, Identification of KPIs.*

- Process *Project Management/Methodology, Project Scope, Testing, Team Skills, Involvement of Business and Technical Personnel, External Consultants, Interaction with Vendor (SAP), Adequate Resources, Change Management, User Participation, Training, Process Maturity, Knowledge Transfer*
- Technology *Data Quality, Business Content, Performance, Source Systems, Security, Technical*

Question 2. *Are the critical success factors of an ERP system implementation relevant to the implementation of Business Intelligence which is implemented as an extension of an ERP system?*

The research found that many of the ERP system's critical success factors acknowledged in the research literature were identified as relevant to Business Intelligence when Business Intelligence is implemented as an extension of an ERP system. The critical success factors that were common to both systems were; *User Participation, Team Composition, Change Management, Management Support, Training, Methodology, Strategic Alignment, External Consultants* and *Champion*. However, although these factors were common to both systems how they were applied and managed would differ between systems.

There were a number of ERP system's critical success factors that were found not to be applicable to Business Intelligence. These related to *Culture, Organisational Fit*, and *Technology*.

Question 3. *Of the identified critical success factors are some more critical than others?*

Various Business Intelligence critical success factors were found to be dependent on the contexts that were associated with Component, Application and Temporal aspects of the Business Intelligence initiative. Based on the study's research a Critical Success Factor Context Framework was developed to model the impacts of these contexts on the Business Intelligence critical success factors. The evaluation of more than 9,000 industry presentations revealed that the implementation of Business Intelligence varies between companies. This variation is dependent on a number of factors; the component of Business Intelligence

implemented, how this component is applied and experience of the company in implementing Business Intelligence. Each of these factors contributes to the importance and role of different Business Intelligence critical success factors. In addition critical success factors vary in relevance throughout the implementation process. These variations in how Business Intelligence is implemented in different companies make the application of Business Intelligence critical success factors difficult. An important outcome of this thesis was the development of the Business Intelligence Critical Success Factor Context Framework. This framework provides a structure to enable both researchers and industry to evaluate the relevance of the different Business Intelligence critical success factors in different implementation scenarios. The framework's contexts (Component, Application and Temporal) are not limited to Business Intelligence implementations. The Context Framework could be used to gain a better understanding of critical success factors in different information systems related implementations. Previously there has been considerable research associated with critical success factors of different information systems (Medoza et al, 2007; Chang et al, 2008; Kim et al, 2011). A short coming of this research has been the high level generalisation of critical success factors. This high level generalisation has made it difficult for companies to understand how a particular factor applies to them. The Critical Success Factor Context Framework provides a level of granularity to enable companies to benchmark their implementation to similar implementations in other companies and the associated critical success factors. The Critical Success Factor Context Framework is a major contribution to better understanding and applying critical success factors resulting in improved information system's implementations.

### **Limitations**

There are a number of limitations that need to be documented in relation to this research. These include:

#### ***Variable Nature of Industry Presentations***

Industry presenters provide a significant amount of information about companies' implementation and use of software solutions. For many individuals these presentations are their primary source of information. However from a content analysis perspective the value of industry presentations varies. The content analysis was performed on Microsoft PowerPoint presentations from a range of industry events. Presenters use Microsoft PowerPoint as a medium to facilitate their presentation and how they use this medium varies

from presenter to presenter and from audience to audience. The level of detail which appears on each slide also varies. Some presenters provide high level information of the slide and then discuss the detail for each point. Other presenters include significant detail on each slide as they know that in many cases the audience will have access to the slides after the presentation to act as a reference. The content analysis phase of the research analysed the content of each slide. The analysis findings varied depending on the amount of detail that had been included. Importantly, many IT and ERP-related events (including SAP) are now being web cast or providing replay web casts of the presentations. This new approach to information capture will facilitate easier and potentially overcome future variability of content analysis of industry presentations.

### ***Industry Presentation Sample***

The research focussed on Business Intelligence critical success factors where Business Intelligence had been implemented as an extension of an ERP system. The Business Intelligence and ERP system environment focussed on solutions provided by SAP. Although, SAP is the leading vendor for ERP systems and Business Intelligence it cannot be assumed that the identified critical success factors are applicable to Business Intelligence and ERP system environments from other vendors. At a high level it would be expected the critical success factors would be similar— however, at the operational level some factors may potentially be different due to inherent proprietary software, solutions and approaches. Hence, it is more than likely that the Context Framework would impact on critical success factors differently for different vendor solution offerings.

### ***Geographies***

All the industry presentations analysed originated from conferences in America, Australia and Germany. It can be assumed that the majority of presenters came from these countries and the presentations reflected a western approach to Business Intelligence. More research needs to be conducted as to the applicability of the identified critical success factors and the Context Framework to companies in other geographic regions such as Asia, Middle East and Africa— areas that a well documented cultural difference regarding technology adoption (Hofstede et al, 2010).

### **Future Research**

Opportunities exist for future research to validate and or extend different aspects of this study (future research will potentially address the limitations identified above). There needs to be further research into the validation of using industry presentations as source for data collection for research. The information, communications and technology industry is evolving at a very fast pace. Accordingly, the frequency of industry conferences has increased to facilitate the exchange of knowledge for companies. The industry presentations provide an insight to how companies are utilising these technologies and solutions and associated issues. The industry presentations also provide a historical record of how companies' information and communications and technology environments have evolved. The approach adopted in this research could be easily applied to other research scenarios.

A number of Business Intelligence critical success factors were identified which were not identified in any of the previous research. Further research is required to validate these factors and to determine whether they only applicable to SAP environments.

The value of critical success factors to companies has been discussed and this value can be enhanced by considering the Critical Success Factor Context Framework. Research needs to be conducted to validate this framework and its applicability to other scenarios where critical success factors are utilised. Associated with this Context Framework research is an investigation of Business Intelligence critical success factors for each maturity stage (Temporal Context) in the various maturity models.





## **APPENDIX**

Appendix I Business Intelligence Terms

Appendix II Content Analysis of Industry Presentations

Appendix III Interview Questions For Industry Practitioners



**Appendix 1 - Business Intelligence Terms and Descriptions.**

Administrator's Workbench	A component of SAP NetWeaver BW used for creating structures in the data warehouse as well as managing the entire data warehouse environment.
Aggregate	An aggregate is a subset of an InfoCube.
Analytics	Pre-packaged Business Intelligence
Analysis Process Designer	a component of SAP NetWeaver BW used for data mining
APD	Analysis Process Designer:
Advanced Planner and Optimiser	A planning solution which is associated with Supply Chain Management.
APO	Short for Advanced Planner and Optimiser
BEx	Short for Business Explorer. It includes following tools to present the reports to end user: Analyzer, Query Designer, Web Application Designer (WAD), Report Designer and Web Analyzer.
BI	Short for Business Intelligence
BIA	Short for Business Intelligence Accelerator
BI Integrated Planning	BI Integrated Planning provides business experts with an infrastructure for realizing and operating planning scenarios
BIP	Short for BI Integrated Planning
Business Content	Business Content is a complete set of BW objects developed by SAP to support the OLAP tasks. It contains roles, workbooks, queries, InfoCubes, key figures, characteristics, update rules, InfoSources, and extractors for SAP R/3, and

	other SAP solutions.
Business Intelligence	Process, methodology and or tools used to analyse information
Business Intelligence Accelerator	This appliance provides improvements in query performance through sophisticated in-memory data compression and horizontal and vertical data partitioning
Business Objects	A leading Business Intelligence vendor acquired by SAP
BW	Business Information Warehouse (BW) is a Data Warehousing solution from SAP.
BW-BPS	Short for BW Business Planning and Simulation
BW Business Planning and Simulation	Components of the BI system that provide flexible tools for creating planning applications in companies
Characteristic	Characteristics are descriptions of fields, such as Customer ID, Material Number, Sales Representative ID, Unit of Measure, and Transaction Date.
Corporate Performance Management	Functionality for Strategy Management and Performance Measurement. A component of Strategy Enterprise Management
CPM	Short for Corporate Performance Management
DashBoard	A visualisation of KPI's
DataMart	The distribution of contents of ODS or InfoCube into other BW data targets on the same or on other BW systems
Data Mining	Data mining is the process of extracting hidden patterns from data. It is one of the functions provided by SAP BI.
Data Store Object	A DataStore object serves as a storage location for consolidated and cleansed transaction data or master data on a document (atomic) level.
Data Warehouse	Data Warehouse is a dedicated reporting and analysis environment based on the star schema (Extended) database design technique and requiring special attention to the data ETL process.

DataSource	A DataSource is not only a structure in which source system fields are logically grouped together
Data Target	A structure that data is stored in SAP NetWeaver BW
Dimension table	Part of the Star Schema structure for InfoCubes.
DSO	Short for Data Store Object
EDW	Short for Enterprise Data Warehouse
Enterprise Data Warehouse	The Enterprise Data Warehouse, a comprehensive / harmonized data warehouse solution, is design to avoid isolated applications.
ETL	Short for Extraction Transformation and Loading
Extraction Transformation and Loading	The process of extracting, transforming, transferring, and loading data correctly and quickly.
Fact tables	The Fact table is the central table of the InfoCube.
Hierarchy	Tree like structures of characteristics and their values which facilitate navigation
InfoArea	InfoAreas are used to organize InfoCubes and InfoObjects
InfoCube	An InfoCube is a fact table and its associated dimension tables in the star schema.
Information Broadcasting	Information broadcasting allows you to make objects with Business Intelligence content available to a wide spectrum of users
InfoObject	In BW, key figures and characteristics are collectively called InfoObjects
InfoPackage	An InfoPackage specifies when and how to load data from a given source system

InfoProvider	A structure that provides information for reporting and analysis
InfoSet Query	A tool for maintaining queries is suitable for both developing queries as well as <i>ad-hoc reporting</i> .
InfoSource	An InfoSource is a structure in which InfoObjects are logically grouped together.
Integrated Planning	Provides business experts with an infrastructure for creating and operating planning scenarios or other applications
Key figure	Key figures are numeric values or quantities, such as Per Unit Sales Price, Quantity Sold, and Sales Revenue
Metadata Repository	Metadata repository contains information about the metadata objects of SAP NetWeaver Business Intelligence.
MultiProvider	An InfoProvider made up of a combination of other InfoProviders
NetWeaver Business Intelligence	See SAP NetWeaver Business Intelligence
ODS	Short for Operational Data Store
Operational Data Store	ODS is a BW architectural component located between PSA and InfoCubes that allows BEx reporting
Open Hub Service	The open hub service enables you to distribute data from an SAP BW system into external data marts, analytical applications, and other applications
Persistent Staging Area	The inbound storage area for data from the source systems in the <b>SAP</b> Business Information Warehouse
Process Chain	A process chain is a sequence of processes that are scheduled to wait in the background for an event.
PSA	Short for Persistent Staging Area
Query	A BW query is a selection of characteristics and key figures for the analysis of the data in an InfoCube.

SAP NetWeaver Business Intelligence	The name used to describe SAP's Business Intelligence product offerings
SEM	Short for Strategic Enterprise Management
Source system	A source system is a protocol that BW uses to find and extract data.
Star schema	A star schema is a technique used in the data warehouse database design to help data retrieval for online analytical processing
Strategic Enterprise Management	Delivers end-to-end ERP software capabilities to support the entire performance management life cycle
Xcelsius	Dashboard and visualization software





## Appendix II – Analysis of Presentations

Presenter/s:	Anonymous
Company:	New Zealand Inland Revenue Department
Presentation Title:	Inland Revenue Department: Planning Using BPS
Year:	2003
Event:	SAUG Plenary
Location:	Sydney
Organiser:	SAUG
Solution:	Strategic Enterprise Management
Critical Success Factors:	User Participation Scope Performance Technical
Slide: 15	<p>The critical success factors that apply to any project applies here – most of you will be aware of them so I will not cover them here.</p> <p><b>Project team needs to be comfortable with ambiguity</b></p> <ul style="list-style-type: none"> <li>• Focus on the outcomes and manage scope around that - you have more flexibility than when configuring SAP</li> <li>• Make sure that project team members that know that users do not always do what they are told or do not always follow the process as written and design checks into the process</li> <li>• Need to be prepared to re-think if something does not work in practice</li> </ul> <p><b>Usability, usability, usability</b></p> <ul style="list-style-type: none"> <li>• Getting this right is essential</li> <li>• In general, users find a web based approach is easier to use however it is not a perfect solution <ul style="list-style-type: none"> <li>• Easier to build an “application” bring different elements together in one place</li> <li>• Staff can save shortcuts on their desktop for easy and quick access</li> <li>• Performance is better using the web than the GUI</li> <li>• Printing not good</li> </ul> </li> <li>• Testing also needs to include usability testing (in addition to unit, integration, stress and user acceptance testing) and this should not be left to just before go-live</li> <li>• Functionality missing that would improve usability – for example annual totals of monthly information in the layouts</li> </ul> <p><b>Layouts and formula’s are only half the picture</b></p> <ul style="list-style-type: none"> <li>• There is tendency to focus on what the layouts look like and the calculations. While it is important to get this right it is only half the picture</li> <li>• Just as important is how the user interacts with the system.</li> <li>• Unlike R/3 – you define how the user moves through the planning process and need to build checks into the process. For example, ensure that users can only enter data that is valid and capture errors early.</li> </ul> <p><b>Speed</b></p> <ul style="list-style-type: none"> <li>• There are trade-offs between usability and system performance in terms of speed <ul style="list-style-type: none"> <li>• More information on layout – slower performance</li> <li>• Makes it necessary to break up tasks into different layouts</li> </ul> </li> <li>• As you would expect – there are trade-offs between accuracy and performance – users are not always prepared for this trade-off</li> <li>• If using the Excel interface – it will always be slower than an Excel model – but this is what users compare it to</li> <li>• The web interface performs faster than the Excel interface</li> </ul>

	<p><b>Be innovative</b></p> <ul style="list-style-type: none"> <li>We found that the consultants working with us were reluctant to explore the use of the new functionality offered in the version we implemented – however, use of some of this new functionality provided some of the biggest benefits – for example delivering layouts and reports on the web</li> <li>We also used some of the standard functionality in ways not intended – for example to for some planning administrator tasks</li> <li>And allow for this in your project plan - as it will mean some experimentation in the design phase</li> <li>If you make a mistake – it is easy to reverse – just clear the cubes and start again – but there is cost and it needs to be controlled</li> <li>So – this does need to be a controlled process and does not do away with the need for clear requirements and good well thought through design</li> </ul>
Slide: 16	<p><b>Methodology issues</b></p> <ul style="list-style-type: none"> <li>The standard ASAP methodology is not appropriate for this type of project – need more of a prototyping approach. This means that the design is not as fixed up front and is refined through the process. Scope and objectives (big picture stuff) becomes more important to prevent going off track and to focus on what is important. This will result in some rework (but before this causes a problem – earlier rather than later) and a better, and more accepted product.</li> <li>We had trouble at the design stage with the team wanting to jump into the technical specifications too quickly – need a heavy focus on why and what trying to achieve.</li> </ul> <p><b>Proof of concept</b></p> <ul style="list-style-type: none"> <li>We included, in the design phase, the development of a very simple prototype, including reports.</li> <li>This was mainly for the purpose of communication – to stakeholders and during the early user workshops to give them a feel for what would be delivered</li> <li>This worked well (too well in some cases)</li> <li>We could have used the development of a prototype better as a “proof of concept” for the more difficult areas.</li> </ul> <p><b>Think twice about using the excel interface for planning layouts</b></p> <ul style="list-style-type: none"> <li>Particularly if your users are Excel savvy</li> <li>Do not automatically assume that because staff are familiar with MS Excel that this is the best approach. Just because it looks like Excel does not mean that you have all the functionality that comes with Excel.</li> </ul>

Presenter/s:	Abdelnaby, M
Company:	Renaissance Partner Group
Presentation Title:	Tips and tricks to improve and maintain local and global user acceptance of your SAP NetWeaver BI system
Year:	2008
Event:	SAPinsider Reporting and Analytics 2008
Location:	Las Vegas
Organiser:	Wellesley Information Systems
Solution:	Reporting
Critical Success Factors:	Resources User Participation Team skills Methodology
Slide 10	Dedicated Reporting Team Staff with a mix of Functional/Technology skill sets business analysts who document specifications

Slide 15	<p>Build credibility in the user community by demonstrating a robust, well-defined reporting organization</p> <p>Respond to the needs of the user community by aligning your reporting organization to the needs of the business, rather than using a “one size fits all” approach</p> <p>Keep your finger on the pulse of the user community, enabling your reporting organization to respond quickly and decisively before a challenge escalates to a crisis</p>
Slide 17	<p>Develop an overall Reporting Methodology for your organization when dealing with business users</p> <p>Establish the process of developing new reports and correcting existing reports</p>
Slide: 58	<p>Reporting is unique – its implementation never ends</p> <p>Reporting has direct impact on the business and business users</p> <p>Organize around the business needs and not technology</p> <p>Build a Reporting Methodology</p> <p>Build bridges between the function and technical divide</p> <p>Invest in the long term reporting organization</p> <p>Prepare a roadmap</p>

Presenter/s:	Abrahamyan, R., Chica, J., Gulabrao, P., Hoskins, L
Company:	Spectrolab Inc
Presentation Title:	BW -- Big Win for a Small Company
Year:	2006
Event:	ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW upgrade
Critical Success Factors:	<p>User Participation</p> <p>Team Skills</p> <p>Business Content</p> <p>Governance</p>
Slide: 39	<p><u>Key Learnings</u></p> <p>Develop a parallel PRD in a test environment.</p> <p>Get a quick win.</p> <p>Allow additional time for team members to learn the new tool.</p> <p>Activate all content that is relevant to the project.</p> <p>Define development authorization profiles as broad as possible, this will reduce “down time”.</p> <p>Implement standard business processes first.</p> <p>If new processes are not defined take extra time to ensure everyone understands the expectant results.</p>
Slide 40	<p><u>Key Learnings</u></p> <p>Document new processes extensively.</p> <p>Involve the Power users extensively.</p> <p>Spend enough time during design. One mistake and the whole process is affected.</p> <p>Change to query is not like a change to an ABAP report. Could potentially involve ten steps depending on the design flaw.</p> <p>Do regular “show and tell” with the business owners to ensure buy-in and to highlight potential pit-falls early. Users do not know what to expect and the sooner they see the better as it reduces rework and re design.</p> <p>Review the status regularly and adapt to changes when needed rapidly.</p>

Presenter/s:	Agarwal, R.
Company:	IBM
Presentation Title:	When, why, and how SAP BW/SAP NetWeaver BI can be harnessed for better HR reporting
Year:	2008
Event:	Reporting and Analytics 2008
Location:	Las Vegas
Organiser:	Wellesley Information Systems
Solution:	HR Reporting
Critical Success Factors:	User Participation Methodology Business Content Reporting Strategy Scope Strategic
Slide: 16	<u>Criterion 1 Reporting Strategy</u> Is SAP NetWeaver BI part of your reporting solution set? Does it support decisions at all levels of users? Does it support the required reports?
Slide 17	<u>Criterion 2 Usability</u> Is there adequate training on SAP NetWeaver BI provided to end users? How will the reports be disseminated?
Slide 19	<u>Criterion 3 Requirements Analysis</u> Are the requirements clearly defined and documented? Do the requirements support evolving business needs? Are the reports classified into analytical vs. operational?
Slide 21	<u>Criterion4 Functionality</u> Do your tools support your business requirements? Is the right Business Content available to accomplish your requirements?
Slide 22	<u>Is your data model in line with your business requirements?</u> - Are your technical specifications defined and documented? - Does your infrastructure support your portal (if you have one)?

Presenter/s:	Agirishetti, V.
Company:	
Presentation Title:	BW 3.50 Upgrade and BPS project implementation using BW-BPS functionality
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anaheim
Organiser:	ASUG
Solution:	BPS
Critical Success Factors:	Resources User Participation Methodology Business Content Testing Technical
Slide 25	<u>Key Learnings</u> Plan SAP GUI rollout in advance Plan and complete R/3 Plug-in upgrade/Install in advance Run SAP_DROP_TMPTABLES program to just before PREPARE and just before R3UP Prepare/use detailed test plans for AWB objects Set Basis and Oracle parameters for BW systems.
Slide 26	<u>Key Learnings</u> Involve Key Business users in Query/report Testing QA Environment configuration should be close to Production Environment.

## Factors Critical To The Success Of Business Intelligence

	<p>Consider the interface software upgrade for compatibility</p> <p>Import profiles from OS level after upgrading J2EE before any modifications to profiles in BW.</p> <p>Global Data load schedule for Load balancing</p> <p>Do not change password of <b>DDIC</b> user during upgrade</p> <p>BI_Content 3.53 password: 2DCFC71D8D, 281450 if it is included in upgrade in KEY_CHK phase.</p>
Slide 42	<p><u>Key Success Factors</u></p> <p>Teamwork/Partnership</p> <p>Established methodology</p> <p>Commitment of Project Resources</p> <p>Assessment of system and plan accordingly</p> <p>Detailed test plans and extensive system testing</p> <p>Risk Plan for worst case scenario</p>

Presenter/s:	Al-Angari, S. Khalil., W
Company:	Saudi Aramco
Presentation Title:	BI 7.0 Upgrade of 7 TB data at Saudi Aramco
Year:	2008
Event:	2008 ASUG Annual Conference
Location:	
Organiser:	ASUG
Solution:	BW Upgrade
Critical Success Factors:	<p>Management Support</p> <p>Resources</p> <p>User Participation</p> <p>Team Skills</p> <p>Scope</p> <p>Methodology</p> <p>Interaction With SAP</p>
Slide 42	<p><u>Critical Success Factors</u></p> <p>Get Management Support</p> <p>Obtain User Commitment</p> <p>Consult with SAP</p> <p>Complete a full discovery &amp; evaluation prior to start</p> <p>Define scope of upgrade</p> <p>Prepare a solid project plan with Basis team</p> <p>Get resources ready and committed</p> <p>Freeze development</p> <p>Plan awareness sessions</p>

Presenter/s:	Amar, C., Gupta, C.
Company:	PepsiCo
Presentation Title:	PepsiCo NW2004s BI 7.0 Upgrade Project Key Learnings
Year:	2007
Event:	ASUG Illinois Chicago Chapter
Location:	Chicago
Organiser:	ASUG
Solution:	BW Upgrade
Critical Success Factors:	<p>Team Skills</p> <p>Methodology</p> <p>Testing</p>
Slide 11	<p><u>Lessons Learned</u></p> <p>Adhere to a plan – start with technical upgrade followed by introduction to new tools</p>

	<p>Have a good, repeatable test plan which can be easily administered</p> <p>Weigh the pros/cons of converting the 3.x design &amp; functionalities to NW2004s / BI 7.0</p> <p>It is not mandatory to convert – making this a “policy” and clear communication to the development community helped</p> <p>The development team should undergo a delta training to learn about the new functionalities before the upgrade</p> <p>SAP is strongly recommending that all customers go-live with minimum SPS10/BI SP11</p>
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Presenter/s:	Anderson, F., Yung, L
Company:	Allstate Insurance Company
Presentation Title:	How Allstate Utilizes Information Broadcasting to Publish Workbooks to SAP NetWeaver Portal
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	Bex Broadcasting and Portals
Critical Success Factors:	Performance Governance Technical
Slide 21	<p><u>Key Learnings</u></p> <p>Performance – make sure you are sized for the number of concurrent workbooks and queries that you need to run in a given time window</p> <p>IB is not the solution for poorly performing reports</p> <p>Workbook design should be taken into consideration when planning to broadcast in IB</p> <p>Setup clear processes for: scheduling, changing, and presentation of reports</p> <p>Make sure you have enough Portal storage capacity</p>

Presenter/s:	Anderson, M.
Company:	SAP
Presentation Title:	SAP BI: Best Practices for implementing SAP Business Intelligence
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Champion User Participation Team Skills
Slide 16	<p><u>Project Lessons learned From BI Implementations</u></p> <ol style="list-style-type: none"> <li>1. Selection and empowerment of the team is critical to the success of the overall project. The right people assigned to the right tasks produces the desired result.</li> <li>2. Complimentary skill sets are required to make the right set of decisions. This includes a team where both IT people and Business People work together at the same time outside of traditional organization boundaries.</li> <li>3. Strong leadership for the team is required. The leader must be able to make decisions and galvanize the team into action. Leadership by committee have not proved effective for enterprise implementations.</li> <li>4. Constant communication to the user community as the project is underway promotes desire for the new information and prepares the community for final acceptance.</li> <li>5. Deliver what you promise when you promised it. Deliver project components in</li> </ol>

## Factors Critical To The Success Of Business Intelligence

	stages so that the business can touch and see the value of the investment sooner. This creates excitement and momentum for them and for the implementation team.
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Presenter/s:	Anderson, M., Lo, A.
Company:	SAP
Presentation Title:	Effective Implementation of BW 2.0
Year:	2001
Event:	2001 ASUG Annual Conference
Location:	
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	User Participation Team Skills Scope Business Content
Slide 11	<u>Information Model as a Reference</u> <b>Business Requirements set the scope</b> Business Areas and Key Processes Key Players and their tasks Performance Indicators <b>Information Supply Chain</b> Looking at information as a resource Information Management Process as business process Sources, Transformations, Distribution, Value Adding <b>SAP BW Business Content as a reference and base</b> best practice business information based on processes, not on departments designed enterprise wide
Slide 27	<u>Project Team and Skill Sets</u> <b>Project Team</b> Usually includes SAP BW consultants Usually includes Global SAP Partners Project team sizes between 4 - 12 team members Projects members have 1 - 12 years of experience with SAP products Project Managers should have ASAP Training <b>SAP BW</b> SAP R/3 Reporting Tools, Report Painter, Report Painter etc. Non-SAP reporting tools Data Warehousing Skills R/3 Implementation Experience(ie landscape,etc..) Strong DBA(Oracle 8i, DB2 UDB, etc..)

Presenter/s:	Arthur, C., Kennis, P.
Company:	Rockwell Collins
Presentation Title:	How the BI Team at Rockwell Collins Implemented an Analytical Income Statement
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	2007
Solution:	BI
Critical Success Factors:	Management Support Resources User Participation



	Team Skills Scope Testing Technical Integration of Business and technical
Slide 12	<u>Business sponsorship and engagement critical to project success</u> <ul style="list-style-type: none"> <li>• Sponsorship from Executive Leadership <ul style="list-style-type: none"> <li>• CIO and CFO</li> </ul> </li> <li>• LCVS Core Team was established to address this growing data problem <ul style="list-style-type: none"> <li>• Included Business Subject Matter Experts, eBusiness Subject Matter Experts, Project Management, and Executive Sponsors</li> <li>• Core team made all decisions regarding project scope and charter collaboratively</li> </ul> </li> <li>• LCVS Profitability project kicked off <ul style="list-style-type: none"> <li>• Direct involvement in project from core team during requirements capture, design, development, testing, and deployment</li> <li>• Working relationships very important <ul style="list-style-type: none"> <li>• Must have trusted relationship amongst team members, critical to project success</li> </ul> </li> </ul> </li> </ul>
Slide 21	<u>Lessons Learned</u> <ul style="list-style-type: none"> <li>• Business sponsorship is critical – project will spin out of control without it <ul style="list-style-type: none"> <li>• Senior Leadership Focus</li> </ul> </li> <li>• Project Management skills critical for Technical Leaders on the project <ul style="list-style-type: none"> <li>• As well as the PM assigned to the project</li> </ul> </li> <li>• Communications – don't forget about it <ul style="list-style-type: none"> <li>• Leadership – business and IT</li> <li>• Project Team – morale boosters, status, issues</li> <li>• Customers – what is changing and how does it impact you?</li> </ul> </li> <li>• Don't underestimate testing requirements <ul style="list-style-type: none"> <li>• Work with customers up front – what is their expectations?</li> <li>• Plan your detailed unit/integration/functional/regression test requirements well in advance – For financial customers, do we need to reconcile to the penny? We spent thousands of dollars looking for a penny or two. Accuracy and precision were critical to our customers.</li> </ul> </li> </ul>
Slide 22	<u>Lessons Learned</u> <ul style="list-style-type: none"> <li>• Committed resources for the project <ul style="list-style-type: none"> <li>• Both IT and Business resources</li> </ul> </li> <li>• Ensure project team cohesion <ul style="list-style-type: none"> <li>• Team building events, “Getting to know each other”</li> </ul> </li> <li>• Think outside the box <ul style="list-style-type: none"> <li>• Don't be afraid to challenge the status quo, be innovative</li> </ul> </li> <li>• Prototyping is a very effective way to reduce uncertainties on the project <ul style="list-style-type: none"> <li>• Way to get quick wins with customer</li> <li>• Allows for customer to see what they asked for in requirements</li> </ul> </li> <li>• Requirements capture – ensure success by having good requirements <ul style="list-style-type: none"> <li>• Don't allow customers to be vague – pin them down on what the true requirement is – EX: Need a report that will display sales: Really wanted: Report that will display sales by business segment, and provide for navigating by the following characteristics....</li> </ul> </li> </ul>
Slide 23	<u>Lessons Learned</u> <ul style="list-style-type: none"> <li>• Analyze project failures <ul style="list-style-type: none"> <li>• How could we have done better to avoid this failure?</li> <li>• Apply learning's to future projects</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>Avoid major BW hardware landscape replatforms during critical phases of project <ul style="list-style-type: none"> <li>Rockwell Collins chose to replatform BW landscape during critical phases of project <ul style="list-style-type: none"> <li>Went from 3 systems to 9</li> <li>Configuration control procedures lacking – no central point of contact during replatforming</li> <li>Transports between systems difficult to track and monitor</li> <li>Shift in philosophy of how BW landscapes should be used, and how transports should be managed.</li> </ul> </li> </ul> </li> <li>Avoid Alignments into R/3 for purchased acquisitions during critical phases of project <ul style="list-style-type: none"> <li>Causes schedule slips – alignment required to go certain time of year</li> </ul> </li> </ul>
Slide 25	<p><u>Key Learnings –take home points</u></p> <ul style="list-style-type: none"> <li>Trusted relationship and partnership between IT and Business customers is critical to success of projects</li> <li>Ensure that the project team is on the same page – need to have communications across the team to ensure the same message is heard, and understood</li> <li>Don't be afraid of organizational cultural change <ul style="list-style-type: none"> <li>Help Business understand why the change is required and is better for them</li> </ul> </li> <li>Challenge the status quo – not always easy or fun</li> <li>Requirements, Requirements, Requirements <ul style="list-style-type: none"> <li>Don't short change the requirements capture process – the success of your project depends upon the quality of your requirements</li> </ul> </li> </ul>

Presenter/s:	Atherton, C.
Company:	EDS
Presentation Title:	EDS : Optimization of ETL in a Global SAP NetWeaver BI Environment
Year:	2008
Event:	2008 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Team Skills Business Content Data Quality
Slide 3	<p><u>Key Learnings</u></p> <p>Integrate Performance Management into your overall vision for Business Intelligence</p> <p>Assemble a diverse, experienced and imaginative team to tackle performance issues</p> <p>Understand the scalability of SAP Business Content</p>

Presenter/s:	Brookshire, K., Bandla, J.
Company:	Brown-Forman
Presentation Title:	NetWeaver 2004s BI, Integrated Planning and BIA Ramp-up Learnings at Brown-Forman
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando

Organiser:	ASUG
Solution:	BW, BIA, Integrated Planning
Critical Success Factors:	Technical
Slide 24	<u>Key Learnings</u> Do not treat NW2004s BI upgrade as a regular release technical upgrade Involve portal team as part of BI upgrade Review new analysis authorization objects and map them carefully to the existing reporting authorizations BI accelerator (BIA) uses TREX search engine technology to speed up BI query performance BIA increases user and IT productivity due to fast and constant query response times and reduced administration effort SAP xApps for Analytics enrich end user experience. Zero programming required to build powerful analytics NW04s BI-Integrated planning offers one user friendly interface for both planning and reporting applications. UI design is essential for the success of the implementation

Presenter/s:	Barba, M.
Company:	Colgate-Palmolive
Presentation Title:	Lessons Learned by Colgate-Palmolive While Implementing SAP Strategy Management
Year:	2009
Event:	2009 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Change Management Technical
Slide 3	<u>Learning Points</u> BW Integration: Use your current BW infrastructure to report existing BW KPI's on SSM Change Management: Control and Manage the changes to your instances using the transporter functionality embedded on SSM 7.0 Upgrade process: From SSM 2007 to SSM 7.0 LDAP/SSO: Ease the access to SSM taking advantage of your current company user directory.

Presenter/s:	Beavers, K. D., Gerlach, R., Madren, W., Masdea, J.
Company:	SAP, Occidental Chemical Corporation, Air Producst & Chemicals, Phillip Morris
Presentation Title:	Pre-Conference Seminar: SAP BI Jumpstart
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Management Support User Participation Team Skills Reporting Strategy Methodology
Slide 35	<u>BI Success: Key Things to Understand</u> Understand your organization, and success factors Choose a proper deployment path and methodology

## Factors Critical To The Success Of Business Intelligence

	Start with business process, data quality and semantics Define a reporting strategy Build a quality team ... and good processes Partner with the business Learn from others Recognize the obstacles Know when and where to get help
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Presenter/s:	Bennings, B.
Company:	Procter & Gamble
Presentation Title:	Business Intelligence for Global Accounts Payable in Procter & Gamble
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	User Participation Team Skills Data Quality
Slide 35	<u>Key Factors to Implementation</u> Know your processes and the data in your systems Establish controls over those processes to standardize them and capture information about how well you follow these processes Standardize master data !!! Know your customers and what they need Utilize developers who know the technology and how it can be configured to best suit your specific needs

Presenter/s:	Bertschinger, C, Hinnerkortm, M.
Company:	Alstom
Presentation Title:	From the Idea to realization within 3 months
Year:	2000
Event:	mySAP Business Intelligence Conference
Location:	Hamburg
Organiser:	
Solution:	BW
Critical Success Factors:	Management Support User Participation Team Skills Business Content Data Quality
Slide 6	<u>Success Factors</u> Customer defines requirement Sponsoring from top management Think big, start small Composition of the project team
Slide 13	<u>Experience</u> Data hygiene Identification Incomplete data Incomplete SAP reports Inefficient processes Business content

	Time saving
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Presenter/s:	Bhardwaj, A.
Company:	Coronado Software
Presentation Title:	Craft your SEM roadmap
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	
Organiser:	ASUG
Solution:	SEM
Critical Success Factors:	Management Support Team Skills Scope Strategic Technical
Slide 5	<u>Five Key Elements of Successful SEM projects</u> 1 - A clear business case for each module 2 - Strong executive sponsorship (essential for SEM) 3 - A project steering committee 4 - Project charter closely aligned with business value 5 - Clear definition of how SEM will be used
Slide 57	<u>Key Points to take home</u> <ul style="list-style-type: none"> <li>• Process re-engineering may be a significant aspect of your SEM project <ul style="list-style-type: none"> <li>➤ Don't underestimate the importance of this step to achieving success with SEM</li> </ul> </li> <li>• BW is a critical component of SEM from both a data repository and performance perspective <ul style="list-style-type: none"> <li>➤ Your BW design decisions will have a significant impact on your SEM solution</li> <li>➤ Be sure to get strong outside resources if you don't have in-house expertise with BW</li> </ul> </li> <li>• Managing the scope of your implementation will help make your project a success</li> </ul>

Presenter/s:	Biddle, B. R., K
Company:	Graybar
Presentation Title:	How Graybar has Utilized BW and the Portal for Daily Reporting
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW Portals reporting
Critical Success Factors:	User Participation
Slide 33	<u>Best Practices</u> We have found that it is important to be consistent with the display formats of the reports. We chose a PDF display approach. We have found that is important to have detailed data available to substantiate the reports and provide the information needed to address problem areas. We have found that is important to make all key performance measurements easily available on as few screens as possible. We have found it important to ensure all Groups involved provide feed back on the development to address their needs

## Factors Critical To The Success Of Business Intelligence

Slide 34	<u>Key Learnings</u> Reporting is dynamic and you need a solution that can grow and respond quickly the demands of the business. Consider future data and reporting requirements whenever building a new data reporting solution. Additional details can be very helpful later. Data can be aggregated from multiple BW data sources into a single dashboard report through Business Objects.
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Presenter/s:	Birudala, V., Paul, N.
Company:	Wawa
Presentation Title:	Integrated Planning Implementation experience at WAWA
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	BW Integrated Planning
Critical Success Factors:	User Participation Testing
Slide 33	<u>Lessons Learned</u> More Complex to Build than Originally Anticipated Testing and validation is Difficult and Time Consuming for the Business Users Business Change Management is Large (Users do not want to give up their legacy tools) Technology is Maturing

Presenter/s:	Bishop, L.
Company:	Coca-Cola
Presentation Title:	Customized Reporting for SAP RPM at Coca-Cola
Year:	2008
Event:	2008 ASUG Operations Optimization Event
Location:	Nashville
Organiser:	ASUG
Solution:	RPM BW
Critical Success Factors:	Business Content Technical
Slide 4	<u>Learning Points</u> xRPM Implementation Global IT Initiative Short Time-Frame Excludes C-Projects & Resource Planning BW Implementation Activated BW Content BW Customization Custom Reporting Suite
Slide 21	<u>Key Learnings</u> Align Project Systems and xRPM Align CATs and xRPM Create consolidated InfoCubes based on use Status (xRPM) Phases (Decision Points) Costs (PS) Time Reporting (CATs)

	Challenges Customization to add specific Coke attributes Portal Performance Extractor Performance
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Presenter/s:	Bodla, R., Cathcart, M
Company:	City of Henderson
Presentation Title:	SAP Strategy Management - Beyond Scorecards: Changing the Way You Discuss Performance
Year:	2008
Event:	2008 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Management Support User Involvement
Slide 4	Standardization of reporting allows discussion to be on “performance” rather than the format of the report Mandates are not necessary, support from upper management is enough (let departments make up their own mind on when to implement) People support what they help create (so get as many people as possible involved in getting information into the system) SSM provides clarity to department managers about how their division/section fits into the departments overall Vision/Mission
Slide 21	

Presenter/s:	Booth, R., Cade, B.
Company:	Valero Energy
Presentation Title:	BPS Implementation at Corporation
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	BPS
Critical Success Factors:	User Participation Methodology Training Technical
Slide 4	<u>Learning Points</u> Keep the implementation simple and realistic, using a phased in approach Centralize Budget and Plan data in BPS Have clear staff support upon the project completion to minimize consulting cost
Slide 4	<u>Best Practices</u> Form a partnership with the business community. Keep the process as simple as possible. Listen to the business users. Have clear deliverables. Invest in training both End user and Functional.

Presenter/s:	Brandazza, P., Zocco, F.
Company:	Magneti Marelli
Presentation Title:	SAP BW to support strategic information management at Magneti Marelli

## Factors Critical To The Success Of Business Intelligence

Year:	2000
Event:	mySAP Business Intelligence Conference
Location:	Hamburg
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Integration of Business and Technical Personnel Technical
Slide 9	<u>Lessons Learned</u> You have to analyse functional requirements and corresponding data modelling in depth Delta update functions: You have to check batch procedures very carefully Close integration is needed between the application team and the technical team during the whole project Analyse the standard extraction procedures very carefully (in cases of huge data transfers, it is sometimes better to build up custom procedures)
Slide 10	<u>Lessons Learned</u> Contemporary release upgrades between R/3 and BW: Plan the testing activity very carefully Close integration between R/3 and BW: Data model and metadata shared Common development platform [ABAP/Workbench] can allow some activities to be split between the two products, reducing customization effort, and improving performances of both systems

Presenter/s:	Braun, A., Irgit, H.
Company:	Hungarian Oil & Gas
Presentation Title:	Hungarian Oil & Gas Business BW/SEM Project
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	BW, SEM
Critical Success Factors:	Performance, Business Content, Integration of technical and Business Personnel, Change Management, Technical
Slide 33	<u>Lessons Learned- Architecture</u> <ul style="list-style-type: none"> <li>Holistic application architecture approach to handle:               <ul style="list-style-type: none"> <li>R/3 upgrade (EI), patches, etc</li> <li>BW/SEM upgrade, patches, etc</li> <li>Non R/3 system connections through EAI and/or ETL</li> </ul> </li> <li>Define the system landscape early on               <ul style="list-style-type: none"> <li>What system must be used for what</li> <li>What are the dependencies between multiple systems</li> </ul> </li> <li>Transporting (between SAP systems) conception and discipline is essential.</li> <li>Define an approach for the batch schedule:               <ul style="list-style-type: none"> <li>Whether an external scheduler will be used or not</li> <li>Whether BW and R/3 batch architectures will be integrated</li> </ul> </li> <li>Work with your hardware vendor</li> <li>Business Go-live vs. Technical Go-live</li> </ul>
Slide 34	<u>Lessons Learned BW &amp; SEM</u> <ul style="list-style-type: none"> <li>Decide where to maintain your Master Data depending on how much control you have over your R/3 system(s)</li> <li>Build BW on BW platform (financials)               <ul style="list-style-type: none"> <li>Performance management – plan to control your actuals</li> </ul> </li> <li>Design for performance</li> <li>Benefit twice from BW by building SEM on top.</li> </ul>



	<ul style="list-style-type: none"> <li>• Fix where needed – Do your fixes on the source system instead of building complex rules</li> <li>• Authorisations/locking must be part of SEM Architecture</li> <li>• Version Management is key – Financial Standards</li> <li>• Too detailed adds very little value - Benchmark from Day 1</li> <li>• Do not miss your planning deadlines. You miss a year!</li> <li>• Excel still lives!</li> </ul>
Slide 35	<u>Lessons Learned Project</u> <ul style="list-style-type: none"> <li>• Have clearly defined and agreed business objectives</li> <li>• Transparent and well communicated processes focus on tangible, measurable benefits</li> <li>• Get business involved and build communication</li> <li>• Start small – vision to Growth &amp; Benefit; do not underestimate meaning of change management</li> <li>• Use pre-delivered Business Content</li> </ul>

Presenter/s:	Bukary, R.
Company:	Sap Steelcase
Presentation Title:	Powering the Next Stage of Business Evolution with SAP Analytics.
Year:	2005
Event:	SAP Business Intelligence & Analytics Conference
Location:	
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Training Data Quality Strategic
Slide 24	<u>How to prepare for BI Analytics</u> Get your data act together – standards! Educate your staff to know the possibilities Standardize your integration Know your business

Presenter/s:	Burke, C. and L. Campbell
Company:	PacifiCorp
Presentation Title:	Learning to Crawl with SAP BW
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anaheim
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Change management Data Quality Training Technical Partners Business Content
Slide 31	<u>Overall Lessons Learned</u> <ul style="list-style-type: none"> <li>• Don't underestimate complexity of BW               <ul style="list-style-type: none"> <li>• Manage expectations carefully</li> <li>• 'You already own BW! Just turn it on and you have your reports' – Common misconception at PacifiCorp...                   <ul style="list-style-type: none"> <li>• Unfortunately it's not that easy!</li> </ul> </li> </ul> </li> <li>• Size it strategically               <ul style="list-style-type: none"> <li>• System capacity can make or break you</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>Replication inherent in BW causes significant growth</li> <li>Taking an enterprise approach (re-usable objects) brings more data replication...</li> </ul>
Slide 32	<u>Overall Lessons Learned</u> <ul style="list-style-type: none"> <li>Prepare for organization change <ul style="list-style-type: none"> <li>BW roles don't just 'plug in' to standard SAP functions... <ul style="list-style-type: none"> <li>Development is not just ABAP, nor is it simply config</li> <li>BW presents a new model for Security, BASIS, and Release Management</li> </ul> </li> <li>It's very different from a traditional EDW <ul style="list-style-type: none"> <li>Some people can adapt to this difference, some have a harder time.</li> </ul> </li> <li>Factor in and budget for training! <ul style="list-style-type: none"> <li>BW specific training for developers, security, BASIS, report writers, etc is essential.</li> </ul> </li> </ul> </li> </ul>
Slide 33	<u>Overall Lessons Learned</u> <ul style="list-style-type: none"> <li>Don't neglect the strategic view <ul style="list-style-type: none"> <li>Many different approaches for BW Implementations <ul style="list-style-type: none"> <li>If not done carefully, easy to create data mart chaos</li> </ul> </li> <li>Keep the enterprise view in mind <ul style="list-style-type: none"> <li>If groups are decentralized, ensure visibility across groups for new data requests</li> <li>Understand what transactional data needs to be shared, design accordingly.</li> </ul> </li> <li>Partner carefully <ul style="list-style-type: none"> <li>Implementation partner in this space is critical</li> <li>Capabilities as well as culture and ability to work with team, provide knowledge transfer can make or break you</li> </ul> </li> </ul> </li> </ul>
Slide 34	<u>Overall Lessons Learned</u> <ul style="list-style-type: none"> <li>Keep in mind overall infrastructure dependencies <ul style="list-style-type: none"> <li>Dependencies on R/3 plug-in, WebAS, Portal, as well as BW specific support packs are key</li> <li>Factor in time for support pack updates, refreshes, etc.</li> <li>While BW is isolated from R/3, the dependencies are huge and need to be factored in from a release management as well as support pack dependency perspective.</li> </ul> </li> <li>Learning curve is steep for ALL groups (Dev, Functional, BASIS, Security) <ul style="list-style-type: none"> <li>Do what you can to optimize your training!</li> </ul> </li> </ul>
Slide 35	<u>Overall Lessons Learned</u> <ul style="list-style-type: none"> <li>Do what you can with Business Content <ul style="list-style-type: none"> <li>A new team can activate and load Business Content for relatively easy win...</li> <li>It's rarely the complete solution, however.</li> </ul> </li> <li>Ideally start with low data volume... <ul style="list-style-type: none"> <li>As data volumes grow, so too does infrastructure cost and complexity. <ul style="list-style-type: none"> <li>Often at a pace you may not have anticipated...</li> </ul> </li> </ul> </li> </ul>
Slide 36	<u>Overall Lessons Learned</u> <ul style="list-style-type: none"> <li>Sizing can be difficult... <ul style="list-style-type: none"> <li>Even with business content, magnification of data can be significant and difficult to forecast <ul style="list-style-type: none"> <li>Transformation and normalization of fixed asset data by period led to major data expansion</li> </ul> </li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• Even 'mature' version (3.1) of BW is pretty dynamic <ul style="list-style-type: none"> <li>• Steady volume of OSS notes, both for base product, content and R/3.</li> </ul> </li> </ul> <p>Choose your 'starting' release carefully...</p> <ul style="list-style-type: none"> <li>• Need to balance being on the leading edge with cost and complexity of upgrade <ul style="list-style-type: none"> <li>• We will need to plan for 3.5 upgrade over the next year...</li> </ul> </li> </ul>
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Presenter/s:	Burlet, C., Gunn, C., Rueswald, M.
Company:	General Mills
Presentation Title:	Managing change in the production BW environment at General Mills
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Change management
Slide 35	<u>Internal Change</u> Summary You need to know who is doing what You need to tell the team what is happening You need to be prepared if something goes wrong

Presenter/s:	Burroughs, C.
Company:	United Biscuits
Presentation Title:	SAP BW - Enabling the United Biscuits Change Agenda
Year:	2000
Event:	mySAP Business Intelligence Conference
Location:	Hamburg
Organiser:	SAP
Solution:	
Critical Success Factors:	Methodology
Slide 13	<u>BW learning Points</u> Very difficult to go live at the same time as R/3 · LIS/SIS skilled resource extremely important · Size correctly - don't skimp on hardware · Not a silver bullet <ul style="list-style-type: none"> <li>– There are bugs</li> <li>– ASAP still developing but a good framework</li> </ul> · Patch levels are important (SAP R/3 and BW) · Be obsessed with Project Management

Presenter/s:	Callaghan, P. and P. Gillespie
Company:	New Brunswick Power Transmission Company
Presentation Title:	New Brunswick Power Transmission Company (NBPT) implements SAP Work Management
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anaheim
Organiser:	ASUG
Solution:	BW Work Management

## Factors Critical To The Success Of Business Intelligence

Critical Success Factors:	Testing Data Quality Training Change Management
Slide 40	<u>Success Factors</u> Data cleansing Readiness review Field training & road shows Field communication & change management Sustainment plans & organization
Slide 41	<u>Lessons Learned</u> Lack of extended (SME) team members for data cleanup always a factor Coordination of BW design and testing requirements with PM data and work processes BW transports not as reliable / repeatable as R/3 Even if you are implementing BW, do not ignore PMIS for operational reporting

Presenter/s:	Chancellor, W. F., Saleh, T.
Company:	Saudi Aramco
Presentation Title:	The SEM Balanced Scorecard: A Case Study
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	SEM
Critical Success Factors:	Management Support Team Skills Training Identifying KPI's Strategic Technical
Slide 41	<u>Critical Success Factors</u> 1. Executive sponsorship is critical 2. Concept training for management early in the process 3. Select a good consultant early to guide the process 4. Select a team with knowledge about the theory, and your planning process 5. BSC Training & SEM training required for team 6. Use existing strategic documents to start. 7. Define the highest level KPI's and objectives first. 8. Limit objectives and measures to the fewest needed. Avoid proliferation of measures and objectives by focusing on KPIs defined at highest levels.
Slide 42	<u>Critical Success Factors</u> 9. Keep team together. 10. Full time support from client organizations when requested. 11. Create an audit trail: document and sign off for measures and objectives. 12. Build the scorecards on paper before SEM. 13. Measures defined by the process experts of the organization 14. Use corporate requirements for KPI's as starting point. 15. Use SAP defined measures where applicable.

Presenter/s:	Chandra, L.
Company:	Airbus

Presentation Title:	Airbus Quality System - Tuning up quality with an integrated Quality information System
Year:	2000
Event:	mySAP Business Intelligence Conference
Location:	Hamburg
Organiser:	SAP
Solution:	BW Quality Management
Critical Success Factors:	Team Skills Business Content Change Management
Slide 27	<u>Key Success Factors</u> <b>Sponsor quality management</b> <ul style="list-style-type: none"> <li>• <b>Right application</b></li> <li>• Added value for QM user</li> <li>• Integration of the core business processes</li> <li>• <b>Experienced and motivated people</b> QM, IT, consultants (PwC, SAP)</li> <li>• <b>Iterative and timeboxing approach</b></li> <li>• <b>Time to market</b> with business content of QM and MM</li> <li>• <b>Early prototyping</b> with QM data and BeX look and feel</li> <li>• <b>Marketing of the BW application</b> to all potential users at all management levels</li> </ul>

Presenter/s:	Cherian, J., Swarthout, T
Company:	Graphic Packing Inc
Presentation Title:	Graphic Packing Inc: A Winning Supply Chain Strategy Utilizing SAP Netweaver 2004s
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	User Participation Scope Performance Business Content Data Quality Training Technical
Slide 25	<u>Lessons Learned: Requirements Gathering</u> Understand end user requirements in detail Define report layout and discuss with end users Create detailed blueprint document and get approval from business users Identify and discuss drilldown possibilities Discuss mandatory variables and selection options Select power and casual users early in the project and involve them throughout the life of the project
Slide 26	<u>Lessons Learned: Design Phase</u> Evaluate business content and their usability Business content can significantly reduce design time by deploying 'out of the box' solution. Create a prototype in sandbox and test the functionality – this will avoid project delays. Scope creep needs to be controlled earlier on – it is easy for scope to increase exponentially in a BI project.

## Factors Critical To The Success Of Business Intelligence

Slide 27	<p><u>Lessons Learned: Data Loading</u></p> <p>Data preparation on the R/3 side and data loading surprised several team members. Hardware had to be adjusted several times to accommodate data loads and data compression.</p> <p>Database logging had to be turned off during heavy loads.</p> <p>Backup strategy should be defined at the beginning of the project.</p>
Slide 28	<p><u>Lessons Learned: Reporting Related</u></p> <p>BEx Analyzer has been improved tremendously, but several OSS Notes had to be applied to make them fully functional.</p> <p>Troubleshooting front-end was quite a challenge – applying the latest patch level can significantly reduce troubleshooting time.</p> <p>Understanding about .NET Framework, MS visual J# components, Adobe flash, SVG Viewer, MSXML Parser, cookies, etc., is required to get the front-end working. Queries saved with NetWeaver 2004s Query Designer cannot be edited anymore with BW 3.5 Query Designer.</p>
Slide 36	<p><u>Lessons Learned</u></p> <p>NetWeaver 2004s lays the foundation for a long term IT landscape.</p> <p>Allow sufficient time to install and configure the NetWeaver 2004s landscape.</p> <p>Keep your 2004s system updated with the latest support pack level.</p> <p>BI Front-end can deliver excellent reports, but may consume more time to deliver.</p> <p>Out of the box BI Portal can be used to deploy all BI reports, including tasks such as Web Analyzer, Information broadcasting, Knowledge Management, etc.</p> <p>Provide sufficient user training to adapt to the newest technology.</p>

Presenter/s:	Chung, D., Liu, D., Lopez, I
Company:	Bristol - Myers Squibb
Presentation Title:	Bristol - Myers Squibb: Unicode Conversion of a Multi-terabytes BW System Connecting to MDMP R/3
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Technical
Slide 27	<p><u>Lessons Learned: Language Key Assignment</u></p> <p>Two layers of language keys referenced in MDMP R/3</p> <p>One from the application layer which is used in the master data and transaction data.</p> <p>One from the system layer which is the installed language. Currently we have 16 languages in R/3 PRD.</p> <p>When language translation occurs in R/3 during data extract, translation routine checks to see if the language key defined in the data set is part of the installed language. If the language is not defined, then translation fails.</p> <p>We see Russia language 'R' master data already in R/3 PRD, but 'R' language is not yet installed. We had to follow up with SAP functional team.</p>
Slide 28	<p><u>Lessons Learned: Language Key Assignment</u></p> <ul style="list-style-type: none"> <li>For most of transaction data, we used the language key in T001 company table and developed logic.</li> </ul> <p>2LIS_02_ITM:</p> <ul style="list-style-type: none"> <li>Use company code MC02M_0ITM-BUKRS link to T001- SPRAS for the language key.</li> <li>If MC02M_0ITM-BUKRS is null, then use plant code MC02M_0ITM-WERKS to find language key in T001W.</li> <li>Check if language key in TCP0I table where ACTIVE = 'X'. If not, overwrite to 'E'.</li> <li>If MC02M_0ITM-WERKS also is null, set English as default language</li> </ul>

	<p>code.</p> <ul style="list-style-type: none"> <li>Caveat: There is no block in R/3 to restrict users to use installed language only. Users can associate any language key in customer master.</li> </ul>
Slide 29	<p><u>Lessons Learned: ABAP</u></p> <ul style="list-style-type: none"> <li>Understand the differences between Unicode ABAP and regular ABAP string functions <ul style="list-style-type: none"> <li>ABAP Unicode-enabled does not mean error free</li> <li>Understand the behavior of Unicode string functions, e.g., return value of string function between byte mode or character mode (ABAP Describe statement behaves differently with character vs. byte mode).</li> <li>Compile a list of key string functions and check the business logic used in the existing ABAP program to identify if changes are required.</li> </ul> </li> </ul>
Slide 30	<p><u>Lessons Learned: Interface and Others</u></p> <ul style="list-style-type: none"> <li>File format for download and upload <ul style="list-style-type: none"> <li>Fixed format may not work for data containing double byte characters (e.g., Asia-Pac). Investigation required.</li> </ul> </li> <li>Human intelligence in text field <ul style="list-style-type: none"> <li>Avoid mixing business logic in a common text field for cost reasons in an enhancement project or catch-up logic missed during implementation <ul style="list-style-type: none"> <li>It is “pay me now or pay me later” for any quick and dirty enhancement/project using this technique. Downstream systems have to deal with this issue as well.</li> </ul> </li> <li>How to ensure compliance? – It is not easy.</li> </ul> </li> </ul>
Slide 36	

Presenter/s:	Clement, D. and T. Orr
Company:	Duke University
Presentation Title:	Duke University’s Implementation of Business Warehouse
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Team Skills Reporting Strategy
Slide 33	<p>Project Assessment</p> <ul style="list-style-type: none"> <li>Factors contributing to success <ul style="list-style-type: none"> <li>Reporting requirements well understood and documented early</li> <li>Very little changes to requirements</li> <li>Project staff very familiar with underlying R3 data, business processes</li> </ul> </li> </ul>

Presenter/s:	Colombo, M., Golden, M.
Company:	Deloitte Consulting
Presentation Title:	Tips and Tricks for Maximizing Strengths of BPS to Reduce User Frustration
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	Integrated Planning (IP) BPS
Critical Success Factors:	Team Skills Scope Testing Integration between Business and technical personnel Technical

Slide 47	<p><u>Lessons Learned Project Management</u></p> <p>Consider a BPS pilot</p> <p>It gives users opportunity to give input on functionality</p> <p>It minimizes risks of limited customer buy-in</p> <p>Have a clearly defined Business Model (functional + technical blueprint)</p> <p>Try to avoid implementing in parallel with ECC and BI (design risk)</p> <p>Transition out of BPS into IP progressively</p> <p>Refer to the How to guide for running BPS and IP in parallel</p> <p><a href="https://www.sdn.sap.com/irj/servlet/prt/portal/prtroot/docs/library/uuid/0c08e62d-0a01-0010-b3b5-ef8ed3d4e23a">https://www.sdn.sap.com/irj/servlet/prt/portal/prtroot/docs/library/uuid/0c08e62d-0a01-0010-b3b5-ef8ed3d4e23a</a></p> <p>Testing with planning applications is particularly challenging</p> <p>Don't underestimate the impact of reporting and visualization</p> <p>Documentation is critical</p> <p>Stress difference between planning and analytics</p> <p>(Layout = data entry, Report = data analysis unless you use IP)</p> <p>Control Scope Tightly!</p>
Slide 48	<p><u>Lessons Learned Technical Design</u></p> <p>Leverage the use of small web layouts and authorization variables to minimize data locking.</p> <p>Keep allocations simple. If complex allocations are needed consider retraction or function exits.</p> <p>Use multi-providers for reporting and staging cube for external data loads.</p> <p>Extensive FOX formulas' foreach loops, characteristic relationships and data slices have serious performance implications. Testing is particular important with BPS</p> <p>BPS relies heavily on external data</p> <p>External data is often dirty, extensive reloading process, difficult to detect inconsistencies</p> <p>There are 8 critical tests you need to perform</p> <ul style="list-style-type: none"> <li>• Functional: Unit, Integration, User Acceptance, Prod Readiness</li> <li>• Technical: Performance, Operations, Deployment, Verifications</li> </ul> <p>Good unit test will decrease integration test cost/effort</p> <ul style="list-style-type: none"> <li>• BPS requires more complete and accurate data for unit testing then ECC</li> <li>• If possible use copy of production data for unit testing</li> </ul>
Slide 49	<p><u>Staff Properly to Ensure Success</u></p> <p>Project Manager</p> <ul style="list-style-type: none"> <li>• BI Project Management experience</li> <li>• Large scale solution experience / Team integration experience</li> <li>• BI / SAP architecture and technology understanding</li> <li>• Industry experience desirable</li> </ul> <p>Data Warehousing Solution Architect</p> <ul style="list-style-type: none"> <li>• Data Warehousing expert</li> <li>• Familiar with data warehousing principles and best practices</li> <li>• Ability to access and advise on quality of data model solution</li> <li>• Third-party ETL tools (Ascential DataStage, Informatica, etc.) highly desired</li> <li>• Good understanding of SAP BW, SAP ECC, SAP-CRM/APO, SAP-SEM, BPS, BCS, CPM and BI (front-end) tool</li> </ul> <p>Planning / Budgeting Process Solution Architect</p> <ul style="list-style-type: none"> <li>• Strategic Planning, Budgeting, Forecasting business process expert</li> <li>• Driver based planning, forecasting / simulation / what-if analysis expert</li> <li>• SAP SEM-BPS, BW-BPS, SEM-BCS implementation experience / expertise</li> <li>• Multi-dimensional modeling knowledge / experience</li> <li>• SAP ECC FI/CO/EC knowledge / experience</li> <li>• Familiar with data warehousing principles and best practices</li> <li>• Industry experience desirable</li> </ul> <p>Technical Architect</p> <ul style="list-style-type: none"> <li>• Technical Project Management experience</li> <li>• Ability to coordinate technical work of Basis resources, database support and BPS/BW technical resources</li> <li>• Ability to resolve and communicate technical problems and solutions to Project</li> </ul>



	<p>Management</p> <ul style="list-style-type: none"> <li>• Knowledge / experience in BI development</li> <li>• SAP BW / BPS development objects (from InfoCubes, ODS to Planning Areas, Levels, and BEx / BPS Variables, etc.)</li> <li>• ABAP development skills in BPS, BW, desired in SAP ECC</li> <li>• Third-party ETL tools (Ascential DataStage, Informatica, etc.) desired</li> <li>• Security Administrator</li> <li>• Technical expertise on BPS and BI security, desired in ECC</li> </ul>
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Presenter/s:	Concepcion, P. C. and K. M. Hester
Company:	Chevron
Presentation Title:	Implementing SAP BW for HR
Year:	2001
Event:	2001 ASUG Annual Conference
Location:	Miami Beach
Organiser:	ASUG
Solution:	BW HR
Critical Success Factors:	<p>Management Support</p> <p>Resources</p> <p>User Participation</p> <p>Scope</p> <p>Methodology</p> <p>Business Content</p> <p>Testing</p> <p>Training</p> <p>Integration of Business and Technical</p> <p>Change Management</p> <p>Technical</p> <p>Security</p>
Slide 24/25	<p><u>Lessons Learned Functionality</u></p> <p>Prototype with delivered business content as early as possible</p> <p>Design to the Go-Live version</p> <p>Flush out security functionality and design early</p> <p>Consider Multi-cubes and ODS</p> <p>Using MDT as a portal to BEx was a big challenge</p> <p>Merging R/3 and non-R/3 HR data was easy</p> <p>Take advantage of event chain processing</p>
Slide 27/28/29/30/31/32	<p><u>Lessons Learned Methodology</u></p> <p>Develop executable methodology</p> <p>Be realistic on time estimates</p> <p>Define project scope early - start small</p> <p>Define and validate security requirements as early as possible</p> <p>Insist on experienced SAP &amp; partner consultants</p> <p>Know your R/3 HR data well</p> <p>Know your Reporting Requirements</p> <p>Do not segregate the HR-BW team from the R/3 HR team</p> <p>Leverage from BW standard delivered contents</p> <p>Sooner and more training</p> <p>Test, test, test</p> <p>Transports need good change control</p> <p>Lag BW testing from HR testing</p> <p>Include Reporting/Business Analysts in the development of test plans</p>
Slide 33/34/35	<p><u>Lessons Learned Leadership and Communication</u></p> <p>Have clear and consistent leadership</p> <p>Address change management on list reporting versus analytical reporting</p> <p>Have a closely integrated BW &amp; HR project teams</p>

## Factors Critical To The Success Of Business Intelligence

	Organizing the group into sub-teams was a “good thing” Ensure that employee resources are consistently involved in report development Allow BW implementation to lag behind the HR implementation
Slide 36/37	<u>Lessons Learned Support and Transition</u> Have SAP resource onsite - this is key Have dedicated security resource Plan for developing training materials and delivering end user training Running parallel systems helped during transition period Plan for Interim Business Processes Consultants should be hands-off during transition Have on-going support transition plan

Presenter/s:	Conety, D.
Company:	Air Products & Chemicals
Presentation Title:	Business Intelligence Reporting at Air Products & Chemicals
Year:	2004
Event:	2004 Technology Forum
Location:	
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	
Slide 33	<u>Key Learnings</u> Appreciation for how Air Product’s BW reporting environment evolved A reporting solution must be flexible enough to service multiple reporting needs and report consumers. All reporting solutions have to evolve over time as reporting needs change

Presenter/s:	Connell, J.
Company:	T-Mobile
Presentation Title:	Case study: How T-Mobile created retail performance reports using SAP BW that meet the needs of over 2,500 users
Year:	2008
Event:	Reporting and Analytics 2008
Location:	Las Vegas
Organiser:	Wellesley Information Services
Solution:	BW
Critical Success Factors:	User Participation Team skills Governance Reporting Strategy Training Change Management Reporting Strategy Integration between Business and Technical personnel Security
Slide 37	<u>Project Success Factors</u> <u>Experienced Report Development Team</u> History is the best teacher Understanding pitfalls helps you avoid them Save time in development!
Slide 39	<u>Project takeaways: What Have We Learned?</u> • Business requirements must be clear • Training is required for a unique audience — know your audience • You will need an experienced report development team • Make sure you have a communication strategy for rollout and production support

	<ul style="list-style-type: none"> <li>• Lack of communication can undermine the project</li> <li>• Lack of preparation can result in a security breakdown</li> <li>• Don't forget about documentation</li> </ul>
Slide 47	<u>7 key Points to Take Home</u> <ul style="list-style-type: none"> <li>• Reporting requirements should be “in scope” for every system project</li> <li>• Management of SAP BW should include permanent, dedicated business support</li> <li>• Reporting requirements should be as detailed as possible, even down to the data element level, to allow for future changes</li> <li>• Constant collaboration between business groups and IT is a must for a successful reporting project</li> <li>• Getting security right is as important as getting the data in the report right</li> <li>• Don't implement back-end workarounds and custom configuration based on every user request — make sure the user really needs the change and that they understand the consequences of the customization</li> <li>• Develop your reports based on a consistent vision</li> </ul>

Presenter/s:	Cuchna, J. and S. Guess
Company:	Inforte
Presentation Title:	Delivered BW Reporting for FICO/HRM and Implementation Strategies
Year:	2004
Event:	2004 Enterprise Resource Planning Forum
Location:	
Organiser:	ASUG
Solution:	BW Reporting FICO/HRM
Critical Success Factors:	Methodology Business content
Slide 35	Business Intelligence best Practices and Approaches <ul style="list-style-type: none"> <li>• Business Intelligence ASAP Methodology</li> <li>• Other Project and Business Intelligence Methodologies</li> </ul>
Slide 40	Implementation Strategies – Summary and Key Learnings <ul style="list-style-type: none"> <li>• Business Intelligence Strategy/Information Delivery Strategy is <b>always</b> needed               <ul style="list-style-type: none"> <li>• Identify initial implementation based on best fit between                   <ul style="list-style-type: none"> <li>• Business Content</li> <li>• Business Opportunity</li> <li>• Business Benefit</li> </ul> </li> <li>• Develop short-term, mid-term and long-term Information Delivery Strategies</li> </ul> </li> </ul>

Presenter/s:	Daftari, K.
Company:	Clarkson Consulting
Presentation Title:	Seven mistakes to avoid when implementing or updating your corporate reporting strategy.
Year:	2008
Event:	Reporting and Analytics 2008
Location:	Las Vegas
Organiser:	Wellesley Information Services
Solution:	
Critical Success Factors:	Management Support User Participation Team skills

## Factors Critical To The Success Of Business Intelligence

	Governance Data Quality Change Management
Slide 42	<u>7 Key Points to Take Home</u> Gain executive commitment and involvement in decision making Ensure robust change control, efficient communication, and early involvement of all constituencies Prioritize competing projects Enforce a comprehensive governance model Mandate the importance and availability of good data Source the right competencies Drive the importance of understanding how current applications work

Presenter/s:	Daws, B. and S. Dunnigan
Company:	Yorktowne Cabinetry
Presentation Title:	Internal and External Real-Time Dashboards and Process Enablement at Yorktowne
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anahiem
Organiser:	ASUG
Solution:	Portals BW
Critical Success Factors:	
Slide 42	

Presenter/s:	de Santis, G.
Company:	Caltex
Presentation Title:	Expanding SAP BI Capability
Year:	2007
Event:	SAUG Melbourne Plenary
Location:	Melbourne
Organiser:	SAUG
Solution:	
Critical Success Factors:	Interaction with SAP Training Interaction between Business and Technical personnel Change Management
Slide 27	<u>Lessons Learned: Good</u> External expertise from SAP very valuable Integrated multifunction team: Back end (technical focus on data extraction and storage) Front end (business focus on report requirements) Targeted training sessions Greater business involvement in report development Zero team turnover during project team members migrated to ongoing support Communication (regular meetings between all project leads)

Presenter/s:	Deshmukh, M., Siebertz, G
Company:	Whirlpool
Presentation Title:	Whirlpool Global Procurement MPV Forecasting and Analytics
Year:	2007
Event:	2007 ASUG Annual Conference

Location:	
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Team skills Training
Slide 22	<p><u>Key Learnings</u></p> <p>Business Process understanding by IT team was absolutely necessary to deliver differentiating capabilities.</p> <p>It took considerable amount of time to transition the excel mindset to completely trust the highly automated system (trade off: increased accuracy to the last penny and speed with no way to massage source data).</p> <p>Due to the magnitude and part level granularity, had to provide validation reports that is easy to use by commodity managers and buyers to dynamically analyze the price variance and trust the system.</p> <p>All users must be trained to be BEx proficient to be self sufficient.</p>

Presenter/s:	Deshpande, A., Lyall, S.
Company:	SMART Modular
Presentation Title:	SMART Modular; SAP SCM and BW Implementation
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW APO
Critical Success Factors:	Scope Interaction with SAP Technical
Slide 51	<p>Lessons Learned</p> <ul style="list-style-type: none"> <li>• Set scope wide enough to make a difference and narrow enough to be manageable</li> <li>• Fixed-bid implementations add more stress to the entire project team, but helps to ensure the project is completed on time and on budget.</li> <li>• The solution that SAP Solution Managers presented during the sales cycle was not the same solution that we ended up implementing: <ul style="list-style-type: none"> <li>• – But with Bristlecone’s help, we have a solution that works!</li> </ul> </li> <li>• ICH 4.1 was not quite ready for prime time. However, SAP was very supportive and helpful in ensuring a successful implementation. I would not hesitate implementing ICH 5.0</li> <li>• Implementing ICH and APO on the same SCM server limits upgrade options.</li> <li>• Demand Planning Collaboration (built on ITS) is much too slow and has too many limitations to use as a web-enabled forecast commit tool.</li> </ul>

Presenter/s:	Dittakavi, S., Umarwadia, M.
Company:	Grainger Inc.
Presentation Title:	Leveraging SAP PI and BI 7.0 Web DataSources for XML data loads at Grainger Inc.
Year:	2008
Event:	2008 ASUG Annual Conference
Location:	
Organiser:	ASUG
Solution:	BW extraction
Critical Success Factors:	Team Skills Testing

## Factors Critical To The Success Of Business Intelligence

	Technical
Slide 13	<u>Best Practices</u> <ul style="list-style-type: none"> <li>Utilize SAP's native EAI tool, Process Integrator (PI)</li> <li>Utilize BI7.0 new data flow concept with Transformations and Data Transfer Process.</li> <li>Moved complex transformations from Informatica to BI. This is possible with the use of Start/End/Expert routines. Insures complete control of future changes in business logic.</li> </ul>
Slide 25	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>Needs coordination between BI and PI teams.</li> <li>Proper sizing of PI and BI for handling larger data volumes.</li> <li>Proper skill sets in both areas for avoiding confusion.</li> <li>Decision of housing transformations in BI or PI.</li> <li>Testing is a big issue due to large volumes – difficult to identify which area has a problem (PI or BI).</li> </ul>

Presenter/s:	Dixit, A.
Company:	Marathon Oil Company
Presentation Title:	Marathon Oil Company BW 3.0B Upgrade
Year:	2003
Event:	ASUG Houston
Location:	Houston
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Testing Technical
Slide 25	<u>Lessons Learned</u> <ul style="list-style-type: none"> <li>The hardware configuration for Sandbox should be similar to that of Production (or at least that of Development). This affects the regression test.</li> <li>The upgrade approach was downtime minimum. The downtime truly was from the start of ALPHA conversion till the completion of Web elements conversion. This downtime was on an average for 10 days.</li> <li>The downtime can be minimized if the resources used are the same across all the BW environments (MBR, MBD, MBQ, and MBP).</li> <li>The greater participation of BW team during regression test would have been more useful.</li> <li>The upgrade for source system (R/3) and the BW should occur at the same time. This helps to minimize the unnecessary effort and gives more time for regression test. This can overall reduce the time for upgrade.</li> <li>Problem solving, regression testing, pre-upgrade activities, support to basis upgrade, and post-upgrade activities occurred in parallel. This offered greater challenge for each task. It affected testing timeline and involved long hours on a given day.</li> </ul>

Presenter/s:	Dixon, D., Pettus, J., Birchmeier, E.
Company:	NASA
Presentation Title:	Information Delivery and Integration Strategies of SAP R/3 and SAP BW
Year:	2004
Event:	2004 Technology Forum
Location:	
Organiser:	ASUG
Solution:	BW R/3
Critical Success Factors:	Team Skills

	Business Content Technical
Slide	<u>Lessons Learned</u> <ul style="list-style-type: none"> <li>• Business Content over-estimated</li> <li>• Still need to understand R/3 data and process models</li> <li>• Custom delta extractors approach paid off</li> <li>• Lack of real-time reporting did not undermine BW</li> <li>• Post-go live, BW addressed majority of new needs</li> <li>• SAP BW became an instrumental data quality tool</li> </ul>
Slide 31	<u>Lessons Learned</u> <ul style="list-style-type: none"> <li>• Could not go-live truly in parallel</li> <li>• Schedule slipped to a staggered go-live</li> <li>• BW is always guilty until proven innocent</li> <li>• More time is spent in R/3 than in BW</li> <li>• Simple questions aren't always that simple</li> </ul>
Slide 47/48	<u>Lessons Learned</u> <ul style="list-style-type: none"> <li>• During the implementation, the decision tree was not strictly adhered to due to project organization</li> <li>• But this turned out to be a good thing</li> <li>• After two years, CIF approach has addressed almost all reporting needs (nothing was really missed)</li> <li>• Preponderance of new development has been with new queries and web reports</li> <li>• After two years, CIF approach has created a growth rate which is now no longer sustainable</li> <li>• Next step is to start archiving or something similar</li> <li>• Integrated ODS should have been parallelized and stacked</li> <li>• Need to understand the logic of the extractors in order to reconcile to R/3</li> <li>• R/3 data complexities drive BW system complexities</li> <li>• Conceptual hierarchies need to be normalized when applying them to R/3 (due to the various modules and their various account assignments)</li> <li>• Generic and dynamic coding is difficult for traditional ABAP developers to support and understand</li> <li>• Performance is compromised with dynamic coding</li> <li>• Code generation an alternative approach</li> <li>•</li> </ul>
Slide 49	<u>Key Overall Learnings</u> <ul style="list-style-type: none"> <li>• Parallel go-live with SAP BW as an EDW was a gamble but was crucial to overall implementation success</li> <li>• R/3 skills on the BW team (knowledge of process, data design and reconciliation reporting) was a critical success factor for integration</li> <li>• Taking an integrated, holistic and adaptive approach was worth the tradeoffs</li> </ul>

Presenter/s:	Doubet, P., Katz, L.
Company:	Rockwell Collins
Presentation Title:	SAP NetWeaver Business Intelligence from a Business Perspective - Key Lessons Learned at Rockwell Collins
Year:	2008
Event:	2008 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	
Critical Success Factors:	Team skills Interaction between Business and Technical Personnel Methodology

## Factors Critical To The Success Of Business Intelligence

Slide 9	<u>Best Practice 1</u> Building analytical solutions requires a strong partnership between the business and technical teams.
Slide 11	<u>Best Practice 2</u> Engaged business partners who truly understand the business are a must Translators between business and technical teams Business Process knowledge Managing the business process is significantly different than DEFINING the business process! “Perspective” must be considered
Slide 12	<u>Best Practice 3</u> Throwing business requirements "over the wall" to IT does not enable success, we strongly recommend and will describe our use of a disciplined “systems engineering” process. Templates to facilitate the process

Presenter/s:	du Plessis, G.
Company:	Sasol
Presentation Title:	Delivering Information as an Intelligent Strategic Business Tool
Year:	2005
Event:	SAP Business Intelligence & Analytics Conference 2005
Location:	
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Strategic Management Support Data Quality Governance Team Skills Methodology Interaction of Business and Technical Personnel Change Management Partners
Slide 9	<u>Critical Success Factors for Decision Support Information</u> Strategic Alignment Performance Measure alignment based on value creation for Strategic, tactical and Operation information requirements Executive ownership, sponsorship and empowerment Standard Definitions of Business Rules Standard definition and alignment of Data A Clear Business Application Strategy and Roadmap Alignment of supporting applications to the information requirements through the adherence to the business rules and data standardisation and alignment Supporting execution approach and alternatives as a migration path to the end goal
Slide 19	<u>Key Learnings and Business Principles</u> Have a view of NetWeaver as a whole and not the individual components – get value from each area without duplication of functionality and effort Adopt a full methodological approach Don't force the technology – business needs must drive the technology Manage the risks involved with being early adopters CHANGE MANAGEMENT and communication is key Skilled resources are scarce Don't assume that a NetWeaver project can be manage like a R/3 project Think big and start small Business buy-in and executive sponsorship is a key success factor Ensure that the right mix of internal and external resources is on the team.



	Particularly critical is to have full-time people from the business function being warehoused (e.g. commercial department, financial department etc..)
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Presenter/s:	Dunning, R.
Company:	Occidental Chemical
Presentation Title:	BI 101 - SAP BI Jumpstart
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Management Support Resources Team Skills User involvement Methodology Strategic Reporting Strategy Data Quality Interaction between Business and Technical Change Management
Slide 23	<u>Successful BI Solutions have the following characteristics</u> <ol style="list-style-type: none"> <li>1. Business sponsors are highly committed and actively</li> <li>2. Business users and the BI technical team work together closely</li> <li>3. BI is viewed as an enterprise resource and given adequate funding for long term growth and viability</li> <li>4. Provide users both static and interactive online views of data</li> <li>5. The BI team has prior experience with BI and is assisted where needed by vendor and consultants</li> <li>6. Your company's organizational culture reinforces BI solutions and end users become your marketing consultants</li> <li>7. Your BI solution resolves pain points</li> </ol>
Slide 35	BI Success: Key Things to Understand <ul style="list-style-type: none"> <li>• Understand your organization, and success factors</li> <li>• Choose a proper deployment path and methodology</li> <li>• Start with business process, data quality and semantics</li> <li>• Define a reporting strategy</li> <li>• Build a quality team</li> <li>• ... and good processes</li> <li>• Partner with the business</li> <li>• Learn from others</li> <li>• Recognize the obstacles</li> <li>• Know when and where to get help</li> </ul>

Presenter/s:	Ehresmann, S., Rademacher, M
Company:	General Mills
Presentation Title:	SAP NetWeaver 2004s BI Ramp-up Learnings at General Mills.
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Methodology Training Partners

## Factors Critical To The Success Of Business Intelligence

	Testing security Technical
Slide 19	<u>Summary and Key Learnings</u> <ul style="list-style-type: none"> <li>• SAP direction for BI is very positive.</li> <li>• An 04s upgrade is much bigger than expected, particularly for an integrated BI environment.</li> <li>• Consider your entire Net Weaver architecture before you upgrade your systems!! Not just BI. <ul style="list-style-type: none"> <li>• Ensure you understand where your BI-Java and BI-Portal will be installed – in your BW instance or a separate instance.</li> <li>• Understand your portal architecture – what is the best option for your environment.</li> </ul> </li> <li>• Plan migration strategy for front-end tool and DTP implementation.</li> </ul>
Slide 20	<u>Summary and Key Learnings</u> <ul style="list-style-type: none"> <li>• Plan adequate time for security testing and analysis.</li> <li>• Plan time for training of developers and end-users.</li> <li>• Need consulting – determine what kind of consulting</li> <li>• Portal Integration is unavoidable and immature</li> </ul>

Presenter/s:	Ennis, E.
Company:	KPMG
Presentation Title:	Business Warehouse at KPMG
Year:	2005
Event:	SAUG Melbourne Plenary
Location:	Melbourne
Organiser:	SAUG
Solution:	BW
Critical Success Factors:	Management Support Team Skills Interaction between Business and Technical Personnel
Slide 22	<u>Some Lessons Learnt</u> <ul style="list-style-type: none"> <li>○ Key to successful development is to get the right business people involved from the start <ul style="list-style-type: none"> <li>• Often people with sufficient detail knowledge don't have the decision authority <ul style="list-style-type: none"> <li>▪ Get senior management actively supporting the project</li> </ul> </li> </ul> </li> <li>○ Don't assume the developers understand</li> <li>○ Break the development down into small implementations</li> <li>○ Don't parallel run the "old" reports, force people to use the new system</li> </ul>

Presenter/s:	Fausch, T. Miethsam, A.
Company:	BSH Bosch & Siemens Hausgeräte GmbH
Presentation Title:	Integrating International Company Planning and Sales Planning at BSH Bosch & Siemens Hausgeräte GmbH
Year:	2005
Event:	SAP Business Intelligence & Analytics Conference 2005
Location:	Dusseldorf
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Change Management Interaction between Business and Technical

	<p>Training</p> <p>Reporting Strategy</p> <p>User Participation</p> <p>Team skills</p> <p>Source Systems</p> <p>Methodology</p> <p>Testing</p>
Slide 20	<p><u>Success Factor: Change Management</u></p> <p>People Integration</p> <ul style="list-style-type: none"> <li>- Interdisciplinary team: IT + Controlling</li> <li>- Global team</li> </ul> <p>Information sharing (What's going on ?)</p> <p>Early training of users and management</p> <p>Well defined project organization and responsibilities (owner of tasks)</p> <p>Increased interests in global Corporate Reporting standards (clarify opportunities and benefits)</p> <p>Distract concerns about global Corporate Reporting standards (discuss expectations and questions)</p> <p>Get commitment and support for process optimization (inform about new or changed processes and workflows)</p>
Slide 21	<p><u>Success Factors</u></p> <p>Team-Qualification, willingness to go out and to do things on short notice; willingness to think beyond the own department</p> <p>Give-and-take mentality and flexibility of users</p> <p>Support by board of management</p> <p>Integration of non-SAP R/3 data</p> <p>Intensive user trainings</p> <p>Clearly defined and achievable targets (not everything at once)</p> <p>Iterative development supported by user tests</p> <p>Detailed concept</p> <ul style="list-style-type: none"> <li>- well thought out</li> <li>- Collective development by business and IT</li> </ul>

Presenter/s:	Finnegan, B. Y., T
Company:	Lyondell Chemical
Presentation Title:	Lyondell Chemical - Utilizing Campaign Manager for Customer Communications
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	<p>BW</p> <p>Campaign management</p>
Critical Success Factors:	<p>Team Skills</p> <p>Training</p> <p>Testing</p> <p>Technical</p>
Slide 31	<p><u>Lessons Learned Subject Matter Expert</u></p> <p>Create a Subject Matter Expert (SME) position to support super users</p> <ul style="list-style-type: none"> <li>♦ Responsibilities <ul style="list-style-type: none"> <li>▶ Training</li> <li>▶ Testing</li> <li>▶ General support of other users <ul style="list-style-type: none"> <li>▪ <i>First line of troubleshooting</i></li> </ul> </li> </ul> </li> <li>♦ Lead Admin fills role at Lyondell</li> <li>♦ Our IT Group supports SME</li> </ul>
Slide 32	<u>Lessons Learned:</u> Train, train, train

	<ul style="list-style-type: none"> <li>♦ Training must be done by a SME</li> <li>♦ Recommendation: Train a primary and a back-up SME for each region</li> <li>♦ Hands-on/repetitive training a must                         <ul style="list-style-type: none"> <li>♦ Small class ideal setting                                 <ul style="list-style-type: none"> <li>▶ 1.5 – 2 days training   <ul style="list-style-type: none"> <li>▪ Bi-annual refresher training for back-ups</li> </ul> </li> </ul> </li> </ul> </li> </ul>
Slide 33	<u>Lessons Learned:</u> <ul style="list-style-type: none"> <li>• Documentation is very important                         <ul style="list-style-type: none"> <li>♦ Detailed support documents are essential due to the lengthy process</li> <li>♦ Screenshot documentation a must</li> <li>♦ Recommendation: An online tool with recorded transactions</li> </ul> </li> </ul>
Slide 34	<u>Lessons Learned</u> Be diligent about returned emails <ul style="list-style-type: none"> <li>♦ Returned emails indicate accuracy of data in the system</li> <li>♦ Super user must track returned email and resolve email issues with sellers</li> <li>♦ Follow up required to rectify error                         <ul style="list-style-type: none"> <li>▶ Email address change</li> <li>▶ Personnel change</li> <li>▶ Typo in address</li> </ul> </li> <li>♦ Maintain to prevent system pollution</li> </ul>

Presenter/s:	Gerber, M.
Company:	Stihl-Group
Presentation Title:	Global Information System for the international Stihl-Group
Year:	2000
Event:	mySAP Business Intelligence Conference
Location:	Hamburg
Organiser:	SAP
Solution:	
Critical Success Factors:	Management Support Governance Data Quality Change Management Technical
Slide 16	Experiences Project management <ul style="list-style-type: none"> <li>. Data Warehouse projects must be given a high priority “from the top”</li> <li>. Establish standards</li> <li>. Data retrieval</li> <li>. “Clean,” consistent source data is crucial for a project’s success</li> <li>. Data analysis</li> <li>. Allow yourself enough time to check data content</li> <li>. Do not be too ambitious. Keep goals within reach and realistic</li> <li>. Make the queries simple. Many simple queries are better than a few complex ones</li> <li>. Allow enough time for your authorization concept</li> </ul>
Slide 17	Experiences End users <ul style="list-style-type: none"> <li>. The reactions to usability and flexibility were positive</li> <li>. Multilingual capability enables worldwide use of reporting and was appreciated by users</li> </ul>

Presenter/s:	Gerlach, W.
Company:	Air Products
Presentation Title:	Multi-dimensional Thinking: What is OLAP and when should I use it?
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anaheim
Organiser:	ASUG
Solution:	BW OLAP
Critical Success Factors:	Technical
Slide 21	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>• OLAP's analytic engine is more flexible than flat, list-style reports</li> <li>• Aggregated views offer a quick way to scan large quantities of data</li> <li>• SAP BW Infrastructure is a complete package</li> <li>• Business users benefit from a "Single version of the truth"</li> <li>• OLAP is appropriate for a variety of reporting situations</li> </ul>

Presenter/s:	Danninger, G.
Company:	Rockwell Collins
Presentation Title:	Upgrading to SAP NetWeaver 2004s and Leveraging SAP NetWeaver 2004s Business Intelligence Webcast
Year:	2006
Event:	
Location:	Web
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Involvement with SAP Resources
Slide 21	Lessons Learned and Key Advice <ul style="list-style-type: none"> <li><input type="checkbox"/> Involve SAP early and be persistent in getting information</li> <li><input type="checkbox"/> Leverage networking and SAP contacts</li> <li><input type="checkbox"/> Perform the preparation work up front of the SAP Assessment</li> <li><input type="checkbox"/> Identify focus areas so resources can be aligned</li> <li><input type="checkbox"/> Involve customers, BI team and management in a report out from the SAP consultant(s)</li> <li><input type="checkbox"/> Complete high level upgrade plan prior to assessment so SAP can help perform "deep dive" into details</li> <li><input type="checkbox"/> Be open to SAP suggestions</li> <li><input type="checkbox"/> Implement best practices</li> <li><input type="checkbox"/> Stay abreast of changes by utilizing sources provided</li> </ul>

Presenter/s:	Gondesi, V. M., D
Company:	Bristol-Myers Squibb
Presentation Title:	Explore New Features of SAP NetWeaver 7.0 BI with Migration of Front-end from SAP NetWeaver BW 3.5
Year:	2009
Event:	2009 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Scope Change Management Interaction Between Business and Technical Personnel

	Testing Technical
Slide 21	<u>Key Learnings</u> Limit the Scope § Migrate only active reports if possible § Resist temptation to do everything at once § Formulate effective Change Management Strategy § Communicate! § Plan Training and GUI Rollout § Involve Business Users from Day One § Align software components across teams § GUI, Front End patch, Excel and dependent components (.NET framework) § Highly recommend using FEP 801 or later § Get signoff on several sample reports before proceeding for entire population § Optimize the Migration Process

Presenter/s:	Grekin, L.
Company:	
Presentation Title:	Pushing the Envelope: Achieving a truly Global Enterprise Data Warehouse with SAP BW
Year:	2004
Event:	2004 Asug Annual Conference and Vendor fair
Location:	Atlanta
Organiser:	ASUG
Solution:	BW Global
Critical Success Factors:	Data Quality Resources Management support Team skills
Slide 6	Technical Aspects are just one challenge Top Management support Local senior management support Staffing Skills Process reengineering Funding
Slide 33	Key Messages Data Quality <ul style="list-style-type: none"> <li>Data Quality goes beyond the technical aspects and into the processes across the organization</li> <li>Data Quality has to be structured as an ongoing and combined effort between business and IT</li> </ul> Functionality <ul style="list-style-type: none"> <li>Most corporations have an island of excellence/early adoption in Marketing data mart for niche tools to perform</li> <li>Enhanced BI features generally come to market through niche players/start-ups</li> <li>If adopted by the user community, are replicated in BW a couple of years later</li> <li>Most of the required functionality of business intelligence tools is achievable with BW</li> <li>In many cases the requestor organization lacks the maturity to utilize the bleeding edge tools</li> </ul>

Presenter/s:	Griggy, D., Kumar, N.
Company:	OMNOVA Solutions
Presentation Title:	OMNOVA Solutions: How We Managed Change for our BW 3.5 Implementation
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Management Support Team Skills Scope Training Interaction between Business and Technical Personnel Business Content Data Quality
Slide 39	<u>Critical Success Factors</u> <ul style="list-style-type: none"> <li>• Executive sponsorship</li> <li>• Extensive participation by the business in every stage of the project – project should be “business driven” – don’t just say this but do it</li> <li>• Quick and clear decision making process</li> <li>• Clearly defined scope and change control process</li> <li>• Experienced consulting resource</li> <li>• Basis support</li> <li>• Knowledge transfer and training</li> </ul>
Slide 43	<u>Lessons Learned at Omnova</u> <b>Communication</b> <ul style="list-style-type: none"> <li>✓ Early stage demos were the key to spark interest</li> <li>✓ Late stage demos helped understand the solution delivered</li> </ul> <b>Employee</b> <ul style="list-style-type: none"> <li>✓ Don’t underestimate the time needed from the employees</li> <li>✓ Content training is as important as the tool training</li> <li>✓ Training is an iterative process</li> <li>✓ Formal follow up to ensure use of tool</li> </ul>
Slide 44	<u>Lessons Learned at Omnova</u> <b>Content</b> <ul style="list-style-type: none"> <li>✓ Pull to push and back to pull</li> <li>✓ Business content versus customization</li> <li>✓ Master data is the foundation of the solution</li> <li>✓ Quality master data determines the user confidence in the analysis</li> </ul> <b>Management</b> <ul style="list-style-type: none"> <li>✓ Key decision maker/sponsor expedites issue resolution</li> </ul>

Presenter/s:	Gulabrao, P. and F. Koen
Company:	Spectrolab
Presentation Title:	BW - A big win for a small company
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	
Organiser:	ASUG
Solution:	
Critical Success Factors:	User Participation Business Content Change Management Security

## Factors Critical To The Success Of Business Intelligence

	Governance
Slide 25	<p><u>Lessons Learned</u></p> <p>Get a subscription to Columbia House to ensure an ample supply of music.</p> <p>Get a quick win.</p> <p>Allow additional time for team members to learn the new tool.</p> <p>Activate all content that is relevant to the project.</p> <p>Define development authorization profiles as broad as possible, this will reduce “down time”.</p> <p>Implement standard business processes first.</p> <p>If new processes are not defined take extra time to ensure everyone understands the expectant results.</p> <p>Document new processes extensively.</p> <p>Involve the Power users extensively.</p> <p>Spend enough time during design. One mistake and the whole process is affected.</p> <p>Change to query is not like a change to an ABAP report. Could potentially involve ten steps depending on the design flaw.</p> <p>Do regular “show and tell” with the business owners to ensure buy-in and to highlight potential pit-falls early. Users do not know what to expect and the sooner they see the better as it reduces rework and re design.</p> <p>Review the status regularly and adapt to changes when needed rapidly.</p>
Slide 26	<p><u>Lessons Learned</u></p> <p>Cannot validate expected results until total custom process is built. Make changes to the design much more painful down the line.</p> <p>Allow only one developer to manage transports. Will reduce locked objects and failed transports.</p> <p>When activating new objects ensure you do not overwrite objects already migrated.</p> <p>Keep key figure behavior as over write or addition in custom info providers in mind during design.</p> <p>Allow extra time for transports. During go-live we transported objects for seven days.</p> <p>Keep meetings focused and to a minimum.</p> <p>Design to ensure characteristics are constant when using multi providers.</p> <p>Test new plug-in. Research of new content and bugs cost valuable time.</p> <p>Do not under estimate the support required after go-live. With more than 175 jobs running through the week even a 1% failure rate takes a long time to fix without help.</p> <p>Sign a support agreement for onsite or remote help.</p>

Presenter/s:	Guleria, H.
Company:	Jabil Circuit
Presentation Title:	Successfully migrating legacy data to BW at Jabil Circuit
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anaheim
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	<p>Management Support</p> <p>Methodology</p> <p>Team skills</p>
Slide 25	<p><u>Key Success Factor</u></p> <p>Define BI ‘Strategy’ prior to creating any ‘Tactical’ solutions</p> <ul style="list-style-type: none"> <li>• Planning, and further planning is highly critical to the success of every BW project</li> <li>• Define overall ‘Strategy’ prior to fixing ‘Tactical’ needs</li> <li>• Provide a team that understands ‘Source’ and ‘BW’ functionalities. Both if possible</li> </ul>



	<ul style="list-style-type: none"> <li>• It has been done thousands of time before, so provide executive sponsorship to the success of the project</li> </ul>
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Presenter/s:	Heldt, A.
Company:	Kimberly Clark
Presentation Title:	Getting started with SAP Business Warehouse (BW)
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Team Skills Business content Resources
Slide 46	<p>Managing Expectations</p> <ul style="list-style-type: none"> <li>• BW implementation timelines vary widely. Biggest factors..             <ul style="list-style-type: none"> <li>– Using Business Content out-of-the-box</li> <li>– Simultaneous implementation with other SAP solutions, R/3, APO, CRM, etc.</li> <li>– Experience of BW staff</li> <li>– Availability of business process resources</li> </ul> </li> </ul>

Presenter/s:	Helling, F.
Company:	Epson Europe
Presentation Title:	A roller coaster ride to report standardization with SAP BW
Year:	2000
Event:	mySAP Business Intelligence Conference
Location:	Hamburg
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Team skills Data Quality Training Change Management Partners
	<u>Project Experiences and Lessons Learned</u> Assign ownership Master and organisational data harmonized Clarify pre-requisites for BIW Hardware in place before project kick-off Training done before project kick-off
Slide 19	<u>Project Experiences and Lessons Learned</u> BIW Support organisation set up asap Communication structure set asap Knowledge-data base defined asap Only accept top-experienced consultants Assign very experienced project manager

Presenter/s:	Hickie, B. and S. Jensen
Company:	McKesson Corporation
Presentation Title:	Building the Foundation of a 10+ Tera Byte BW Data Warehouse

## Factors Critical To The Success Of Business Intelligence

Year:	2003
Event:	2003 ASUG Annual Conference
Location:	
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Resources Performance Methodology User Involvement Change management Team skills Technical
Slide 11	<u>Minimizing Project Risk</u> <ul style="list-style-type: none"> <li>• Divide and Conquer approach <ul style="list-style-type: none"> <li>• Phased rollout</li> </ul> </li> <li>• Focus on functionality end-state <ul style="list-style-type: none"> <li>• Implementation driven by ERP functionality</li> </ul> </li> <li>• Identify key business groups open to change <ul style="list-style-type: none"> <li>• Involve stakeholders in project as “extended” development team</li> <li>• ERP project team and Change Leadership integration</li> </ul> </li> <li>• Build foundation first <ul style="list-style-type: none"> <li>• Architectural principles</li> <li>• “Data” Infrastructure</li> <li>• Proof of Concepts (PoCs)</li> </ul> </li> <li>• Project team education</li> </ul>
Slide 46	Lessons Learned During our Project <ul style="list-style-type: none"> <li>• Appropriate project resources</li> <li>• ERP/BI integration on various levels</li> <li>• Early integration of “auxiliary” teams <ul style="list-style-type: none"> <li>• QA, change leadership/training, internal audit</li> </ul> </li> <li>• Phased functionality rollout</li> <li>• Test &amp; Training system resource limitations</li> <li>• Production start up issues</li> <li>• Hardware impacts</li> </ul>

Presenter/s:	Hooker, G.
Company:	Commonwealth Department of Families, Housing, Community services and Indigenous Affairs
Presentation Title:	BI Rel 7.0 - Implementing Human Resources reporting Via the Web
Year:	2008
Event:	SAUG Brisbane Plenary
Location:	Brisbane
Organiser:	SAUG
Solution:	BW
Critical Success Factors:	Business Content Technical
Slide 37	<u>Lesson learned</u> Build the Headcount and Actions Infocube first – ie one HR Infocube at a time Use a “Prototype” approach when building your solution – do lots of demos - use real data if possible Do not transport the Infocube, web templates queries, infopackages for automation etc UNTIL solution is ready for testing in the QA environment.
Slide 38	<u>Lesson learned</u> Do not activate business content for each Infocube until you really need to do that cube.

	Build your process chains in Development and transport them thru all environments. For each data source you should build one 'auto' and one 'manual' infopackage. Then add all the 'auto' packages only into process chains
Slide 39	<u>Lesson learned</u> Provide one 'super query' for each Infocube you build and give to small number of business users Suggest that you do not allow super users to create queries directly in production. However, if you do allow this, then provide a managed name range for this purpose. (Mature v maturing organisations)

Presenter/s:	Huang, M., Daryapurkar, A.
Company:	OfficeMax
Presentation Title:	OfficeMax : Sale Planning / Forecasting and Related Planning in BPS/BW
Year:	2004
Event:	2004 ASUG Annual Conference & Vendor Fair
Location:	Atlanta
Organiser:	ASUG
Solution:	BW SEM
Critical Success Factors:	Source System Methodology Data Quality Partners Technical
Slide 39	Lessons Learned 1. Data Consistency and integrity issues from different source systems and allowing enough time and resources to tie out the systems 2. A little beautification of interface and layouts increase user acceptance significantly 3. Prototyping of InfoCubes in addition to Planning Layouts and functions was very valuable for functional teams to visualize the deliverable and determine feasibility of solution 4. A clear version strategy and communication regarding version management is very important 5. Some work arounds are required to deliver the functionality needed that is not easily achievable in SEM-BPS 6. Partner consultants with team members to ensure knowledge transfer
Slide 46	

Presenter/s:	Hughes, K., Thoreson, L.
Company:	General Mills
Presentation Title:	BW Data Stewards - VADR - A Case Study at General Mills
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anaheim
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Governance Training Data Quality Interaction Between Business and Technical Personnel

## Factors Critical To The Success Of Business Intelligence

	Resources Technical
Slide 33	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>Managing expectations early in the project by embedding business representatives in the project team</li> <li>Challenges of a BW project with multiple stakeholders and conflicting information requirements</li> <li>The long-term importance of a dedicated Data Steward team to facilitate continued best practices and ensure information quality across an integrated BW reporting environment.</li> </ul>
Slide 34	Lessons Learned <ul style="list-style-type: none"> <li>Building systems which provide integrated data crossing technologies and user groups is a challenge. <ul style="list-style-type: none"> <li>If you are functionally aligned how do you prioritize resources?</li> <li>If you are a corporate resource, how do you accurately represent the business needs?</li> </ul> </li> <li>The learning curve to understand business requirements and develop technical solutions that cross R/3, BW and other included technologies is significant. <ul style="list-style-type: none"> <li>Staffing the both the IS and business sides of the equation is critical to the success of the project</li> <li>An integrated system that is <b><i>not</i></b> designed for a single function / user group will be more difficult to build and maintain, <i>integration comes at a cost</i> (compare to an application with a more focused user group like CO-PA or SEM)</li> </ul> </li> </ul>

Presenter/s:	Hughes, K., Teeter, C.
Company:	General Mills
Presentation Title:	A Successful Strategy to Cross Functional, Multi-Level BI Needs at General Mills
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	
Organiser:	ASUG
Solution:	
Critical Success Factors:	Team Skills Training Change Management Technical
Slide 33	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>Design team makeup for the environment <ul style="list-style-type: none"> <li>May not be the way you 'did things before'</li> <li>Integrate training and documentation into the project</li> </ul> </li> <li>Don't underestimate the cost of integration, or the value <ul style="list-style-type: none"> <li>Measure twice, cut once</li> </ul> </li> <li>Understand your audiences and their needs (it takes more analysis than you think) <ul style="list-style-type: none"> <li>Assess degree of change and complexity</li> <li>Tailor the solution to multiple levels – make it effective!</li> </ul> </li> <li>Tailor design and delivery of training to each audience</li> <li>Pre-training activities to help users prepare for change <ul style="list-style-type: none"> <li>Never surprise a user in training</li> </ul> </li> </ul>

Presenter/s:	Jensen, S.
Company:	McKesson
Presentation Title:	Building the Foundation of a 10+ TByte BW Data Warehouse
Year:	2004

Event:	2004 ASUG Annual Conference & Vendor fair
Location:	Atlanta
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Resources Team Skills Interaction of Business and Technical Personnel
Slide 46	<u>Lessons Learned During our Bi Project</u> Appropriate project resources ERP/BI integration on various levels Early integration of “auxiliary” teams QA, change leadership/training, internal audit Phased functionality rollout Test & Training system resource limitations Production start up issues Hardware impacts
Slide	<u>Project Resources</u> Resources must include a balance of business, functional, and technical resources Roles must be defined, communicated, and enforced Skills assessment should be conducted for each project resource based on role definition Do not hesitate to transition resources (consultants and employees) if skills are not appropriate If using an Integrator, ensure objective review of skill sets

Presenter/s:	Julian, R.
Company:	MassMutual Financial Group
Presentation Title:	Making the Enterprise Information Factory a Reality with SAP NetWeaver BI at MassMutual
Year:	2008
Event:	2008 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Source System Testing Change Management Technical
Slide 41	<u>Best Practices/Learnings/Do Differently</u> Grab ALL Business Data from Source Systems Stop Managing Point-to-Point Testing Coordination Outbounds Should be More Canonical Cultural Impacts Establish a Build Schedule Concurrent Development Testing

Presenter/s:	Khalil, W.
Company:	Saudi Aramco
Presentation Title:	Upgrading a Large Data Warehouse From BW2.0B to BW3.0B
Year:	2003
Event:	2003 ASUG Annual Conference

## Factors Critical To The Success Of Business Intelligence

Location:	
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Management Support User Participation Resources Scope Methodology Interact with SAP Technical
Slide 28	Critical Success Factors Get Management Support Obtain User Commitment Consult with SAP Complete a full discovery & evaluation prior to start Define scope of upgrade Prepare a solid project plan with Basis team Get key resources ready and committed (35 BW experts, 5 Basis, 2 Authorization, 3 Complementary) Freeze major development Complete Alpha Conversion prior to upgrade Plan awareness sessions

Presenter/s:	Khritonenko, A.
Company:	Ukrainian Mobile Communication
Presentation Title:	SAP NetWeaver – Strategic Platform for Enterprise Data Warehousing at Ukrainian Mobile Communication
Year:	2005
Event:	SAP Business Intelligence & Analytics Conference 2005
Location:	
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Management Support User Participation Team Skills Scope Interact with SAP
Slide 20	DWH Project Lessons Learned Success factors: Concrete achievable goals Well-defined project scope Dedicated team Support from key-users Local support from SAP Ukraine Problems: Gathering requirements Data model for TELCO Performance on first stages Scope creep

Presenter/s:	King, M., Yelamaneni, K.
Company:	Allegheny Energy
Presentation Title:	How Self-service Gives Business Users the Power of Reporting
Year:	2009
Event:	2009 ASUG Annual Conference

Location:	Orlando
Organiser:	ASUG
Solution:	BW Reporting
Critical Success Factors:	Resources Governance Training Security Business Content Interaction between Business and Technology Personnel Technical
Slide 24	<u>Key Success Factors fro Reporting Self Service Model</u> Full-time dedication of the individual performing the Reporting Business Analyst role <input type="checkbox"/> Issues experienced with time available of those individuals committed less than 100% to the role <input type="checkbox"/> Assign development role by business process <input type="checkbox"/> Provide standards on reporting tool selection <input type="checkbox"/> Reinforce process training at regular networking sessions
Slide 25	<u>Key Learnings</u> Reporting Business Analyst fills the knowledge gaps (process & technology) between business users and IT <input type="checkbox"/> Integrated security model for a reporting self-service will reduce manual authorizations and securing the content <input type="checkbox"/> Simplified reporting architecture eliminates complexity in creating and publishing reports <input type="checkbox"/> Do not change SAP data extractors <input type="checkbox"/> Leverage standard SAP content extensively (from data extractors and models to queries, web templates & dashboards) <input type="checkbox"/> Remember that one SAP reporting tool does not address all information needs cost effectively <input type="checkbox"/> Use all available tools with established usage guidelines (SAP BI and ECC) <input type="checkbox"/> Establish clear operational and governance processes

Presenter/s:	Kleinjans, R., Saifuddin, M., Sheffer, A
Company:	Wolverine World Wide
Presentation Title:	How the BPS and BCS Functionality of SAP SEM Helped Streamline Planning and Actuals Consolidation
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	SEM
Critical Success Factors:	Technical Reporting Strategy
Slide 47	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>• Cyclical availability of Finance team members</li> <li>• Iterative development/playback approach</li> <li>• R/3 Group Acct Number to map to Global COA</li> <li>• BCS master data maintenance (COA, PCs)</li> <li>• R/3 preparations (e.g., Trading Partners, GLPCT)</li> <li>• Historical data impact on reconciliation timelines</li> <li>• Reporting strategy options <ul style="list-style-type: none"> <li>• Impacts the InfoCube design and development</li> </ul> </li> </ul>

## Factors Critical To The Success Of Business Intelligence

Presenter/s:	Kode, S.
Company:	Protec
Presentation Title:	SOx Control Reports Using SAP Netweaver BI for Accounts Receivables
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	BW Accounts recievable
Critical Success Factors:	Technical
Slide 30	<u>Best Practices</u> <ul style="list-style-type: none"> <li>• Implementation of an enterprise data warehouse architecture</li> <li>• Use of multiproviders for reporting</li> <li>• Use of internal controls such as sign-offs for design, test scripts and production moves</li> </ul>
Slide 31	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>• Design considerations for a SOx control reports</li> <li>• A proven solution to provide non-editable reports (PDF) via Dazel web delivery (InfoBox)</li> <li>• Understanding of a process and an enterprise data warehouse architecture that is proven to work</li> </ul>

Presenter/s:	Koen, F.
Company:	Spectrolab
Presentation Title:	BW Reduces Our Total Cost of Information Ownership - A Success Story
Year:	2003
Event:	ASUG 2003 Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	User Participation Team skills Business Content Change Management Security Technical
Slide 24	<u>Lessons Learned</u> Get a subscription to Columbia House to ensure an ample supply of music. Get a quick win. Allow additional time for team members to learn the new tool. Activate all content that is relevant to the project. Define development authorization profiles as broad as possible, this will reduce "down time". Implement standard business processes first. If new processes are not defined take extra time to ensure everyone understands the expectant results. Document new processes extensively. Involve the Power users extensively. Spend enough time during design. One mistake and the whole process is affected. Change to query is not like a change to an ABAP report. Could potentially involve ten steps depending on the design flaw. <b>Do regular "show and tell" with the business owners to ensure buy-in and to highlight potential pit-falls early. Users do not know what to expect and the sooner they see the better as it reduces rework and re design.</b> Review the status regularly and adapt to changes when needed rapidly.



Slide 25	<p><u>Lessons Learned</u></p> <p>Cannot validate expected results until total custom process is built. Make changes to the design much more painful down the line.</p> <p>Allow only one developer to manage transports. Will reduce locked objects and failed transports.</p> <p>When activating new objects ensure you do not overwrite objects already migrated. Keep key figure behavior as over write or addition in custom info providers in mind during design.</p> <p>Allow extra time for transports. During go-live we transported objects for seven days.</p> <p>Keep meetings focused and to a minimum.</p> <p>Design to ensure characteristics are constant when using multi providers.</p> <p>Test new plug-in. Research of new content and bugs cost valuable time.</p> <p>Do not under estimate the support required after go-live. With more than 175 jobs running through the week even a 1% failure rate takes a long time to fix without help.</p> <p>Sign a support agreement for onsite or remote help.</p>
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Presenter/s:	Koerner, J.
Company:	Inforte
Presentation Title:	Key success factors for using SAP NetWeaver BI to accelerate your financial period-end close process
Year:	2008
Event:	Reporting and Analytics 2008
Location:	Las Vegas
Organiser:	Wellesley Information Services
Solution:	BW
Critical Success Factors:	<p>Strategic</p> <p>Scope</p> <p>Resources</p> <p>Team Skills</p> <p>Methodology</p> <p>Data Quality</p> <p>Technical</p>
Slide 33	<p><u>Key Success Factor – The Right Mix of Skills in Your Team</u></p> <p>An important project success factor is the right team mix</p> <ul style="list-style-type: none"> <li>• Many BI project teams are too heavy on technical people</li> <li>• In order to make a solution successful data experts and business process experts are an equally important part of the team</li> </ul>
Slide 34	<u>Key Success Factor – Look Beyond Technology -Strategic alignment</u>
Slide 35	<p><u>Key Success Factor – Put Money where it matters</u></p> <p>Most BI projects vastly underestimate the importance of people in project success</p>
Slide 36	<p><u>Key Success Factors – Lessons Learned</u></p> <p>Get business users on the team full time</p> <p>Don't rely on technical BI people to understand your processes and your data</p> <p>Data is paramount</p> <p>Ensure to have team members who understanding of your transaction data in the underlying source systems (e.g., SAP ERP)</p> <p>Ensure to have team members that understand the process of creating new master data and hierarchies needed for reporting</p> <p>Phase the project</p> <p>Fast small steps rather than painfully slow strides</p> <p>Get the basics right – add “bells and whistles” later</p> <p>Implement formal sign-off and scope control procedures</p>
Slide 37	<p><u>Key Success Factors – Lessons Learned</u></p> <p>Invest in great design ... it will pay off down the line</p>

## Factors Critical To The Success Of Business Intelligence

	<p>Hire a strong architect who understands not only the tool, but also the data</p> <p>Remember: Errors stemming from bugs are easy to fix, the ones stemming from design flaws are the expensive ones</p> <p>The front end is the face of your solution</p> <p>Great designs and elegant technical solutions will die without an engaging front end</p> <p>Have BI-BEx people and business people co-design</p> <p>Have the business users mock-ups their reports and logic in Microsoft Excel</p>
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Presenter/s:	Kutty, R.
Company:	Eastman Kodak
Presentation Title:	An Eastman Kodak Company Behind the Scenes Look at Web Enabling the Data Warehouse: e-success!
Year:	2001
Event:	2001 ASUG Annual Conference
Location:	Miami Beach
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	<p>Team Skills</p> <p>Methodology</p> <p>Interaction with SAP</p> <p>Training</p> <p>Management support</p> <p>Change Management</p> <p>Technical</p>
Slide 24	<p><u>Key Contributions to Success</u></p> <p>Attitude: “can do” and relentless Perseverance.</p> <p>Uncompromising partnership – Kodak, SAP, and Arcplan</p> <p>An integral pre-requisite: <u>Adequate Training</u> especially w.r.t Bleeding Edge technology</p> <p><u>Knowledge-based Team</u> vis-a-vis Availability-based Team</p> <p>Team should encompass all areas - Infrastructure, Design &amp; Development, DBAs, BASIS, Application Development etc.,</p> <p>Well defined user requirements</p> <p><u>Continuous interaction with the user group</u> (representative) at all stages of the project</p> <p><u>Educate and Inform</u> on the technical possibilities/ limitations outside the scope of the requirements and/ or functional specifications</p> <p>Change Management</p> <p>Start Small (Deployment) -Think Big (R&amp;D)</p> <p>Project Durations – Optimistic vis-à-vis Realistic</p> <p>System Test environments, Conditions, simulations</p> <p>Laptop and Desktop</p> <p>LAN and WAN</p> <p>DSL/ Cable and Dial up</p> <p><u>Reengineer</u> where and as often as needed</p> <p>The Processes should <u>facilitate not vegetate..</u></p> <p>Document - Establish the ground rules for documentation; BEFORE or AFTER and the degree of documentation to be pursued.</p> <p>Recognition and Support from Sponsors and Management</p>

Presenter/s:	Landis, B., Leslie, G.
Company:	Johnson and Johnson
Presentation Title:	Deploying SAP BI Analytics & Dashboards for the Casual User: A Case Study at Joh
Year:	2005

Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	
Organiser:	ASUG
Solution:	BW Dashboard
Critical Success Factors:	User Participation Business Content Technical
Slide 31	<u>Dashboards – Lessons Learned</u> Usability drives acceptance, usage, etc.... _ Simple improvements can have big effects _ Benefits Realization when your users “use“ the system _ Make smarter decisions faster! _ Less is More for certain user groups _ Leverage tools you have in place _ No need to constantly chase the product releases _ Web Application Designer can greatly improve reporting look & feel _ Ongoing phased rollout approach for enhancements _ Use data from BW Statistics cubes to validate user feedback / prioritize work items

Presenter/s:	LaRusso, J. and J. Redmon
Company:	International Paper
Presentation Title:	Meeting the SAP Reporting Challenges at International Paper
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	BW Reporting
Critical Success Factors:	Resources Business Content Training Data Quality Technical
Slide 8	<u>Critical Success Factors</u> Increase Sales Representatives ability to: <ul style="list-style-type: none"> <li>• Effectively manage relationships</li> <li>• Respond to service needs (managing inventories)</li> <li>• Grow the accounts</li> </ul> Proactively manage the continuous improvement of profitability and margin derived from the account
Slide 40	<u>Lessons learned</u> Data management and integrity Avoiding record duplication and ensuring consistency of information Resource constraints
Slide 41	<u>Lessons Learned – Team’s experience</u> The team background Mapping the R/3 development team skill sets to BW The utilization of SAP training to enhance BW developer skills Customization of business content
Slide 42	<u>Lessons Learned – SAP &amp; Crystal Support</u> <ul style="list-style-type: none"> <li>• Early life cycle for integration of products</li> <li>• Documentation</li> <li>• Throughout the project SAP and Crystal provided support with varying degrees of response time</li> </ul>

## Factors Critical To The Success Of Business Intelligence

Presenter/s:	Lemos, D., Silvia, P.
Company:	Pacific Gas and Electric
Presentation Title:	Implementing SAP NetWeaver Business Warehouse Accelerator at PG&E: Lessons Learned.
Year:	2009
Event:	2009 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW BIA
Critical Success Factors:	Management Support Team Skills Technical
Slide 36	<u>PG &amp; E Top 10 Lessons Learned</u> 1. Plan to order hardware early - lead times can be long 2. Make sure you have a committed project sponsor 3. Update to latest service pack 4. Involve your basis team and environment management team early 5. BWA may be an “appliance” but its not a toaster (more like solar panels)
Slide 37	<u>PG &amp; E Top 10 Lessons Learned</u> 6. Create benchmarks for workbooks, queries and cockpits to document success 7. Run the query analysis to identify queries which BWA provides greatest/least benefit 8. Perform query tuning and potential redesign as part of a larger system performance tuning effort. 9. Make sure failovers and spare blades are part of your hardware sizing 10. Create a small dedicated team with access to external expertise as needed

Presenter/s:	Loeser, S., Schafer, K.
Company:	Coca Cola
Presentation Title:	Comprehensive Integration of Planning and Reporting for Sales and Controlling
Year:	2005
Event:	SAP Business Intelligence & Analytics Conference 2005
Location:	Dusseldorf
Organiser:	SAP
Solution:	BW Integrated Planning
Critical Success Factors:	Team skills Use involvement Methodology Data Quality Interaction Between Business and Technical Personnel Change Management Performance Security Technical
Slide 17	<u>We’ve learned to appreciate the value of integration management as critical success factor</u> <ul style="list-style-type: none"> <li>• Projects of this size have plenty of <b>integration issues</b> to be recognized and to take care of adequately. Complexity requires <b>team work</b> instead of a ‘single integration guru’.</li> <li>• Clarification of <b>ownership</b> is prerequisite to ensure quick and target-driven decision making. Missing ownership delays progress significantly.</li> <li>• <b>Comprehensive</b> topics ( e.g. information modeling, authorizations) require <b>integration</b> of the different <b>aspects</b> and <b>views</b> from the project streams.</li> <li>• A structured but time-consuming <b>step by step approach</b> in the beginning (content analysis &gt; information-model &gt; logical data-model &gt; technical datamodel), in the end, reduces re-design efforts noticeable.</li> </ul>

	<ul style="list-style-type: none"> <li>• <b>Prototyping</b> allows to converge towards a user-accepted and feasible solution and contributes to increasing data and functional quality.</li> <li>• Regular and open <b>communication</b> as well as close collaboration with the <b>user community</b> maintains awareness, improves acceptance and finally increases tolerance in case of difficulties.</li> </ul>
Slide 30	<p><u>We've learned taming a dragon needs to be well prepared, properly and jointly executed by several parties</u></p> <ul style="list-style-type: none"> <li>• Well-structured <b>methodology</b> and in-depth BW/SEM-BPS <b>expertise</b> where the most important success-factors</li> <li>• The intention to cover all professional requirements brought <b>hardware, software</b> and <b>people</b> to their <b>limits</b></li> <li>• <b>Master data</b> is the key for validity and quality of results</li> <li>• Results need to be assessed with pragmatic <b>business driven focus</b>, accounting principals are often not applicable</li> <li>• Significant <b>engagement</b> of <b>functional department</b> is crucial</li> <li>• Strong <b>Key-user expertise</b> covering content and technical background is required to understand dependencies and analyze results</li> </ul>
Slide 32	<p><u>During the project all participants learned their lessons ...</u></p> <ul style="list-style-type: none"> <li>• Management of <b>joint Business/IT</b>-projects of this size require dedicated <b>Change Management</b> for users and all stakeholders</li> <li>• Clarification of <b>process-</b> and <b>data-ownership</b> needed to increase sensitivity for reporting and planning specific issues</li> <li>• <b>Role-sort</b> between functional departments and Business Systems (IT) to be clarified (Poweruser concept, Support organization)</li> <li>• Understanding for the need to <b>reconcile integrative aspects</b> (foundation of the Business Intelligence Council)</li> <li>• Cleansing of data and permanent monitoring of <b>data-quality</b> (master data, maintenance processes) are fundamental</li> <li>• Assessment of <b>performance</b> and <b>authorization</b> aspects needs to take place in an early stage of the project</li> <li>• <b>Partnership</b> of all stakeholders aligned towards a common objective is a key success factor</li> </ul>

Presenter/s:	Love, R.
Company:	AFLAC
Presentation Title:	SEM at AFLAC, Using SAP to Support Long-Term Planning
Year:	2004
Event:	2004 Enterprise Resource Planning Forum
Location:	
Organiser:	ASUG
Solution:	SEM
Critical Success Factors:	Testing Training Partners Technical
Slide 22	<p><u>Lessons Learned</u></p> <p>Test, Test, Test, Utilize the consultants for knowledge transfer Provide up-front training, particularly on modules and FOX Programming Twelve weeks is a challenge for some long-term planning environments</p>

Presenter/s:	Lowery, S., Madill, M., Walsh, N
Company:	Walt Disney
Presentation Title:	Leveraging SAP NetWeaver BI Functionality After SAP BW Upgrade
Year:	2008
Event:	2008 ASUG Annual Conference
Location:	Orlando

## Factors Critical To The Success Of Business Intelligence

Organiser:	ASUG
Solution:	BW Upgrade
Critical Success Factors:	Change Management Methodology Interaction with SAP Team Skills Security Technical
Slide 13	<u>Change Management and Communication</u> <ul style="list-style-type: none"> <li>▪ Don't underestimate the impact of minor changes to end users</li> <li>▪ Consider changes that are seen and unseen <ul style="list-style-type: none"> <li>▪ Changes in appearance of tool/functionality</li> <li>▪ Changes in underlying security authorization</li> <li>▪ Impacts to technical support organizations</li> </ul> </li> <li>▪ Customized workbook impacts</li> <li>▪ Effective and timely communication is key</li> </ul>
Slide 15	<u>Lessons Learned</u> Maintenance of roles for Security Team has been simplified by using InfoArea security and new Analysis Authorizations, but it was a bumpy road getting there Implementation would have been smoother if we had a resource from SAP that had been through an upgrade Functionality changes have been fraught with bugs. Users can not start using new functionality until some of the bugs have been fixed or 'enhancements' have been implemented through support stacks A detailed cutover plan came in really helpful when issues arose during setting users anticipation for system downtime and load catch-up

Presenter/s:	Madill, M.
Company:	Walt Disney
Presentation Title:	Disney: Safe and Sane Approach to Deploying BW Query Builders
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW Reporting
Critical Success Factors:	Security Training User participation Technical
Slide 25	<u>Key Learnings</u> Need to educate, certify, monitor and support ongoing Consider security implications and mitigate the risks Build queries against the BW meta data for monitoring Form a user group to assist on ongoing support user skills change management

Presenter/s:	Madill, M.
Company:	Walt Disney
Presentation Title:	Walt Disney: Complementing SAP NetWeaver BI with COGNOS and Business Objects
Year:	2008
Event:	2008 ASUG Annual Conference

Location:	Orlando
Organiser:	ASUG
Solution:	BW Other BI
Critical Success Factors:	Performance Technical
Slide 17	<p>Lessons Learned</p> <p>Need to balance flexibility added in the meta level to performance on the SAP server</p> <p>Use queries to drive Cognos Packages or Business Objects Universe, not direct cube access</p> <p>Hierarchies work significantly different in BI tool than in SAP</p> <p>Security will need to be maintained in both SAP and BI Tool</p> <p>BI Reporting Tools are <b>NOT</b> as Bex is</p> <p><input type="checkbox"/> Need to manage user expectations</p>

Presenter/s:	Manrique, E.
Company:	Inforte
Presentation Title:	Implementing Strategic Enterprise Management
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	Anaheim
Organiser:	ASUG
Solution:	SEM
Critical Success Factors:	<p>Resources</p> <p>Team skills</p> <p>Methodology</p> <p>Interaction between Business And Technical</p> <p>Change management</p> <p>Scope</p> <p>Data Quality</p> <p>Training</p> <p>Technical</p> <p>Security</p> <p>Strategy</p>
Slides 21-23	<p><u>Lessons Learned</u></p> <p>Resources</p> <p>Interaction between Business And Technical</p> <p>Change management</p> <p>Scope</p> <p>Data Quality</p> <p>Training</p> <p>Technical</p>
Slide 24	<p><u>Lessons Learned</u></p> <p>Drive business design completion to closure</p> <p>_ Establish some type of Blueprint – data flows, questionnaires, customizing templates. Blueprint templates found in SEM-BPS ASAP CD</p> <p>_ Use Blueprint document as a functional spec for design and configuration – make it a living document for training and support purposes</p> <p>_ Apply the latest support packages when possible (new functionality, plus bug fixes)</p> <p>_ Know BW or someone the team that does – become familiar with SEM and BW variables</p> <p>_ Though similar, the Balanced Scorecard is not the same as the Management Cockpit (value field vs. frame customizing)</p>
Slide 25	<u>Lesson Learned</u>

## Factors Critical To The Success Of Business Intelligence

	<p>In order to be truly successful, you must get 100% buy in from the business and 100% resource commitment from the business – the solution should not be owned by IT</p> <ul style="list-style-type: none"> <li>_ Gather all requirements upfront and map requirements to specific planning functions and prototype the solution</li> <li>_ Nail down scope, obtain business sign off and stick to it. Otherwise agree to strict change control procedures since the timeline will most likely be impacted</li> <li>_ Conduct workshops with key users along the way for buy in and validation of business requirements/processes</li> <li>_ Test integration with other SEM components</li> <li>_ Look at authorizations as soon as possible</li> </ul> <p>Leverage existing strategy Review data requirements</p>
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Presenter/s:	Manrique, E.
Company:	Inforte
Presentation Title:	BW Reporting for Finance Personnel
Year:	2004
Event:	2004 Enterprise Resource Planning Forum
Location:	Atlanta
Organiser:	ASUG
Solution:	BW Reporting
Critical Success Factors:	Business Content Strategic
Slide 33	<p><u>Key learnings</u></p> <p>BW reporting for core Finance has matured, but in industry specific areas SAP is working on delivering additional capabilities over the years to come.</p> <p><input type="checkbox"/> FICO &amp; HRM BW Business Content covers a lot. Review and use it, but you will need to implement appropriate adjustments based on your business requirements and source systems, so PLAN for it (FTE, TIME &amp; \$\$\$)</p> <p><input type="checkbox"/> In addition to your statutory ‘must’ have reports, ensure your BW reporting and Business Intelligence solution helps securing your competitive position, growth and sustainable profitability</p>

Presenter/s:	Manrique, E.
Company:	Inforte
Presentation Title:	Delivered BW Reporting for FICO/HRM and Implementation Strategies
Year:	2004
Event:	2004 Enterprise Resource Planning Forum
Location:	
Organiser:	ASUG
Solution:	BW Reporting FICO/HR
Critical Success Factors:	Strategy Business content
Slide 29	<p><u>Key Learnings</u></p> <ul style="list-style-type: none"> <li>• Key Learning 1 <ul style="list-style-type: none"> <li>• Business Strategy/ Information Delivery Strategy (IDS) ALWAYS NEEDED</li> </ul> </li> <li>• Key Learning 2</li> </ul>



	<ul style="list-style-type: none"> <li>Business Strategy/ Information Delivery Strategy (IDS) ALWAYS NEEDED</li> <li>Key Learning 3           <ul style="list-style-type: none"> <li>Business Strategy/ Information Delivery Strategy (IDS) ALWAYS NEEDED</li> </ul> </li> <li>Key Learning 4           <ul style="list-style-type: none"> <li>FICO &amp; HRM BW Business Content covers a lot. Review and use it, but you will need to implement appropriate adjustments based on your business requirements and source systems, so PLAN for it (FTE, TIME &amp; \$\$\$)</li> </ul> </li> </ul>
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Presenter/s:	Manrique, E.
Company:	Inforte
Presentation Title:	Lessons Learned from Implementing SEM - Part II
Year:	2004
Event:	2004 ASUG Annual Conference & Vendor Fair
Location:	Atlanta
Organiser:	ASUG
Solution:	SEM
Critical Success Factors:	Management Support Data Quality Team Skills Strategy Change Management Training
Slide 33	data quality <ul style="list-style-type: none"> <li>No database or information source has 100% completely accurate and complete information. The purpose of a data quality program is to have as good as information as possible, assign ownership of data quality, monitor and measure data quality, and be able to explain data quality issues.</li> </ul> user skills <ul style="list-style-type: none"> <li>The organization must invest in analytical resources in order to leverage a new reporting and analytics environment appropriately.</li> </ul> data model and requirements <ul style="list-style-type: none"> <li>The data model expresses the business requirements in a technical format. Misaligned or misunderstood requirements lead to a poor design which leads to non-use.</li> </ul> Production support <ul style="list-style-type: none"> <li>The data warehouse lives and breathes everyday, data must be loaded and monitored, data quality must be checked, and users questions must be answered in a timely fashion.</li> </ul> executive commitment and expectations <ul style="list-style-type: none"> <li>Executive championship, coaching and sponsoring helps people adopt data warehousing and exploit its value. Keeping Executive expectations in line generates satisfied users and business results.</li> </ul> training and change management <ul style="list-style-type: none"> <li>Technical personnel, business personnel, and project management personnel will all see changes to their job description. Helping people through this helps ensure success.</li> </ul>

Presenter/s:	Maravilla, M., Vines, G., Woyicki, S.
Company:	Integrity Media
Presentation Title:	Implement SAP BW faster with SAP Best Practices for Business Intelligence
Year:	2004

## Factors Critical To The Success Of Business Intelligence

Event:	2004 ASUG Annual Conference & Vendor Fair
Location:	
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	<p>Scope</p> <p>Data Quality</p> <p>User Interaction</p> <p>Team skills</p> <p>Business Content</p> <p>Security</p> <p>performance</p> <p>Technical</p>
Slide 24	<p>The technical landscape can be the biggest challenge.</p> <p>Having a Basis person who is familiar with the issues that may arise is crucial to maintaining a project schedule.</p>
Slide 28	<p><u>BW Best Practices</u></p> <p><b>Project Preparation</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Clearly define scope, focus on Reporting “Pains”</li> <li><input type="checkbox"/> Realistic understanding of project conflicts (i.e. parallel implementations)</li> <li><input type="checkbox"/> Identify Team Roles</li> <li><input type="checkbox"/> Data Extraction</li> <li><input type="checkbox"/> Front End</li> <li><input type="checkbox"/> Data Architect</li> <li><input type="checkbox"/> Application Specialist</li> <li><input type="checkbox"/> Basis/Security</li> <li><input type="checkbox"/> Heavily engage user community early!</li> <li><input type="checkbox"/> Work as part of the project team during implementation</li> <li><input type="checkbox"/> Augment project team</li> <li><input type="checkbox"/> BW Advocates to the user community</li> </ul>
Slide 29	<p><u>BW Best Practices</u></p> <p><b>BluePrint</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Define Approach – Top Down or Bottom Up</li> <li><input type="checkbox"/> Define Reporting Requirements – Strategic, Tactical, Operational</li> <li><input type="checkbox"/> <i>Set Expectations about what type of information BW will and will not deliver!!!</i></li> <li><input type="checkbox"/> Leverage Business Content</li> <li><input type="checkbox"/> Joint Application Development Sessions with Key Users to develop/sign off on Data Models</li> <li><input type="checkbox"/> Establish Naming Conventions</li> <li><input type="checkbox"/> Agree upon security model (Cube vs Report vs Field level)</li> </ul>
Slide 30	<p><u>BW Best Practices</u></p> <p>Realization</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Maintain Data Models with a 3rd party tool (ARIS, ERwin, Visio)</li> <li><input type="checkbox"/> Keep user community informed, especially key users</li> <li><input type="checkbox"/> Set user expectations – Power Users vs End Users</li> <li><input type="checkbox"/> Consider BEx Analyzer (Excel) or Web for initial deployment</li> <li><input type="checkbox"/> Caution with Transports!</li> </ul>
Slide 31	<p><u>BW Best Practices</u></p> <p>Final Prep</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Define Support Infrastructure</li> <li><input type="checkbox"/> Tier 1 – IT Support (Software, Accounts, Passwords)</li> <li><input type="checkbox"/> Tier 2 – Power Users/Analysts</li> <li><input type="checkbox"/> Early Adopters, Slice and Dice</li> <li><input type="checkbox"/> 5-20% of User Base</li> <li><input type="checkbox"/> Shield Development Team from Support/Maintenance of End Users</li> <li><input type="checkbox"/> Meet periodically with the Development Team</li> <li><input type="checkbox"/> Tier 3 – Development Team</li> <li><input type="checkbox"/> New Development</li> </ul>

	<input type="checkbox"/> Error resolution
Slide 32	<u>Best Practices</u> Go Live and Support <input type="checkbox"/> Careful with New Patches <input type="checkbox"/> Monitor Statistics Cubes <input type="checkbox"/> Continue to educate Power Users / communicate with End Users <input type="checkbox"/> Governance Process for Change Requests <input type="checkbox"/> Performance Tuning is an ongoing process!

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Presenter/s:	Masar, J.
Company:	PGP Corporation
Presentation Title:	Ensure your reporting process keeps pace with your logistics processes and systems during and after an implementation
Year:	2008
Event:	Reporting and Analytics 2008
Location:	Las Vegas
Organiser:	Wellesley Information Services
Solution:	BW Reporting
Critical Success Factors:	Technical
Slide 46	<u>Key Lessons Learned</u> Enforce consistent architecture and error-handling process for all interfaces <input type="checkbox"/> For example, in case of batch file processing <input type="checkbox"/> Files converted into parent IDocs <input type="checkbox"/> Parent IDocs broken down into child IDocs (one per transaction) <input type="checkbox"/> Each posted transaction includes file name, IDoc number ... <input type="checkbox"/> Error handling reports include business impact info <input type="checkbox"/> For example, in the case of real-time transaction processing <input type="checkbox"/> Define guidelines for direct BAPI vs. IDoc processing (based on response time required) <input type="checkbox"/> Error handling reports include business impact info
Slide 47	<u>Key Lessons Learned</u> Production support readiness <input type="checkbox"/> Pursue 100% accuracy from the very first day (for example, we identified some interface bugs only weeks after go-live and it was extremely painful to fix all the transactions, especially those affecting the customers) <input type="checkbox"/> Solicit sufficient access for fixing them (although this may conflict with role segregation requirements) <input type="checkbox"/> Allow immediate posting of adjustments if that leads to less trouble down the road (rather than always fixing the root cause first or wait until month-end) <input type="checkbox"/> Provide them with reports that quantify both technical and business aspects of issues <input type="checkbox"/> The higher the data volume, the more robust reporting tools need to be ready immediately after go-live

Presenter/s:	Masciandaro, M.
Company:	Rohm and Haas
Presentation Title:	How Rohm and Haas Turned Dashboard Hype into Reality
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	BW Dashboard
Critical Success Factors:	Management support

## Factors Critical To The Success Of Business Intelligence

	Data quality
Slide 31	<input type="checkbox"/> Data quality is reachable with a single instance of R/3 <input type="checkbox"/> Still need to employ good loading practices <input type="checkbox"/> Drive dashboards from the top down <input type="checkbox"/> Bottom up will never agree on the short list of KPI's <input type="checkbox"/> Don't believe the vendor hype <input type="checkbox"/> You can deliver this with the tools you have

Presenter/s:	McGivney, P., Skelley, J.
Company:	Bayer
Presentation Title:	SAP BI Enhances Financial Reporting
Year:	2007
Event:	2007 ASUG Events
Location:	Orlando
Organiser:	ASUG
Solution:	BW Reporting
Critical Success Factors:	Business Content Technical Training Interaction between Business and Technical personnel Senior management Resources
Slide 14	<u>Best Practices</u> Leveraged Bayer recommended Data Model <input type="checkbox"/> Maximized the use of standard BW content for Info Cubes, Characteristics, Key Figures and Attributes <input type="checkbox"/> BW Info Spoke utilized for Info Cube data extraction <input type="checkbox"/> Standard BPS functions used in data transformations <i>Copy Repost Attribute Lookup</i> <i>Allocations FOX Formulas Delete</i> <input type="checkbox"/> BCS delivered upload and validation functionality
Slide 15	<u>Lessons Learned/Key to Success</u> <input type="checkbox"/> Communication <input type="checkbox"/> End User Training <input type="checkbox"/> Support Training <input type="checkbox"/> Prioritization <input type="checkbox"/> Finance/IT Solution Ownership <input type="checkbox"/> Senior Management Support <input type="checkbox"/> Resource Assignment

Presenter/s:	Meerpohl, O., Brendel, C.
Company:	JHRPlatz
Presentation Title:	Data Warehouse as technology - SAP BW as a solution?
Year:	2000
Event:	mySAP Business Intelligence Conference
Location:	Hamburg
Organiser:	SAP
Solution:	BW
Critical Success Factors:	User Participation Team Skills Data Quality Business Content Methodology Training Performance Interaction between business and technical personnel
Slide 10	<u>Lessons Learned</u>

	<p>Retail Business Content: sound basic structure</p> <p>Check data quality in OLTP beforehand</p> <p>Optimum configuration of the SAP BW database is necessary (different from R/3)</p> <p>SAP BW is more technology-based than R/3, therefore the team should include a technical consultant</p> <p>Classic phase strategy does not always correspond to the BW project procedure required (for example, aggregate definition)</p> <p>Future users must be involved in the project at an early stage</p> <p>Problems and progress must be openly discussed</p>
Slide 11	<p><u>Lessons Learned</u></p> <p>Always look at results through the eyes of the user</p> <p>Application users should be included in the project team at an early stage</p> <p>Users are only happy if their results appear on the screen quickly</p> <p>The query design must facilitate fast reporting</p> <p>Incorporate the consolidation phase, in which the power users are already involved, into the project design to ensure</p> <ul style="list-style-type: none"> <li>n Early training</li> <li>n Multiplication effect</li> <li>n Necessary quality inspections and removal of errors</li> </ul>

Presenter/s:	Meluso, D. Gondesi, V.
Company:	Bristol Myers Squibb
Presentation Title:	Explore New Features of SAP NetWeaver 7.0 BI with Migration of Front-end from SAP NetWeaver BW 3.5
Year:	2009
Event:	2009 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW Upgrade
Critical Success Factors:	Scope Change management testing
Slide 31	<p><u>Key Learnings</u></p> <p>Limit the Scope</p> <ul style="list-style-type: none"> <li>§ Migrate only active reports if possible</li> <li>§ Resist temptation to do everything at once</li> <li>§ Formulate effective Change Management Strategy</li> <li>§ Communicate!</li> <li>§ Plan Training and GUI Rollout</li> <li>§ Involve Business Users from Day One</li> <li>§ Align software components across teams</li> <li>§ GUI, Front End patch, Excel and dependent components (.NET framework)</li> <li>§ Highly recommend using FEP 801 or later</li> <li>§ Get signoff on several sample reports before proceeding for entire population</li> <li>§ Optimize the Migration Process</li> </ul>

Presenter/s:	Michals, V., H. Schmidt-Kleessen, Stulb, J.
Company:	Morris Communications
Presentation Title:	Morris Communications: BW Media Cube Structures & InfoObjects
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anaheim
Organiser:	ASUG
Solution:	BW

## Factors Critical To The Success Of Business Intelligence

Critical Success Factors:	Data quality Performance Business Content Technical
Slide 12	<u>Key Points for a successful implementation</u> <ul style="list-style-type: none"> <li>▪ Analyze your R/3 master data to ensure you are pulling the correct Info Objects</li> <li>▪ Involve the BW team in decisions about master data and configuration. Decisions made on the R/3 side can adversely affect how and what data can be reported in BW</li> <li>▪ Understand the information needs before designing cubes</li> <li>▪ Analyze gaps between delivered content and business requirements</li> <li>▪ Remember that performance tuning is critical!</li> </ul>
Slide 13	<u>Key Points for a successful implementation</u> <ul style="list-style-type: none"> <li>▪ Consider comparative reporting needs <ul style="list-style-type: none"> <li>▫ Convert higher-level legacy data into BW for year over year comparisons <ul style="list-style-type: none"> <li>– Differing ad order structures makes converting low-level legacy data into R/3 or into BW difficult</li> </ul> </li> <li>▫ Report lineage and revenue together <ul style="list-style-type: none"> <li>– Modified R/3 to add schedule line number to revenue distribution data</li> <li>– At the time, this was a Morris-specific modification</li> <li>– Required for calculation of average rate</li> </ul> </li> <li>▫ Understand your “SALES” and “REVENUE” reporting requirements and HOW or IF the M/AM and BW data streams support these requirements</li> </ul> </li> </ul>
Slide 31	<u>Key Learnings –A review</u> <ul style="list-style-type: none"> <li>▪ Building an ODS for each DataSource enables modifications after deployment</li> <li>▪ Tuning to optimize performance is a must</li> <li>▪ Customizing will be required <ul style="list-style-type: none"> <li>▫ Examining the delivered business content for efficiency and gaps is necessary</li> </ul> </li> <li>▪ Deleting PSA and change log data</li> <li>▪ Making assumptions is not an option</li> </ul>
Slide 32	<u>Best Practice</u> <ul style="list-style-type: none"> <li>▪ Implement in the following stages: <ul style="list-style-type: none"> <li>▫ Install business content</li> <li>▫ Understand what you have</li> <li>▫ Make any modifications</li> <li>▫ Do performance tuning</li> </ul> </li> </ul>

Presenter/s:	Miller, D. and J. Tighe
Company:	The New York Times
Presentation Title:	Advertising Analytics at The New York Times: Implementing SAP NetWeaver BI
Year:	2007
Event:	Sapphire 07
Location:	Atlanta
Organiser:	SAP
Solution:	
Critical Success Factors:	User Participation Strategy Business Content Upper management Integration between business and technical personnel Testing

	Technical
Slide 38	<u>Lessons Learned</u> Harmonization took much longer than anticipated. “Face time” with end users was critical. “May I have your undivided attention...” Bring users offsite for key workshops. Business Driven, not Finance or IT. Delivered Content for IS-AM was initially sparse – led to more customization. “Going first” enabled more participation from both end users and senior management in key design decisions.
Slide 44	<u>Lessons Learned: Realization</u> Being a NW 2004s (BI 7.0) Ramp up Customer presented challenges: Stability of the Platform Learning curve for the team Make sure you have a strong, dedicated Basis team! Keep up with Support Packs! Make sure you size the development and test environments right. Frequent validation with core end users.
Slide 41	<u>Lessons Learned: Final Prep and Go Live</u> Stress testing is useful for both system performance and query design. We used the project team for stress testing. Core Team business owners conducted rollout to sales force. Involvement from key business owners all along made UAT easier. Reconciliation before UAT. Have users on site for UAT. Prepare formal sign-off document in advance of UAT – so they know what they are committing to!
Slide 42	<u>Lessons Learned: Phase 2.. Chnaging “the plumbing”</u> Now we need to connect our Legacy BI analytics environment to IS-AM: Understanding the new IS-AM process and master data is key. Getting time from IS-AM functional team has been a challenge. Synergies with IS-AM Conversion team: <ul style="list-style-type: none"> <li>o They have leveraged our data cleansing routines.</li> <li>o They have helped us to drive data mapping.</li> </ul> Not always a straight one-for-one Mapping of legacy to IS-AM. Using new IS-M content, and will convert and transfer Legacy data to new cubes.
Slide 43	<u>Lessons Learned: Extending the model</u>  We have already started building a Circulation Reporting environment for Legacy data in advance of Circ go-live. <ul style="list-style-type: none"> <li><input type="checkbox"/> Circ IS-M team has already established blueprint.</li> <li><input type="checkbox"/> We are able to leverage new content for data model.</li> <li><input type="checkbox"/> Anticipating less conversion effort.</li> </ul>

Presenter/s:	Müller, H. D.
Company:	Novo Nordisk
Presentation Title:	Using SAP BW Business Content for our strategic decision support system
Year:	2000
Event:	mySAP Business Intelligence Conference
Location:	Hamburg
Organiser:	SAP

## Factors Critical To The Success Of Business Intelligence

Solution:	BW
Critical Success Factors:	Business Content Technical Team Skills
Slide 12	<u>Checklist for SAP BW Project</u> n The Data Warehouse project is a business-driven process n Infrastructure required: u You need to install a plug-in on the R/3 side u Minimum support package level on the R/3 installation required u You need support packages for the plug-in u You need SAP GUI 4.6D n Your use of the standard business content depends on the customization of your R/3 environment n Plan your project with good buffers, especially when putting the infrastructure in place. n At least one experienced SAP BW Consultant should be involved in the process

Presenter/s:	Muvvala, S.
Company:	Seal Consulting
Presentation Title:	Technical Challenges in Integrating CRM and R3 Data in BW
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anaheim
Organiser:	ASUG
Solution:	BW CRM
Critical Success Factors:	Strategy Interaction between Business and Technical personnel Technical
Slide 41	Leading Practice <ul style="list-style-type: none"> <li>• Focus on Business Processes and Requirements</li> <li>• Study the data flow from Start to End including non SAP systems</li> <li>• Data Integration – A Vital Activity in the complete Process</li> <li>• Involve BW Team with CRM/R3 implementation team from the initial stages of the project</li> <li>• Flexible, Non-Complex data models</li> <li>• Drive the data models from Business Processes and Reporting Requirements</li> <li>• </li> </ul>
Slide 42	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>• CRM Extraction Methods and Enhancements</li> <li>• CRM-BW Integration</li> <li>• Data Integration among R3, CRM and BW</li> <li>• Issues and Resolutions in extracting data from CRM</li> <li>• Implementation – R3, CRM and BW</li> </ul>

Presenter/s:	Slatzer, S., Muvvala, S.
Company:	Avnet
Presentation Title:	Managing BW system in a Global Environment
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	BW



Critical Success Factors:	Technical
Slide 49	<p>Key Points to take home</p> <ul style="list-style-type: none"> <li>Managing BW System has – TWO Important Considerations <ul style="list-style-type: none"> <li>Data Management and System Management</li> </ul> </li> <li>BW and Source Systems Administrators have to work hand-in-hand</li> <li>A strategy has to be in place for System Copies</li> <li>All the Data Targets need administration constantly</li> <li>Statistics, Indexes and Aggregates have to be monitored constantly</li> <li>Archiving shall be planned during the design phase of Data Targets</li> </ul>

Presenter/s:	Wervey, D., Narayanan, A.
Company:	Travel centers of America
Presentation Title:	Achieving Optimized BI Solution Using XI & POS DM for Retail Industry
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW XI POS
Critical Success Factors:	Data quality Technical
Slide 41	<p><u>Key Learnings</u></p> <ul style="list-style-type: none"> <li>POS DM &amp; BW areas needs to be thoroughly understood for a successful Retail Implementation</li> <li>There is a need to identify the right data validation techniques</li> <li>POS – DM is BADI/task based. This gives the flexibility to add in client specific validation rules that are based on BW master data</li> <li>Important functionality of Sales audit can be achieved using a combination of BW Reports, Remote cube functionality and POS Workbench overview</li> <li>Having the right blend of resource in all areas: Retail Store, POSDM, BW, Accounting, Operations, Audit &amp; various IT support resources</li> </ul>

Presenter/s:	Netherland, D.
Company:	CPChem
Presentation Title:	CPChem BW Upgrade
Year:	2003
Event:	
Location:	
Organiser:	ASUG
Solution:	BW Upgrade
Critical Success Factors:	Scope Interaction with SAP Training
Slide 4	<p>Key to Success</p> <ul style="list-style-type: none"> <li>Project Scope - Limited</li> <li>Dry Run</li> <li>SAP Upgrade Workshop (WNABWT) for 3.0 – Both Basis and BW support attended. Next &gt; July 14-18</li> <li>SAP service offering to help with upgrade – 3 Phases <ul style="list-style-type: none"> <li>Assessment</li> </ul> </li> </ul>

## Factors Critical To The Success Of Business Intelligence

	<ul style="list-style-type: none"> <li>○ Upgrade</li> <li>○ Post upgrade</li> <li>• Communication &amp; Delta Training for Users</li> <li>• Resources – OSS, <a href="http://service.sap.com/bw">service.sap.com/bw</a>, <a href="http://www.asug.com/">www.asug.com/</a>, <a href="http://www.sapfaq.com">www.sapfaq.com</a></li> </ul>
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Presenter/s:	Nilles, M.
Company:	Mannesmann Rexroth
Presentation Title:	Global SAP Business Information Warehouse within a global roll out strategy
Year:	2000
Event:	mySAP Business Intelligence Conference
Location:	Hamburg
Organiser:	SAP
Solution:	BW Global
Critical Success Factors:	Upper Management Team Skills Performance Interaction between Business and Technical personnel Testing Partners Technical
Slide 16	<p>Project Experiences</p> <p>Global Rollout Strategy accelerates a Global DW Project (Global attention, Key-Figure Definitions ERP depended)</p> <p>Quick-Win based on BW brings buy-In of Management</p> <p>Web-Reporting enables Management commitment and awareness (surf the Wave of the E-Business Hype)</p> <p>Without in-depth SAP R/3 knowledge and experienced experts BW Projects will fail</p> <p>New way of working for SAP R/3 Application Consultants</p> <p>Experienced project team to develop the global and local BW in parallel serves to ensure an optimal future integration</p> <p>Good Consulting Support (Global Presence, Link to SAP Development)</p> <p>Specification of common definitions for contents should be driven by all affected parties in frequent discussions already at the beginning</p> <p>Active Integration Management (BW-ROM needs to be integrated into Integration Tests – in former times Reporting was always behind the application in a second step)</p> <p>Globalization Issues still problematic with Release 2.0B (Languages, Support Packages, Upload via time zones)</p>

Presenter/s:	Oliveira, H. W., C
Company:	Sony Canada
Presentation Title:	Implementing SEM-BPS at Sony Canada: Benefits, Challenges, and Solutions
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW, SEM
Critical Success Factors:	Team skills User Participation Business Content Performance Interaction between Business and Technical personnel

	Technical
Slide 31	<p>Learning Points</p> <p><b>Best Practices:</b></p> <ul style="list-style-type: none"> <li>• An initial prototype always seems to be the best approach, it gives you a pretty good idea about your implementation and builds team confidence about BPS capabilities</li> <li>• For your data modeling and design use as much as possible the standard objects delivered by SAP</li> <li>• Because of the conceptual modeling aspect of BPS, a strong participation and commitment of the business team is a must</li> <li>• Although Fox Formulas are easier and more flexible for changes, ABAP Exits Functions can give you the best overall performance</li> </ul>
Slide 31	<p>Learning points (cont)</p> <p><b>Performance:</b></p> <ul style="list-style-type: none"> <li>• Run BPS functions in the background especially for Planning Sequences or Global Planning Sequences</li> <li>• For performance gains, create a specific Planning Level/Package to run your most demanding functions</li> <li>• Fox Formulas might have good performance running on testing data but not on production data</li> <li>• Manage expectations as users will always compare to the speed of EXCEL spreadsheets</li> <li>• Check on SAP Web site for the SAP Note</li> </ul>
Slide 32	<p><u>Learning points (cont)</u></p> <p><b>Planning for success:</b></p> <ul style="list-style-type: none"> <li>• Have a project manager skilled in SAP and familiar with the company's business processes</li> <li>• Plan for heavy business users involvement that have a strong understanding of current planning processes</li> <li>• IT person with strong BW and data modeling experience</li> <li>• Consult SAP web sites such as: <ul style="list-style-type: none"> <li>• SDN (SAP Developer Network) <a href="http://www.sdn.sap.com">www.sdn.sap.com</a></li> <li>• SAP How-To-Guides</li> </ul> </li> </ul>

Presenter/s:	Koulgi, A.
Company:	Orbis
Presentation Title:	BW BPS at Orbis
Year:	2007
Event:	ASUG Maryland Chapter
Location:	Maryland
Organiser:	ASUG
Solution:	BW BPS
Critical Success Factors:	Team skills Methodology Performance Business Content Data quality Technical
Slide 13	<p><u>Best Practice for Implementation</u></p> <p><b>Differences to ERP Projects</b></p> <p>BI Projects are development projects</p> <p>Design Data Structures, Data Load Processes, Data Transformation, Reporting</p> <p>Less Process Design compared to ERP projects</p> <p><b>Design Workshop</b></p> <p>Analyze Requirements &amp; necessary Functionality</p> <p><b>First Prototype</b></p>

	<ul style="list-style-type: none"> <li>◆ Accelerated Implementation of first Prototype</li> <li>◆ Evaluation SAP Content</li> <li>◆ Check Data Quality, Performance</li> <li>◆ Proof-of-Design</li> </ul> <p><b>Small Implementation Team</b>  Core Team works on implementation of functionality  Extended Project Team / Advisory Group  Process-Know How, Integration of affected departments</p> <p><b>Recurring Prototypes</b>  <ul style="list-style-type: none"> <li>◆ Enhancement of Functionality by Core-Team</li> <li>◆ Presentation Prototypes to extended Project Team</li> </ul> </p>
Slide 15	<p><u>Lessons Learnt</u></p> <p>Do NOT replicate OLD process of planning  BPS is NOT operative planning tool  Different from R/3 implementation. Get out of the mind set  Do NOT underestimate Master Data Management  Deal with front end integration challenges right in the beginning  Spend dedicated and quality time in modeling. Changes to model has major impact.  Use central team to maintain master data in R/3 as well as in BW</p>
Slide 16	<p><u>Lessons Learnt</u></p> <p>Currency handling should be well defined upfront and well tested  Unlike R/3, think of reporting requirements right in design workshops  Consider need for change history right in the beginning  Consider rounding issues: Disaggregating and aggregation may lead to differences</p>

Presenter/s:	Pereira, K. and m. Villazon
Company:	Powelink
Presentation Title:	Powelink BI Journey
Year:	2008
Event:	SAUG Brisbane Plenary
Location:	Brisbane
Organiser:	SAUG
Solution:	BW
Critical Success Factors:	Governance Security Technical
Slide 8	<p><u>Lessons Learnt</u></p> <ul style="list-style-type: none"> <li>• Defined an Enterprise Data Warehouse Framework to address all the “business” challenges <ul style="list-style-type: none"> <li>– SAP BI is our EDW, <b>not just a reporting tool.</b></li> <li>– Management Cockpit, Decision Support and Reporting, <b>not just reporting</b></li> </ul> </li> <li>• Defined a Security Framework – Especially required if you’re implementing HR and PY reporting. <ul style="list-style-type: none"> <li>– Security Framework so that security model was based on the “Big picture”.</li> </ul> </li> <li>• New PS and IM reports only now getting developed</li> </ul>

Presenter/s:	Pettus, J.
Company:	NASA
Presentation Title:	NASA Organizational & Enterprise Planning with SAP BW
Year:	2004
Event:	2004 Technology Forum
Location:	

Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Team skills User Participation Training Testing Interaction between Business and Technical personnel
Slide 18	<u>Lessons Learned</u> <ul style="list-style-type: none"> <li>Implementation of BW in Parallel with R/3 is difficult             <ul style="list-style-type: none"> <li>Configuration changes in R/3 impact BW</li> <li>Resources focused on R/3 implementation</li> <li>BW team must have R/3 Process knowledge in order to be successful</li> </ul> </li> <li>Implementing a Centralized Data Warehouse in a decentralized environment is difficult             <ul style="list-style-type: none"> <li>Previously the different NASA Centers had the flexibility to develop their own reports, rollups structures and could develop their specific definition for calculations</li> </ul> </li> </ul>
Slide 19	<u>Lessons Learned</u> <ul style="list-style-type: none"> <li>Training was conducted but it was on the tool capabilities and did not provide the users the information they needed. The training should have focused on the new processes and their impact to reporting</li> <li>Training on generic data that is not specific to the end users did not help the user to gain understanding of the system</li> <li>Large percentage of the users do not need OLAP capability, and are not comfortable with the BW interface, they want the ability to have nicely formatted printed reports</li> <li>Need to build a support structure (Super Users) that understand the new process and data to support the user community</li> </ul>

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Presenter/s:	Pope, D.
Company:	AFLAC
Presentation Title:	A Perfect 10 - The Reality of a BW Upgrade
Year:	2004
Event:	2004 ASUG Annual Conference & Vendor Fair
Location:	Atlanta
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Change Management Scope Interaction with SAP
Slide 44	<u>Lessons learned</u> <ul style="list-style-type: none"> <li>SAP Upgrade Services             <ul style="list-style-type: none"> <li>Early watch reports, upgrade checks</li> </ul> </li> <li>Managed Scope             <ul style="list-style-type: none"> <li>Has to be tightly controlled and constantly managed</li> <li>Watch for hidden agendas and missed requirements</li> </ul> </li> <li>Plan early and then re-plan             <ul style="list-style-type: none"> <li>We don't plan to fail we fail to plan</li> <li>Communicate weekly status of accomplishments and next week objectives</li> <li>No task over 40 hours in duration</li> </ul> </li> </ul>

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Presenter/s:	Priyaranjan, D. and D. Swierenga
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## Factors Critical To The Success Of Business Intelligence

Company:	General Mills
Presentation Title:	General Mills Supplier Evaluation - A Sustainable BW Solution
Year:	2004
Event:	2004 Extended Supply Chain Management & Manufacturing Forum
Location:	
Organiser:	ASUG
Solution:	
Critical Success Factors:	Data quality technical
Slide 62	<p>Lessons learned</p> <ul style="list-style-type: none"> <li>• Prototyping key to defining user requirements</li> <li>• Prototype in Dev client as long as possible <ul style="list-style-type: none"> <li>• No golden client</li> <li>• No refresh of data</li> </ul> </li> <li>• Data Discovery s/b 10% to 20% of project plan</li> <li>• Allow time for Data Scrubbing</li> <li>• Manage complexity</li> </ul>

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Presenter/s:	Reddy Gondes, V.
Company:	Intelligroup
Presentation Title:	SAP NetWeaver Business Intelligence Upgrade and Utilization
Year:	2008
Event:	2008 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Methodology Scope User Participation Change Management Training Interaction with SAP Technical
Slide 21	<p><u>Key learning Points</u></p> <p>Allow sufficient time for preparation &amp; project planning  Start upgrade preparation prior to project start date  Decide on when to freeze development during upgrade  Decide how the upgraded landscape should look like!  Plan for Hardware requirements for the upgrade  Plan important tasks such as Alpha conversion, Clean up transports/Inactive objects, DB consistency, Objects consistency as well as other post upgrade validations/activities</p>
Slide 22	<p><u>Key Success Factors</u></p> <p>Strong Project Management &amp; Leadership  Scope Control – No configuration change  Good Testing plan  Active end-user participation during testing  Freeze on development projects  Effective Change Management and Training  QA check by SAP</p>

Presenter/s:	Rille, N.
Company:	Los Angeles Community College District
Presentation Title:	Developing R/3 and BW Reports to Meet Users' Unspecified Reporting Requirements
Year:	2005
Event:	2005 ASUG Public Sector Symposium
Location:	Washington
Organiser:	ASUG
Solution:	BW Reporting HR
Critical Success Factors:	Data quality Interaction between business and technical personnel technical
Slide 29	<p><u>Lessons Learned</u></p> <p>Traditional requirements gathering is no help</p> <ul style="list-style-type: none"> <li>• They're either ill-informed, unavailable or uninterested <ul style="list-style-type: none"> <li>• Often, they're all the above</li> </ul> </li> </ul> <p>Neither are non-traditional ones</p> <ul style="list-style-type: none"> <li>• You're unlikely to stumble upon the nugget in the rubble</li> </ul> <p>Build cubes rich in attributes</p> <ul style="list-style-type: none"> <li>• Add your own familiar ones</li> <li>• Consider a key figure of constant "1" for line counts ("Qty")</li> </ul> <p>Mask R/3 clumsiness whenever you can:</p> <ul style="list-style-type: none"> <li>• Ex: R/3: Personnel Area = "V000"    BW: Location = "Valley" (or Loc= "V" if using short text)</li> </ul>
Slide 30	<p>Lessons Learned (cont'd)</p> <ul style="list-style-type: none"> <li>• Use text variables for multi-use reports <ul style="list-style-type: none"> <li>• Ex: Plan participation: Dental, Health, Ins, Savings, EAP heading is "b63 - &amp;ZPLANCAT&amp; participants - &amp;ZMOYR&amp;-&amp;ZMOYR2&amp;"</li> </ul> </li> <li>• Avoid single-purpose reports: <ul style="list-style-type: none"> <li>• "Classified Workforce Analysis" → "Workforce Analysis"</li> </ul> </li> <li>• Match heading width to data width</li> <li>• Try for "portrait" orientation, especially if Web-based</li> <li>• Use subtotals sparingly</li> </ul>
Slide 31	<p>Lessons learned (cont'd)</p> <ul style="list-style-type: none"> <li>• For each subject area, find a functional wizard and befriend him/her <ul style="list-style-type: none"> <li>• They know what they need to do their jobs</li> <li>• They appreciate you listening and helping them and others</li> </ul> </li> <li>• Figure out the "batch schedule" as soon as you can</li> <li>• SAP's Concurrent Employment (CE) implementation is sketchy, maybe worse: <ul style="list-style-type: none"> <li>• Data model oddities (Ex: SSN, Employee status)</li> <li>• PY extractor (to cube OPY_C02) doesn't</li> </ul> </li> </ul>
Slide 32	<p>Lessons learned (cont'd)</p> <ul style="list-style-type: none"> <li>• Double your time estimates for data cleansing / data loading / data validation <ul style="list-style-type: none"> <li>• ZIP codes</li> <li>• Imaginary Organizations and Positions</li> <li>• Over-limit assignments</li> <li>• Overpayments</li> </ul> </li> <li>• Most importantly: <ul style="list-style-type: none"> <li>• Don't pick a holiday weekend for go live</li> <li>• Don't pick a fiscal year end for go live</li> <li>• For sure don't do both</li> </ul> </li> </ul>

## Factors Critical To The Success Of Business Intelligence

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Presenter/s:	Roble, J., Priyaranjan, D.
Company:	General Mills
Presentation Title:	Practical solutions for Realignments / Restatements of Historical data in BW
Year:	2004
Event:	2004 Technology Forum
Location:	
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Strategy Technical
Slide 49	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>• Realignment is business requirement driven.</li> <li>• Options: Reload vs. using Navigational attributes</li> <li>• Reloading allows faster query on Characteristics, but longer reload times.</li> <li>• Navigational attributes requires no special load jobs</li> <li>• Navigational attributes can cause performance issues <ul style="list-style-type: none"> <li>• Nightly Change run may run longer.</li> <li>• Excessive use can affect performance</li> <li>• Tools to tune Change run.</li> </ul> </li> </ul>

Presenter/s:	Roble, J.
Company:	General Mills
Presentation Title:	General Mills: The SAP NetWeaver 2004s Platform - Life After the Upgrade
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	Bw Upgrade
Critical Success Factors:	Technical
Slide 55	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>• Upgrade in steps: <ul style="list-style-type: none"> <li>• Technical upgrade: Database, ABAP Stack &amp; Java Stack</li> <li>• Rollout of new functionality</li> </ul> </li> <li>• Go live with highest Support Pack your time line will allow.</li> <li>• Rollout Analysis Authorizations &amp; BI Stats with upgrade.</li> <li>• NW04s Bex Tools Rollout takes time &amp; has portal dependencies, plan for it.</li> </ul> <p>NW04s BI is not a BW evolution... ... it's a REVOLUTION!</p>

Presenter/s:	Rodriguez, S.
Company:	Valero Energy Corporation
Presentation Title:	Case study: How Valero Energy Corporation uses SAP Query as an alternative to ad hoc reporting for HR end users
Year:	2008
Event:	Reporting and Analytics 2008
Location:	Las Vegas
Organiser:	Wellersly Information services
Solution:	
Critical Success Factors:	User interaction Training



	Technical
Slide 46	<u>7 key points to take home</u> <ul style="list-style-type: none"> <li>• Always, always think outside the box!</li> <li>• Utilize custom fields. You will be surprised what you can accomplish with custom fields.</li> <li>• Be smart about custom fields. They can be simple, but you should still consult a developer for quality assurance.</li> <li>• Organize your field groups. It will save time later in searching for the various fields.</li> <li>• Empower your users! By giving them flexible queries, they can do many reports on their own.</li> <li>• Ask LOTS of questions! The users can provide essential information as can the developers and consultants.</li> <li>• Spend the time to train your users well — this will save you valuable time later</li> </ul>

Presenter/s:	Rudnick, L. and C. Swartz
Company:	General Mills
Presentation Title:	SEM-BPS at General Mills: Improving Profitability Planning
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	
Organiser:	ASUG
Solution:	BW SEM
Critical Success Factors:	Technical
Slide 57	<u>Key Learnings – Technical</u> <p>Web Front-End functionality not complete</p> <ul style="list-style-type: none"> <li>• Search functions on variable values</li> <li>• Multi-Variables not supported</li> <li>• Variable selections using hierarchy nodes</li> </ul> <p>Heavy involvement with BW Team throughout the course of the project</p> <ul style="list-style-type: none"> <li>• First system with Transactional Cubes</li> <li>• RFC required to allow for independent BW upgrades</li> <li>• Requirement for 6 new cubes</li> <li>• Over 150 new Key Figures</li> </ul> <p>Data management – compression, aggregates</p>
Slide 58	<u>Key Learnings – Technical</u> <ul style="list-style-type: none"> <li>➤ SEM-BPS functionality is easy to make complicated <ul style="list-style-type: none"> <li>• Flexibility allows for excessive detail</li> <li>• Functions and formulas can become very complex</li> </ul> </li> <li>➤ Training was a challenge because of data-locking issues <ul style="list-style-type: none"> <li>• Needed multiple cubes</li> <li>• Locking at higher levels of hierarchy</li> </ul> </li> <li>➤ SEM transports lack detailed functionality <ul style="list-style-type: none"> <li>• Only high-level objects can be selected for transport</li> <li>• Direct Production changes required</li> </ul> </li> </ul>
Slide 58	<u>Key Learnings – Technical</u> <ul style="list-style-type: none"> <li>➤ Excel interface is not as robust as Excel itself <ul style="list-style-type: none"> <li>• Many features “Grayed Out”</li> <li>• Users cannot format layout</li> </ul> </li> <li>➤ Having Actual data in BW beforehand significantly reduced Development time <ul style="list-style-type: none"> <li>• Many Characteristics and Key Figures already in place</li> </ul> </li> <li>➤ Amount of data can grow very quickly <ul style="list-style-type: none"> <li>• Depends upon level of detail</li> <li>• Versions caused data to multiply</li> <li>• New Key Figures meant saved records were much</li> </ul> </li> </ul>

## Factors Critical To The Success Of Business Intelligence

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Presenter/s:	Schouppe, I.
Company:	Agfa
Presentation Title:	Overview of the Enterprise BI Platform at Agfa
Year:	2005
Event:	SAP Business Intelligence & Analytics Conference 2005
Location:	Dusseldorf
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Business Content Interaction between business and technical personnel Technical Data quality Management support Training Change management
Slide 25	Lessons Learned <input type="checkbox"/> SAP NetWeaver BI business content the driver in the process of defining the reporting requirements with the business <input type="checkbox"/> Project team Business Key Users and BW Competence Center (IT) <input type="checkbox"/> BW network The need for a local BW key user <input type="checkbox"/> Standard processes Incident handling, Enhancements, Authorisation
Slide 26	Lessons Learned Data quality SAP NetWeaver BI reveals data inconsistencies between source systems SAP NetWeaver BI judged on accuracy of data (24/24 365 support) <input type="checkbox"/> Web reports only is not an option Critical success factors Key users (most important !) Management support Training Change management Documentation

Presenter/s:	Scotvold, L.
Company:	Nexen
Presentation Title:	Strategies for Information Delivery and Lessons Learned
Year:	2004
Event:	2004 Technology Forum
Location:	
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Business Content Change Management User Involvement Data quality Training Performance Report strategy
Slide 35	<u>Summary of Key Lessons Learned</u> <b>Change Management</b> <ul style="list-style-type: none"> <li>Don't underestimate the change management challenges.</li> </ul>

	<ul style="list-style-type: none"> <li>Setting and managing expectations will be key to your success.</li> </ul> <b>Contact with users</b> <ul style="list-style-type: none"> <li>Face to face time with users - ongoing communication and training are essential for success.</li> </ul>
Slide 36	<u>Summary of Key Lessons Learned</u> <b>User needs evolve</b> <ul style="list-style-type: none"> <li>Build only key reports at the beginning until users have had time to work with the data</li> <li>As users become more comfortable with data flows, business processes, and reporting tools, their needs change.</li> </ul>
Slide 37	<u>Summary of Key Lessons Learned</u> <b>Ensure source transactional data is right and that processes are solid</b> <ul style="list-style-type: none"> <li>When the wrong numbers appear in reports, users lose faith in BW</li> <li>Do not rely only on BW to correct underlying processes or fix source transactional data</li> </ul>
Slide 38	<u>Summary of Key Lessons Learned</u> <b>There is a constant need to review and re-tune</b> <ul style="list-style-type: none"> <li>Query performance should be monitored and re-tuned regularly as usage patterns change with increased sophistication of users</li> <li>Data models should also be regularly reviewed, as user needs change</li> <li>Reporting tools mature over time - it is important to leverage new capabilities that fit with organizational needs</li> <li>Information Delivery strategies can never remain static</li> </ul>
Slide 39	<u>Summary of Key Lessons Learned</u> <b>Other points to ponder...</b> <ul style="list-style-type: none"> <li>The use of standard business content is definitely recommended, but be careful to review your data model for efficiencies</li> <li>It is easier to implement BW when you already have a stable R/3 environment</li> <li>Ensure that delivery mechanism is in line with the identified need – BW may not always be the right answer</li> <li>A separate Reporting team can give information delivery the visibility and attention it deserves, but must work closely with other teams</li> </ul>

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Presenter/s:	Shanmuganathan, R.
Company:	John Keells Holdings
Presentation Title:	Successful BI Implementation Strategy for a Diversified Conglomerate
Year:	2008
Event:	SAP Summit India
Location:	Mumbai
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Management Support User participation Strategic Partner Governance Team skills Interaction between Business and Technical personnel Technical
Slide 31	<u>Critical Success Factors</u> Executive Sponsorship & business/IT leadership <ul style="list-style-type: none"> <li>Business led with IT's stewardship</li> <li>Empowering the end user with the right set of tools rather than dependency on IT</li> </ul>

## Factors Critical To The Success Of Business Intelligence

	<ul style="list-style-type: none"> <li>• Clearly defined business needs &amp; performance indicators</li> <li>• Proven functional &amp; technical capability and maturity of the product</li> <li>• Right Partner with the correct attitude, expertise, experience and the commitment to see the project to the end</li> <li>• Building internal capacity for self sustenance, both at power user and core user levels</li> <li>• Clearly documented policies for usage, information retention, capacity planning to derive a sustainable business case</li> <li>• Highly energized and committed team</li> </ul>
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Presenter/s:	Sikora, P.
Company:	PepsiCo
Presentation Title:	PepsiCo Scores a Hit with the SAP Netweaver 2004s Platform - BI Integration
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	BW Teradata
Critical Success Factors:	Technical strategic
Slide 24	<u>Key Learnings</u> <ul style="list-style-type: none"> <li>• Create Integrated Project Plan with Teradata team <ul style="list-style-type: none"> <li>• BW developed earlier using Flat File loads - converted them to UDC when Teradata views were ready – about 40% rework</li> </ul> </li> <li>• Match landscapes between Teradata and BW <ul style="list-style-type: none"> <li>• Ideally need to have 1 to 1 environment match</li> </ul> </li> <li>• Resolve field mapping issues ahead of actual BW object build <ul style="list-style-type: none"> <li>• Ensure Teradata data types match BW</li> <li>• Verify SQL generated by UDC – and received by Teradata</li> </ul> </li> <li>• Limit return data set for UDC Virtual Cube queries <ul style="list-style-type: none"> <li>• Use variables to restrict answer set returned</li> </ul> </li> <li>• If possible develop on Support Pack after all functional enhancements incorporated <ul style="list-style-type: none"> <li>• w/SP 7 front end changed requiring heroics to get web template working</li> </ul> </li> </ul>
Slide 25	<u>Best Practices</u> <ul style="list-style-type: none"> <li>• Define an overall Data Strategy that best fits your business <ul style="list-style-type: none"> <li>• Then select the tool(s) that address your requirements</li> </ul> </li> <li>• Leverage tools to take advantage of their strengths</li> <li>• Own the solution internally</li> <li>• BI 2004S Specific – be selective with tool set <ul style="list-style-type: none"> <li>• Weigh pros/cons of leveraging new features – converting not mandatory</li> </ul> </li> </ul>

Presenter/s:	Smith, D.
Company:	Wyeth
Presentation Title:	Learn how Wyeth was able to deliver BW Web reports to their HR Business Partners
Year:	2005
Event:	2005 HCM and Financials Forum
Location:	
Organiser:	ASUG
Solution:	BW HR

Critical Success Factors:	Reporting Strategy Business Content Training Security Testing
Slide 31	<u>Lessons Learned –Security</u> <ul style="list-style-type: none"> <li>Using Standard Business Content introduces security issues you may not have thought of when using custom objects</li> <li>New authorizations may be included in upgraded versions of BW and they may not be clearly evident in the upgrade documentation</li> <li>Understand what objects HR owns and what objects other application areas own</li> <li>Testing is crucial not only for the initial implementation, but also for every support pack and version upgrade</li> </ul>
Slide 51	<u>Lessons Learned – HR Business Partner Web Page</u> <ul style="list-style-type: none"> <li>Define and communicate an HR reporting strategy</li> <li>Educate your users on BW and explain the differences between analytical and operational needs</li> <li>Involve the business users in every phase of the project</li> <li>Finalize the requirements before you start building the BW data model</li> <li>Once the data model is done, changes to the model can be extensive and costly.</li> <li>Leverage HR Business Content</li> </ul>

Presenter/s:	Smith, D., Hutchison, J.,
Company:	Wyeth Pharmaceuticals
Presentation Title:	Business Warehouse for HCM: Two Different Solutions
Year:	2005
Event:	2005 ASUG Annual Conference and Vendor Fair
Location:	Anaheim
Organiser:	ASUG
Solution:	HR
Critical Success Factors:	Business Content Testing Security
Slide 24	<u>Lessons Learned</u> New authorizations may be included in upgraded versions of BW and they may not be clearly evident in the upgrade documentation. We learned that going from BW 2.0 to BW 3.0 a new authorization objects was introduced. This new authorization object allowed non-HR developers access to PSA data when some records were green and the others red. We then had to update the security and test for this new condition.
Slide 25	<u>Lessons Learned</u> For our first implementation of BW/HR we did not use standard business content since we were extracting data from a non SAP mainframe. During our second implementation of BW/HR we are now extracting data from SAP HR and using stand business content. We found new security issues since we are sharing new objects such as 0employee and also the new objects are not using our naming convention of “ZHR”
Slide 27	<u>Key Learnings</u> Involve the BW security team at the beginning of the project Understand what objects HR owns and what objects other application areas own Testing is crucial not only for the initial implementation, but also for every support pack and version upgrade

Presenter/s:	Soeller, S., Cherian, J., Malone R.
Company:	Graphic Packaging
Presentation Title:	Packaging Results for the Supply Chain Using the SAP NetWeaver Platform
Year:	2007
Event:	Sapphire 07
Location:	Atlanta
Organiser:	SAP
Solution:	BW
Critical Success Factors:	Team skills Resources Change management performance Technical
Slide 27	<u>Lessons learned from the Netwaever 2004s experience</u> <ul style="list-style-type: none"> <li>•NetWeaver delivered several of the solutions GPI was looking for</li> <li>•NetWeaver is capable of delivering results via the web –a feature that is helpful for all levels of management</li> <li>•We installed all three instances –development, Testing and Production on a single physical server, thereby reduced the need to manage several systems</li> </ul>
Slide 28	<u>Lessons learned from the Netwaever 2004s experience</u> <ul style="list-style-type: none"> <li>•Solution Manager had to be made a central component of our SAP landscape</li> <li>•Installing Java stack was bit complex, and we had to spend more time getting it to work</li> <li>•GPI liked the fact that NetWeaver can be made Unicode without having to change the R/3 code page</li> </ul>
Slide 29	<u>Lessons learned from the Netwaever 2004s experience</u> Competent external SME's –BW functional –BW basis (including Portal) <ul style="list-style-type: none"> <li>•Over-plan for internal and external resources</li> <li>•Manage reporting expectations</li> <li>•Build in post go-live support for performance optimization</li> </ul> –Aggregates –Additional Cubes –Monitoring

Presenter/s:	Tan, M.
Company:	Orica
Presentation Title:	Orica's BI Journey
Year:	2008
Event:	SAUG Melbourne Plenary
Location:	Melbourne
Organiser:	SAUG
Solution:	BW BOBJ
Critical Success Factors:	Technical
Slide 27	Key Points <ul style="list-style-type: none"> <li>•BOBJ complements BW</li> <li>•BW/BOBJ Integration – No issue</li> <li>•Pervasive BI need the right BI tool</li> <li>•A much improved value proposition from SAP in the BI space.</li> <li>•Focus shifted from technology to solution.</li> <li>•Start small with quick wins</li> </ul>

Presenter/s:	Thrasher, R., Wagner, C.
Company:	GTS
Presentation Title:	Synopsys: CRM & BW - It Takes Two
Year:	2007
Event:	2007 ASUG Annual Conference
Location:	Atlanta
Organiser:	ASUG
Solution:	BW CRM
Critical Success Factors:	Governance Training Champions Technical
Slide 27	<u>Lessons Learned: BW Usage</u> <ul style="list-style-type: none"> <li>• Help Managers &amp; Execs learn to effectively use CRM data</li> <li>• Data governance: create policies, communicate &amp; measure adherence</li> <li>• Train users; adjust approach based on user communities</li> <li>• Identify &amp; train BW “champions” in each region/area</li> <li>• Determine &amp; use best reporting option: BW, ABAP, TMs</li> <li>• Demonstrate value to CRM users with BW, using their data</li> </ul>
Slide 28	<u>Lessons Learned: Creating Reports</u> <ul style="list-style-type: none"> <li>• When first using BW, base new reports on reports from previous system, then adjust to work with your new system’s data and processes</li> <li>• Document your bookmarked reports in Excel</li> <li>• Balance operational vs. management reporting requirements</li> <li>• BEx: SAP-supplied Excel add-in is front-end to BW</li> <li>• Use CRM data fields to drive BW reporting</li> </ul>

Presenter/s:	Wang, J.
Company:	Weyerhaeuser Company
Presentation Title:	Concurrent BW Projects, One Enterprise BW Solution, One Single BW Landscape
Year:	2006
Event:	2006 ASUG Annual Conference
Location:	Orlando
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Team skills Interaction between Business and Technical personnel Data quality Governance Technical
Slide 33	<u>Key points to Take Home</u> <ul style="list-style-type: none"> <li>• Fix the release schedule and set expectation accordingly</li> <li>• Establish a Core BI Design Team to ensure the integrated application design</li> <li>• Build up subject area expertise along key business process areas</li> <li>• BI is integral part of a business solution, so engage in the business process design earlier</li> <li>• Data definition, standard and governance is key</li> <li>• Ensure the complete data requirements gathered from business process and reporting design</li> <li>• Manage the development and support of BI solutions with Solution Manager</li> </ul>

Presenter/s:	Wilmsmeier, A.
Company:	Volkswagen Bank
Presentation Title:	Volkswagen Bank: Building an Enterprise Data Warehouse with SAP BW
Year:	2003
Event:	2003 ASUG Annual Conference
Location:	New Orleans
Organiser:	ASUG
Solution:	BW
Critical Success Factors:	Data quality
Slide 31	<p><u>What we did</u></p> <ul style="list-style-type: none"> <li>• One reality of Data Warehousing is that it is hardly ever possible to collect all required information within the available time frame</li> <li>• We consciously decided to <ul style="list-style-type: none"> <li>– accept that there will be omissions, incorrect representations of information and even incorrect information (80:20 rule)</li> <li>– establish a data quality management process and accept a retroactive approach in data quality management with continuous improvements of data quality</li> <li>– anticipate changes and extensions</li> </ul> </li> </ul>

Presenter/s:	Witkowski, W. A.
Company:	Coca-Cola
Presentation Title:	BW Implementation at The Coca-Cola Company: A Case Study
Year:	2001
Event:	2001 ASUG Annual Conference
Location:	
Organiser:	ASUG
Solution:	BW SEM
Critical Success Factors:	Management support Scope Resources Methodology
Slide 19	<p>BW Project Life Savers</p> <ul style="list-style-type: none"> <li>♦ Management's unwavering support/vision of BW and SEM to move towards New Dimension Product environment</li> <li>♦ Declaring Legacy, 3rd party and other Data Warehouses "OUT OF SCOPE" in the initial BW implementation</li> <li>♦ Recognize &amp; Address the First Customer Ship syndrome</li> <li>♦ Prototyping = Proves successes &amp; uncovers issues</li> <li>♦ Flexibility of resources to move to BW, take on multiple evolving roles, work on prototype effort, live in ambiguity</li> <li>♦ "Team room" atmosphere</li> <li>♦ Effort, Effort, Effort. YOU must drive &amp; own your solution</li> </ul>

Presenter/s:	Yamane, C.
Company:	Global Media
Presentation Title:	Supporting BW in a Global 7x24 environment
Year:	2004
Event:	2004 ASUG Annual Conference & Vendor Fair
Location:	Atlanta



Organiser:	ASUG
Solution:	BW Global
Critical Success Factors:	Partners Technical
Slide 17	<p>Words of Wisdom</p> <ul style="list-style-type: none"> <li>• Stabilize Environment</li> <li>• Establish Exception Base Monitoring</li> <li>• Provide extra monitoring during critical time periods</li> <li>• Performance gets Top Billing in all enhancements</li> <li>• Involve Basis, Database, OS, and Disk Storage Vendors to Tune System</li> <li>• Revisit Business Requirement Periodically</li> <li>• Implement Logical Partitioning</li> <li>• Implement Process Chains</li> </ul>

Presenter/s:	Yang
Company:	rapidigm
Presentation Title:	BW Upgrade in 6 weeks
Year:	2004
Event:	2004 ASUG Annual Conference & Vendor Fair
Location:	Atlanta
Organiser:	ASUG
Solution:	BW upgrade
Critical Success Factors:	<p>Management support resources Team skills Methodology testing Scope</p>
Slide 7	<p><u>Strengths</u></p> <ul style="list-style-type: none"> <li>• Stable BW Environment – no current technical issues</li> <li>• Strong Team Work and Clear Division of Responsibilities</li> <li>• Strong Management Support – strong support and trust from all levels of management</li> <li>• Strong Work Ethic – every team member was willing to work 24/7 as needed</li> </ul>
Slide 8	<p><u>Upgrade Success Factors</u> Clear Strategy and road map Do your homework Clear testing plan and execution Learning potential pitfalls and errors and find solution beforehand Do your homework Limit functional enhancements to a minimum and focus on upgrade.</p>
Slide 18	<p><u>Key Success Factors</u></p> <ul style="list-style-type: none"> <li>• Know your resources</li> <li>• Know thy enemy <ul style="list-style-type: none"> <li>• Understand and plan for the constraints</li> <li>• Execute</li> </ul> </li> <li>• Prepare for the worst case scenario</li> <li>• Early warning system</li> </ul>





### Appendix III – Interview Questions For Industry Practitioners



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SCHOOL OF  
THOUGHT**

## Factors Critical To The Success Of Business Intelligence Systems

Paul Hawking from the School of Management and Information Systems at Victoria University, is currently researching the factors that impact on the success of BI system implementation and use. This aspect of the study involves conducting of interviews with industry experts that have been involved in managing the implementation and use of BI systems within an organization. The purpose of these interviews is to elaborate and prioritise previously identified BI critical success factors.

As an experienced BI systems practitioner, I would like to invite your participation in my study by involvement in an interview.

The interview will last approximately 45-60 minutes. It will be recorded. Your participation is entirely voluntary. You do not need to answer any question if you are not comfortable answering. You can withdraw from the study at any stage of the interview (before, during or after).

Please note that the results will be handled in strictest confidence and all written and electronic records will be stored securely for at least five years. Results of the interview process will be published on a group basis (for instance, as a customer or as a vendor perspective). Absolutely, no individual interview participant or their business will be used in the reporting of results.

We look forward to your kind cooperation for the research. For any questions, you may contact me.

Yours faithfully

Paul Hawking

School of Management and Information Systems

**This research project has been approved by the Victoria University**

**Faculty of Business and Law Human Research Ethics Committee. Project BHREC**

**XXXXX**

If you have any queries or complaints about the way you have been treated, you may contact the Secretary, Victoria University Human Research Ethics Committee,  
Victoria University, PO Box 14428, Melbourne, VIC, 8001 phone (03) 9919 4710

## Sample Interview Questions

Date of Interview:

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Name of Interviewee:

Position:

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Name of Organization:

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### Background Information

- Outline research process and findings up to this stage.
- Can you give me some background about your BI experience in terms of role, projects completed, and tools used?

### Critical Success Factors

- From the previous research I have identified a list of BI system critical success factors. From your experience from the supplied list are there factors that should be omitted or added? Expand.
- Would you consider some factors more critical than others and why?
- Is it possible to prioritise the list of factors? Expand
- Are different factors more important at different stages of a project? Expand
- Many of the factors identified are applicable to IT projects in general are there factors which are specifically relevant to BI systems?
- From your experience for each of the factors identified what processes have companies implemented to ensure that the factor has been satisfied?



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