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# Towards Business Intelligence Maturity

*Paul Hawking*

*Although Business Intelligence is seen as priority by many companies, the level of benefits achieved varies significantly from company to company. Researchers have attempted to relate the types of benefits achieved to the company's Business Intelligence maturity. This paper, adopting a case study methodology, investigates one company's trials and tribulations in regards to their Business Intelligence implementations. The paper documents a number of Business Intelligence best practices and maps these practices to a Business Intelligence Maturity Model.*

**Keywords:** Business Intelligence, Maturity Model, SAP.

## 1 Introduction

Companies today have come to realise the importance of providing accurate, relevant and timely information — information that allows their organisational personnel to engage in effective decision-making practices. Evans and Wurster [1, pp. 72] in their paper on Information Economics stated that "... *information is the glue that holds business together*". Companies have developed and implemented systems to facilitate the collection, processing and dissemination of information. One such system, Enterprise Resource Planning (ERP), has enabled companies to gain efficiencies in their business processes and associated transactions through the high degree of integration of their company-wide business processes and the standardisation of the associated data [2]. ERP systems are an essential element of the corporate information systems infrastructure, allowing a business to be competitive in today's world, as well as providing foundation for future growth [3].

Accenture interviewed 163 executives from large enterprises around the world to identify how companies were using Enterprise Resource Planning (ERP) systems to improve business performance and the specific practices that resulted in sustained value creation [2]. They found that the implementation of an ERP system resulted in sustained value creation; however some corporations realised far more comparable benefits than others. These benefits were directly related to the actions of management in regards to the development and evolution of their ERP system. Davenport et al [2] identified three major evolutionary stages in regards to benefit realisation facilitated by ERP systems. These were:

**Integrate:** Unification and standardisation of data and processes. Use the ERP systems to better integrate business processes and the associated organizational units.

**Optimise:** Align business processes to the overall corporate strategy through the utilisation of embedded "best practice" processes with the ERP system.

**Informate:** Utilising the information generated by the ERP system to transform work practices. This refers to trans-

## Author

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forming ERP systems data into context rich information, through Business Intelligence, to support effective decision making.

These evolutionary stages are reflective of a company's ERP systems maturity level. The concept of maturity is often used to describe the advancement of both people and organisations. Implicit is that with increasing maturity there are improvements in quantitative or qualitative capabilities. Accordingly the more mature a company is in regard to their ERP system, the more value they realise from the system.

“ This paper investigates one company’s trials and tribulations in regards to their Business Intelligence implementations ”

Harris and Davenport [4] conducted a more extensive follow up study in 2006, involving 450 executives from 370 companies, in an attempt to identify the factors that drove value from ERP systems, as well as how companies used these systems to enhance competitiveness and differentiation. One of the key findings from this study was that improved decision making was the most sought after and realised benefit. 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. Top performing companies were able to achieve this by implementing their ERP systems extensively throughout their organisations across a broad range of business functions. This provided an increased level of integration. They also found that top performing companies were more likely to integrate their business processes across organisational boundaries and with suppliers and customers.

Related to the desired benefit of improved decision making, top performing companies aggressively used information and analytics to improve decision making [4]. These findings are supported by Gartner, a leading business analysis firm, who conducted a worldwide survey of 1,500 Chief Information Officers and identified Business Intelligence as the number one technology priority for companies, followed by ERP systems [5]. Gartner predicted that the worldwide revenue for Business Intelligence software would reach \$US10.8 billion in 2011 [6]. The increased expenditure on Business Intelligence reflects the level of impact these systems can potentially have on a company’s performance. IDC, another technology analysis firm, found in a survey of 62 companies that there was on average a 401 percent ROI over a three year period [7]. The Data Warehousing Institute identified in 2005 that the use of Business Intelligence in a number of organisations, such as Hewlett Packard and the US Army, had a significantly positive impact on their performance. Hewlett Packard found in 2004 that, due to their Business Intelligence initiative, the value of worker productivity increased by approximately USD\$10.6 million, whilst the company’s reporting costs were reduced by some \$8.6million. The US Army found that as a result of their Business Intelligence implementation, 10 trained analysts could complete as much work as 200 traditional analysts. In another example of the value of Business Intelligence, Harrah’s, a major hotel and casino owner in America, found

that Business Intelligence contributed to their improve business performance which was associated with their \$235 million profit in 2002. Harrah’s spent \$10million building a 30 terabyte data warehouse [8] and used Business Intelligence to better understand their customers and their gambling habits [9]. The IDC group collected data from forty three companies in North America and Europe that had implemented a Business Intelligence and found that twenty companies achieved a ROI of less than 100 percent, fifteen achieved an ROI between 101 and 1000 percent, whilst eight achieved an ROI greater than 1000 percent [10].

Although Business Intelligence is seen as a priority for many companies to survive in a competitive market there is uncertainty as to the path to follow. Researchers have identified that companies utilise Business Intelligence in different ways, with varying levels of success. A review of the literature indicates that companies often fail to realise expected benefits of Business Intelligence and sometimes consider the project to be a failure in itself [11][12][13][14][15]. Gartner 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 [16]. A survey conducted by Cutter Consortium Report [17] in 142 companies found that 41 percent of the respondents had experienced at least one Business Intelligence project failure and only 15 percent of respondents believed that their Business Intelligence initiative was a major success. Moss and Atré [18] indicated that 60% of Business Intelligence projects failed due to poor planning, poor project management, undelivered business requirements, or, of those that were delivered, many were 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 indeed, delivered too late to be useful [19].

These researchers have attempted to map Business Intelligence usage and best practices to provide a roadmap for companies to move forward and maximise the benefits of their Business Intelligence initiatives. One approach for this roadmap has been the development of Business Intelligence Maturity Models [20][21][22][23][24][25][26]. The purpose of these models is to provide companies with a

“ Companies have developed and implemented systems to facilitate the collection, processing and dissemination of information, such as Enterprise Resource Planning (ERP) ”

roadmap to improve the management of their corporate data, as well as to maximise the benefits obtained from Business Intelligence. The Business Intelligence Maturity Models identify practices incorporating different stages which are associated with a company's Business Intelligence progress and growth. Although there are many Business Intelligence Maturity Models, they each differ in the practices and stages characterising different levels of maturity.

**2 ASUG Business Intelligence Maturity Model**

The Americas SAP User Group (ASUG) is the largest SAP user group in the world with more than 85,000 members from 4,000 companies [27]. SAP is the market share leader in both ERP systems and Business Intelligence [28]. ASUG developed a series of benchmarking studies to assist its members to better understand the implementation and usage of ERP systems and associated solutions such as Business Intelligence. In 2007, ASUG in conjunction with SAP developed a Business Intelligence benchmarking initiative and has had more than 100 companies participate in the initiative [29]. A website was developed to capture the benchmarking information and a series of presentations was conducted to introduce customers to the initiative. The key questions which the study was intended to answer were:

- How do companies leverage Business Intelligence to drive business performance?
- For which business process is Business Intelligence most critical?
- What are the key performance indicators of an effective Business Intelligence environment?

- How much do top performing companies invest in Business Intelligence?
- What are the best practices that companies can adopt to drive effectiveness and efficiency of their Business Intelligence environment? [29]

Key metrics were designed to capture information to answer these questions. The web site was designed to capture enough information from different company's Business Intelligence experiences to enable relevant comparisons. These details were compared to details from other companies as well as industry standards, allowing a range of Business Intelligence benchmarks to be created. Part of the benchmarking derivation process was the mapping of companies to a maturity model. The ASUG Business Intelligence Maturity Model (Table 1) allows Business Intelligence maturity to be classified as per practices related to Application Architecture, Standards and Processes, Governance, and Information and Analytics. Each of these practices is made up of a number of stages which describe different aspects of Business Intelligence maturity.

It would be expected to find many companies in the early levels of Business Intelligence maturity and therefore provide verification for the practices and associated stages. But are the higher levels of maturity reflective of Business Intelligence best practices? Each year Gartner identifies companies for their Business Intelligence Awards of Excellence. It would be reasonable to expect that a company which achieved such an award would be very mature as per the model. This research adopts a case study approach to investigate the Business Intelligence operations of a re-

Stage	1	2	3	4
	Information Dictatorship	Information Anarchy	Information Democracy	Information Collaboration
<b>Information and Analytics</b>	Requirements are driven from a limited executive group	KPI's and analytics are identified, but not well used	KPI's and analytics are identified and effectively used	KPI's and analytics are used to manage the full value chain
<b>Governance</b>	IT driven BI	Business driven BI evolving	BI Competency Centre developing	Enterprise wide BI governance with business leadership
<b>Standards and Processes</b>	Do not exist or are not uniform	Evolving effort to formalise	Exist but are not uniform	Uniform, followed and audited
<b>Application Architecture</b>	BI "silos" for each business unit	Some shared BI applications	Consolidating and upgrading	Robust and flexible BI architecture

Table 1: The ASUG Business Intelligence Maturity Model [24].

“ Three major evolutionary stages have been identified in regards to benefit realisation facilitated by ERP systems: optimise, integrate, and informate ”

cent Business Intelligence Award of Excellence recipient, (alias CompPack). The Business Intelligence operations are then mapped to the ASUG Business Intelligence Maturity Model to investigate its applicability.

### 3 Case Study

A case study research methodology was used to examine CompPack and its use of Business Intelligence to support their overall business strategy. The case study focused on a large company involved in the packaging and processing industry. The data collection process included interviews of key personnel, examination of existing documentation and analysis of internal documentation. Yin [30] suggests that a single, in-depth case study is an appropriate research approach under a number of conditions, one of which being that it is a critical case whereby it meets all the necessary conditions for testing a theory.

CompPack is a global food packaging and processing company which has been established since 1929. This private company has 20,000 employees, 50 factories and sales operations in 150 countries. In 2008, CompPack produced 141 billion packages worldwide resulting in total sales of Euro 8,610million.

CompPack decided to implement a SAP ERP system in 1994 to support their business. Similar to many other companies, CompPack's ERP system implementation was not as successful as they would have liked. In 1999, CompPack was faced with a number of issues. There were the issues of the impending Y2K and the impact this would have on the company, especially as some of the legacy systems were almost twenty years old. In addition CompPack's business had grown globally and the ERP system needed to support these new markets and associated operations. It was decided to undertake a Process Globalisation Project supported by SAP solutions.

The SAP implementation which included the implementation of a data warehouse adopted a phased approach based on geographical locations. The first two phases involved geographic locations associated with CompPack's smaller markets, thus minimising the risks. The third phase involved implementing SAP in Germany and United States, which represented the majority of CompPack's markets and thus the highest risk. This implementation was not without its problems. The project took 12 months instead of the planned 6 months and incurred a 300 percent budget overrun.

The implementation of the data warehouse was a relatively small component of the overall SAP implementation. The project overruns limited the scope of the of the data warehouse implementation. The data warehouse was designed to be a large repository of business data based on the

premise that if data was collected and stored in one location, then the business users would access it for their business needs. This expectation did not occur. A major reason for this was the lack of performance associated with making the data available to the business users. The performance issues were related to the technical design and infrastructure. Data was extracted from the ERP system into the centralised data warehouse. The data was then aggregated and extracted into geographically based data warehouses (data marts) and, in some cases, the data was further extracted to power users' personal computers. This series of data extractions resulted in delays in performance in delivering relevant data to the intended users. Accordingly there was a lack of confidence in the centralised data warehouse solution.

In 2005, the staff responsible for the data warehouse realised that, after spending 20 million Euros, the current system was not providing the expected benefits and so arranged a meeting with the Chief Financial Officer (CFO) to discuss the various options. The CFO agreed that there needed to be a change of direction and, in 2006, the data warehouse project was stopped and a new Business Intelligence initiative was commenced. The project was referred to as "Business Warehouse" to differentiate it from the previous project

It was decided to reduce the complexity of the current Business Intelligence environment and that the new project would standardise the BI infrastructure across CompPack to SAP's Business Information Warehouse (SAP BW), including Business Explorer (Bex) web component for the presentation of reports. This reduced the number of extractions required as per the previous implementation and thus improved overall performance in the providing business data to the users.

The Business Warehouse project had two major milestones. The first was to replace a legacy financial consolidation system by getting the global legal financial accounting data into the SAP BW system and ensure its correctness. The second milestone was associated with loading the management accounting data into the BW system as well ensuring that the correct data was available to report on the key performance indicators (KPI's) of CompPack's core business processes. This meant that CompPack had evolved, from a having legal financial accounting view of the company, to a management view of the company involving budgets and core business process performance. This availability of key data, via the BW system, resulted in greater support and acceptance by business users. The Business Intelligence team started to develop standardised processes to enable the provision of more and more key

$$\text{Performance} = \text{Process} \times \text{People} \times \text{Tools}$$

**Figure 1:** Business Performance at CompPack.

information to support the business.

SAP, in conjunction with hardware partners IBM and HP, developed a "bolt on" infrastructure solution to improve the performance of reporting. The Business Intelligence Accelerator (BIA), utilising blade computing technology, has been reported to improve reporting by up to one thousand times faster, according to Lewis. In early 2009, CompPack implemented the BIA to improve their reporting performance. The reporting response time was reduced from an average of twenty seconds down to five seconds. The availability of financial and management data, in conjunction with improved reporting performance, resulted in greater support and acceptance of the BW system by the business users.

As part of the Business Warehouse project, CompPack considered there were three important phases to their Business Intelligence journey. The first phase involved getting the necessary infrastructure and data in place to provide some quick wins, while at the same time providing a foundation for future development. Prior to the implementation of the Business Warehouse project CompPack had a fragmented corporate reporting applications environment. The second phase involved the governance of Business Intelligence in terms of the processes related to the collecting requirements to the development of reports. A standardised reporting template was developed which included charts, data tables, filters and the ability to change the dimensions for analysis. All reports were developed based on this template and thus, once a user was familiar with the functionality and navigation of one report, they could then apply this knowledge to any other report. The only training that was required was in relation to the business content of the report and its applicability. The governance standardisation enabled a best practice approach to ensure a successful Business Intelligence solution. The final phase was to build upon the foundation laid down by the first two phases to extend the coverage and usage of Business Intelligence to support management and the business.

A major factor of the Business Intelligence initiative's success was due to the agreement by senior management as to the role of Business Intelligence within CompPack. There was agreement that, to improve business performance, there needed to be three things in place. There needed to be the right business processes, people needed to be trained how

to execute these business processes and, finally, the correct tools needed to be available to support the people and processes (Figure 1). Business Intelligence was considered to be an essential tool to monitor processes and thus measure performance. CompPack developed a strategy map and balanced scorecard, including relevant KPI's, to implement and monitor their strategy.

The monitoring of business processes through the associated KPI's was integral to the company's performance and this was the main priority for Business Intelligence. Another business priority for Business Intelligence was the need for a single version of truth about the business. This included consistent facts about customers, products, suppliers, past performance and future forecasts. CompPack's Process Globalisation Project was the single largest investment in the company's history and Business Intelligence enabled the company to realise many of the benefits from this investment.

As part of the Business Warehouse project, CompPack consulted with Gartner in an attempt to identify "best practice". One recommendation was the establishment of a Business Intelligence Competency Centre (BICC). A BICC is responsible for developing the overall strategic plan and priorities for Business Intelligence. It defines the requirements (including data quality and governance) and helps the organisation to interpret and apply the insight to business decisions [31]. CompPack considered that a BICC was essential if it was to achieve an enterprise view of the data and reporting requirements.

To fully capture the company's requirements CompPack's BICC was comprised of two structures. The first structure consisted of:

**Business Information Management (BIM):** This consisted of 5 full time senior business analysts who had a good understanding of the business and the capabilities of Business Intelligence.

**Global Information Management (GIM):** This project team consisted of between 15 to 25 people and provided the technical Business Intelligence expertise. The BIM and GIM worked closely together with common goals.

**Global Information Management Service Delivery Team (GIM SDT):** This group involved approximately 12 people and were responsible for ensuring the availability and an ongoing support for reports once they were developed.

**Global Process Owners/ Global Process Drivers (GPO/ GPD):** This group were responsible for key business processes. CompPack decided that these people were the only people who were allowed to request IT related projects. This resulted in IT having a very focussed business role.

The other structure, which was referred to as the "Ex-

“ Top performing companies aggressively used information and analytics to improve decision making ”

Measure	Score	Comment
Global Enterprise-wide Adoption – the ultimate measure of BI success – % of employees as active BI users	> 10%	More than 10% of employees are active users; expect to reach 15% in 2009. More than 30000 navigations per day. 20% of employees are registered users.
% coverage in BI of business processes and business performance measurements Single source of truth across borders, processes, businesses	100%	Business performance measurements are available for all business processes and all business units. Expanding coverage within processes and units. Used in all Markets and in the centre.
Response time	5 seconds	Worldwide: all management reports in 15 seconds or less, average navigation step below 5 seconds
Reliability, Consistency & Quality	7AM	All managers have fresh data at 7AM their time worldwide. Information is correct and broadening. Adoption makes sure it stays correct.
Easy to use – low training cost	High user adoption	Information portal based on geography, business roles and business processes; standard layouts make it easy to understand and use
Enables next steps – new major business information initiatives	Global Information Projects	Successful major new information projects – brand information back to our customers, worldwide alignment on Sales Forecasting

**Table 2:** Business Intelligence Value Scorecard.

tended BICC" consisted of the MIS coordinator from each of the business areas that utilise Business Intelligence. Their role was to act as change agents and encourage the adoption and use of the Business Intelligence solution.

The BICC is overseen by a steering committee made up of senior management and their ongoing support is considered essential to the success of the Business Intelligence initiative. A priority of the BICC is not just to gather requirements and develop reports but also the deployment of those reports and the realisation of their value. The process of gathering requirements, developing reports, deployment and report value realisation has been documented to ensure that the process is standardised, repeatable and clearly understood across the company. This has enabled the process to be refined and improved. A timeline for the report development and deployment process was developed and publicised. This facilitated business areas planning and scheduling their reporting requests. Reports are rolled out quarterly.

CompPack's approach to Business Intelligence has enabled them to gain a high level of success in relation to their

Business Intelligence initiative. In December 2008 they had approximately 1800 active users representing about 9% of the employees. By June 2009, the number of active users had increased to 2,600 (12.5%). CompPack believes that this level of usage could not be achieved unless the users perceived the Business Intelligence system to be of value.

To ensure that CompPack's approach to Business Intelligence is best practice, they developed a "Business Intelligence Effectiveness Scorecard". This scorecard consists of a number of assessable components including;

**Business Case and Vision:** 1) single source of truth; 2) business analysis across borders, processes, businesses; 3) analysts move from data gathering to real business analysis; 4) reduce total reporting cost.

**Executive Support:** CFO provides visible public support.

**Alignment to Business Strategy and Business Processes:** Only Global Business Process Owners can request Business Intelligence or CPM projects.

**Alignment and Working Practices, Business and IT:** Business Transformation Process aligns strategy, process

“ Researchers have attempted to map BI usage and best practices to provide a roadmap for companies to move forward and maximise the benefits of their BI initiatives ”

““ The ASUG Business Intelligence Maturity Model allows BI maturity to be classified as per the most relevant practices ””

and organisation. Business owns scope prioritisation and outcomes.

**Extended BICC:** Central team contains both business and technical expertise. Network from the centre Business Transformation Officers and Market MIS Coordinators provide the link to adoption.

**Predictability – Robust and Effective Delivery Methodology:** Compliance to IT Project and Service processes as a subset of Business Transformation process.

CompPack believe that their Business Intelligence approach has satisfied the above criteria. However the above scorecard only reinforces that the correct approach has been implemented. A further scorecard, "Business Intelligence Value Scorecard" was developed to quantify the Business Intelligence impact on the business. This scorecard including measures is displayed in Table 2.

CompPack has noticed that, due to their approach to Business Intelligence and the value generated, different areas of the business are placing greater demands on the Business Intelligence group for new initiatives. This increased demand for Business Intelligence is reflected by the last measure in the above scorecard.

Business Intelligence has enabled CompPack to refine their business processes as they move towards a business transformation. Business Intelligence is used to gauge the performance of business processes and thus essential to understanding the impact of business process redesign. Since the introduction of Business Intelligence, CompPack has seen significant improvements in many of their core business processes. For example CompPack focused on reducing the time between the ordering and implementation of their packaging equipment at a customer's site. Through the revision and refinement of the associated processes they were able to reduce this time from 140 days down to 47 days. The process of taking a customer's packaging design and manufacturing it was reduced from 15 days to 5 days. Accordingly Business Intelligence is considered essential to business sustainability and growth at CompPack.

#### 4 Business Intelligence Maturity Model Applicability

CompPack's Business Intelligence implementation and usage would make it be considered a very mature company

as per the ASUG Business Intelligence Maturity Model. KPI's and analytics are used extensively to manage the entire business. The BICC has enabled the company to develop enterprise wide governance and Business Intelligence leadership while at the same time implementing standardised processes and standards to support the Business Intelligence initiative. This standardisation also applies to their Business Intelligence architecture. These Business Intelligence practices are aligned with the highest level of maturity in the ASUG model, Information Collaboration. This level of maturity is further supported by CompPack achieving a Gartner Business Intelligence Award of Excellence in 2009. Table 3 classifies CompPack's BI practices as per the Information Collaboration stage of the ASUG Business Intelligence Maturity Model.

CompPack have realised that it is important to measure Business Intelligence from two different perspectives. Firstly, and the most common reason for measuring Business Intelligence is to prove its value as an investment. They have been able to quantify the tangible benefits Business Intelligence has provided the company. The second perspective is to measure Business Intelligence activities for the purpose of monitoring and improving the Business Intelligence process. The development of a BICC and a number of scorecards has enabled CompPack to adopt an enterprise wide approach to business Intelligence. Throughout the case study research CompPack continually emphasised that "*... it is not about Business Intelligence but about corporate performance management and Business Intelligence is only one part of the formula*".

#### 5 Conclusion

The ASUG Business Intelligence Maturity Model attempts to classify Business Intelligence usage and best practices into different stages. As Business Intelligence technology evolves and permeates all aspects of business it would be expected that these stages would also evolve to include different practices. The application of the model to Business Intelligence Award of Excellence winner demonstrates the suitability and applicability of the model at the more mature stages. This paper provides an example of a company's Business Intelligence journey and what could be considered Business Intelligence best practice.

““ CompPack, a large multinational company in the food packaging and processing industry, decided to implement a SAP ERP system in 1994 to support their business ””



“ A major factor of the BI initiative’s success in CompPack was due to the agreement by senior management as to the role of BI ”

Stage	4 Information Collaboration	CompPack Practices
<b>Information and Analytics</b>	KPI's and analytics are used to manage the full value chain	<ul style="list-style-type: none"> <li>• Implementation of Strategy map and balanced Scorecard</li> <li>• Globalisation Process Project</li> </ul>
<b>Governance</b>	Enterprise wide BI governance with business leadership	<ul style="list-style-type: none"> <li>• Establishment of an enterprise wide Business Intelligence Competency Centre supported and promoted by senior management.</li> </ul>
<b>Standards and processes</b>	Uniform, followed and audited	<ul style="list-style-type: none"> <li>• The implementation of the Business Intelligence Competency Centre.</li> <li>• Introduction of BI Effectiveness Scorecard</li> </ul>
<b>Application Architecture</b>	Robust and flexible BI architecture	<ul style="list-style-type: none"> <li>• Business Intelligence Accelerator</li> <li>• SAP Business Intelligence</li> <li>• Business Explorer web reporting</li> </ul>

**Table 3:** The ASUG Business Intelligence Maturity Model and CompPack [24].

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