

A White Paper by Exact Software



# Managing BI Complexity

Overcoming the complexities associated with traditional BI approaches

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# Executive Summary

*As companies started implementing BI projects it became apparent that BI applications had their own framework that posed challenges in their unification with the existing technology and resources.*

The business environment today is becoming ever more complex. More businesses, than ever before, are relying on fact based decision-making and analytics to compete in this environment. This has given rise to “Business Intelligence”, or simply BI, which is a broad category of applications and technologies for accessing, combining, computing and analyzing data to help enterprise users make better business decisions.

According to research by KRC Research, on behalf of Unisys Corporation, BI has become a significant part of the IT strategy of all organizations. The survey respondents attributed the trend due to the following: managing corporate performance (29% respondents), monitoring business activity (27% respondents) and reporting or regulatory compliance (22% respondents). BI has been positioned as a panacea for the information retrieval challenges and is supposed to simplify the information maze.<sup>1</sup>

As companies started implementing BI projects it became apparent that BI applications had their own framework that posed challenges in their unification with the existing technology and resources. The introduction of ‘new parts’ like data warehouses, reconciliation, application servers, additional skill-sets, and increased maintenance led to even greater complexity.

In this paper we will focus on the following:

- How can BI help manage the increasingly complex business environment?
- How can BI maintain simplicity without sacrificing the benefits

Finally, we will examine real world examples of companies facing complexity at several levels, and how they addressed it with BI.

## Introduction

In A. J. Deutsch’s short story A Subway Named Mobius, Boston’s Public Transportation authority introduces a new line and the topology of the network becomes so complex that a train vanishes...lost in some fourth dimensional properties of the network.

The mathematics in this story may not always be accurate, but many managers today can identify with the situation. They work with systems that are increasingly complex - where it may seem almost impossible to understand all the interconnections.

Many fear they may lose track of some important detail that could cause their train to jump the track.

## **Mechanics of Complexity**

Let's examine the mechanics of complexity from the practical aspects most relevant to management and decision-making:

*Business Intelligence is supposed to address data and information complexity in the modern business environment to help minimize the decision-making complexity.*

### **Complexity of Business Goals and Decisions**

Managers are subject to complex, often competing, pressures (e.g. regulatory guidelines, customer satisfaction, profitability targets, cost justifications, etc.). Managers must make more decisions, faster, and based on an ever increasing accumulation of facts and figures. This gives rise to decision overload!

### **Complexity of Knowledge and Skills**

With software trying to become “everything for everybody” the range of knowledge and skills needed to retrieve the relevant information and then try and make timely business decisions is too much for one person to master. This leads to confusion with more people in the mix managing the same system – too many cooks!

### **Complexity of Data Infrastructure**

This seems to be the fundamental reason behind most of the information complexity. The information needed to make decisions is buried in a large heap of data, sometimes in a number of systems in variegated locations (e.g. databases, data warehouses, transaction systems, etc.). It is a challenge for IT departments to manage the smooth running of these systems, let alone support report writing for the managers and business users.

## **Enter Business Intelligence...**

Business Intelligence is supposed to address data and information complexity in the modern business environment to help minimize the decision-making complexity.

### **Overcoming Complexity of Business Goals and Decisions**

BI should:

- Supply accurate data in a timely manner in a secure environment
- Present data in the form of easily digestible information
- Provide easy means to answer ensuing questions
- Allow effective communication

*Simple framework of BI means lesser introduction of “newer parts”, easier administration and maintenance. This also means more time and energy can be spent on analyzing the information than trying to gather, store and reconcile.*

### **Overcoming Complexity of Knowledge:**

BI should simplify gathering and presenting information, so that less technical knowledge is needed and communication between the members of the organization is improved. Information should be surfaced in common business language rather than cryptic database languages thus keeping information retrieval and consumption simple for all.

### **Overcoming Complexity of Data Infrastructure:**

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### **Real World Challenges**

Complexity challenges BI in various ways. Some companies, especially the large ones, experience multiples of these complexity challenges.

### **Multiple Enterprise Data Sources:**

As organizations grow, they may end up with one or more transaction systems for a variety of reasons: mergers and acquisitions, additional applications due to growing needs, different software vendors, legacy databases, etc.

### **Consolidation of Data:**

The first challenge is to access and combine data from these multiple databases in an efficient and timely manner. Redundant databases like the data warehouse or data marts impose additional ‘feeding and seeding’ requirements that can be a big drain on the resources.

### **Performance and Throughput:**

These databases may be centralized or dispersed. Consolidation often poses a performance challenge. It is imperative to execute ‘queries’ with minimal impact on system performance and with minimal hardware investment. The consolidation has to make use of every resource available – hardware and network.

### **Real-Time Analysis:**

Businesses often times need on-demand business analytics – on-hand inventory from multiple locations, open orders or upcoming shipments to ship from various locations, etc. As businesses need to react more quickly to market demands, putting this capability in the hands of users gives a big competitive edge. This also means that BI should allow real-time analysis with simplicity and minimal impact on the system performance.

*Data source selection should be external to each analysis and determined by the business user.*

## **Syntactic and Semantic Heterogeneity:**

Multiple databases and transaction systems results in information heterogeneity:

- Syntactic – same business information retained in different database tables across
- Semantic – same business elements being referred to in different terminology.

The result, long report writing cycles - long wait times.

## **Geographical Dispersion of Databases:**

Here the underlying challenge involves limited bandwidth between the various data sources, as well as between the data sources and the BI users. In case of international locations, the time zones can be a big factor as well

BI should solve this problem seamlessly via an integrated network of collaborating sub-systems and also making the communication more effective through simple logical means like federation of queries and data compression.

## **Complex Analyses and End User Flexibility:**

### **Too Many Reports**

Often times tools "bind" the data sources into each analysis/report. This restricts the end users from being able to select the data sources to analyze information from. The end result - a different report variation for each combination (thus exploding the number of distinct reports that needs to be maintained). Data source selection should be external to each analysis and determined by the business user.

### **Cross Functional Analysis:**

This is also true in the case of cross-functional analysis. If a report is bound to a 'data mart' or a departmental analysis, the user finds it difficult to expand the analysis across a process. This results in numerous incongruent reports. A single view across the process would make it much easier to measure and manage overall business performance.

## BI Side Effects – Added Complexity

The implementation of BI has matured over time. In the earliest stages, power users equipped with spreadsheets exerted control over the content and display of information. The IT department strictly controlled access to the company's data. Most requests were handled as one-off reports. The resulting effect was mostly to add work to a small number of low level workers.

As the demand for more information rose, data warehouses were introduced. Data warehouses require specialized software, new database structure, and new hardware to house the resulting data. Additional personnel are required to plan, implement, and manage this infrastructure. Anybody who accesses the data needed special training. Company growth and business changes required expensive changes to the data warehouse.

In the 1990s, organizations attempted to build their business intelligence infrastructure data warehouse elements in a top-down monolithic fashion. These large-scale, enterprise-class projects had trouble delivering value to the business, with studies showing failure rates from 30%, according to the Meta Group, up to 80%.

Inserting BI applications into an organization may necessitate many changes which, of course, increase the complexity of the system.

### **In keeping with Manning's framework, here are some BI side-effects:**

#### **Complex BI Framework**

Many BI solutions require additional computer hardware (application and database servers), which may require additional personnel or enhanced skill-sets, resulting in increased costs, overhead and of course, complexity.

#### **BI Knowledge and Skills**

New software, database management systems, and hardware platforms will all require training and support. IT and users must be thoroughly briefed on the current systems as well as given a clear understanding of the desired results of the BI implementation. If any of the training is incomplete or insufficient it has a cascading impact on the overall implementation. Also, heavy reliance on knowledge and skills means the system becomes very human-dependent.

#### **BI Administration and Maintenance**

The more the parts in the framework, the more the upkeep required. It is not uncommon to hear of organizations having dedicated personnel to manage a BI system. While it may not be totally avoided depending on the number of enterprise users and the volume of data and information, dedicated resources translates into additional cost of ownership.

*While most BI vendors have solved the basic data access issues, just being able to access the data from the various databases is not enough. Combining the information in an efficient manner resulting in consistent harmonized, easy-to-digest presentation is imperative for success.*

## Principles to Managing BI Complexity

### **Leverage Developments in Technology:**

Databases are becoming faster and more efficient. Processor speed is getting cheaper. This means that there is ample scope to achieve the same end results by leveraging the databases directly than building a 'staging' area.

Middleware technology has advanced significantly and is capable of managing complex queries. An integrated multi-threaded middleware allows federated, parallel queries that utilize each database resource most effectively. For business this means, real time information is becoming easily accessible.

### **Keep the Business User in the Forefront**

Business requires reporting but static reports are not at all enough to provide answers to business questions. Also, business needs access to enterprise-wide information from the requisite data sources. Managers need to focus on the functional and process performance and not just departmental performance.

While most BI vendors have solved the basic data access issues, just being able to access the data from the various databases is not enough. Combining the information in an efficient manner resulting in consistent harmonized, easy-to-digest presentation is imperative for success.

Business managers need information to analyze business and their knowledge and skills are focused on measuring and managing business rather than learning new software. It is necessary to ensure that the business users are comfortable with the new means of accessing information.

### **Leverage what Already Exists - Introduce only the Essential Parts**

Leverage the data directly from the databases or transaction systems. This helps get to the source of information thus increasing the level of confidence in the reports. This is critical in today's environment of compliance and audits.

Leverage the native database - SQL and data optimization tools, etc. This way there is no need to learn new proprietary systems or languages. Also, this ensures reusability of the BI work by other applications.

Utilize every piece of hardware in the 'query and analysis' process. Leverage the existing user PCs and existing hardware without forcing unnecessary upgrades. With Desktops and laptops becoming more and more powerful their processing power can be leveraged thus minimizing the need for a heavy middleware server.

Make use of off-peak hours to maximize throughput of queries and reports from the existing systems.

*Business users need to focus on analyzing and managing business. They don't need to be report writers.*

Do not introduce redundant databases unless absolutely necessary. This includes data warehouses, data marts, and any redundant stored data. Selective summarization and storage, if at all required, is much more efficient than mass storage and allows a lot of room for growth.

### **Keep Simple Things Simple and Make Difficult Things Easier**

Business users need to focus on analyzing and managing business. They don't need to be report writers. Keep the user layer simple, clean but provide analysis tools to help them answer questions or investigate. Do not expect users to learn database terminology or any technical skills.

A business-oriented metadata model is required to achieve this. Also, in multiple database situations where there is syntactic heterogeneity between databases this metadata model is required to "normalize" the various systems.

In situations where there is a business need for cross-functional or process analysis spanning multiple data sets, BI needs to modularize the analysis task and allow each component to be independently specified and incrementally validated. This way as business grows and there are additional areas that need to be analyzed those analysis modules can be plugged into the metadata without the need to define all the analyses all over again.

Semantic heterogeneity can be managed easily by creating a centralized corporate standard master file database that encodes the "official customer / item / vendor numbers", and then cross-reference that database to each local database.

## Real World Examples

Here are some examples of companies who used BI to combat complexities they faced.

### **CASE STUDY: A Global Manufacturer of Packaging Products**

A global business that manufactures plastic packaging at 26 sites around the world employing thousands of employees worldwide

#### ***The Business Challenge***

The primary initiative was a board-level directive to reduce total inventory costs and manage inventory levels more efficiently. The company had struggled with high inventory costs and a lack of available information to effectively coordinate inventory and production. The company had also recognized a need to analyze and manage sales and sales margins at the product and supplier level on a daily basis.

#### ***Business Value Delivered***

Using BI, the Finance group standardized and streamlined the monthly closing procedures, eliminating several man-days of work. This freed the group to concentrate

on higher value activities such as accounts receivable management. Additionally, with the visibility BI provides into their sales processes, the company has been able to effectively forecast and plan production to meet demand, while eliminating bottlenecks and over-production. Use of BI has helped managers of one site reduce inventory levels by more than \$900,000 without impacting customer service, by identifying and controlling obsolete and slow moving items.

### **CASE STUDY: A Leading Pharmaceutical Company**

The North American division of a leading pharmaceutical company, a leader in international specialty pharmaceuticals, with over a thousand registered products, and thousands of employees in more than 70 countries.

#### ***The Business Challenge***

Prior to implementing BI, the company distributed many printed reports, which were coded with RPG. An important product requirement, therefore, was to reduce the amount of time and effort required to develop complex and flexible reports. It was also critical that the solution reduce the reporting interval and provide timely electronic distribution.

#### ***Business Value Delivered***

The primary benefit to the company has been the ability to access timely, accurate business information that had been previously unavailable. BI provides the factual framework by which the management team evaluates and forecasts sales performance, inventory levels, product trends, and financial results. The overall effect of the availability of this information has been improved decision-making throughout the organization. The company recently conducted a survey of BI users to assess the effect BI has had on productivity. The survey found that BI saved the organization more than 300 hours per month in analysis and report development, freeing up valuable time for other business activities.

### **CASE STUDY: A Multi-national Biotechnology Company**

A multinational biotechnology company with over a thousand employees and presence in dozens of countries.

#### **The Business Challenge**

The company recognized the need to leverage its data in over 60 enterprise databases and find a way to turn it into useful business information. The company was struggling under the burden of creating, maintaining and distributing approximately 1,200 different business reports, and the absence of a standardized reporting structure hampered efforts to monitor and manage business performance. Building a centralized data warehouse was evaluated as an option, but the prospect of integrating more than sixty operations databases around the world was seen as a huge challenge.

*Often times this complexity can be avoided and businesses can see instant and ongoing benefits, if some basic principles are followed: keep the business goals in mind, leverage technology developments, leverage what already works, and keep simple things simple.*

## **Business Value Delivered**

The implementation of Business Intelligence provided the company with an immediate improvement in the distribution and application of business information. BI streamlined the process of delivering information, eliminating the 1,200 static reports and turning the data in the sixty distinct databases into a valuable business asset. BI enables the company to evaluate in detail when and where products are produced, then compare that information to actual ship dates. The information allows managers to reconfigure production to closely match customer demands and deliver products just-in-time, dramatically reducing inventory costs and improving operating efficiency. The company also uses BI to track the shelf life of products, and shift resources when necessary to avoid expiration issues. This capability provides a direct bottom-line benefit for a company that ships a volatile product through a complex network all over the world.

## **Conclusion**

In this paper we began by exploring the kinds of complexity managers see in business today. We then focused on how Business Intelligence can be used to help manage these increasingly complex business environments. Finally, we examined real world examples of companies facing complexity at several levels, how they addressed it with BI, and the benefits they reaped as a result of implementing BI.

BI complexity issues are getting a lot of attention since executives are directly noticing the results in the form of longer lead times to get information, higher uncertainty in making decisions, and greater administration costs. Often times this complexity can be avoided and businesses can see instant and ongoing benefits, if some basic principles are followed: keep the business goals in mind, leverage technology developments, leverage what already works, and keep simple things simple.

BI solutions built using those principles greatly enhance user satisfaction, provide immediate ROI, and are nimble so they can adapt quickly to business changes and grow as the business grows. In closing, Business Intelligence is not a cure all for organizations, but it certainly can help organizations control complexity and manage their businesses better by greatly simplifying the decision making process without sacrificing any the technical benefits that such solutions offer.

## About Exact Software

Established in 1984, Exact Software is one of the world's leading providers of business software solutions. Its integrated solutions comprise traditional enterprise resource planning (ERP) as well as related software solutions such as human resource management (HRM), customer relationship management (CRM), corporate performance management (CPM), project management and electronic workflow.

Exact is headquartered in Delft, the Netherlands and has offices in Europe, the Middle East, North, Central and South America, Asia, Australia and Africa. With around 2750 employees, subsidiaries in more than 40 countries, and solutions available in 40 languages, Exact currently serves customers in more than 125 countries.

Exact Software delivers performance management solutions that help companies intelligently interpret and analyze business data. Exact Software enables companies to leverage their investments in enterprise systems by transforming operational data into business insights, providing the information basis for improved decision-making and enhanced profitability. The company focuses on small and mid-sized manufacturers and has deep domain expertise in the manufacturing industry. Companies like Ace Hardware, Bayer AG, Intertape Polymer Group, Parker Hannifin and Biomet rely on Exact Software for enterprise reporting and analysis. Exact Software is a valued partner of leading technology firms including IBM, Microsoft, Oracle, Infor Global Solutions, WorkWise, AssetPoint, and Penta Technologies. For more information, see [www.exactba.com](http://www.exactba.com).

<sup>1</sup> Source: "Business Intelligence Trends Survey": results of an online survey conducted by KRC Research for Unisys Corporation, July 2004

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