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"The Business Value of Business Intelligence"

by

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BUSINESS VALUE

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Historically, many data warehousing and business intelligence (BI) initiatives have been IT-driven, and much of the focus within the industry has been on the technical aspects of delivering information to the BI user community. Having arrived at a point where many of the technical challenges and tradeoffs are at least well understood, attention has shifted toward expanding the ways in which BI can be used to deliver business value.

As always, the BI vendors are key players in the market expansion process – through product innovation and their articulation of value propositions. Key vendor initiatives include: (1) offering pre-integrated BI product offerings – generally known as packaged analytical applications; (2) advocating expansion of the BI footprint within organizations, often referred to as "BI for the masses" and/or "enterprise analytics;" and (3) positioning the use of their products as reflective of "BI best practices."

As promising as expanded use of BI may be, there is still the need for careful and balanced discussion of the specific business and technical preconditions for capturing the business value of business intelligence, particularly in today's tight IT investment climate. The goal of this article will be to contribute to the emerging dialog on the subject of business value by extrapolating from BI lessons learned and from DecisionPath Consulting's experience working with Fortune 1000 customers and Government agencies.

Introduction

In the 1990s, much investment in IT was focused on enterprise applications - such as ERP, SCM, and CRM – and on connectivity between trading partners via the Internet and more traditional means such as EDI. The business benefits of these investments included transactional efficiency, internal process integration, back-office process automation, transactional status visibility, and reduced information sharing costs.

While some of the enterprise applications also provided BI, the primary motivation for many of these investments was to achieve better control over day-to-day operations. For example, ERP systems allow companies to track order status, inventory, and customer service in real time, SCM systems provide supply chain planning functions, and CRM systems provide sales pipeline management and call center management tools. In the data warehousing world, all of these applications - and others - were considered sources of data that could used to provide business intelligence.

In the 1990's, we also saw the emergence and maturation of data warehousing as a specialty field focused on helping organizations make better use of the vast amounts of raw transactional data captured by enterprise applications. Many of the early adopters were in transaction-intensive businesses, such as financial services, telecommunications, and retail, as marketing managers attempted to make sense of vast amount of transactional data as a means of improving revenue and profitability. From the technical side, the challenges of ETL, data storage, and information delivery were addressed by:

- Relevant products
- A growing body of data warehousing management knowledge
- The evolution of well-defined data warehousing architectures that could be applied in many organizational contexts

As the 1990s came to a close, enterprise applications had been widely adopted by major organizations, and innovators were beginning to look at how to leverage IT for purposes such as strategic enterprise management, managing customer profitability, improving supply chain and/or operations performance, improving "front-office" business processes (such as sales force management and campaign management) and improving indirect business processes (such as budgeting and business planning). On the data warehousing side, many of the technical challenges had been overcome, spawning the opportunity to expand the use of data warehousing to new parts of the enterprise and to industries where adoption lagged.

As a result of these developments, we are now presented with an opportunity to marry organizational desire to better leverage information with the technical ability to deliver information to support a wider variety of business processes that impact the bottom line. To their credit, vendors in the BI community have recognized this opportunity and are delivering a steady stream of innovative BI products. As always, however, innovative products and/or innovative uses of IT come with uncertainty regarding the business value that will actually be captured. Further, there are existing BI tools that have yet to be as fully exploited as they could be, an example being the use of optimization tools for tactical and operational process improvements to supply chain and operations.

Accordingly, we believe it is a strategic necessity for organizations to assess how they can use BI to improve results and to use structured approaches to ensure that their investments in BI actually deliver business value.

What is "Business Value" and How Do We Capture It?

In economic terms, the business value of an investment (an asset) is measured as the net present value of the after-tax cash flows associated with the investment. For example, the business value of an investment in a manu-

facturing plant is the sum of the incremental after-tax cash flows associated with the sale of the products produced at the plant. Similarly, an investment in BI creates an asset that must be used to generate incremental after-tax cash flow. Accordingly, BI investments should be subjected to a rigorous assessment of how the investment will result in increased revenues, reduced costs, or both.

While there are hundreds of ways to express business benefits, there is no business value associated with an investment unless the benefits achieved result in increased after-tax cash flows. For example, it is common for BI vendor value propositions to emphasize business benefits such as agility, responsiveness, customer intimacy, information sharing, flexibility, and collaboration. But investing in BI to achieve such business benefits may actually destroy business value unless those attributes can be defined in operational terms and realized through business processes that affect revenues or costs. For example, a $2 million investment in a BI application must result in incremental after-tax cash flow of at least $2 million or the organization will suffer a reduction in assets.

To illustrate this point, many companies use BI to improve customer segmentation, customer acquisition, and customer retention. These improvements can be linked to reduced customer acquisition costs, increased revenues, and increased customer lifetime value, which translate to increased after-tax cash flows. On the other hand, a BI investment that improves demand forecasting will not deliver business value unless the forecasts are actually incorporated into operational business processes that then deliver reduced inventory, reduced order expediting costs, or some other tangible economic benefit. In other words, the business benefit "improved forecasting" is useless unless it is somehow converted into incremental after-tax cash flow.

Looked at more broadly, the quest for delivering business value via BI can be seen as a matter of determining how an organization can use BI to:

- Improve management processes - such as planning, controlling, measuring, monitoring, and/or changing - so that management can increase revenues, reduce costs, or both

- Improve operational processes – such as fraud detection, sales campaign execution, customer order processing, purchasing, and/or accounts payable processing – so that the business can increase revenues, reduce costs or both

In other words, the business value of BI lies in its use within management processes that impact operational processes that drive revenue or reduce costs, and/or in its use within those operational processes themselves. Let us illustrate this point with a couple of examples.

Many companies these days aspire to use customer relationship management strategies that distinguish between customers based on their value. In retail banking, a customer with loans, large savings accounts, a checking account with large balances, credit card balances, and who uses on-line banking is much more valuable than a customer with only a low-balance checking account who comes into a branch frequently. Clearly the bank would not want to lose the former customer, whereas it might be willing to lose the latter.

For the bank to implement a customer relationship management strategy based on the difference in customer value, it first needs BI applications that allow it to know which customers are highly valuable, which are valuable, which are less valuable, and which are not valuable. That knowledge alone, however, is not enough to ensure that the bank does not lose highly valued customers. It must

also have management processes and operational processes that take into account the differences in customer value and treat the highly valuable customers preferentially. For example, the bank might waive a late fee on a loan payment for the valuable customer, but not for the less valuable customer.

The strategy of treating customers differently depending on their value as customers is also used in supply chain management. The central idea is to design and optimize supply chain business processes to provide superior service to those customers who drive the bulk of one's profit. In order to do this, a manufacturer needs a BI application that allows it to know which are its most profitable customers. As with the bank, however, this knowledge is of little use unless it can be translated into business rules for manufacturing schedules that recognize that orders for the most valuable customers should be serviced ahead of those from marginal customers.

Given that capturing the business value of BI depends on being able to use BI in a way that has an operational impact, organizations must look beyond the initial rollout of BI applications, as shown in Figure 1.

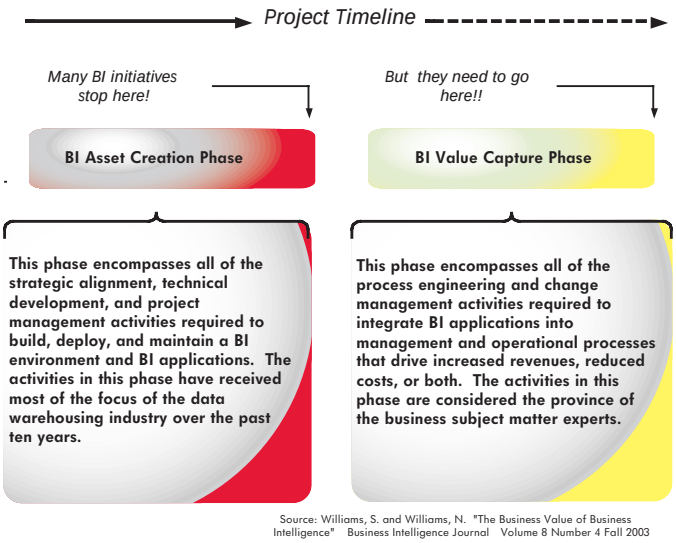

Figure 1. Looking Beyond the Initial Rollout

As Figure 1 shows, capturing the business value of BI requires organizations to go well beyond the technical implementation of a BI environment. Specifically, organizations must engage in effective process engineering and change management in order to capture business value from BI.

The implication of this requirement is that BI methodologies must be extended to include these additional preconditions, as shown in Figure 2.

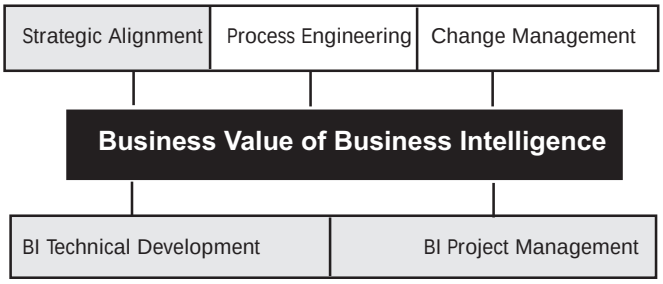

Figure 2. Preconditions

Three preconditions shown in Figure 2 (those in light gray boxes) are generally well understood, based on data warehousing industry experience over the past decade. The other two preconditions – process engineering and change management – are not as well understood for BI applications; they currently stand as barriers to capturing the business value of business intelligence. Let us examine this idea with an example.

In a typical large company, much of the information routinely available to managers comes in the form of static reports and from ad hoc information gathering and analysis. A general manager who receives a monthly Profit and Loss statement may notice that revenue is less than budgeted, in which case he or she will most likely assign a staff analyst, middle manager, or functional manager to figure out the factors contributing to the variance.

The specific form of the analysis, the manner in which it is done, and the information sources the analyst uses are likely to be ad hoc and idiosyncratic. Most likely, the analyst will do the best he or she can with the information and time available, with little opportunity for extensive scenario analysis and assessment of alternative courses of action.

Imagine now that the company invests in a BI application for revenue management. The application is capable of looking at revenue trends by customer, by geographic region, by product, and by salesperson. Further, it is rolled out company wide, with on-line training available to any potential business user who may want to use the application. For some reason, however, revenues continue to decline and analysis of application use show that only a handful of potential users regularly use the application.

The CFO initiates a project review because he wants to know why the projected incremental revenues have not materialized, and discovers that there was no plan for how the BI application would be used within the user community and no plan for introducing and ensuring the efficacy of the changes required to capture the business value of the investment. This is particularly vexing to the CFO, given that a subject matter expert (SME) was part of the application development team.

In order to avoid the above scenario, we recommend that a structured approach to business value capture be employed. In the sections that follow, we will look at strategic alignment, process engineering, and change management as key interrelated preconditions for capturing business value.

How Do We Achieve Strategic Alignment?

As data warehousing matured in the 1990s, a considerable body of expertise developed around the task of aligning the use of BI with organizational strategies. Essentially, it is a matter of four activities:

- Understanding the strategic drivers of the competitive environment (private industry) or organizational environment (government and non-profit) and related business goals
- Determining the business questions for which answers are required in order to plan, budget, control, monitor, measure, assess, and/or improve organizational performance in relation to the strategic goals
- Identifying the tools, methods, and analytical frameworks that can be used to support execution of key business processes and management of organizational performance
- Following well-established technical procedures for identifying, acquiring, integrating, staging, and delivering the data and information managers need

While this alignment process is straightforward conceptually, there are a wide variety of challenges that must be overcome, as with any endeavor in IT. For example, working with business users of BI to determine their business questions (information requirements) is still an art despite the existence of structured requirements gathering methods. It is not uncommon for business users to be so focused on daily challenges that they have difficulty envisioning how BI can be leveraged to improve organizational performance.

On the technical side, there are a wide array of choices to be made with respect to architecture, methodology, tools, technologies, and processes – choices that impact project risk, total cost of ownership, and ultimately the magnitude of the "investment" portion of ROI. There is also the challenge of incorporating sufficient architectural

flexibility to respond to new BI needs as strategic drivers evolve.

While these strategic alignment challenges are significant, there is a substantial body of knowledge about how to go about meeting those challenges, and the methods used to achieve strategic alignment are effective and widely adopted. That said, strategic alignment, while necessary for achieving business value, is not sufficient in and of itself. As we've seen, the availability of strategically aligned BI does not guarantee its adoption to improve the results of critical business processes that determine the revenues and costs of the business. We must also engage in process engineering and change management.

The Need for Process Engineering

There are a variety of processes used to run a business, such as:

- Strategic, tactical, and operational planning processes
- Financial, operational, marketing, product development, and human resources management processes
- Performance monitoring and measurement processes, quality management processes, and continuous improvement processes
- Supply chain and customer relationship management processes

All of these processes involve the use of information, analytical frameworks, and tools to support the many decisions managers have to make. In other words, these processes require BI, and the economic and technological advances over the past decade in information technology generally (and data warehousing specifically) have opened a new frontier for the use of BI to deliver business value.

The key challenge to using BI to capture business value, in our view, lies in the fact that the way information and analytical frameworks are used within organizations has largely depended on individual initiative and ad hoc choices. At a broader level, BI use has been an idiosyncratic and ad hoc practice that varies by industry and by company within an industry.

For example, revenue optimization models are a staple of asset-intensive, high fixed cost industries such as the lodging industry and the airline industry, but they are not widely adopted in discrete manufacturing industries. Within industries, the information and analytical frameworks used varies by company positioning within the industry. While enterprise applications such as ERP, SCM, and CRM provide structure, automation, and process standardization for managing day-to-day transactions, BI use is more unstructured, more ad hoc, and less widely adopted. For example:

- Use of optimization tools for strategic, tactical, and operational supply chain planning has increased over the past decade but such use is still not widely practiced and has stalled over the past three years
- Many major companies are still in the early stages of adopting techniques such as collaborative filtering and clustering to improve sales campaign performance
- Use of scorecards and dashboards in the context of strategic enterprise management is still in its early days
- Use of data mining for fraud detection is still celebrated as an innovative practice
- Event monitoring and business performance management products are in the early stages of adoption

While data warehousing and BI have been around for a decade now, we are still in the early stages of exploitation

of BI's potential. This presents both opportunities and risks. The opportunity, simply stated, is that effective use of BI can deliver superior performance and business value. The risk is that organizations will not employ the process engineering and change management needed for using BI to capture business value.

To capture business value, we believe organizations will benefit from a rigorous process engineering approach. This entails looking beyond vendor value propositions regarding packaged analytics, "BI for the masses" and "BI best practices" to specifically determine, with economic and process engineering rigor, how adoption of BI will result in incremental revenues or incremental cost reductions. To illustrate this concept, let us examine the simple hypothetical BI application shown in Figure 3.

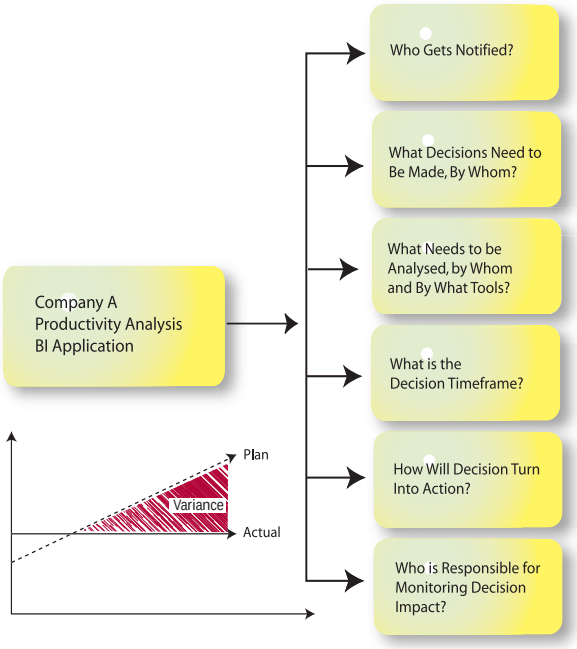

Figure 3. Hypothetical BI Application

Assume that Company A manufactures a semi-custom product and competes on cost. Given that cost is the key basis of competition, Company A has developed a BI application that is used to monitor productivity.

This application is strategically aligned because productivity improvement is critical to cost reduction. We can see from Figure 3 that actual productivity is less than planned productivity, so our BI application has delivered useful information.

That said, we can also see from the questions posed that having useful information is not the same as *exploiting* that information. Unless there are specific management processes for using that information in a timely manner, having the BI application will not create business value. Process engineering is focused on providing answers to the questions posed in Figure 3 and those answers can be captured as the foundation for business rules, standard processes, and standard analytical applications for responding to productivity variances.

This approach can be used for all planned BI applications, and will allow organizations to move from ad hoc responses to recurring business conditions to effective repeatable responses that capture the business value of BI. From this simple example, we can generalize: the business value of BI lies in its effective use within management processes and/or operational processes that drive revenue or reduce costs. Accordingly, process engineering is the critical link between building and delivering BI applications that are strategically aligned and capturing the business value those BI applications are supposed to deliver.

While this proposition is hardly novel or remarkable, we believe that BI industry experience shows that the importance of process engineering has been overlooked or undervalued.

As BI use expands, process engineering is especially important for it's potential to alter competitive landscapes. Vendors are offering a wide range of innovative products with value propositions that are appeal-

ing as general propositions, especially to organizations that are prone to looking for quick fixes. While we are bullish on some of these products when used appropriately, we remain convinced that organizations must be rigorous about determining how the use of these products can deliver business value in their specific contexts. Process engineering is essential to that determination.

Process Engineering in Practice

The co-authors recently served as judges for TDWI's 2003 Best Practices in Data Warehousing Awards, with one co-author serving on the panel of judges for the Advanced Analytics best practices category. There were eight nominees in the category, including Ford, Land's End, Hewlett Packard, Sears, and Nationwide Insurance. While all of the nominees had achieved a high degree of strategic alignment with their BI applications, leaders were distinguished by the degree to which they had integrated BI with value-driving business processes.

For example, Land's End, the category winner, used a process engineering approach that included developing a corporate metric model and mind maps that anticipated the specific ways that inventory managers would use metrics to improve business performance. Another category leader, Ford, developed a closed-loop inventory management process that used BI to reduce inventory and cycle time. Viewed from the perspective shown in Figure 2, Lands End and Ford captured business value by attending to process engineering and change management, thus satisfying key business preconditions for success.

When using process engineering to determine exactly how BI will be used to increase revenue or reduce costs, it is important to keep in mind that the process should be tailored to the situation because the degree of process change associated with a BI investment varies. At one end of the spectrum, a BI application may simply deliver higher quality information on a timelier basis, such as providing managerial accounting information, e.g. historical product costs, to a company's budgeting process. The typical budget process makes numerous assumptions using information that budget analysts have squirreled away in numerous spreadsheets. A new BI application would provide an integrated view of product costs that could be used across the budget department. The budget process itself might not change much, though it would be easier to obtain information for making budget assumptions.

At the other end of the spectrum, a BI application may involve totally new information, analytical routines, and management processes. An example drawn from our experience involved a BI application used by a $2.5 billion manufacturer for sales and operations planning. In this case, the manufacturer lacked sales trend information that could be used for demand forecasting, and it did not have a sales and operations planning process. To reduce costs, the manufacturer had determined that it needed such a process. From a management process engineering perspective, there was no "as-is" state, and the implementation of the BI application involved providing managers with new information, presented with new tools, for use within a new management process.

Given the potential differences in the scope of management process change, it is important to fit the scope of the management process engineering to the task at hand.

The Need for Change Management

Process engineering identifies how BI applications will be used within the context of key management and operational processes that drive increased revenue and/or reduced costs. It provides a map of what processes must change and *how* they must change in order to create business value with BI applications. Process engineering lays the foundation for change management, because process changes drive changes in individual and organizational behavior.

Change management is a generic discipline whose principles are generally understood and have been widely applied for decades to a variety of organizational change processes, including business process changes induced by IT investments in enterprise applications such as ERP. That said, change management as it applies to BI initiatives is not well characterized, and a number of BI project failures can be attributed to ineffective change management.

In our view, these failures point to a shared problem in the BI industry: that of overstating the ease with which BI applications can be deployed and accepted within organizations. These overstatements - whether by ERP vendors with packaged data warehouses, by BI vendors with packaged analytics, by consultants, or by IT organizations themselves – have a tendency to understate the adoption risk associated with BI applications. Consequently, change management activities are ignored or under funded.

One of the primary change management challenges for BI applications occurs because most organizations use information and analytical frameworks within management processes in an unstructured, ad hoc manner. The degree of process support for such processes has until recently been limited. The advent of collaboration capabilities within BI products presents a tremendous opportunity, but the application of business rules thinking and workflow technologies has to date been largely focused on repetitive, routine tasks such as processing invoices or purchase requisitions.

Given that the targeted user community for many BI applications is executives, managers and business analysts, the challenge of introducing structure in the use of information and analytical tools could be substantial. In effect, the use of BI within the executive and management ranks of companies is highly unstructured, in contrast to the use of transactional IT systems such as ERP, which is highly structured and standardized. To capture the business value of BI initiatives aimed at management processes, organizations must apply scientific management and process control thinking to "white collar" activities, a substantial change.

Business Value Analysis of Business Intelligence Initiatives

To this point, we have examined strategic alignment, management process engineering, and change management as key preconditions for ensuring that BI investments result in business value (positive after-tax cash flows). The perspective advanced is that analytical rigor, process analysis, and empirical methods should be used in a structured manner to determine how BI can be used to deliver increased revenues and/or reduced costs.

We believe there is no shortcut for rigorous up-front business value analysis of how investments in BI will deliver business value. While traditional return on investment (ROI) analysis is certainly a key component of business value analysis, we recommend taking a broader analytical perspective, consisting of:

- **BI Opportunity Analysis:** Combines environmental analysis, industry analysis, and business strategy review with a comprehensive assessment of how BI can be used to enable critical strategies and support key business processes to improve revenue and reduce costs.
- **BI Readiness Assessment:** Applies readiness assessment instruments (such as those provided with TDWI's *Business Intelligence Fundamentals* course) to assess organizational, business, and technical readiness to deliver information to feed BI applications and frameworks. Extends BI readiness assessments by using BI maturity assessment to evaluate organizational management and decision-making

cultures, capacity for change, and change management capabilities as they affect the use of BI and structured analytical methods.

- **Process Engineering:** Determines and specifies exactly how BI applications will be used in the context of the management processes to plan, control, measure, manage, and improve the business processes of the organization that drive revenue and costs.
- **ROI Analysis:** Uses investment cost estimates and discounted cash flow analysis to estimate the net present value of after-tax cash flows that will result from the investment in a BI initiative. Uses other conventional approaches, such as cost-benefit or payback, if required by organizational capital budgeting process.
- **Change Analysis:** Extends the results of process engineering by assessing the degree of process change required, the degree of individual change required, the skills required by new management processes, and the training required for various types of users.

Business value analysis is the foundation for building the business case for capital budgeting purposes, but it has a broader purpose as well. Specifically, the process engineering and change analysis activities identify the key business activities that must be successfully performed if the BI investment is to capture business value. For example, revised management and/or operational processes must be defined, the community of BI users must be trained in these processes and in the use of BI within the processes, and mechanisms for evaluating the progress of the change process must be implemented. In other words, process engineering and change analysis lay the foundation for managing for business value delivery.

Managing for Business Value Delivery

As with any capital project, capturing the business value projected for the investment requires effective management. Fortunately, the data warehousing industry has developed an extensive body of knowledge about the technical development and project management preconditions for project success. In fact, our view is that these technical preconditions for delivering business value, while not without risk, are readily met. Accordingly, we believe the more substantial challenge lies in meeting the business preconditions, particularly the needs for process engineering and change management.

We've explained that analytical rigor, process analysis, and empirical methods should be used in a structured manner to determine how BI can be used to deliver increased revenues and/or reduced costs. Juxtaposed to this perspective is a marketing message to which executives are frequently exposed, namely that BI products provide "out-of-the-box" solutions that can be implemented in very short timeframes to deliver substantial business benefits.

Experience suggests that business executives often respond to value propositions and that use business language to make emotional appeals to executives' aspirations (beat the competition/make money) and insecurities (fear of failure).

This is not to say that the BI products in the market cannot be used to deliver business value, because history has shown that they can if used intelligently. Rather, executives need to guard against these emotional appeals, because they can cause an organization to underestimate the degree of process engineering and change management required for capturing the business value of BI investments, and when this happens the organization does not manage for business value capture, thus increasing the odds of failure.

To overcome this risk, organizations need to focus like a laser on the key value capture activities – process engineering and change management. The BI project cannot stop when the BI application is deployed. In fact, we can consider the point of deployment to be like halftime in a sporting event. To ensure that business value is captured, the team must continue to perform at a high level. This is not to say that the players in the game will stay static. Once the BI asset has been built, the onus for business-value capture falls on the business side, which is essentially an IT governance issue. Empirical studies suggest that IT investments deliver greater value when the responsibility for business value capture resides on the business side. This is also a cultural issue, with those organizations with effective IT-Business partnerships achieving better results.

Ultimately, capturing the business value of BI is a strategic challenge and opportunity, and we have seen that the potential for BI is substantial. With appropriate rigor and a willingness to manage for business value, there is no reason that organizations cannot capture the business value of business intelligence, however that might be defined in their specific circumstances.

Biographies

Steve Williams *is the President of DecisionPath Consulting, a firm that provides data warehousing and business intelligence strategy and technical execution services to leading corporations and Government agencies. He holds an MBA in General Management from the Darden School at the University of Virginia and a B.S. in Business Administration from the University of Maryland, and he has over 24 years of consulting experience.*

Steve's primary areas of expertise are in business strategy, business intelligence, analytical applications, information technology strategy, process engineering, program planning, supply chain management, e-business, and Federal government BI programs. He is a frequent speaker at TDWI, APICS, and NAPM events and is also a guest lecturer on supply chain collaboration and supply chain IT at the Darden School, University of Virginia. He is also the author of a chapter on IT for collaborative commerce for a forthcoming book.

Nancy Williams *is the leader of the Data Warehousing and Business Intelligence Practice at DecisionPath Consulting. She holds an MBA in General Management from the Darden School at the University of Virginia and a B.S. in Education, also form the University of Virginia. Nancy is a regular instructor at TDWI World and Regional Conferences and has taught the TDWI Fundamentals and Data Modeling courses for a number of Fortune 500 companies and Government agencies.*

Nancy's primary areas of expertise are in business strategy, data warehousing, business intelligence, information requirements, data warehouse architecture, data modeling & design, ETL strategy, data quality, and Federal government BI programs. She has over 17 years of consulting and management experience, and is a leading authority on data warehousing and business intelligence. Nancy is a panelist for DM Review Magazine's Ask the Experts and a regular speaker at industry events.

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