



**Operational excellence in
manufacturing:** How to win
at the margins with business
intelligence

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Introduction

Your customers are ever more demanding, and margins for error are shrinking. With intense public scrutiny on product recalls and quality issues, anything less than perfection in any area – a single missed shipment, a single product defect – can have permanent consequences.

Product quality, productivity and customer retention – in short, the pillars of *operational excellence* – are critical to profitable manufacturing concerns. While strategies such as Six Sigma, lean manufacturing, continuous improvement and others will continue to drive management decisions, many manufacturers are placing a renewed focus on the fundamentals of execution. Operational excellence has emerged as the key to sustainable revenue and business growth.

What is operational excellence? As defined by Michael Treacy and Fred Wiersema in a seminal *Harvard Business Review* article, “Companies pursuing operational excellence are indefatigable in seeking ways to minimize overhead costs, to eliminate intermediate production steps, to reduce transaction and other ‘friction’ costs and to optimize business processes across functional and organizational boundaries.”¹

Operational excellence is ultimately about delighting your customers and setting a new standard of performance in your industry. By focusing on the fastest and most efficient ways of satisfying your customers’ needs, the pursuit of operational excellence will position you as the preferred supplier in your industry. This unwavering focus allows you to grow revenue with existing customers and to attract business away from your competition.

Empowering Operations

“Operational excellence is when each employee can see the flow of value to the customer—and fix that flow when it breaks down. It’s that simple.”

*—Kevin Duggan,
faculty member,
Lean Enterprise Institute²*

Operations is the delivery mechanism of the manufacturing enterprise, providing what the business sells and how that product gets to market. It is an engine driving the work in purchasing, production, distribution, logistics and inventory management. That engine depends on input from the front line of the business—sales, marketing and finance.

Offshore and outsourced production, technology-enabled process excellence and supply chain integration are part of the relentless drive for lower costs. After decades of investment in continuous improvement initiatives, manufacturing companies have achieved what major cost savings are possible. Managing and winning at the margins is the new competitive area.

This is why operational excellence has become the driving force for the manufacturing enterprise. By providing a framework in which people and technologies can realize their full potential, operational excellence empowers people throughout the business to be true performance managers—by aligning action with business strategy.

The Value of Business Intelligence

With the stakes so high in an unforgiving economic climate, it is not surprising that business leaders have been investing in technology to improve Operations. The question is no longer, “Should I invest in improving Operations?” Rather, it is, “How can I invest in operational excellence?” and “How can I measure the effectiveness of these investments?”

To connect processes with performance goals, companies need business intelligence (BI) capabilities, including metrics, key performance indicators (KPIs), dashboards and advanced reporting. With the right BI solution, manufacturers can gain crucial visibility into performance and ensure Operations is functioning at peak levels.

You can get a continuous view into key areas such as procurement, production and materials management. You can gain the ability to see problems *as they happen*, which means you can solve them quickly and guarantee they have a minimal effect on your business. Even better, you can see trends developing, which allows you to take proactive action to prevent problems before they happen. This means you can solve problems quickly and guarantee they have a minimal effect on your business.

It’s not all about solving problems, though. The right BI solution empowers you to prevent problems before they occur by monitoring, analyzing and reporting on business performance. It helps reduce costs, prevent losses, improve revenues and identify new, potentially profitable business opportunities.

“Companies must go beyond just providing reports of basic operational metrics to facilitating access, to be able to correlate process outcomes to corporate performance goals and apply operational metrics to assure continuous process improvement.”

*—Ventana Research,
“Supply Chain Business
Intelligence Adoption,*

Metrics Matter

Manufacturers that leverage BI technology to measure and monitor key performance indicators have an edge in managing their operations, according to the Manufacturing Enterprise Solutions Association (MESA). In a handbook entitled “Metrics that Matter,” MESA reported performance management applications such as dashboards have helped manufacturers “improve significantly” against both operations and business metrics.

“What we’re talking about is manufacturers’ survival,” said Julie Fraser, principal of Industry Directions, Inc., and the MESA study’s consultant. “If operations and finance aren’t on the same page at the same time, you have a company at cross-purposes. And most manufacturers can’t afford to be in that position today.”³

Manufacturing managers recognize the importance of evaluating operational decisions holistically. However, it is often difficult to link specific operational practices to strategic outcomes and, in turn, to financial results. This presents challenges for both business and IT managers seeking to justify the cost of operational improvement initiatives and performance management technologies.

Before we explore the role of BI in your pursuit of operational excellence, let’s take a closer look at what Operations does and what it is intended to accomplish.

The Operations Dilemma

More than any other business discipline, Operations is responsible for heterogeneous activities and processes – a multitude of activities and processes it must plan and manage, but does not directly control.

At one end, Operations works with a variety of suppliers and shippers to bring materials into the company. It must inspect and store these materials and deliver them to production, all the while overseeing the smooth and efficient execution of the manufacturing processes. Finally, Operations must store and ship the finished products. At each step, Operations must plan and manage a multitude of events.

“We see performance management as the proof point of supply chain activities. Without measurement procedures in place, companies have no way of knowing if all that money and effort spent on supply chain planning is doing any good.”

*—Mark Vigoroso, Analyst,
Aberdeen Group*

Operations must be able to react to a host of constantly changing factors. The environment is a dynamic one, always fluctuating. Operations must deal with changes in customer demand, shifting priorities, inventory shortages and unexpected events, capacities changing due to machine availability, and labor shortages (from sickness, vacations and so on). At times you might have to mandate overtime work in order to meet demand, but at a higher cost.

Throughout the entire production, supply chain and order-to-delivery cycle, Operations must know where everything is, when more is coming, how much is needed, when, where and what’s supposed to be done with it. Operations must be able to monitor production and make sure a quality, finished product gets to the customer, all the while negotiating with innumerable partners and navigating a myriad of environments and priorities. While the ideal is a smooth, end-to-end process, the reality is often rather different.

In short, Operations is a nuts and bolts world. Operational excellence in today’s business environment means not only delivering efficiency and quality, but managing the supply chain across the board: from procurement to production to materials management to delivery. The crucial factor for success? Ensuring your information is completely cross-functional, treating the enterprise like a single body, a single entity that has intelligence throughout, in every detail, in every link of the supply chain.

Delivering on the Promise Made to the Customer

For Operations to win at the margins, every day and every shift must balance the need to reduce costs while staying agile enough to respond to new customer demands. Operations has the responsibility to lead six core areas of the company's decision-making:

- **Purchasing and procurement:** Ensuring timely and cost-effective input of resources.
- **Production and capacity:** Generating timely output in the face of uncertain demand, complicated processes and variances in input.
- **Inventory management:** Understanding the balance between holding cash and delivering on customer service requirements.
- **Distribution and logistics:** Achieving efficient distribution and delivery.
- **Cost and quality management:** Balancing the need to reduce costs with the equal requirement to deliver quality output.
- **Process efficiency:** Designing a process to monitor and analyze performance benchmarks to find opportunities for greater efficiency.

Purchasing and Procurement

The purchasing and procurement decision area manages both input costs and supply requirements. In many manufacturers, input costs account for up to 50 percent of total costs. For every one percent gained in input cost savings, somewhere between 0.25 percent and 0.5 percent typically will be earned as profit.⁴ This is a significant return on investment when compared to other investments and project returns.

In addition to cost, the procurement personnel must ensure inputs arrive in a timely manner. Inputs arriving too late threaten production and customer delivery; inputs arriving too early cause unnecessary inventory buildup. Managers must balance input costs with the production outputs required to satisfy customers. In the short term, your decisions must include how to respond to shortage problems, price increases and delivery delays. Long-term decisions include determining your supplier strategy.

These decisions require information on specifications, procurement tenders, price quotations and vendor performance assessments. The better you understand the trade-offs, the more finely tuned your ability to win at the margins.

Production and Capacity

Without product, there is no business. Accordingly, this decision area is the backbone of the business. Production management depends on order fulfillment and expected sales information. Ideally, you know product demand well in advance to be able to plan capacity and schedule production runs for given products. This minimizes downtime and maximizes machine loadings. Changing a schedule, especially for an urgent customer need, means rearranging existing production schedules and results in extra setup time, change-over time, idle time and lost capacity. The bottom line: It reduces your ability to win at the margins.

As with any chain of interconnected links, changes in demand affect your input requirements. The domino effect of changes spreads across the whole operations process, creating a series of costly capacity management responses. To counter this, you must communicate new information immediately so that Operations can adjust its schedule in the most effective manner. You must also communicate potential delays to Customer Service for resolution. Closely monitoring this ebb and flow of changing circumstances lets Operations maximize its use of production capacity.

Inventory Management

Shipping appropriately bundled products to fill customer orders is the concern of the inventory management decision area. Balancing customer requirements, speed of order fulfillment and the volume of buffer stock you need to hold are key. The principle of holding buffer inventory is simple – but the larger your product range, the greater the complications. If a business has 5,000 specific product items and 10,000 customers, there are 50 million possible product/customer combinations to monitor and serve effectively. With bundling combinations, there are many more. The fact that buffer stock ties up cash compounds the urgency of decisions. If you hold one month of buffer inventory, one month of production has not earned a return – equivalent to more than eight percent (one-twelfth) of a year's production cost.

But inventory management must also determine the financial and customer consequences of removing buffer stock from inventory. Tying up 40 to 50 percent of your inventory with products that are rarely ordered makes no sense unless key customers highly value these products. Understanding the full implications of these decisions requires access to information. It means knowing the total annual sales and profit value of thousands of product items. Most will earn less than one percent of total margin. If order frequency is low and irregular, the case for culling these product items increases. Even if significant savings will result from this product cull, you must align the decision with input from other functions such as Sales and Customer Service. Factual reasons will be useful when communicating your rationale to customers.

Distribution and Logistics

This decision area includes managing quality, cost and timeliness of distribution and delivery. Short-term issues require the handling of customer orders and shipping using the most efficient routing, scheduling and equipment. Long-term issues require determining whether you can reduce mileage costs, improve delivery execution and ideally exceed customer service needs.

The operational infrastructure to distribute and deliver customer goods is intricate and costly. Many companies work with third-party carriers, distributors or wholesalers for their expertise. Distributors specialize in particular channels, routes and/or territories, and can distribute more quickly and efficiently than most manufacturers. Strategically placed distribution warehouses can be an advantage to, and extension of, your sales force. While outsourcing makes sense on many levels, it does mean you lose direct control and have to accept the risks that come with loss of control. Managing such risks requires negotiating and monitoring distributor agreements with clear terms and commercial guidelines.

Identifying, managing and evaluating the most effective distribution and logistics routes for customers or prospects draws on accurate, timely information on order processing, handling characteristics, packaging, routing and scheduling.

Cost and Quality Management

In cost and quality management, you balance cost savings in one area against potential rework, rejects, downtime or customer complaints. Purchasing may find a new, lower-cost supplier but the consequence may be higher scrap rates.

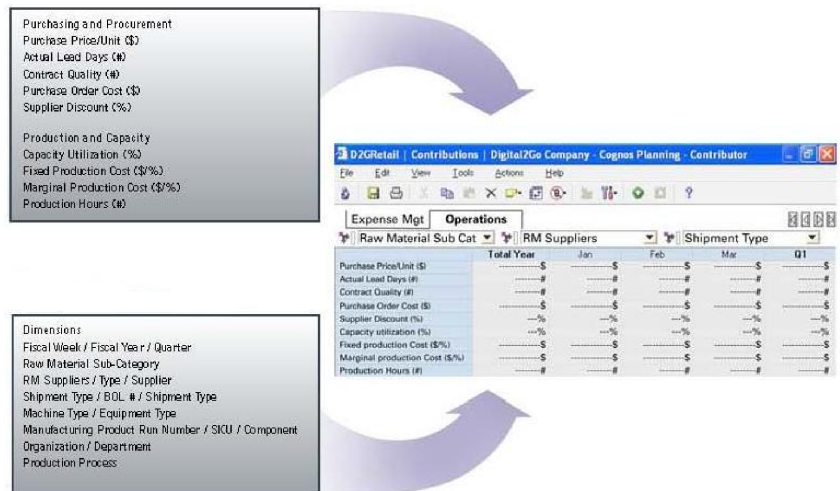
To know what is best for the business, you need to understand cost variances and their impacts. By contrasting cost differences, you can benchmark performance, identify patterns and understand the root causes of cost differences. You also need to understand and analyze the value and cost of preventative measures that ensure quality such as training, appraising incoming materials, manufacturing processes and inspections. The more you examine measurable work activities and the more detailed your breakdown of costs, the more detailed your understanding will be of the root causes of variances in those costs. Measuring and monitoring must be integrated with quality expectations to understand the effect of changes.

Process Efficiency

Process efficiency management looks at ways to improve operation and supply chains. This means looking for performance outliers and understanding why they occur. There are three areas where well-designed comparative performance metrics can make the difference between an industry follower and a leader:

- Internal operational processes.
- External developments and trends.
- Competitive benchmarking.

Your internal operational processes are most familiar to you, and the easiest to analyze. For example, if Purchasing's "cost per dollar of purchase" is a benchmark, then an unusual increase in this index may indicate two things. Either purchasing costs have increased or purchases have decreased. You must determine whether purchasing efficiency has gone down or if sales have slumped. Another possible benchmark is "dollars of sales per order." If this metric is decreasing, it can indicate that the business is filling more orders for the same dollar total in sales. This may mean that costs have risen without an accompanying increase in sales – but it may instead indicate that you need to re-engineer the business to handle smaller orders.



The Purchasing and Procurement and the Production and Capacity decision areas and their dimensions illustrate how the Operations function can monitor its performance, allocate resources and set plans for future financial targets.

Taking advantage of external developments and trends requires looking outside your company. Should you shift to low-labor-cost economies for cheaper manufacturing or services such as call centers? Are there new manufacturing techniques, equipment or technologies that can introduce dramatic efficiencies? Failing to follow up on these external efficiency developments may jeopardize your competitive position.

In addition, many leading manufacturers extend their monitoring activities to their competitors. Simple comparative benchmarks such as sales per employee, volume output per employee, inventory levels, number of warehouses and others will help identify performance differences, so you can know the actions you need to take.

The Need for Visibility

While the challenges Operations faces are manifold and complex, the solution can be summed up in a single word: “Visibility.”

From planning to final product delivery, timely and meaningful information is required, not just to improve processes, but also to keep existing processes running efficiently. The earlier a good decision is made the better; the later a mistake is identified and corrected, the higher its cost.

But not everything can be solved at the planning stage. The trick is to solve the problem at the ideal moment. When sufficient information is available, not before, or the decision will be based on guesswork at best; and not later, as the later the decision is made the more it will cost to implement. The issue must be identified as soon as possible in the process, and then the right information must be provided to help the appropriate person take corrective action.

The benefits of comprehensive, company-wide visibility of accurate, timely information taken from and delivered to the entire Operations organization and its partners cannot be overstated.

- Line managers must have a complete view of all jobs and events, to be able to compare and measure their progress against standards.
- Manufacturing personnel must have an accurate view of actual and projected demand, so that they can adapt to it.
- Planners and troubleshooters must have continuous visibility of variances, which means they will have the early warning they need to take corrective action.
- Executives and line managers must be able to rapidly evaluate cost drivers and manufacturing performance through highlighted exceptions against standards, projections and budgets, so they can adapt production, both to reduce the cost of production and to increase throughput and efficiency.

In all these cases, the starting point for a solution is visibility – visibility into processes and particulars, and across the organization. With visibility, you can analyze the information and gain the capability to identify trends and correct issues.

Why Business Intelligence?

“Without BI, it is impossible to correlate process outcomes to corporate performance goals or to apply operational metrics to continuous process improvement.”

–Ventana Research, “Supply Chain Business Intelligence Adoption, Use and Practices,” 2007

A business intelligence solution provides the visibility you need to monitor, analyze and report on your business performance. BI ensures reliability in the planning process and, through solid metrics management, allows decision-makers to react more quickly in a dynamic environment. BI takes vast amounts of corporate data from multiple data sources and transforms it into meaningful information about the business. It helps reduce costs, prevent losses, improve revenues and identify new, potentially profitable opportunities to be pursued.

BI provides visibility throughout the organization to help everyone understand how the business is performing. It does not replace existing manufacturing systems, but serves as a front end, aggregating internal and external (third-party) data and consolidating it in a central framework. It creates a common, shared context that enables effective and collaborative decision-making.

BI can be used in a specific department or across an entire organization. It can measure the performance of a particular initiative or of the entire company and add to the understanding of information. It can be integrated with planning and monitoring solutions to help align tactics with strategy, measuring performance at all levels against goals. In this way, all parts of an organization can be aligned, and work towards the same strategic objectives.

BI answers the three key business and operational questions: How are we doing? Why? And what should we be doing? Manufacturers are accustomed to receiving detailed information about what happens, but not a lot of explanation as to why. BI helps you analyze information so that better and quicker decisions can be made. This makes it possible to streamline processes, improve throughput, increase operational efficiency and link all elements of the supply chain more closely.

Having daily views (instead of delays up to six weeks) into excess inventory and obsolete inventory (zero movement) that incorporate highlighted exceptions can have a dramatic impact on the carrying costs of your organization. With visibility into average days of supply, for example, in comparison with turns and average value over time, you can perceive trends towards stockouts, which can be remedied in advance, keeping your business operating smoothly.

Get Everyone on the Same Page

The IBM® Cognos® 8 Business Intelligence solution can make your entire supply chain, all your operations and your entire enterprise intelligent – by delivering the global visibility that is the key to your success in today’s hyper-competitive environment.

IBM Cognos 8 BI can track a number of key metrics that are the critical factors in the success of your Operations, for example:

- Increased throughput.
- Reduced manufacturing costs.
- Shortened lead times.
- Reduced backlog.
- Improved quality performance.
- Reduced reject rate.
- Reduced scrap levels.
- Reduced line downtime.

Once the IBM Cognos solution has provided you and everyone in your enterprise with the knowledge needed to drive success, you can monitor and plan based on that wide-ranging intelligence. With dashboards, scorecards and rich reporting capabilities, IBM Cognos 8 BI can help you ensure your day-to-day operations are aligned with your overall enterprise-wide strategy.

The costs of poor performance are too high to ignore, as are the opportunities offered by efficient performance across the enterprise.

Transforming Data Into Intelligence

For Operations, with its manifold responsibilities throughout the supply chain, the key is not only to consolidate data required to plan, monitor and manage all the processes and events that fall under its mandate, but also to render this data comparable and meaningful through all levels and locations of the organization.

The COO in Madison, the shipping manager in Montreal and the sales rep in Madrid should all be working with the same information. But that's just the beginning. True business intelligence then gives each player the ability to view the information most relevant to his or her responsibilities, both in the context of global indicators and in detail.

Thus, the shipping manager in Montreal, in trying to reduce costs, should be able to see that a nearby plant is shipping to the same destination, and that consolidation might save money. Meanwhile, the COO in Madison should be able to drill down from his executive dashboard to the details of the Madrid sales forecast and see if plant production capacity will be sufficient to meet demand.

Data is facts collected and organized. Information is data made meaningful. Intelligence is information applied and analyzed in a specific context.

Business intelligence is intelligence applied to address specific business issues – including operational excellence.

Business and Operational Alignment with Scorecards and Dashboards

Most Operations personnel working in a large plant may have little idea of the official corporate strategy, or how they can best contribute to that strategy. Similarly, visibility of operational performance between the corporate and business levels is often very poor.

A scorecarding system, which may be based on the Balanced Scorecard approach or on the SCOR (Supply Chain Operations Reference) model created by the Supply Chain Council, can be very effective in making performance visible, thereby forcing an emphasis on visibility of performance targets and actual performance and encouraging an environment of increased accountability.

Manufacturers that have undertaken the nontrivial task of defining their KPIs are well positioned to adopt scorecarding technology, particularly if these have been defined across multiple plants within a business unit. These KPIs should be hierarchically defined, so that business users can “drill down” into areas of poor performance to understand root causes. Web-based scorecards and dashboards ensure maximum visibility, access and use.

Linking strategic metrics developed by executives down to operational metrics on the plant floor drives business and operational alignment, and the result is operational excellence.

Procurement Excellence

An IBM Cognos BI solution provides the visibility into processes and events that allows you to consolidate your procurement activities, accurately compare and evaluate different suppliers and monitor supplier performance. The purchasing organization and your suppliers' performance are quantified and tracked with KPIs that measure quality and cost (including comparisons to alternate sources), delivery and order or requisition placement. Supplier scorecards enable continuous, timely measurement against consistent standards for all suppliers. With consolidated procurement information, you are better able to leverage your company's purchasing power. You can identify suppliers that offer the same materials or services, and rapidly evaluate their offerings against the same standards.

With the ability to monitor all your suppliers, you can leverage your knowledge to improve supplier responsiveness and the efficiency of your supply chain, and you can gather data that will help you make the most profitable decisions when negotiating future procurement contracts. In addition, you can share information, such as supplier performance data, with suppliers via an extranet, so they know when corrective action is required or when standards have not been met.

Also, having aggregate information on demand, including inventory, supply, supplier performance, etc., allows for quicker and better purchasing decisions leading to a more proactive purchasing organization. With better information in hand, you can consolidate and optimize your suppliers and leverage your buying power, which means a potential for better terms and lower supply costs.

Production Excellence

IBM Cognos BI software offers visibility across all plants, lines and shifts, allowing you to monitor performance trends and to identify, isolate and analyze the source and impact of problems, whether product defects or production anomalies. With the ability to make accurate comparisons, for example, between facilities and shifts, you can discover lags and other problems that had previously gone unnoticed. You can also identify trends in quality, efficiency or throughput, and make proactive decisions based on this insight.

Similarly, the depth and breadth of the intelligence the IBM Cognos solution makes available allows you to analyze the cost of failures: scrapped production, customer returns and other quality-related problems; downtime; as well as costs for specific overhead items such as re-engineering and equipment upgrades.

This intelligence can be used to help capitalize on success, to analyze savings created by new efficiencies or to help understand how to repeat an event that improved quality or throughput. It also offers the benefit of being able to share production performance information with staff, including comparisons across locations, over time, measurement against production standards, etc.

Materials Management Excellence

An IBM Cognos solution opens visibility into the entire inventory: the levels and locations of all assets at any point in time, their worth, their depletion rates, their use; who supplied them, who uses them; what is spoiled, obsolete or surplus; what alternative items are available. With inventory accurately quantified and tracked across the company and its partners, and with changes measured against common standards, such as minimum or age thresholds, you will know at all times what you have, where it is and how long it will last.

From start to finish, from negotiations with suppliers through customer delivery, IBM Cognos software offers full visibility into processes and events, transparency of information and coherent standards made available across your organization.

Summary

With multiple delivery channels, market specialization, high-profile mergers and acquisitions, growing compliance requirements and rising operational costs, manufacturing organizations are increasingly turning to Cognos to help make sense of their high-stakes and complex business landscape.

Many of the world's leading manufacturers already choose IBM Cognos solutions, including 19 of the 20 largest consumer packaged goods (CPG) manufacturers, nine of the top 10 high-tech companies and all of the top 10 auto makers. For manufacturing organizations, both large and small, we offer:

The Right Technology and Solutions

IBM Cognos integrated performance management software and services let the world's most progressive manufacturers:

- Leverage their existing investments by aggregating data from transaction systems (SAP, Oracle, etc.) and other sources across the organization, creating a single, integrated performance management framework – for rapid decision-making.
- Analyze customer, product, market and channel profitability.
- Move beyond cumbersome, error-prone spreadsheets for key plans like sales and operations planning (S&OP) with flexible, connected software to reconcile sales and demand forecasts with supply chain and production plans and to test multiple cost scenarios.
- Identify the source of production issues and take corrective action.
- Comply with legislation, such as Sarbanes-Oxley (SOX) and regulatory requirements (OSHA, EPA).

The Fastest Methods

The IBM Cognos suite of Performance Blueprints help manufacturers quickly address planning and performance management process areas that need attention. IBM Cognos Performance Blueprints consist of targeted, pre-built data, process and policy models based on proven best practices in manufacturing operations, sales, marketing and finance. They include:

- Sales and Operations Planning (S&OP) Performance Blueprint.
- Trade Promotion Management Performance Blueprint.

Performance Management Experts

When you make an investment in IBM Cognos software, Global Customer Services makes a commitment to you: to bring the full range of our personnel, resources and expertise to your deployment to help you achieve the next level of performance. Our Professional Services, Education and Support services help you accelerate deployment, promote strong user adoption and increase your competitive advantage.



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Endnotes

- 1 Harvard Business Review, "Customer Intimacy and Other Value Propositions," Michael Treacy and Fred Wiersema, Jan.-Feb. 1993.
- 2 Management Services, "Measuring up lean: The journey towards operational excellence," by Kevin Duggan, Spring 2007.
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About IBM Cognos BI and Performance Management

IBM Cognos business intelligence (BI) and performance management solutions deliver world-leading enterprise planning, consolidation and BI software, support and services to help companies plan, understand and manage financial and operational performance. IBM Cognos solutions bring together technology, analytical applications, best practices, and a broad network of partners to give customers an open, adaptive and complete performance solution. Over 23,000 customers in more than 135 countries around the world choose IBM Cognos solutions.

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