tdwi's
Best of Business Intelligence

VOLUME 7

A Year in Review

2009 IN REVIEW:

BI's Value Put to the Test

PLUS 2010 FORECAST:
Can BI and DW Teams Find Benefits in Recession?

RESEARCH EXCERPT
Beyond Reporting: Delivering Insights with Next-Generation Analytics

INSIGHTFUL ARTICLES
Advanced Analytics
Master Data Management
BI in the Cloud

FUTURE

PRESENT

PAST

THE VERY BEST OF TDWI'S BI ARTICLES, RESEARCH, AND NEWSLETTERS

tdwi
THE DATA WAREHOUSING INSTITUTE

Spotfire Analytics:
Better than BI.
Smarter than Spreadsheets.

To learn the top 5 reasons why,

CLICK HERE!

TIBCO
The Power of Now®

Spotfire®

tdwi's Best of Business Intelligence
A Year in Review

SPONSOR INDEX

TABLE OF CONTENTS

EDITORIAL DIRECTOR'S NOTE

Welcome to the seventh annual *TDWI's Best of Business Intelligence: A Year in Review*. Each year we select a few of TDWI's best, most well-received, hard-hitting articles, research, and information, and present them to you in this publication.

Stephen Swoyer kicks off this issue with a review of recent major BI developments. "2009 in Review: BI's Value Put to the Test" describes 2009 in ups and downs: the year saw more vendor winners than losers, but a down economy and consolidation still claimed others. Swoyer argues that 2009 was "tailor-made to test the very value business intelligence claims to bring to the table."

In "2010 Forecast: Can BI and DW Teams Find Benefits in Recession? Or, the Data Mart and the Pendulum," TDWI Research analysts Wayne Eckerson and Philip Russom share their predictions for the new year. Eckerson predicts that BI will move forward in fits and starts in 2010, and Russom highlights controlled diversification as one of the strongest (and strangest) BI/DW trends to date.

To further represent TDWI Research, we've provided an excerpt from one of the past year's Best Practices Reports. Eckerson's "Beyond Reporting: Delivering Insights with Next-Generation Analytics" explains that it's key to understand your business users, their roles, and the information they need.

This volume's *Ten Mistakes to Avoid* will help you avoid some common pitfalls in designing and developing operational BI applications. And thanks to articles from TDWI's e-newsletters, you'll learn more about the balanced scorecard, BI in the cloud, advanced analytics, data mining, analytic data warehousing, and master data management.

In "The New Imperative for Business Schools," one of our selections from the *Business Intelligence Journal*, Mark Conway and Gauthier Vasseur question whether business schools are preparing their students with the new skill sets many organizations need. Our second *Journal* piece, "Who Are the Business Intelligence Leaders of Tomorrow?" by Jim Gallo, suggests that our rush to cut costs and outsource jobs may be creating a leadership vacuum.

TDWI is committed to providing industry professionals with information that is educational, enlightening, and immediately applicable. Enjoy, and we look forward to your feedback on the *Best of Business Intelligence*, Volume 7.

Denelle Hanlon

Denelle Hanlon
Editorial Director, *TDWI's Best of Business Intelligence*
The Data Warehousing Institute
dhanlon@tdwi.org

Make Your Data Behave.

Data in your organization arrives in many shapes and sizes – well-disciplined isn't one of them. DataFlux data quality and data integration solutions transform chaotic data into a well-behaved and reliable foundation for enterprise business initiatives such as compliance, data governance and master data management. We provide a single platform that can analyze, improve and control your critical data – and help your organization deliver trusted information to support business decisions. Better data equals better business. That's a lesson we all can learn.

DataFlux A sas COMPANY

Leader in Data Quality and Data Integration

www.dataflux.com
877-846-3589

International
+44(0) 20 3176 0025

2009 IN REVIEW

BI's Value Put to the Test

BY STEPHEN SWOYER

It wasn't exactly the best of years, but—all things considered—it was a far cry from the worst. There's a sense, in fact, that the tumult of 2009 seemed tailor-made to test the very value business intelligence (BI) claims to bring to the table.

When the going gets tough, proponents like to claim, it's a safe bet to double down on BI. Although it won't completely inoculate you against the effects of adverse business conditions, BI certainly provides a measure of insulation. The events of 2009 put that claim to the test.

Hold Fast and Thrive

Given the economic outlook and the abundance—some might say overabundance—of vendors in the data warehousing (DW) market, the stage seemed set for a massive bloodletting, particularly in the analytic database arena.

By late 2008, Oracle had announced its most ambitious high-end DW entry to date (the Oracle Database Machine), Microsoft had picked up prominent analytic DW player DATAllegro (announcing plans to roll that technology into

a high-end flavor of its SQL Server database), and the analytic database segment itself was teeming with vendors: Aster Data Systems, Dataupia, Greenplum, Infobright, Kognitio, Netezza, ParAccel, and Vertica were thought to be enmeshed in a Malthusian struggle for resources (i.e., customers), to say nothing of recognition.

On the whole, however, 2009 saw more vendor winners than losers. Winners came in the form of companies that held their own (by treading water or shoring up their positions in the midst of choppy market conditions) or new players that made solid (if unspectacular) splashes.

The long-awaited bloodletting in the analytic database segment, for example, didn't come to pass. Yes, Dataupia had an especially rocky 2009, but—in spite of predictions of its soon-and-inevitable demise—it remains a viable, if skeletal, entity. Founder and inaugural CEO Foster Hinshaw even came back (following a successful battle with illness) in November.

Meanwhile, an already-teeming ecosystem of analytic database players buzzed with new claimants: Kickfire (a developer of DW appliance systems), Calpont (developer of InfiniDB, another analytic database entrant), Groovy Corporation (an Australia-based analytic database start-up), EXASOL AG (an analytic database auf Deutsch), VectorWise (a Dutch analytic database start-up with a formidable academic pedigree), and VoltDB—the latter a start-up founded by data warehousing luminary Michael Stonebraker—all burst on the scene in 2009.

On top of this, BI/DW newcomers such as Compact Solutions, VDO Software, and WhereScape, along with a host of new software-as-a-service (SaaS) BI players, also conspired to keep things interesting.

Consolidation of an Altogether Different Kind

All wasn't sweetness and light in 2009, however.

A BI industry long accustomed to unchecked growth had a reality check in 2009. Call it a new (and perhaps unprecedented) spin on BI market consolidation: culling.

To the extent that there was shrinkage of any kind in the combined BI and DW space over the last

several years, it occurred largely as a consequence of consolidation. Best-of-breed players such as Crystal Decisions, Firstlogic, and OutlookSoft—along with BI giants Hyperion Solutions, Business Objects, and Cognos—were gobbled up by bigger vendors. Probably the single biggest scare faced by any BI vendor in recent memory was that of the former Brio Software, which—by all accounts—warmly welcomed a timely buy-out overture from Hyperion. That was six years ago, an eternity in business and technology time.

ALL WASN'T SWEETNESS AND LIGHT IN 2009, HOWEVER. A BI INDUSTRY LONG ACCUSTOMED TO UNCHECKED GROWTH HAD A REALITY CHECK IN 2009.

In 2009, the unsparing economic climate claimed at least one BI industry victim when LucidEra, an ambitious SaaS start-up, shut its doors. The end came quickly, at least in light of LucidEra's near-four-year history. In late spring, founder Ken Rudin started quietly shopping for a white-knight buyer. Finding no takers, LucidEra went belly-up in early summer, a victim (insiders confirmed) of an especially chary venture capital (VC) climate.

For a while, it seemed as if Dataupia too might succumb to the same VC troubles. Things came to a head in late June, precipitated in part by LucidEra's implosion. Several industry watchers speculated that Dataupia would almost certainly be next. By year's end, however, reports of its demise looked to be premature: founder and CEO Hinshaw retook the leadership role in November; concomitant with Hinshaw's return, the company claimed it had secured new funding, too. Dataupia isn't in the clear: in addition to reassuring jittery customers and keeping pace with aggressive competitors, it must replace both its CTO—respected DW technologist John O'Brien—and its veteran VP of marketing, Samantha Stone.

Another player that surprised observers was Microsoft, which pulled the plug on its PerformancePoint Server product in late January 2009. At that point, PerformancePoint had been shipping for just 16 months.

To be fair, Redmond didn't completely pull the plug: PerformancePoint's scorecarding features will get a new lease on life in the upcoming

SharePoint Server release. Still, it was a surprising setback for Microsoft, which had once waxed enthusiastically about taking budgeting, forecasting, and planning mainstream. Moreover, Redmond had been tremendously successful with its BI-oriented offerings: SQL Server Analysis Services, SQL Server Integration Services (née Data Transformation Services), and SQL Server Reporting Services were all smash hits. With two SQL Server–oriented offerings on tap in 2010—viz., Projects Gemini and Madison—Microsoft hopes to resume its winning streak.

Consolidation remains a hugely important force in the combined BI and DW segment. For example, the industry said goodbye to Sun Microsystems, steward of the former MySQL AB and prominent partner to a pair of analytic database players (Greenplum and ParAccel). Other casualties of merger and/or acquisition include SPSS, GoldenGate Software, and HyperRoll.

Sun was both the first to fall and—as of press time—the last to close: the European Commission (EC) still hasn't approved Oracle's acquisition bid.

SPSS fell next, gobbled up in July by IBM. Both SPSS and rival SAS had achieved prominence by leveraging their strengths in statistical analysis and data mining. In just the last decade, both had emerged as creditable BI and analytics players too. IBM's acquisition of SPSS leaves SAS—with its more than $2 billion in annual revenues—as the Last of the Independent Statisticians.

On the whole, it was another extremely busy year, acquisition-wise, for Oracle—especially on the BI front. In addition to Sun and data integration specialist GoldenGate, Sun also tied up a legacy loose end, nabbing HyperRoll, a vendor that first gained fame (and invited litigation) by marketing an OLAP accelerator technology for Hyperion's Essbase engine.

Today's Trends

A number of notable trends either came to the fore or *stayed* in the fore in 2009. Here are some of them:

A DREAM (STILL) DEFERRED
BI vendors have been talking up "pervasive" business intelligence for a long time. To be truly pervasive, BI must achieve widespread adoption outside of its traditional silos *and*—more often than not—deliver measurable business impact. BI has consistently failed to make the grade in both respects.

In 2009, laments BI tools expert Cindi Howson, a principal with BIScorecard.com, BI didn't gain much, if any, ground.

"Since our initial survey in 2007, success rates and BI usage are largely unchanged," writes Howson in the 2009 edition of her *Successful BI Survey*. "While there are some very successful BI deployments, the majority are stuck in the middle, with only slight to moderate success and business impact."

THE PERCENTAGE OF EMPLOYEES USING BI ACTUALLY *DIPPED* IN 2009, SLIPPING BY 1 POINT.

In fact, Howson concedes, the percentage of employees using BI actually *dipped* in 2009, slipping by 1 point.

MORE DATA, MORE PROBLEMS
In 2008, DW vendors started waxing enthusiastically about the mainstreaming of multi-terabyte data warehouses. It sounded far-fetched—the sweet spot for data warehouse configurations is in the double- or triple-digit gigabyte range, after all—but 2009 saw an undeniable uptick in multi-terabyte (or "big data") activity.

In 2009 we had Big Data pushes on the parts of both Microsoft—which announced a Fast Track SQL Server DW program in February—and Oracle, which unveiled its mammoth Exadata Version 2 in September.

Similarly, 2009 saw a surge of interest in technologies such as MapReduce and Hadoop (to say nothing of Google's and Microsoft's next-gen takes on MapReduce, dubbed Pregel and Dryad, respectively), which proponents claim are tailor-made for Big Data and Big Problems of Scale. To wit: analytic database player Aster Data Systems sponsored a Big Data Summit in New York; Cloudera—a commercial Hadoop firm—likewise convened the first ever Hadoop World, also in New York. Meanwhile, a pair of established heavyweights (Netezza and Teradata) seemed to warm up to MapReduce, too.

This year promises more of the same. On tap: SQL Server R2 Parallel Data Warehouse, otherwise known as Project Madison, Microsoft's effort to retrofit SQL Server 2008 with massively parallel processing (MPP) capabilities. It's slated to ship sometime in 2010.

Assuming it completes its acquisition of Sun, Oracle could deliver still another Exadata refresh; Teradata, Netezza, and other pure-play analytic competitors have promised to deliver much more in terms of both speed (chiefly via solid state disk drives and flash cache modules) and capacity (thanks to ever-expanding aerial densities).

Finally, new entrants will emerge to push the Big Data envelope still further.

COLUMNAR IS HOT

Players seemed to warm up to the idea of the columnar store as the repository of choice for analytic requirements. This actually cut both ways, with several row-based vendors touting come-to-columnar deliverables, even as at least one columnar player (Vertica) trumpeted the availability of a row-based capability in its flagship product.

Oracle is the most prominent columnar convert. It introduced Exadata-only support for column-based compression in Oracle 11*g* R2 in September. Elsewhere, analytic database stalwart Greenplum unveiled a columnar implementation of its own, the dauntingly dubbed Polymorphic Data Storage. Finally, columnar player Vertica debuted a new row-based capability called FlexStore as part of its Vertica 3.5 platform refresh in summer 2009.

Expect more on the columnar front in 2010. Industry watcher Curt Monash, who actively tracks the analytic database space, notes that columnar specialist VectorWise has teamed up with Ingres (the commercial steward of the open source Ingres database) to develop what amounts to a row/column hybrid. It's slated to appear sometime in 2010, according to Monash.

ANALYTICS RELOADED: BI AND THE POST-ANALYTIC AGE

Tired of plain old analytics? Vendors started talking up "advanced analytics" as the latest, greatest, and most promising spin on analytic technology to date.

Forget about the data warehouse–driven reporting or OLAP applications to which your boss has long been partial. Advanced analytics prescribes the use of extremely complex (often SQL-driven) queries or best-of-breed predictive analytic tools. IBM says advanced analytics also entails the top-to-bottom reorganization of a company's existing business processes; such was Big Blue's pitch with the Business Analytic Optimization (BAO) service it unveiled in April. IBM, as a matter of fact, bet *huge* on analytics in 2009: all told, it launched BAO, spent $1.2 billion for SPSS, and unveiled a "Smart Analytic" appliance based on RISC/Unix hardware and Cognos software, with middleware assists from DB2 and WebSphere.

VENDORS STARTED TALKING UP "ADVANCED ANALYTICS" AS THE LATEST, GREATEST, AND MOST PROMISING SPIN ON ANALYTIC TECHNOLOGY TO DATE.

There's a sense in which BI has already entered the post-analytic age. According to TDWI Research, nearly 40 percent of shops are currently practicing advanced analytics. They're just getting started: by 2012, says TDWI research analyst and veteran industry watcher Philip Russom, fully 85 percent of organizations will be doing as much.

Vendors are already brushing up on their advanced analytic talking points. Netezza, for example, says it's preparing a big advanced analytics push for 2010. At its Partners user conference this October, Teradata discussed advanced analytics in tandem with analytics powerhouse SAS. Look for more on the advanced analytic tip in 2010. Microsoft hasn't yet weighed in.

Final Observations

Although some BI and DW players had previously flirted with cloud computing, 2009 was the year in which BI in the cloud really soared.

We saw a downpour—a cloudburst?—of cloud-related offerings, with enhanced packages from bleeding-edge adopter Vertica and brand new offerings from Aster Data Systems, IBM, Oracle, Teradata, and others.

ALTHOUGH SOME BI AND DW PLAYERS HAD PREVIOUSLY FLIRTED WITH CLOUD COMPUTING, 2009 WAS THE YEAR IN WHICH BI IN THE CLOUD REALLY SOARED.

Also, software-as-a-service players such as Birst, Good Data, Oco, and PivotLink started talking up the inevitability of SaaS BI. Most of these vendors *also* argued that the demise of SaaS BI pioneer LucidEra—which went out of business in July—was more a function of a brutal economic climate than a referendum on the SaaS BI model; industry watchers took note.

Finally, 2009 was the year in which free and/or open source software (F/OSS) arguably went mainstream, at least with BI buyers. About 25 percent of all companies were using F/OSS BI tools in 2009, according to BI and DW consultant Mark Madsen, who conducted a survey of F/OSS BI usage.

What's more, Madsen found, fully 40 percent of small shops and nearly one-third of large organizations were in the process of evaluating F/OSS BI offerings.

The inescapable upshot, according to Madsen, is that F/OSS BI has at long last crossed a threshold—into respectability.

Stephen Swoyer is a New York–based freelance journalist who writes about technology. Contact him at stephen.swoyer@spinkle.net.
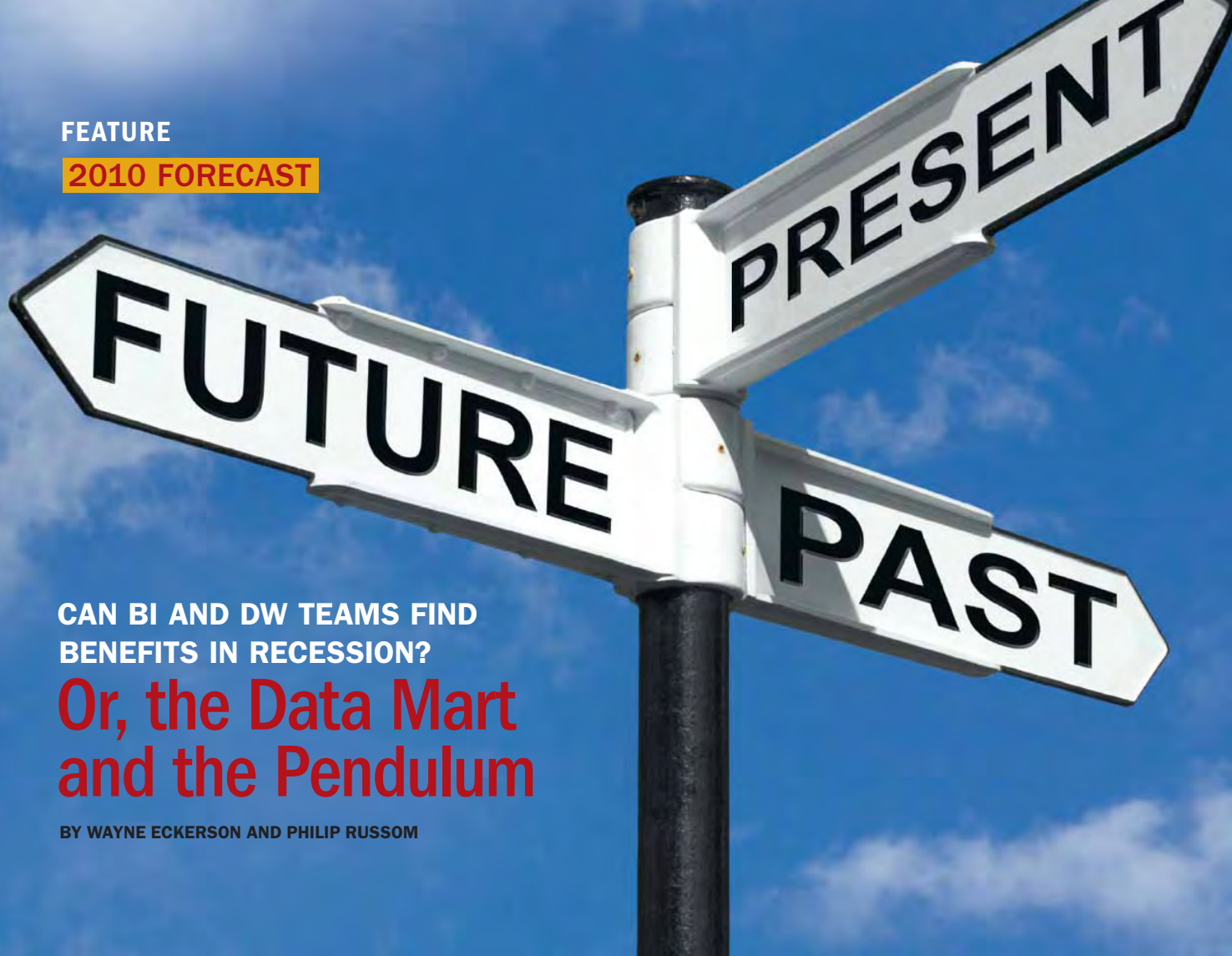
CAN BI AND DW TEAMS FIND BENEFITS IN RECESSION?

Or, the Data Mart and the Pendulum

BY WAYNE ECKERSON AND PHILIP RUSSOM

HOTSPOTS AND HOLDING PATTERNS

WAYNE ECKERSON

I've always contended that business intelligence (BI) managers are akin to Sisyphus, the legendary Greek king who was condemned to roll a boulder uphill for eternity. Just when you deploy a reasonable data warehouse (DW), the business changes and you have to start all over again.

Last year, the economy crashed and left most BI budgets in tatters with projects, hiring, and training all placed on indefinite hold. We at TDWI were part of this series of falling dominoes; our attendance at four consecutive events dropped below normal levels.

But things are picking up. Attendance at our November 2009 conference was almost back to normal, and 2010 forecasts among our audience on LinkedIn.com have tilted toward optimistic.

(If you have joined TDWI's LinkedIn community, see the discussion "BI in 2010.") "Two thousand ten will be a growth year for BI," said one director of IT. Why? In a tough economy, companies need more insights about customers to remain competitive, he said. Another consultant added, "In the past few months, I've started seeing … clients remove hiring freezes for BI teams and start to worry about knowledge retention."

But no one knows for sure whether the economy is recovering or on the verge of another freefall. There are signs for both. The upshot is that mostly small, tactical projects are getting funding. Large BI shops will need to justify their budgets by showing greater value via analytics and operational BI, while small and midsize shops will seek refuge in departmental and workgroup BI vendors that promise faster, better, cheaper BI. (See Figure 1.)
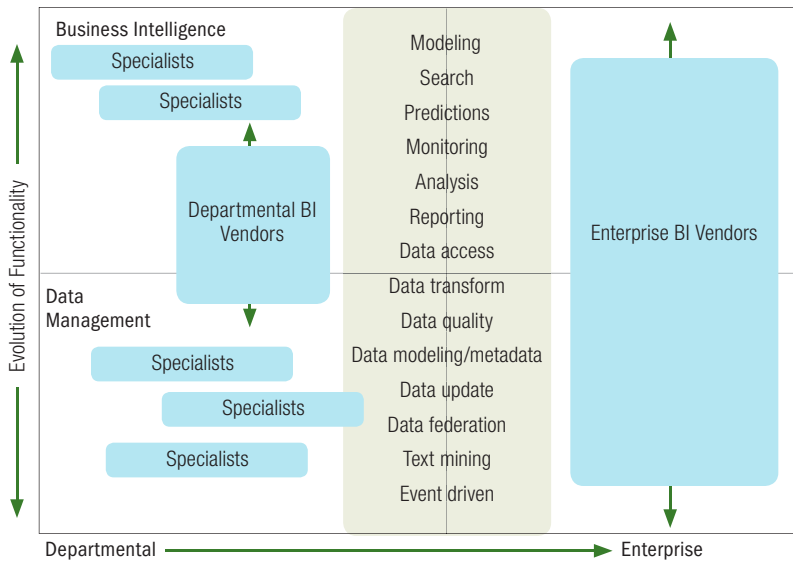
Figure 1. Enterprise BI vendors are building and buying their way to delivering a complete BI stack (and some are incorporating hardware and databases as well), while departmental BI vendors are focused on delivering highly integrated ad hoc reporting and dashboard tools with lightweight ETL. Enterprise BI vendors will continue to purchase BI specialists in niche areas to complement their stacks (e.g., IBM's acquisition of data mining vendor SPSS) while departmental BI vendors will generally avoid acquisitions and add additional functionality organically.

Forecast 1: Departmental BI

That's good news for departmental BI solutions. "Faster, cheaper, better" has been the mantra of open source, in-memory, and cloud-based BI solutions. Their market entrance couldn't have been better timed. These departmental solutions are stealing market share from enterprise BI vendors in the small and midsize business (SMB) market and they are making inroads into the departmental nooks and crannies of bigger companies.

QlikTech is perhaps the best known and fastest-growing vendor of the lot; even the enterprise players now mention it as a competitor. But there are a raft of other upstarts that have crafted highly integrated reporting, dashboard, and ad hoc tools using the latest Web 2.0 and other technologies: Corda, Jaspersoft, Pentaho, Tableau, Spotfire, ADVIZOR Solutions, Birst, PivotLink, InetSoft, MyDials, eThority, GoodData, Neutrino Concepts, Autometrics, and the list goes on.

Despite their size, these vendors will survive in a very tight market in 2010, and some will even thrive. They are obviously making inroads because the reaction from the enterprise BI players has been swift and aggressive.

Earlier this year, MicroStrategy created a stir by offering its MicroStrategy Reporting Suite for up to 100 business users at no charge. This fall, IBM Cognos released IBM Cognos Express, a BI suite geared exclusively at the mid-market based on the TM1 in-memory database. And SAP BusinessObjects plans to launch Project Kona in early 2010, which replaces its current cloud-based offerings with an integrated suite that customers can download for free for 30 days before purchasing with a credit card.

SOME SEISMIC SHIFTS ARE HAPPENING AMONG ENTERPRISE VENDORS.

Forecast 2: Enterprise BI Adopts Analytics and Near-Real-Time Data Delivery

While most of the action will be at the departmental level, some seismic shifts are happening among enterprise vendors. To maintain growth rates, deal sizes, and earnings, enterprise BI vendors are offering more comprehensive tool suites and packaged solutions, trying to become one-stop shops for anything related to BI, DW, or performance management. The two key additions to enterprise

BI portfolios in 2010 are analytics and near-real-time data delivery.

Near-real-time data delivery. Judging from our 2009 Best Practices contest, many leading adopters of BI already support intraday delivery of data. These forward-thinking BI teams have figured out how to extend the DW or data mart with mini batch loads, changed data capture, and/or trickle feeds. Most ETL tools now provide adapters to make this even easier. It's a good bet that 2010 will see operational BI (or near-real-time DW if you prefer) become a more commonplace feature of a DW architecture.

Analytics everywhere. Analytics has been the top vote-getter at the past several TDWI BI Executive Summits. A large percentage of attendees say this is a technology they want to adopt in the next three years. The major problem with analytics is that no one knows exactly what it is or how to do it. Some equate analytics with interactive reports, and others with more sophisticated SQL to perform complex routines, such as market basket analyses. Still others associate it with statistical data mining algorithms and SAS programmers. It is clear, however, that many companies are ready to move beyond basic reporting.

BI vendors now tout analytics, but they are really talking about easier ad hoc query or end-user reporting capabilities. Some have gone the next step and integrated data mining tools into their suites. Information Builders now embeds R, an open source data mining package. SAP BusinessObjects resells SPSS Clementine, but SPSS was recently purchased by IBM and will undoubtedly find its way into the Cognos 8 BI suite.

In addition, the nascent analytic database market offers a nice path forward. These databases use a variety of techniques to vastly improve the price-performance of complex queries running against large volumes of data. Most support ad hoc SQL queries that traditional databases cannot run without bogging down performance for standard report-based processing. Some database vendors are reinventing the user-defined function through a technique called MapReduce, which promises to automatically parallelize the execution of custom-built programs running inside a database. This will make it possible to run sophisticated analytics, such as optimizations, decision trees,

and sequential path analysis that are not easy to do with plain SQL.

Summary. On the whole, BI will move forward in 2010 in fits and starts. Expect a lot of action at the low end of the market serving small and midsize businesses and departments at large companies. The new-born analytical silos will cause requisite hand-wringing among astute IT managers but will be hard to stop. Larger BI programs will be in a maintenance mode, trying to retain gains they've made in budget battles. They'll also be looking for ways to add value to their companies' BI investments, adding near-real-time data delivery and analytics to improve the usefulness of underlying data.

Wayne W. Eckerson is the director of TDWI Research and the author of Performance Dashboards: Measuring, Monitoring, and Managing Your Business *(John Wiley & Sons, 2005). You can reach him at weckerson@tdwi.org.*

DIVERSIFICATION OF BI/DW PLATFORMS REQUIRES CONTROL
PHILIP RUSSOM

This time last year, I published my prognostications for BI and DW in 2009. Looking back, I must say (with a firm pat on my back) that I was spot-on with most of my predictions, but missed the mark (though only slightly) with others. I'd like to amend the record by reviewing these predictions and adding updates for 2010. After all, the trends we see in BI/DW are multiyear phenomena, moving with the briskness of a glacier. And multiple trends are more closely related than I previously noted, so I'll explain the connections.

Across the trends I'm about to describe, you'll see that many user organizations are diversifying their portfolios of BI tools and DW platforms. Strangely enough, the same organizations are consolidating and centralizing their assets for operational applications and data center assets. Even stranger, the diversification of BI/DW flies in the face of conventional wisdom, which says we should maintain an enterprise data warehouse

(EDW) as the "single version of the truth," standardize reporting and analytic tools, and beware of data mart proliferation. And yet, the controlled diversification of BI/DW platforms makes sense in the newest world order, given new requirements for advanced analytics and available funding from departmental budgets. This is only one set of trends in BI/DW, but it deserves attention here because it's one of the strongest—and strangest.

The current recession is not the same as the burst of the Internet bubble. Last year, I was still watching to see if the reaction of corporations and the methods for recovery would be the same, relative to IT, BI, and DW. If reactions were similar, then maybe we could predict our immediate future based on what happened earlier this decade. Despite similarities, there are significant differences between the two economic events, such that comparisons don't yield accurate predictions for future BI/DW events.

For example, in my work, I research database consolidations and related matters such as IT centralization and platform standardization. In 2001–2003, these projects were extremely common as cost-cutting measures. And at the time, I personally did a lot of consulting for data mart consolidations and reporting platform standardizations, which is how consolidation and centralization manifested themselves in BI/DW. Likewise, as the recession spread in 2007–2009, I saw many corporations again step up consolidation and centralization. Again, cost-cutting and the "do more with less" mentality are driving these projects. Yet the specific forms of these projects—especially application server virtualization—are also driven by much-needed upgrades to applications architecture, reforms in data center design and management, and preparations for cloud computing.

System consolidation and centralization is an operational trend, not a BI/DW trend, at the moment. This is a critical though subtle distinction. The consolidation and centralization projects I just described are firmly focused on operational and transactional systems. In other words, in the recession so far, I haven't seen much activity consolidating and centralizing data warehouses, data marts, reporting platforms, analytic applications, or other BI/DW systems. In fact, I've come to realize that the opposite is occurring.

User organizations are currently diversifying their portfolios of BI tools and DW platforms far more often than they are consolidating them. This is a radical change compared to the early years of this decade. It's as if a pendulum has swung from one extreme to the other.

For example, in 2001–2003, data mart consolidation projects were rampant, as a sign that organizations couldn't tolerate errant data collections that might contradict central, authorized collections, as seen in the average EDW. Let's recall that—in the wake of debacles at Enron and WorldCom—new legislation in the U.S. and Europe had recently demanded greater data fidelity, as expressed in regulatory reports. Such reports (not to mention enterprise decision making) are threatened by unauthorized data marts and other distributed BI data stores.

THE TRENDS WE SEE IN BI/DW ARE MULTIYEAR PHENOMENA, MOVING WITH THE BRISKNESS OF A GLACIER.

The pendulum has now swung to the other extreme. In 2007–2009, we've settled into a new tolerance of distributed BI data stores. "Data mart" is no longer a dirty word. In fact, I attended the Teradata Partners Conference, where we were all surprised (and mostly pleased) to hear a Teradata executive in a keynote address state that "Teradata now advocates data marts." His statement makes perfect sense, given the growing number of user organizations that augment a central EDW with additional BI data stores for specific workloads or to satisfy departmental requirements.

A surge in analytics is driving up the need for separate analytic databases. In recent years at TDWI, we've noted that our Members and other users are diving deeper into analytics than ever before. There are different approaches to analytics, so let me qualify this trend by saying that the recent change is a movement into what's usually called "advanced analytics," as opposed to rudimentary forms such as online analytic processing (OLAP). Variations of OLAP are by far the most common analytic approaches in use today, usually implemented as parameterized reports fed by a static cube of carefully prepared data. This differs from advanced forms of analytics—based on data mining, predictive analytics, complex

SQL, MapReduce, natural language processing, statistics, artificial intelligence, and so on—which enable the discovery of unknown facts (far more broadly than OLAP can) by supporting ad hoc analytic methods against unknown or changing collections of lightly prepared data.

Given the unpredictable nature, quickly evolving data, and demanding workload of advanced analytics, users are choosing to offload analytic data from an EDW to a secondary platform called an analytic database. Any database management system (DBMS) can manage an analytic database. But in response to demand this decade, software vendors have produced new DBMSs that are purpose-built for analytics or DW. Many new analytic DBMSs are now available, based on appliances, columnar data stores, MapReduce, and open source. Some of these are available through clouds or software-as-a-service licenses.

Now that we've seen the growth of analytics, let's step back and ask: Why is this happening? The leading reason is that user organizations need advanced analytics to make sense of recent changes in their customer bases, operational expenses, marketplaces, and competitive landscapes. Advanced analytics helps managers understand recent changes and how best to respond to them, ranging from operational cost cutting to spotting new sales opportunities. Because of the constant economic turmoil of this decade, business change is rampant. TDWI expects the turmoil to continue, which means more organizations will dive deeper into analytics to adapt and thrive.

Users are adopting more DW workloads, which are sometimes offloaded to a secondary DW platform. As we just saw, workloads for advanced analytics are regularly offloaded. Other offloaded workloads are for real-time or on-demand reporting, operational BI, and performance management. As workloads diversify, so do the platforms that support them, which means users may end up with multiple DW platforms.

In a related trend, department budgets are relatively fluid, compared to frozen budgets for capital expenses (which an EDW is, in many organizations). Hence, more BI and DW platforms are being deployed to satisfy the reporting or analytic needs of departments that have independent budgets.

The EDW is not going away, not by any stretch of the imagination. The EDW's focus on reporting and OLAP will stay intact, even as some organizations complement it with platforms optimized for specific data processing workloads or departmental requirements.

Users tolerate analytic databases, but not spreadmarts. If you're experienced in BI/DW, you know there's a danger in tolerating unauthorized data marts, spreadsheets, and other personal productivity databases, which TDWI collectively calls "spreadmarts." One of the challenges for organizations deploying analytic databases (and the department-focused reporting and analysis tools that go with them) is raising their content quality and controlling their use more than has been done for the average spreadmart.

BI AND DW ARE CURRENTLY TOLERATING A FAIR AMOUNT OF TOOL AND PLATFORM DIVERSIFICATION.

Summary. In closing, let's pull all the points under discussion into a cohesive trend. System consolidation and centralization are common trends driving activities in data centers and operational applications. Yet BI and DW are currently tolerating a fair amount of tool and platform diversification, driven by new requirements in advanced analytics and the availability of department funds. You and your colleagues may well be pursuing these requirements in 2010. After all, advanced analytics helps businesses discover opportunities and respond to change. And a departmental focus helps fund BI innovation in a time of economic stress. If you diversify BI and DW platforms this way, however, be sure the diversification provides quality content and control, to avoid spreadmart proliferation.

Philip Russom is the senior manager of TDWI Research at The Data Warehousing Institute, where he oversees many of TDWI's research-oriented publications, services, and events. He's been an industry analyst researching BI issues at Forrester Research, Giga Information Group, and Hurwitz Group. You can reach him at prussom@tdwi.org.

Wouldn't it be Great if all Your Business Intelligence Data Performed in Concert?

Improve Your Business Intelligence Applications. Now more than ever, current, accurate, and timely information is a critical success factor in today's fast-paced, volatile markets. Increasingly, your company's business leaders rely on you and your BI applications to provide this crucial information so that the best possible decision can be made. If the BI system is loaded improperly, with dated information, or the reports are not delivered in a timely manner, incorrect decisions can ensue with severe consequences for the business.

Automating the ETL and reporting processes ensures that the data in your system is always current and accurate and that reports are generated in a timely fashion. Tidal Enterprise Scheduler's advanced BI integrations enable you to build and automate complex data flows across systems and applications to ensure the ETL processes that feed your BI systems are completed correctly and in the appropriate sequence each and every time and that the reports are delivered on-time, every time.

Beyond Reporting: Delivering Insights with Next-Generation Analytics

BY WAYNE ECKERSON

CLASSIFYING POWER USERS

One of the classic mistakes that organizations make when purchasing business intelligence tools is to straddle the middle. That is, they purchase tools that are too complex for casual users but not sophisticated enough for power users. The key to a successful deployment of BI technology is to understand your business users, the roles they play, the information they need, and the manner in which they want to consume and analyze that information. But this is easier said than done.

We are fortunate today to have a plethora of tools and technologies to offer organizations that want to increase their analytical IQ. The downside of this technological cornucopia is that it's difficult to know which tools to give to which users. This is further complicated by the fact that most users play multiple roles, sometimes simultaneously, and each role brings with it different information requirements and different styles of consuming information.

Ultimately, BI needs to be customized to users' roles and personalized to their individual tastes. The best way to start this process is to create an inventory of your users at an aggregate level. This requires classifying users based on

some logical scheme, such as business titles, departments, or information consumption patterns. These categories should be based on how business users consume information today.

FOUR TYPES OF POWER USERS

For example, let's examine power users. This is a diverse group of users who perform a variety of analytical tasks. In general, there are four types of power users:

1. **Business analysts.** Data- and process-savvy business users who use data to identify trends, solve problems, and devise plans.

2. **Super users.** Technically savvy departmental business users who create ad hoc reports on behalf of their colleagues.

3. **Analytical modelers.** Business analysts who create statistical and data mining models that quantify relationships and can be used to predict future behavior or conditions.

4. **IT report developers.** IT developers, analysts, or administrators who create complex reports and train and support super users.

According to our survey, most organizations have all four types of power users, although only 51% have analytical modelers. (See Figure 1.)

Which of the following types of power users exist in your organization?

IT report developers/ analysts	86%
Business analysts	83%
Business super users	81%
Analytical modelers	51%
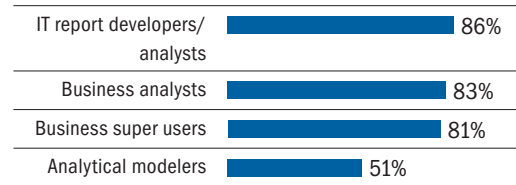
Figure 1. Most organizations have all four types of power users.

The finance department has the highest percentage of all types of power users, followed by sales, marketing, and service. Marketing has the second highest percentage of analytical modelers. (See Figure 2.)

BUSINESS ANALYSTS. Business analysts sit at the intersection of data, process, and strategy, and they play a significant role in helping the business solve problems, devise plans, and exploit opportunities. Their titles include "business analyst," "financial analyst," "marketing specialist," and "operations research analyst." Executives view them as critical advisors who keep them grounded in reality (data) and help them bolster arguments for courses of action.

Which departments have dedicated analysts?

	SUPER USERS	BUSINESS ANALYSTS	IT REPORT DEVELOPERS	ANALYTICAL MODELERS
Finance/accounting	68%	58%	41%	43%
Sales	39%	39%	19%	13%
Marketing	37%	37%	19%	22%
Service	32%	32%	27%	19%
Product management	23%	23%	16%	10%
HR	21%	21%	11%	5%
Logistics	16%	16%	7%	7%
R&D	16%	16%	0%	19%
Procurement	14%	14%	22%	4%
Manufacturing	11%	11%	9%	5%

Figure 2. Percentage of departments with dedicated analysts.

Business analysts perform three major tasks:

1. **Gather data.** Analysts explore the characteristics of various data sets, extract desired data, and transform the extracted data into a standard format for analysis.

2. **Analyze data.** Analysts examine data sets in an iterative fashion—essentially "playing with the data"—to identify trends or root causes. Analysts will visualize, aggregate, filter, sort, rank, calculate, drill, pivot, model, and add or delete columns, among other things.

3. **Present data.** Analysts deliver the results of their analysis to others in a standard format, such as a report, presentation, spreadsheet, PDF document, or dashboard.

Today, business analysts spend the most time on steps 1 and 3 and the least time on step 2, which is what they really get paid to do. Unfortunately, due to the sorry state of data in most organizations, they have become human data warehouses. TDWI estimates that business analysts spend an average of two days every week gathering and formatting data instead of analyzing it, costing organizations an average of $780,000 a year.[1]

According to our survey, most business analysts use spreadsheets to access, analyze, and present data, followed by BI reporting and analysis tools. However, in most cases, the analysts use BI tools as glorified extract tools to grab data warehouse data and dump it into a spreadsheet or desktop database, where they normalize the data and then analyze it. The next most popular tool is SQL, which analysts use to access operational and other sources so they can dump the data into spreadsheets or desktop databases (which rank number five on the list, following OLAP tools). (See Figure 3.)

Top Seven Tool Sets Used by Business Analysts

1. Spreadsheets
2. BI reporting/analysis tools
3. SQL
4. OLAP tools
5. Desktop databases
6. BI authoring tools
7. Interactive visualization tools

Figure 3. Business analysts use BI tools and SQL to dump data into spreadsheets or desktop databases to do their analyses.

To improve the productivity and effectiveness of business analysts, organizations should continue to expand the breadth and depth of their data warehouses, which will reduce the number of data sources that analysts need to access directly. They should also equip analysts with better analytical tools that operate the way they do. These types of tools include speed-of-thought analysis (i.e., sub-second responses to all actions) and better visualizations to spot outliers and trends more quickly.

SUPER USERS. Super users are typically technically savvy business users who take responsibility for creating reports on behalf of colleagues in their departments. In most cases, the super users are self-appointed volunteers who handle reporting tasks in their departments.

In a mature BI environment, super users are part of a BI competency center, which provides them with training and support. The super users fulfill departmental requests for ad hoc reports, offloading such requests from the BICC, and make suggestions to enhance and extend the standard BI reports designed by the BICC. The super users also participate in BICC working committees and help craft the BI road map, select products, and design an enterprise BI architecture.

Super users generally use BICC-supplied BI reporting/analysis tools to create reports on behalf of their colleagues. (See Figure 4.) This means they are crafting queries against a set of business objects (or metadata) that they can drag and drop into a query panel or report template. The BICC creates the business objects, shielding super users from the complexities of the back-end database(s). In organizations without a BICC, the super users may be business analysts and use spreadsheets, SQL, or OLAP tools.

Top Seven Tool Sets Used by Super Users

1. BI reporting/analysis tools
2. Spreadsheets
3. SQL
4. OLAP tools
5. BI authoring tools
6. Interactive visualization tools
7. ERP/CRM reporting applications

Figure 4. Super users use BI report tools to create reports for colleagues.

---

[1] From Wayne Eckerson and Rick Sherman, *Strategies for Managing Spreadmarts: Migrating to a Managed BI Environment*, TDWI Best Practices Report, Q1 2008. Available at www.tdwi.org/research/2008/04/strategies-for-managing-spreadmarts-migrating-to-a-managed-bi-environment.

The way to make super users more productive is to provide an organizational framework for the delivery of BI capabilities. This includes establishing a BICC with formal roles and responsibilities for super users as well as a standardized BI tool set, semantic layer, and corporate-approved standard reports and dashboards. This allows super users to focus on gathering and meeting user requirements rather than wrestling with report creation and delivery tools. It also minimizes the number of requests they receive from colleagues to create routine, ad hoc reports, so they can focus instead on higher-value problems and solutions.

ANALYTICAL MODELERS. Analytical modelers are much like business analysts except they use statistical and data mining techniques to coax hidden patterns and relationships out of large data sets (i.e., create analytical models) that can be used to predict behavior and events. Traditionally, analytical modelers are Ph.D. statisticians, operations researchers, and econometricians, but new analytic workbenches make it possible for savvy data and business analysts to create complex statistical models.

In general, analytical modelers are inquisitive, die-hard experimentalists who interact with large data sets to create accurate models. Like business analysts, they sit at the intersection of business processes and data and are experts in each. They traditionally work outside the bounds of the IT department and the BI team. Most prefer to access the raw data directly so they have first-hand knowledge of its strengths and shortcomings and can extract data at the right level of granularity for each analysis. Like business analysts, they spend a disproportionate amount of time exploring and preparing data, rather than analyzing the results.

Almost all analytical modelers use analytical (i.e., data mining) workbenches to create analytical models. In most cases, they use BI tools, SQL, or spreadsheets to extract data from source systems and prepare it for the modeling process, a step that consumes about 80% of the time required to create an analytical model. (See Figure 5.) Once the data is ready, they generate the model using the analytical workbench and then apply the model to all relevant records in a source system—a process known as scoring—mostly in a batch process, but sometimes dynamically. To do this, the modeler either downloads all records to the workbench (which isn't practical for large data sets) or uploads the model to the database, which performs the scoring either dynamically or in batch.

Top Seven Tool Sets Used by Analytical Modelers

1. Data mining workbenches
2. BI reporting/analysis tools
3. SQL
4. OLAP tools
5. Advanced visualization tools
6. Spreadsheets
7. BI authoring tools

Figure 5. Analytical modelers primarily use workbenches to create models.

In general, analytical modelers view IT as gatekeepers to the data, and thus, obstacles to doing their jobs. Analytical modelers have gotten very cagey at circumventing IT, accessing data on their terms and time, and creating their own "islands of analytics." Conversely, IT views analytical modelers as renegade IT outfits who submit runaway queries that degrade performance for other users and undermine data security procedures that threaten the viability of the organization. Tools and techniques to overcome this divide would benefit analytical modelers.[2]

IT REPORT DEVELOPERS. IT report developers have many titles: BI manager, BI developer, database administrator, ETL developer, and software developer. They are a central resource that creates reports for business units and end users. In an organization without a formal BI program, this group is the sole developer of reports and dashboards. Traditionally, this approach creates a significant backlog of report development requests. When it comes to tools, IT report developers primarily use SQL and BI reporting and authoring tools to create reports for the business.

Top Seven Tool Sets Used by IT Developers

1. SQL
2. BI reporting/analysis tools
3. BI authoring tools
4. OLAP tools
5. Spreadsheets
6. Interactive visualization tools
7. ERP/CRM reporting applications

Figure 6. IT developers use SQL and BI reporting tools to support BI requirements.

---

[2] See Wayne Eckerson, *Bridging the Divide: Aligning Analytical Modelers and IT Administrators*, TDWI Monograph, July 2008.

To avoid backlogs, most IT organizations have created a BICC that works collaboratively with super users and governance teams to create a BI delivery environment that meets user requirements in a timely fashion. The IT group also establishes data governance programs and recruits stewards in each department or business unit (who may also be super users) to help define and maintain data definitions and policies for updating, revising, and maintaining critical data elements.

The goal with BI and data governance programs is to get the business to take ownership and responsibility for its reporting and data environments, using IT as a resource to facilitate the process and manage the infrastructure. Unfortunately, it is difficult for IT to create such governance programs without strong buy-in from the business. IT would benefit from strong executive vision about the value of data and analysis and adequate funding and sponsorship of governance programs.

SUMMARY
Today's defacto analytical tools—spreadsheets, desktop databases, and reporting tools—are rudimentary at best and haven't changed much in decades. In recent years, vendors have delivered many new analytical tools and technologies designed to improve the productivity of business analysts and preserve information consistency throughout an organization.

Wayne W. Eckerson is the director of TDWI Research and the author of Performance Dashboards: Measuring, Monitoring, and Managing Your Business *(John Wiley &Sons, 2005). He can be reached at weckerson@tdwi.org.*

Improve Decision Making with
MicroStrategy's Dynamic Dashboards

MicroStrategy has set the standard for enterprise dashboards by combining next-generation dynamic data visualization and dashboard interactivity with MicroStrategy's highly scalable, industrial-strength business intelligence platform.

Dashboards come to life with unparalleled user interactivity providing more insightful and efficient corporate performance analysis. MicroStrategy 9™ offers exciting new dashboard templates and tools that simplify the design process.

To find out more, visit www.microstrategy.com/dynamic-enterprise-dashboards, or call 888-537-8135.

MicroStrategy®

Mistakes to Avoid
When Designing and Developing Operational BI Applications

BY CLAUDIA IMHOFF AND COLIN WHITE

Operational BI (OBI) is a popular topic in most BI shops these days, and rightfully so. Operational BI enables *more informed business decisions* by directly supporting specific business processes and activities. It supports *faster business decisions* by seamlessly integrating BI with business processes to create a *closed-loop* decision-making environment. Finally, it provides a *more dynamic business environment* where the business can learn, adapt, and evolve based on the analysis of its operational business performance.

Operational BI is defined as a set of applications, services, and technologies for monitoring, analyzing, reporting on, and managing the business performance of an organization's daily business operations.

Operational BI has had a dramatic impact on traditional BI environments and on a new audience of BI users. These users now have immediate access to the insights they need when making decisions about customers, products, and even campaigns while these business activities are happening.

Assuming All Analytics Must Come from the Data Warehouse Environment

The data warehouse is a key supplier of data analytics, but not the sole supplier of analytics. There are other forms of analytics needed for a fully functioning operational BI environment. Because many analytics used in operational BI require low-latency or real-time data, organizations try to speed up the overall processes of the data warehouse—trickle feeding the data, automating analyses, and so on—to make it the sole supplier of analytics. Although this works for some low-latency analytics, at some point the data warehouse team must turn to other analytical techniques to complete the OBI picture.

One of these techniques is event analytics. Event data is created by *business activities* (banking transactions [ATM], retail operations [POS, RFID], market trades, and Web interactions) or by *system events* (generated by sensors, security devices, or system hardware or software). Event analytics applications often perform their analyses even before the transactional data is stored in an operational system. For example, many fraud-detection applications analyze transactions for

fraudulent characteristics first and then store them in transactional systems for further processing. Obviously, the data warehouse contributes to the overall OBI environment by generating the fraud models used by the event analytics software.

Another technique is to make BI analytics (or its results) available as callable services within an operational workflow. Embedded BI services can be external to the workflow (as a part of a service-oriented architecture) or included within the workflow itself. These services come in two flavors. The first calls a stored analysis or model, uses it dynamically during the workflow, and receives the results before invoking the next activity—for example, calling a stored analysis to dynamically determine a loan applicant's credit worthiness. The second type retrieves the static results from an earlier analysis; for example, a CSR retrieves a customer's lifetime value score or segment ID stored in a data warehouse.

Both types are employed by a business process or person to support real-time or near-real-time business decisions and actions.

The combination of traditional data analytics, embedded BI services, and event analytics form the foundation of operational BI. All three must come together at appropriate points in the workflow to provide a mature and effective operational decision-making2. environment.

Failing to Match BI Agility to Business Needs

There is a lag between the time an event happens and the time a company responds to it. This is caused by several factors, such as preparing the data for analysis, running the analysis, and determining the best course of action based on the results (for example, taking action when a campaign sells a product that is about to run out of stock). Obviously, the ability to reduce the time to action here (stopping the campaign or changing the featured product) can have significant impact on a company's revenues and reputation. This is BI agility. It requires that the *action time* match the business need.

However, there is a trade-off. Is it timely enough for the business or is it actually too fast? Even if the business requires reduced latency, can the

business users correctly process the inputs that quickly? Can the operating procedures handle the time frame appropriately to ensure a correct reaction? There are many moving parts in an OBI environment, and any that are out of sync or incomplete can cause an erroneous decision to be made. In this situation, the cost of creating such a low-latency BI environment may be more than the actual benefit the company receives.

Another trade-off is the soundness of the architectural infrastructure (more on this later). Building an OBI solution that is inflexible or fragile just to meet an arbitrary time frame may spell disaster. If the action time requirement changes (and it is almost certain that it will) from two hours to one hour, you don't want to have to rebuild the entire architecture. To avoid this situation, the BI implementers must understand all inputs to be taken into consideration, from event occurrence to action taken.

Failing to Determine if the Infrastructure Can Support Operational BI

Although traditional BI processing is often critical to business operations, a temporary failure of the BI system will not typically affect short-term business operations. Also, given that the BI system is separated from operational processing, it means that BI processing has little effect on operational performance except during the capturing of operational data.

The situation with operational BI is different from traditional BI because it is closely tied to the daily operations of the business. A failure in an operational BI system could severely impact business operations. This is especially true for operational BI applications that support close to real-time decision making, such as fraud detection.

There are several approaches to supporting operational BI, such as embedding BI in operational processes, accessing live operational data, and capturing operational data events and trickle feeding them to a data warehouse. All of these approaches have the ability to affect the performance of operational systems.

It is very important, therefore, that the infrastructure of the BI system, its underlying data warehousing environment, and related operational

systems be capable of providing the performance, scalability, availability, and reliability to meet operational BI service levels. The cost of providing such an infrastructure increases as these service levels approach real time, and these costs must be balanced against the business benefits achieved and the ability of the organization to exploit a more agile decision-making environment.

Assuming that Operational BI Is Just a Technology Solution

It's critical that BI implementers be able to tie BI applications to operational applications and, even more important, with operational processes. Yes, technology is important, but perhaps just as important are the standard operating procedures (SOPs) that must be followed by business personnel. Many BI implementers do not realize that their OBI solution impacts how people perform their jobs. Without understanding how SOPs will be affected, the OBI team can cause severe problems with operations or, worse, find their solutions being ignored or circumvented.

As a first step, the BI team should study, understand, and document the full business workflow using the new BI application. OBI applications can cause big changes to processes and procedures. When they do, the team must determine how the SOPs must change: Will they need to be rewritten or enhanced to include the new OBI application? What impact will this have on the workforce? Who will create and maintain the new SOP?

The team must also determine which personnel will be affected by the new procedures and what training they will need. This means studying how these personnel make decisions, how they access and use information, and how they monitor the impact of their decisions on the company. Training must be ongoing and flexible to accommodate the inevitable turnover in operational personnel. Some of the workforce may immediately grasp this new paradigm; others may not.

Assuming that Operational BI Simply Involves Capturing More Timely Data

It is often assumed (incorrectly) that operational BI simply involves capturing more timely data. Although real-time or low-latency data is an important feature of operational BI processing, there are other factors that also need to be considered when improving BI agility and supporting faster decision making.

Once operational data has been captured, it needs to be analyzed and the results delivered to the BI consumer, which may be a business user or another application. The time it takes to analyze the data increases the time (the *action time*) it takes for a business user or an application to make a decision. It is important, therefore, that the actual queries used in the analysis are optimized for good performance. It is also important that the underlying query processing engine is optimized for efficient analytical processing. In some instances, the analytical results may be precalculated to reduce action times (customer lifetime value scores, for example).

The efficient delivery of results to the BI consumer is also important for operational BI success. The delivery medium used (dashboard, portal, mobile device, action message) must be selected to match the action time requirements of the business. The availability of automated decision-making features such as alerts, recommendations, and decision workflows can help business users make faster decisions. In near-real-time decision-making situations (fraud detection, for example), fully automated decision-making features may be employed.

Assuming Existing Data Quality Procedures Will Work for Operational BI

Most data quality procedures are reactive by nature; they detect and fix errors in data after it has been created. For example, during the ETL process, many BI teams invoke a data quality process after data extraction and before data transformation. The true source of the error (the operational system) does not get corrected and, in fact, continues to produce the errors. The more you have to manipulate the data after the fact, the more latency you introduce into the overall process.

Operational BI requires a more dynamic environment, and the faster it gets, the more the data quality processes have to speed up. In fact, an ideal situation for operational BI would be to make these data quality processes more proactive than the current reactive mechanisms used. In other words, it is better to fix the data *before* it gets stored in the operational systems. This may not always be possible but should be a goal of the team. In any case, the data quality processes must be as rapid as possible to ensure minimal data latency.

To that end, the BI team should understand how "perfect" the data must be for the operational BI solution. In some situations, the data may not be perfect but it may be good enough for the operational BI application. The team should establish an environment that relies on its ability to prevent problems rather than relying solely on an environment that fixes them.

Failing to Realize that Operational BI Is Process Centric Rather than Data Centric

Strategic BI and tactical BI are data centric in that they provide aggregated data analytics that show the performance of the business and its business units at specific moments in time. These data points rarely allow users to see the performance of an individual, ongoing business process. Operational BI, on the other hand, focuses on the performance of specific business processes and the business activities that make up that process.

Operational BI processing involves capturing and analyzing data events that can be used to monitor and track the performance of an ongoing business process and its associated business activities. The event analytics produced by this analysis enable organizations to spot bottlenecks in business operations and identify business activities that should be optimized to reduce costs and improve business efficiency.

Operational BI is process centric rather than data centric. This means that the business processes and business process workflows that are potential targets for use with operational BI must be clearly understood and documented if an operational BI project is to be successful.

Although operational BI is focused on individual business processes and event analytics, data analytics are often used to put event analytics into a broader business context. Optimizing an individual business process can impact the performance of another business process. Increasing the business performance of Web retail sales could, for example, impact the performance of other retail channels. Using event analytics in conjunction with data analytics enables the organization to balance short-term and long-term business objectives.

Assuming that IT Development Skills for Operational BI Are the Same as Those for Other Traditional Types of BI

Operational analytics is one of the biggest growth areas in BI. This growth is occurring in analytical applications built by the BI group *and* in analytical solutions built by other groups in the organization. For example, the use of operational Web analytics for optimizing Web site business and technology performance is a rapidly growing area, and the Web development group often builds these analytical solutions. Similarly, content management groups are building content analytics, and operational applications groups are using technologies such as business activity monitoring (BAM) and complex event processing (CEP) to create event analytics.

There are several reasons why these IT groups are independently building their own operational analytical solutions. A key reason is the lack of an overall operational BI strategy and the lack of senior management oversight. Another important reason, however, is that these types of operational analytical applications often require skills that do not exist in the traditional BI organization. The problem is, of course, that the groups that do have these skills may not always be proficient in the development of applications for business decision making. The net result is political battles, project control disagreements, budget fights, and the incorrect use of technologies.

Interviews with customers who have successfully overcome these issues show that the best solution is to remove the dividing lines between different application development groups and create a single development group with pooled skills and resources. Another option is to create competency centers that share skills and knowledge.

Assuming that the Users of Operational BI Are the Same as Those for Other Traditional Types of BI

Most traditional BI environments support a few hundred, maybe a few thousand, users. Opening up the BI environment to operational and front-line personnel means ramping up support to potentially tens of thousands of users. This fact alone can be daunting, but consider performance requirements. These operational personnel expect and require response times that mimic those found in their other operational systems—that is, sub-second to a couple-of-seconds performance for BI queries and analytics.

OBI users have *very* different interface requirements and are typically less technically savvy and less analytical in their thinking. These differences mean that BI implementers must rethink how BI is delivered to them. They must study their access methods and needs, develop appropriate dashboards, portals, or other interfaces according to these needs, and monitor the community's usage patterns to revamp and revise the interface as needed. The interface should bring together the appropriate BI results, BI services, events, and operational capabilities to support each workflow. Furthermore, it should be intuitive in its usage as well as seamlessly embedded within existing operational processes.

Failing to Monitor and Audit Automated Decision Making

Operational BI application processing will need to be more automated as service-level agreements require operational BI solutions to provide real-time or near-real-time responsiveness. Application examples include fraud detection, risk analysis, financial trading, call center performance, and, in the telecom industry, network management.

There are many ways of adding automation to the decision-making process, including rules-driven alerts and recommendations, decision workflows, data mining models, and decision engines. All of these approaches in some respect are reliant on business rules that are developed based on business user expertise or by analyzing business trends and patterns over a period of time.

The problem here is that successful automated or semi-automated decision making relies almost entirely on the quality of the rules that drive decisions and recommendations. Several factors can impact the quality of these rules, including the level of expertise of the users creating the rules and changing business circumstances.

The current economic crisis is an example of how organizations can become over reliant on the algorithms and recommendations made by automated models and decision engines. Poor quality or incorrect business rules can have disastrous business consequences, and it is very important that these rules, and the decisions made based on these rules, are validated and audited regularly. The procedures used for validation and auditing should be a component of the operational BI development project.

Claudia Imhoff is a TDWI Fellow and the president and founder of Intelligent Solutions, Inc. She is a speaker and internationally recognized BI expert. Dr. Imhoff has co-authored five books and has an expert channel and blog on the BeyeNETWORK.

Colin White, president and founder of BI Research, is a consultant, analyst, and educator who is well known for his knowledge of business intelligence, data management, and business integration technologies. He has co-authored three books and contributes to the BeyeNETWORK.

Delivering the Balanced Scorecard with Your BI Program

BY DAVID BLOOM AND TOM VICTORY

Business intelligence programs are increasingly being pushed to support balanced scorecard–based performance management. Scorecards are a new and complicated requirement that will challenge the skills of BI programs and force adoption of new methods.

The balanced scorecard (BSC) was conceived as a top-down tool for measuring and communicating business unit strategy. In this form, it was a quarterly or annual executive-level report of organizational performance. However, it soon became clear that the balanced scorecard could be the basis of an integrated performance management system. To function as a performance management system, the balanced scorecard must provide department- and individual-level detail and deliver metrics with sufficient frequency to impact operational decisions.

Delivering such a BSC requires a business intelligence system. Scorecards built by analysts manually compiling and massaging data do not scale to the needs of a performance management system. One of our clients estimated the manual labor cost of their scorecard production and variance reporting at more than $2 million per year.

Key Problems for Supporting a Balanced Scorecard

Today's BSC automation tools are robust, and once summarized and extracted, the data volumes are easy to manage. The key BSC challenges facing BI teams relate to program alignment, release planning, automation, and business adoption.

Alignment failure. This is the most important cause of failure. Alignment failures are not obvious. Instead, they arise in subtle differences between scorecard measures and underlying data definitions. In the same way that organizations are striving to achieve master data management (MDM), they must also begin to address master metric management (MMM), which ensures consistency of metric derivation and meaning between BSC and BI initiatives. Other informational challenges occur when either initiative lacks adequate data completeness, timeliness, level of detail, and/or precision to support the other.

The other key aspect of alignment stems from the underlying purpose of the two initiatives. A BSC's focus is on performance monitoring—typically evaluating actuals against stated targets—and BI's objective is to enhance decision making and provide actionable information that improves the underlying business process performance. BI provides the window beyond the higher-level metrics typically found in a scorecard to understand such things as root cause, impact, and corrective action. Thus, when these initiatives are led by different business and IT teams, the likely outcome is inconsistent between the BSC metrics and the more detailed BI information. For example, the measures of fulfillment results on a scorecard should be supported by analytical capabilities to delve into customer delivery issues (e.g., poor transport planning, delays due to specific suppliers, improperly trained workers). BSC metrics that are not supported by BI infrastructure are hard to act on.

Failure to deliver incremental progress. If the first step of a BSC/performance management project is to build an enterprise data warehouse, the BSC project will fail. By its nature, a balanced scorecard is an integrated view across a wide range of business functions and contributing source systems. To support this view, there will be a strong temptation to first build the robust data environment upon which the scorecard rests. However, this can lead to long, expensive, and high-risk projects.

Failure to automate. Manual steps seem to sneak into BSC efforts. This usually begins with a quick massaging of the numbers in a spreadsheet and a manual upload of a few records from an isolated system. Individually, a manual step may be more cost effective than automating it, but the accumulation of these manual steps slows delivery, adds cost, and reduces accuracy.

BY ITS NATURE, A BALANCED SCORECARD IS AN INTEGRATED VIEW ACROSS A WIDE RANGE OF BUSINESS FUNCTIONS AND CONTRIBUTING SOURCE SYSTEMS.

Failure to support adoption. Adoption suffers, particularly when BSC initiatives are created as technical solutions to deliver metrics, rather than as management performance initiatives driven by the business.

Tips for Delivering Scorecard-Based Performance Management

Use a proven, program-level BI method. Use a program approach to building your business intelligence capabilities and aligning them with BSC initiatives. A comprehensive method will include the steps necessary to build a BI vision, understand the risks and opportunities, develop a release strategy, and implement functionality. Business priorities should determine the allocation of effort between a BSC and other BI initiatives, rather than existing staffing levels or the department that owns the initiative.

Many organizations are good at the detail work of implementing ETL, reports, and dashboards, but lack the right governance processes to align the projects and key features with business performance needs. A program-level method creates that alignment.

Intangibles drive adoption. Some BSC efforts end up with a "zombie" scorecard. A zombie occurs when a scorecard is created but not used, likely because the BSC effort fails to gather momentum and adoption. A lack of senior-level commitment, poor consensus building, poorly explained data, and missed expectations may keep people from using the scorecard. Managing these intangibles with communication, training, and a quality user experience is critical to a successful BSC.

Have realistic technical expectations. A BSC will not fix problems that already exist in your BI environment. In particular, a BSC initiative will challenge existing metadata management and data governance. Defining and managing metrics consistently is often a new metadata competency. Many early-stage business intelligence efforts underinvest in these "soft" concerns, as the returns are harder to measure than they are with technical implementation. A BI readiness or maturity assessment is a good place to start.

Summary

Delivering a balanced scorecard–based management system requires a comprehensive business intelligence program. Manual and spreadsheet balanced scorecards do not scale to the frequency, detail, and accuracy required for a management system. Business intelligence programs can overcome the challenges of implementing a balanced scorecard by focusing on adoption, intangibles, and alignment.

David Bloom is a principal, information systems engineer with The MITRE Corporation (www.mitre.org). David has more than 20 years of experience in business intelligence and information management and has served as a TDWI instructor. He led consulting practices at DecisionPath, Wipro, and American Management Systems.

David Bloom's affiliation with The MITRE Corporation is provided for identification purposes only, and is not intended to convey or imply MITRE's concurrence with, or support for, the positions, opinions, or viewpoints expressed by the author.

Tom Victory is a principal consultant in the business intelligence and performance management practice at DecisionPath Consulting (www.decisionpath.com). Contact him at tom.victory@decisionpath.com.

acxius
www.acxius.com

YOUR **VALUED** BUSINESS PARTNER

HIGH PERFORMANCE · CONSULTING

Challenges with your Big and Complex Data? Falling short with your Smart Integration and Intelligent Reporting goals?

Let Acxius be your valued partner in meeting your data, integration, reporting, and decision support needs.

As a best-in-class consulting firm, Acxius serves clients around the globe, providing high performance, intelligent, user-friendly, scalable solutions for their big and complex data and information challenges.

Acxius delivers full lifecycle, high value, quality results that allow clients to achieve goals in an increasingly competitive marketplace.

Contact Acxius today, and let us be a part of your success.

www.acxius.com

references available upon request

When You Should Implement in the Cloud

BY WAYNE ECKERSON

Cloud computing holds considerable promise. By virtualizing hardware and software infrastructure and paying a third party to deliver services for a subscription or usage-based fee, companies can save money and time— and speed the deployment of business solutions.

Initially, cloud-based solutions were designed for small to midsize companies that didn't have the resources or capital to create and manage a software and hardware infrastructure. Today, large companies are investigating the cloud as a way to add new business solutions quickly and augment existing data center capacity.

Types of Cloud Offerings

Cloud computing isn't for everyone, especially in the BI space. To understand what makes sense to deploy in the cloud, you first have to fathom what the cloud does. In essence, the cloud abstracts underlying services and is a common metaphor for the Internet, which routes data dynamically across a global network based on capacity and other factors. Today's cloud delivers three levels of services that together comprise a solutions stack: applications, platforms, and infrastructure services (see Figure 1).
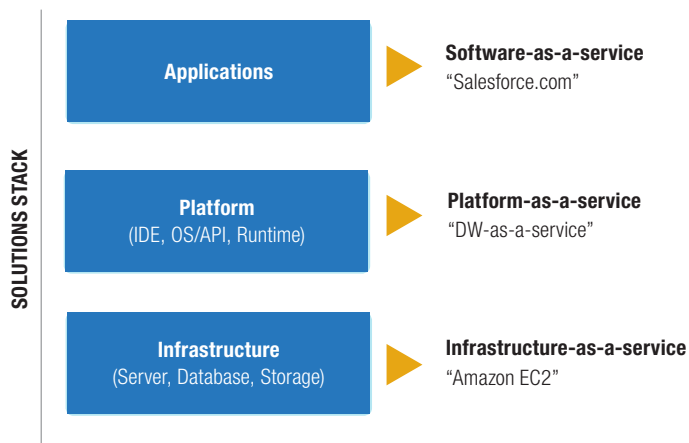
Figure 1. Types of cloud-based services.

SaaS. Application services are often referred to as software-as-a-service (SaaS). Salesforce.com, which was founded in 1999 to deliver sales solutions online to small and midsize companies, popularized the notion of SaaS. Salesforce.com now boasts 1.1 million subscribers and has spawned many imitators. With SaaS, employees use a browser to access an online application housed and managed by the SaaS provider. There is no hardware to configure, software to install, or licenses to purchase. You simply pay a monthly fee for each user, and you're up and running.

IaaS and PaaS. In the past several years, the cloud industry has grown, spawning two more services: infrastructure-as-a-service (IaaS) and platform-as-a-service (PaaS). Amazon popularized IaaS with the advent of its EC2 cloud computing offering, which lets IT administrators dynamically provision servers in Amazon's data center and pay according to usage. Many IT administrators now use IaaS as a convenient, low-cost way to maintain development, test, or prototyping environments or to support analytic sandboxes that have short life spans.

PaaS is the newest addition to the cloud family, allowing developers to build and deploy custom cloud-based applications and solutions. Many PaaS customers are ISVs that want to create cloud-based offerings or enhance them with complementary applications such as reporting or analysis.

BI in the Cloud

From a BI perspective, all three incarnations of the cloud offer interesting possibilities but come with constraints. For instance, SaaS offerings are essentially packaged analytic applications. Like their on-premises brethren, SaaS offerings need to be highly tailored to an application domain. This ensures the solution fits the customer requirements and doesn't require endless, unprofitable rounds of customization. It doesn't do much good if the SaaS vendor only supports one application out of several; the customer will end up with a mix of on-site and hosted solutions that are difficult to integrate. Unless the SaaS vendor supports a broad range of integrated functional applications, it's hard to justify purchasing any SaaS application.

Data transfers. Another constraint is that all three types of BI cloud offerings need to transfer data from an internal data center to the cloud. Most BI solutions query a data warehouse or data mart that is continuously loaded from operational systems residing in the company's data center. Currently, moving large volumes of data on a regular basis to the cloud over the public Internet injects latency and complexity into the load process and can become expensive since cloud providers charge fees for data transfers and data storage. In addition, when users query cloud-based data marts using BI tools that run on in-house servers, their queries and result sets also travel across the Internet, adding more latency and cost.

Given this constraint, BI cloud-based solutions are ideal in the following situations:

- Small companies that don't have much data

- Applications that don't require lots of data, such as development and test environments or small data marts that can be updated quickly

- Applications in which all source data already exists in the cloud (e.g., Salesforce.com or a start-up company that runs its entire business in the cloud)

- Ad hoc analyses that require one-time import of data from one or more sources (the cloud is proving an ideal way to support data-hungry analysts)

- Report sharing

Data security. Data security is another constraint but one that is largely illusory. Companies are reluctant to move data outside of the corporate firewall for fear that it might get lost or stolen. Highly publicized data thefts in recent years certainly feed this sentiment, but the fear is largely irrational. Most companies already outsource sensitive data to third-party processors, including payroll (e.g., ADP) and customer and sales data (e.g., Salesforce). When IT administrators examine the data center and application-level security supported by cloud vendors, most will say the data is probably more secure in these data centers than in their own! Most new technologies encounter the same criticisms; for example, many thought e-commerce would lead to widespread fraud when it first became available in the late 1990s.

Due diligence. Nonetheless, companies looking to outsource applications, platforms, or infrastructure to the cloud should investigate the cloud provider's operations to ensure they can meet your system-level agreements for security, availability, reliability, scalability, and performance. For instance, what are the provider's failover and backup procedures? Do they have a disaster recovery plan? Do they comply with SAS 70 data center security protection guidelines?

In addition, you should carefully analyze pricing policies and total cost of ownership. Does the SaaS provider charge setup or cancellation fees? At

what point in the future will the total cost of the SaaS solution be more than if you had purchased a premises-based license?

Finally, you should analyze the vendor's viability. SaaS vendors take on greater risk than traditional software vendors because their financial model accumulates revenues on a subscription basis rather than up front. Since SaaS vendors must invest in more hardware and customer support resources, they are prone to suffer from lack of capital. As testimony to the challenge of launching SaaS-based products, LucidEra, one of the first BI-for-SaaS offerings, closed its doors in June because it couldn't secure another round of funding.

DATA SECURITY IS ANOTHER CONSTRAINT BUT ONE THAT IS LARGELY ILLUSORY.

Summary
BI for SaaS offers a lot of promise to reduce costs and speed deployment, but only for companies whose requirements are suitable to cloud-based computing. Today, these are companies that have limited or no available IT resources, little capital to spend on building compute-based or software capabilities in house, and whose BI applications don't require significant, continuous transfers of data from source systems to the cloud.

Wayne W. Eckerson is the director of TDWI Research at The Data Warehousing Institute. Eckerson is an industry analyst and the author of Performance Dashboards: Measuring, Monitoring, and Managing Your Business *(John Wiley & Sons, 2005). He can be reached at weckerson@tdwi.org.*

BY MARK CONWAY AND GAUTHIER VASSEUR

The New Imperative for Business Schools

In these times of economic downturns and uncertainty, are your teams trained and ready to respond to fast-growing and complex business challenges? Firms are confronted with increased pressures to master their core business, assess their costs and profit drivers, understand their markets and customers, and be agile enough to make quick, informed decisions. They face increased accountability pressures from regulators and stakeholders, as well as new reporting requirements such as the International Financial Reporting Standards (IFRS) adopted by the International Accounting Standards Board.

All of these management processes require data, information, and facts. In other words, they require business intelligence (BI). Although both commercial and public-sector organizations are rapidly deploying technologies and systems to support and enable these processes, business schools have been slow to embrace these management concepts and practices in their curricula. Are they really preparing their students with the new skill sets many organizations need?

Hugh Watson's insightful article "Business Schools Need to Change What They Teach"

(Watson, 2008) makes a strong case that there is shift under way in the skill sets that employers are looking for as their use and deployment of information changes. We agree with Watson's points. The need for change in skills that he is hearing from CEOs resonates with our experience with customers and corporations around the globe. In fact, we think the recent and rapid evolution of technologies and the need for transparency and efficiency have made this issue even more acute than Watson describes.

Fifteen years ago, BI and enterprise systems were the domain of the technical elite. Reports and queries were developed by IT-savvy staff with access to corporate data and cutting-edge software tools. Now, as firms strive for information democracy, all levels of the organization are using business intelligence. Moving toward pervasive BI enables all departments—from HR to operations to sales and marketing—to leverage BI and analytics, but new skills are required.

At the same time, planning and modeling have long remained the grounds of spreadsheet heroes. Although enterprises have expanded their footprints globally and were challenged for more transparency and visibility, much of the collaborative and analytic work remained manual and labor intensive. A recent TDWI Best Practices Report, *Strategies for Managing Spreadmarts*, pointed out that the problem is not solely the use of spreadsheets. "The problem arises when individuals use these tools as data management systems to collect, transform, and house corporate data for decision making, planning and process integration, and monitoring" (Eckerson, 2008).

Finally, the current lack of exposure to solutions and processes to support budgeting, analytics, and reporting in business school programs is having a negative impact on how their graduates manage information. It contributes to data silos, error-prone processes, and massive amounts of manual labor for highly paid young graduates.

Are young recruits prepared to embrace new technologies and related best practices when they land in the enterprise world? Sometimes. Are fresh finance and MBA graduates equipped to lead the construction of sustainable and nimble information system frameworks? Rarely.

THE CURRENT LACK OF EXPOSURE TO SOLUTIONS AND PROCESSES TO SUPPORT BUDGETING, ANALYTICS, AND REPORTING IN BUSINESS SCHOOL PROGRAMS IS HAVING A NEGATIVE IMPACT ON HOW THEIR GRADUATES MANAGE INFORMATION.

The Skills Needed

The set of skills needed falls under a relatively recent management methodology: enterprise performance management (EPM), which is "a process-oriented, holistic approach to improving the capability of a business to gain insight and manage its performance at all levels" (Dresner, 2007). EPM brings all management processes under a single umbrella, connecting strategic, financial, and operational decisions and activities to create a complete management picture within the organization as well as across its value chain. A true enterprise performance management approach must address the key components of people, processes, data, and technology. EPM is not just a technology or product solution; it is a management practice, aspects of which are enabled by technology.

In its December 2008 *Magic Quadrants for CPM Suites* report, industry observer Gartner highlighted aspects of this new performance-oriented "market landscape," which it estimates is growing at 19 percent per year. Gartner found:

- Growth is driven primarily by users replacing spreadsheet-based applications with "more robust analytic applications"

- CPM is relevant to all organizations, no matter what their industry, because all organizations need analytics

- CPM applications are also key in linking strategy to successful operational execution; the apps leverage BI investments to make financial and operational reporting consistent, improving corporate governance and compliance issues

- Most finance and business users lack knowledge about the potential of these applications

Accenture, an astute market leader in performance, conducted a study of more than 250 executives in the U.S. and UK in July 2008. They concluded that "business analytics process will be a high priority in the boardroom in the coming years. While executives understand that companies with enterprisewide business analytics have an advantage over those still relying on nebulous sources to make decisions, they face institutional challenges to reforming their processes across the board."

One of the institutional challenges Accenture identified was "insufficient quantitative skills in employees." This was a key need that Thomas Davenport highlighted in his *Harvard Business Review* article, "Competing on Analytics," back in 2006!

Implications

What are the implications of these findings for business schools? It had us wondering:

- Should curricula focus on analytic apps that are more robust than spreadsheets? Should educators add some BI, simulation, and modeling tools beyond Excel?

- Is CPM relevant to every industry? Do we need to add information systems to the curricula of departments beyond MIS?

- Isn't linking strategy and execution the essence of management?

- Is there a shortage of users who are able to use these tools? Does this represent a market opportunity?

Graduates of MBA and MIS programs need to have a clear understanding of the four information systems building blocks that support performance management: systems, data, processes, and people.

Aside from light desktop applications and limited SQL basics, systems knowledge is often missing on MBA résumés. All along the data processing chains there are solutions and systems that must be understood. For instance, whether in finance, human resources, marketing, or logistics, most of the processes that graduates will be confronted with will require the following steps:

- Information gathering

- Data cleansing and alignment

- Processing

- Analytics, planning, simulation

- Reporting

Students should be exposed to solutions for each of these stages, such as master data management, extract/transform/load (ETL) tools, BI solutions, data marts, data cubes, advanced visualization, and business modeling. Students need not be technical gurus, but at a minimum they should understand the technical structures that are the foundation of any sound EPM framework. Getting to know the solutions, and understanding their relative importance and implications, is critical to guaranteeing performance and sustainability.

Data management is usually covered only lightly, which regularly leads to true information hell. Ignoring the basics about databases (the different types and their pros and cons), master data (the data that structures the information), and straight-through data processing (where data gets input once with full traceability across all processes) leads to painful consequences, including:

- Overly complex ledgers that cause days of labor during every financial close

- A manual and fragile reporting process that generates a significant number of errors and requires long hours of tedious reviews

- Loss of the information because it is not captured or stored (in an appropriate format) nor aggregated

Data is the raw material that every analyst, employee, and controller deals with every day, and the spreadsheet mirage is slowly vanishing as the need for true data governance emerges.

People management must also evolve as the pressure to do more with less increases. Too often we have seen smart managers allowing days of their staffs' time to be wasted performing manual tasks when simple process fixes could automate the work. Too often talented graduates use their top-notch education in endless hours of copying, pasting, and running macros.

Adding topics such as EPM and BI to the MIS department's studies is not enough. Every graduate of a business or MBA program should be familiar with the concepts, methodologies, and systems used in performance management. Graduates should be required to complete courses on enterprise BI or analytics that provide a solid foundation on data management and the technical underpinnings needed to deliver the right information to the right people at the right time.

What We've Been Doing

For the past five years we have been working with several professors and universities testing ways to infuse this background into finance, MBA, and executive MBA courses. Despite an initial aversion by business students to IT, each lecture series has put the importance of data management in a new light and clearly resonated with students.

In developing teaching materials, we have remained vendor agnostic, focusing on the basic components (systems, data, people, and processes), showing live applications, and bringing real business examples into the classroom. This has been the recipe to the success of the course.

GRADUATES SHOULD BE REQUIRED TO COMPLETE COURSES ON ENTERPRISE BI OR ANALYTICS THAT PROVIDE A SOLID FOUNDATION ON DATA MANAGEMENT AND THE TECHNICAL UNDERPINNINGS NEEDED TO DELIVER THE RIGHT INFORMATION TO THE RIGHT PEOPLE AT THE RIGHT TIME.

What matters for the students is not learning a specific application, but rather understanding how the positioning of the different data elements will drive sustainable, efficient, and accurate operations. It takes some patience to convince a group of future CFOs that looking at infrastructure, data, and automation will be increasingly critical to them. We must convince them that such study will help them analyze and make decisions faster and more accurately, and will lift their work out of spreadsheet hell. They also rapidly realize that it is in their best interests to have a say in these matters, rather than letting other groups in the organization independently decide what is best for them in terms of processes and infrastructure.

Many companies have industry-academic partnership programs that support faculty by bringing "real-world" content and commercial database and ERP software into the classrooms. These are excellent programs and initiatives that enrich the learning opportunities for hundreds of thousands of students around the world; they should certainly continue.

Many organizations now realize that the business processes and tools—such as ERP and CRM—that had provided transactional efficiencies and operational excellence are no longer enough. A new set of management practices and technical systems is required to get the analytic information delivered and formatted in a way that allows businesses to respond to ever more complex and rapidly changing markets.

We need a new level of management excellence. Students and corporations will rely on business schools to provide them with the insights required to meet the ubiquitous demands for more accountability, transparency, reporting, and performance.

Yes, a shift is under way. The best business schools must be prepared.

References

Accenture [2008]. "Survey Shows Business Analytics Priorities Not Yet Achieved," Accenture Research Report, July 2009. http://www.accenture.com/Global/Technology/Information_Mgmt/Information_Mgmt_Services/R_and_I/SurveyAchieved.htm

Chandler, Neil, Nigel Rayner, John E. Van Decker, and James Holincheck [2008]. "Magic Quadrant for CPM Suites," Gartner RAS Core Research Note G00163218, December 19, 2009.

Davenport, Thomas H. [2006]. "Competing on Analytics," *Harvard Business Review*, January 2006, Reprint R0601H, pp. 7–8.

Dresner, Howard [2007]. *The Performance Management Revolution: Business Results Through Insight and Action*, John Wiley & Sons, p. 21.

Eckerson, Wayne W., and Richard P. Sherman [2008]. *Strategies for Managing Spreadmarts: Migrating to a Managed BI Environment*, TDWI Best Practices Report, Q1, p. 7. http://www.tdwi.org/research/display.aspx?ID=8874

Watson, Hugh [2008]. "Business Schools Need to Change What They Teach," *Business Intelligence Journal*, Vol. 13, No. 4, pp. 4–7. http://www.tdwi.org/Publications/BIJournal/display.aspx?ID=9244

Other Articles of Interest

Giannetto, David F. [2008]. "Method or Madness? Initiating a Transition to Make BPM Last," *BPM Magazine*, December 1, 2009, pp. 4–9. http://bpmmag.net/mag/method_madness_initiating_1201/index1.html

Herschel, Richard [2009]. "A Sample Graduate Business Intelligence Program," BeyeNETWORK, March 3, 2009. http://www.b-eye-network.com/view/9873

Kaplan, Robert S., and David P. Norton [2008]. "Mastering the Management System," *Harvard Business Review*, January 2009, pp. 63–77.

Mark Conway is director of product marketing, business intelligence for Oracle Corporation. Contact him at mark.conway@oracle.com.

Gauthier Vasseur is director of Global Performance Management for Google. Contact him at gauthierv@google.com.

Who Are the Business Intelligence Leaders of Tomorrow?

BY JIM GALLO

Abstract

In our rush to cut costs, many of the business intelligence and data warehousing (BI/DW) jobs traditionally done by newly minted college graduates have been moved to offshore companies. In doing so, have we inadvertently undermined our ability to provide for tomorrow's leaders? Have we taken a short-term view, conceding these jobs too easily because of the "value proposition" offshore companies espouse? Perhaps it's time to take a hard look at offshore models and begin thinking creatively about how to overcome the leadership vacuum we're creating. This five-point plan explains what we need to do now to develop local talent.

A Social Issue

It's simple, really: Unless CIOs, CFOs, and CEOs make a commitment to provide opportunities to BI neophytes, we all run the risk that our BI organizations will cease to exist as strategic enablers within our own organizations.

In July, the U.S. government reported that the unemployment rate was 9.5% (*USA Today*, 2009). Even more chilling is the effect on graduating seniors. According to Sara Murray, a reporter for *The Wall Street Journal*, "The bad news for this spring's college graduates is that they're entering the toughest labor market in at least 25 years. The worse news: Even those who land jobs will likely suffer lower wages for a decade or more compared to those lucky enough to graduate in better times, studies show" (Murray, 2009).

Just as important, there will continue to be a severe "brain drain" from the very communities in which we live. If we think in purely BI/DW terms, why would the youth of today major in IT if there are no entry-level jobs because those jobs are outsourced to offshore firms? The problem has become so severe where I live that the state legislature is debating a bill that would provide a $30,000 to $40,000 tax incentive for college graduates to stay in Ohio for three or more years after they graduate.

The BI Leadership Paradox

In survey after survey, BI/DW continues to be listed as a top priority because of both the real and perceived value these solutions provide to businesses and governments alike.

A Gartner survey of more than 1,500 CIOs reports that BI spending will continue to be funded and remains the top priority even though IT spending is expected to remain flat in 2009. CIOs expect to "invest in business intelligence applications and information consolidation in order to raise enterprise visibility and transparency, particularly around sales and operational performance. These investments are expected to pay extra dividends by responding to new regulatory and financial reporting requirements" (Gartner, 2009). "With market watchers Gartner Inc., IDC, and Forrester revisiting and revising their IT spending forecasts downward for 2009 and beyond, spending on business intelligence (BI) and data warehousing (DW) appear, paradoxi-

cally, to be holding steady or poised for growth" (Swoyer, 2009).

If BI/DW is such a core asset, why are organizations so willing to ship the knowledge and skills required to develop these assets offshore? More important, in doing so, are they undermining their ability to grow today's graduates into tomorrow's leaders? After all, where did the BI/DW visionaries and architects of today come from? Undoubtedly, they started out learning the ropes as ETL developers, report builders, business analysts, and data modelers. They're in their current positions because their careers were built on a solid foundation of BI/DW fundamentals.

DESPITE WHAT MAY BE VIEWED AS COMMON WISDOM, WHEN YOU SCRATCH BENEATH THE SURFACE, OFFSHORE MODELS AREN'T ALWAYS THE BARGAINS THEY ARE TOUTED TO BE.

The primary reason companies turn to offshore firms is the perceived cost savings. Despite what may be viewed as common wisdom, when you scratch beneath the surface, offshore models aren't always the bargains they are touted to be. Furthermore, there are ways to create cost and delivery models that provide comparative cost advantages and provide career opportunities and solid BI/DW foundation skills for college students.

A Five-Point Plan

For those who believe that we have a social obligation to our youth and to our local communities, there are ways to turn this offshore trend around. In the process, we can create new jobs locally. Specifically, it is possible to build competitive cost models that are based on:

- Investing in colleges and universities

- Recruiting at the college level

- BI/DW training for recent college graduates

- Efficient delivery processes

- Smart project team organization

PURPOSE	TRAINING	METHODS
Socialization	New Employee Orientation	Presentation
	Client Orientation	Classroom / Presentation
	Team Building	Classroom / Workshop
Theory	*Data Warehousing for Dummies*	Books
	Data Warehouse Lifecycle Toolkit	
	BI Boot Camp Sessions (1 hour each)	Classroom / Presentation
	BI/DW Overview	
	Requirements Gathering for BI Projects	
	Data Modeling	
	Data Standards and Master Data Management	
	Data Quality Assessment	
	Project Planning and Estimating for BI Projects	
	Metadata Management	
	Testing BI Solutions	
	Governance	
	ETL Boot Camp (1–2 days)	Classroom / Presentation
Tools	Netezza Overview	Classroom / Presentation
	Introduction to DataStage (Flex Learning)	Web based
	SQL Refresher	Web and Document based
	DataStage Essentials	Classroom / Hands On
	QualityStage Essentials	Classroom / Hands On

Table 1. Sample "BI Boot Camp" curriculum

Investing in Colleges and Universities

With some minor exceptions, colleges and universities do not offer BI/DW as a core curriculum. I've seen one or two classes being offered within a computer science or MIS major, but there appears to be a dearth of colleges offering BI/DW as a major.

Dr. Hugh Watson of the Terry Business School at the University of Georgia reports, "… the 'good jobs' are changing. As BI is becoming more important and pervasive in companies, people must have a different set of skills. They need to understand how data is stored and be able to access and analyze it using a variety of tools. Universities are behind the curve in recognizing and responding to this change" (Watson, 2008).

In cooperation with human resources and recruiting, our BI group is reaching out to a local community college and a state university to create a BI/DW field of study. We're working with these organizations to help them understand the value of the profession, the demand for skilled resources, and what the curriculum should contain. We offer examples of our methodologies, templates, and other resources, as well as help them understand the depth and breadth of the disciplines involved. In addition, we help them create business case studies that can be used for hands-on exercises to drive home the points learned in the classroom. From a technology perspective, most of the BI vendors are more than willing to provide colleges and universities with software.

It's a win-win proposition. Colleges can create a curriculum for a hot profession that, in turn, will help them attract students to their campuses. The local community gets a talent pool that has completed book learning and gained some practical experience through case studies and projects. The BI community gets additional skilled resources that can help their customers be more successful.
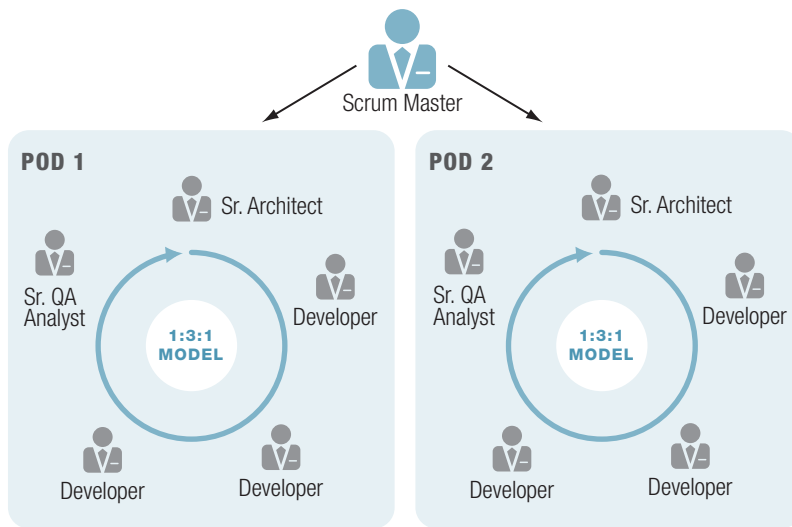
Figure 1. Scalable 1-3-1 team model

Recruiting at the College Level

We believe that one of the keys to the future of our company is the continuous infusion of fresh talent into our workforce. With this in mind, we have created an active college recruiting program and have hired several talented young professionals. They bring us an unbridled sense of enthusiasm and a thirst for learning. We are able to start them out in their BI careers by teaching them the best practices and methods that have made our company and our clients successful. We've found that these new employees are much more amenable to learning how to do things right because they don't carry any baggage of doing things wrong.

Because their university programs do not have a BI curriculum per se, we look for candidates that have strong SQL skills coupled with a belief that BI solutions solve business problems as opposed to perceiving IT as a "geeky" profession. Business knowledge, as well as problem-solving and good communication skills, are the traits we look for. We can always teach new employees how to use a tool.

Through our efforts, we believe we're "paying it forward" because we are helping to stem the outward flow of the local talent pool and creating growth opportunities for our community. Although this may seem altruistic, there is a business advantage as well. We can hire college graduates at a reasonable salary so that the blended rates of our project teams are dramatically reduced. This, in turn, allows us to create competitive cost models that allow us to compete head-on with offshore firms.

BI/DW Training for Recent College Graduates

Because of the general absence of BI/DW curricula in college programs, it's impractical to expect our college graduates to have a deep understanding of BI/DW when we hire them. To move the entry-level folks up the learning curve, we've created a "BI Boot Camp" that encompasses three focus areas: socialization, theory, and tool-specific training. Table 1 provides an example of a recent boot camp during which we prepared our new hires for a specific set of technologies. As a rule, the socialization and theory components of the boot camp are held constant and the tool sets vary based on current needs.

Efficient Delivery Processes

One of the keys to driving down costs and creating the competitive advantage needed to provide opportunities for new hires is to focus on efficient delivery processes. We've found that we can borrow from agile/Scrum methodologies and apply this knowledge directly to BI/DW solutions. Agile methodologies generally promote:

- A leadership philosophy that encourages teamwork, self-organization, and accountability

- A set of engineering best practices that allow for rapid delivery of high-quality software

- A project management process that encourages short development cycles (sprints), clear deliverables, and rapid adaptation

- A business approach that aligns development with customer needs and company goals (Wikipedia, 2009)

These tenets can be customized to fit BI/DW projects, making them, to a large degree, an assembly-line model. Although there are a number of components that make agile work within a BI framework, we've found the product backlog is the key to project success. The product backlog is the collection of functional requirements, defined as the "to-do" list. This itemized list is prioritized into successive sprint backlogs; each sprint consists of the remaining backlog items comprised of the highest priority open backlog items. Customers or business user groups provide the priorities, but the BI team has to break out the size, time frames, and resource team within the sprints.

Smart Project Team Organization

Another response to offshore models is to build project teams that combine seasoned professionals with new hires. This helps build an efficient team while taking advantage of lower-cost resources. We've developed a 1-3-1 model, pairing a senior architect with three junior developers and one senior quality analyst. This core group, or pod, forms the basic work team, whether it is for data integration, break-fix, or report development. The senior architect creates the designs and design templates along with reusable components. The junior team then assembles the components in a factory-like model.

A key differentiator is the inclusion of the quality analyst. The quality analyst is well versed in testing BI solutions, works with the team to develop test cases, and finds problems during the iterative development cycle (rather than after the software has been built).

By creating this model, the blended rate of the team can be reduced to be more in line with offshore cost structures. From a scalability perspective, if the project calls for more resources, then multiple pods can be created, keeping the 1-3-1 structure in place, as shown in Figure 1.

What About Costs?

Let's be clear: Rates and costs are entirely different. Having worked for an offshore firm and competed against such companies for a number of years, I've never been more certain of this.

The offshore advantage is the $25 to $35 per-hour rate, but what's the true cost? The $25 to $35 per-hour rate does not apply to all resources. In a typical offshore model, there are resources available at the advertised rate, but in addition to these junior developers, there are a number of senior resources and project managers that are part of the team.

BY CREATING THIS MODEL, THE BLENDED RATE OF THE TEAM CAN BE REDUCED TO BE MORE IN LINE WITH OFFSHORE COST STRUCTURES.

Rate versus Cost

Generally, you will need a project manager at the client site as well as one at the offshore facility. This duality of staffing needs is often manifested in senior technical resources as well, so instead of looking at the advertised hourly rate for a junior resource, it's more realistic to look at the rates for the entire team per hour, as shown in the following tables.

More important, we must look beyond rates to costs, or, if you prefer, price. I believe rate is only one component of cost and that the following equation is a fair representation of this concept:

$$Cost = Rate \bullet Effectiveness \bullet Quality$$

$$or\ C = R \bullet E \bullet Q$$

Effectiveness includes variables such as:

- Good verbal and written communication skills

- Use of best practices, methodologies, and center of excellence principles

- High degree of code/object reuse

- Team skills

- Ability to directly speak with the customer's business or IT staff in a timely manner to resolve ambiguity

- Time zone differences

- Code and bug fix turnaround time

Quality includes variables such as:

- Code quality (code works upon delivery)

- Use of reliable and repeatable processes and methodologies

- Application of continuous improvement methods

- Customer time and involvement in design, coding, and testing

- Creation and availability of clear and concise documentation

Table 2 shows the typical offshore team using a 12-person team. The rates are based on my personal experiences and observations over the past two years. Notice the duplication of roles and the absence of a quality analyst. From my experience and in speaking with clients working with offshore firms, the development team sends the code to the customer's internal IT group that must test (and often debug) the code.

Offshore Team Role	Number of Resources	Hourly Rate	Extended Rate/Hour
Client Site Project Manager	1	$125	$125
Client Site Senior Architect	1	$160	$160
Offshore Project Manager	1	$65	$65
Offshore Senior Architect	1	$75	$75
Offshore Junior Developer	8	$30	$240
TOTAL = 12			$665
Blended Team Rate/Hour =			$55.42

Table 2. Typical offshore team rates

Table 3 shows a typical cost model for an internal team of 10. In general, most organizations use a blended rate of $55 to $65 per hour for their internal resources. Note that there really isn't a big difference in the blended rates of an internal staff versus an offshore team.

Internal IT Team Role	Number of Resources	Hourly Rate	Extended Rate/Hour
Project Manager	1	$60	$60
Senior Architect	1	$60	$60
Junior Developer	8	$60	$480
TOTAL = 10			$600
Blended Team Rate/Hour =			$60

Table 3. Typical internal team rates

Table 4 shows how a team and pricing model has been applied by our company, making use of college graduates coupled with senior architects. The extended rates are based on actual hourly rates we've used on several of our most recent projects. They're made possible because of the use of recent college graduates as a part of the team.

Onshore Consulting Team Role	Number of Resources	Hourly Rate	Extended Rate/Hour
Project Manager	1	$100	$100
Senior Architect	2	$125	$250
Junior Developer	6	$40	$240
Senior Quality Analyst	2	$75	$150
TOTAL = 11			$740
Blended Team Rate/Hour =			$67.27

Table 4. Typical onshore consulting rates

Looking at the highest blended rate, the Onshore Consulting Team, assume that the Onshore team is marginally better (10 percent) with respect to quality and effectiveness than the Offshore team. (In discussions with multiple CIOs and vice presidents of development, 30 percent for quality and 15 to 20 percent for effectiveness are more realistic rates.) However, using the conservative estimate of 10 percent, the true cost of the Onshore team would be:

Onshore Cost = $67.27 (R) • .9 (E) • .9 (Q) =

$54.49/hour (C)

Comparing the three team models (offshore, internal, and onshore), we arrive at the following price comparison table:

Team Model	Blended Team Rate
Offshore	$55.42
Internal	$60.00
Onshore (external)	$54.49

Table 5. Price comparisons accounting for onshore quality and efficiency

Using the same example, but applying the inverse of the effectiveness and quality variables (1 + .1) to the offshore team, we arrive at the following:

Offshore Cost = $55.42 (R) • 1.1 (E) • 1.1 (Q) =

$67.06/hour (C)

Team Model	Blended Team Rate
Offshore	$67.06
Internal	$60.00
Onshore (external)	$67.27

Table 6. Price comparisons using the inverse for offshore costs

Perhaps, then, an onshore teaming model with the right talent mix is more attractive than we were led to believe.

Cost as a Function of Delivery

Another way to frame the true costs of delivery is to consider the agreements that are struck between organizations and BI delivery teams, whether they are internal IT resources or external entities such as offshore or onshore consulting firms. The most common type of delivery model is based on a time and materials (T&M) agreement, where the customer pays for every hour worked.

There is ample evidence that the quality of offshore work needs considerable improvement. Using the blended offshore rate of $55.42 per hour, and assuming that 25 percent of the deliverables will have to be reworked, the actual cost (versus the bid cost) is $69.28 per hour ($55.42 * 1.25). Thus, what was sold as the low-cost advantage (remember the $30 per-hour rate) turns out not to be the bargain an organization expected.

Most BI professionals I speak with truly believe that T&M models are the only way to price BI/DW projects because there are too many

unknowns and because of the inherent risk associated with data integration (e.g., ETL and data quality). This amounts to an "open checkbook" for delivery. My experience has been that it's fairly easy to create a fixed-price cost model that allows customers to pay for results rather than hours. The keys to using a fixed-price work model with confidence include:

• Good requirements definition processes

• Solid estimating models

• Tight delivery models

• A focus on quality

You might argue that fixed-price models lead to change orders whenever a slight change in scope is determined. The opposite is true. Because of an investment in the items in the above list, we've been able to accommodate a percentage of "scope creep" while keeping the price constant.

Similarly, by applying an agile approach to BI projects coupled with the 1-3-1 teaming model, we've been able to lower our costs by achieving a 7 to 15 percent efficiency gain after the first few sprint cycles. This allows us to deliver more for the same price or to deliver the same amount of work for a lower price.

Summary

Unless we begin to address how to infuse our BI organizations with recent college graduates who are allowed to learn the fundamentals of data modeling, ETL development, data analysis, and report creation, we are setting ourselves up for a leadership crisis in the coming years. It is incumbent on our business leaders to address both the social and economic issues associated with maintaining a cadre of BI professionals who can grow into the BI visionaries and architects of tomorrow.

There are a number of ways in which this can be done, all of them within their sphere of control. These methods include:

• Investing in colleges and universities

• Recruiting at the college level

• BI/DW training for recent college graduates

- Efficient delivery processes

- Smart project team organization

In addition, the BI organizations should focus their efforts on faster and smarter delivery that includes:

- Good requirements definition processes

- Solid estimating models

- Tight delivery models

- A focus on quality

According to Wayne Eckerson, director of TDWI Research, "Business intelligence and data warehousing is not an IT fad that bursts on the scene one day and is gone the next. BI/DW has become the basis for organizations that want or need to compete on knowledge, insights, and analytics. Our industry needs more talented people who can both speak the language of business and translate requirements into data-rich solutions."

If you take a closer look at offshore pricing models and apply the principles we've discussed, you'll find that the two cost models aren't far apart. Because BI is truly a strategic asset and business enabler, maintaining a workforce that is made affordable through college recruiting and an investment in recent graduates is not merely a good idea; it's a business imperative.

References

Gartner [2009]. "Gartner EXP Worldwide Survey of More than 1,500 CIOs Shows IT Spending to Be Flat in 2009," Press Release, January 2009. http://www.gartner.com/it/page.jsp?id=855612

Murray, Sara [2009]. "The Curse of the Class of 2009," *Wall Street Journal*, May 9, 2009. http://online.wsj.com/article/SB124181970915002009.html

Swoyer, Stephen [2009]. "In a Surging Analytic Market, Will Demand Outpace Supply?" *BI This Week*, January 7, 2009. http://www.tdwi.org/News/display.aspx?id=9269

USA Today [2009]. "Unemployment: 9.5%; payroll job loss greater than expected," July 2, 2009ž http://www.usatoday.com/money/economy/2009-07-02-unemployment-june_N.htm

Watson, Hugh [2008]. "Business Schools Need to Change What They Teach," *Business Intelligence Journal*, Volume 13, Number 4. http://www.tdwi.org/Publications/BIJournal/display.aspx?ID=9244

Wikipedia [2009]. "Agile software development." http://en.wikipedia.org/wiki/Agile_software_development

Jim Gallo serves as both a senior data architect as well as a senior data warehouse architect for Information Control Corporation, where he focuses on delivering value through business intelligence and analytics. Contact him at jgallo@iccohio.com.

Advanced Analytics Set to Soar

BY STEPHEN SWOYER

Talk to any business intelligence (BI) or data warehousing (DW) vendor for any length of time and at some point they're going to bring up analytics.

We don't mean just plain vanilla analytics, either. BI and DW players are increasingly talking about *advanced analytics.* Netezza, for example, is prepping a big "advanced analytics" push for 2010; at its Partners user conference, Teradata talked up advanced analytics in tandem with analytics powerhouse SAS. Meanwhile, IBM—which acquired analytics superstar SPSS in late July—announced both an analytics-focused services initiative *and* a "Smart Analytics" black-box appliance. Big Blue and others clearly have analytics on their minds.

According to TDWI Research, the research arm of The Data Warehousing Institute, nearly 40 percent of shops are currently practicing advanced analytics. That's just the tip of the iceberg, however. By 2012, says TDWI research analyst and veteran industry watcher Philip Russom, fully *85 percent* of organizations will be practicing advanced analytics.

The reason? Call it a case of multiple, converging trends, Russom explains.

Advanced analytics involves the use of extremely complex (often SQL-driven) queries or predictive analytic technologies. In this respect, Russom and other experts say, it transcends the data warehouse–driven reporting and OLAP practices that delimit the scope of traditional analytics.

"The use of advanced analytics is driven up by organizations' need to understand constantly changing business environments (as seen in the current recession and the resulting market turmoil) as well as to discover opportunities for cost reductions and new sales targets," writes Russom in *TDWI Checklist Report: Data Requirements for Advanced Analytics.*

"To meet these business goals, organizations are stepping up their use of two forms of advanced analytics: query-based analytics (which relies on complex SQL statements to define recent business events) and predictive analytics (which uses data mining and statistical methods to anticipate future events)."

The rub, Russom stresses, is that advanced analytics isn't a turnkey enterprise.

"Organizations will face challenges as they move into advanced analytics. Many don't understand that reporting and analytics are different practices, often with different data requirements," he writes. "Many have designed a data warehouse to fulfill the requirements of reporting and online analytic processing (OLAP), and they will soon need to expand the warehouse (or complement it with analytic databases) to fulfill the data requirements of advanced analytics, whether query-based or predictive."

Practitioners must grapple with several other issues.

For example, Russom explains, although most shops have experience with data integration or data quality, as well as data modeling (the latter of which can make or break the success of any predictive analytic practice), "they don't know how to adjust these data management practices to fit the needs of advanced analytics."

That's why Russom advocates a nine-step approach to advanced analytics. First, he says, would-be practitioners need to identify how (and why) they plan to use advanced analytic technologies. In other words, don't just do advanced analytics for the sake of doing advanced analytics. It sounds like a no-brainer, but in a business and IT culture in which a keeping-up-with-the-herd mentality predominates, it's a legitimate concern. How many shops rushed out to do service-enablement—or at least spent considerable time and energy talking about doing service-enablement—simply because it was greatly hyped?

Russom champions the use of advanced analytics to discover existing relationships, anticipate the future, and adapt to change.

These aren't just three common applications of advanced analytics, he stresses: they're three goals that are also clearly linked with ROI and business value.

That being said, he emphasizes, shops shouldn't expect to pursue these goals on the cheap. "These goals are worth pursuing from a business standpoint, but they require specialized analytic tools and analytic databases from a technology standpoint. This means that organizations new to advanced analytics will need to reach beyond their current reporting and data warehouse infrastructures."

Second, shops must be prepared to scale up their data integration practices to handle large (or extremely large) data volumes. This is why many DI and DW players—companies including Hewlett-Packard (HP), IBM, Informatica, Netezza, Oracle, SAS, Teradata, and a bevy of analytic database players—have glommed on to advanced analytics. (Players such as Aster Data Systems, Greenplum Software, ParAccel, and Teradata tout fast-loading options they claim are designed for Big Data analytic workloads.)

"Many analytic databases regularly begin an analytic cycle with multiple terabytes. Hence, whether the data is heading into an EDW or a standalone analytic database, data loading must scale up to handle large data volumes that are loaded very quickly," Russom explains. "Likewise, large data extracts from operational systems must be as non-intrusive as possible."

Third, adopters must learn to distinguish between reporting—long the mainstay of traditional data warehousing—and analytics.

"Predictive analytics (which includes techniques for data mining and forecasting) is far more exploratory and forward-looking than reporting and OLAP," he writes. "The value of predictive analytics is the discovery of unknown facts and relationships, the confirmation of known or suspected relationships, and the leverage of those relationships for better decision making."

Predictive analytics differs even from OLAP, which "is usually implemented as a form of parameterized reporting," Russom continues. "In such [OLAP] implementations, the available parameters limit the breadth of the analysis, and the analysis cannot be broadened without technical personnel developing more parameters."

Similarly, adopters must be able to distinguish between data warehouses, data marts, and analytic databases. Shops that have standardized on an enterprise data warehouse (EDW) should be fine, Russom says: "[A]n EDW can handle both query-intense and predictive-scoring workloads, plus it can manage the low-level, detailed data that advanced analytics often requires." Not all shops have an EDW, at least according to Russom's (and TDWI's) understanding. That means they'll have to think seriously about augmenting their existing DW deployments with a dedicated analytic complement.

"[O]rganizations with a warehouse focused on reporting and OLAP will need to extend or complement it with a separate analytic database to support an analytic workload and appropriate data—if they are to provide the right data in the right condition that advanced analytics requires," he argues.

Russom offers other common-sense suggestions. For example, he urges, adopters must design a data warehouse architecture that's able to *accommodate* analytics. This often requires decisions: namely, should analytic data be stored in the EDW itself or in an external analytic "sandbox"? And what advantages—outside of the ability to more adroitly process analytic data in the database management system (DBMS) itself—does the use of in-memory analytic technology confer?

Decisions, decisions, says Russom. Similarly, shops must take the necessary steps to prepare their data for advanced analytics; this involves formatting data such that it can be consumed by a range of analytic technologies, including traditional OLAP

tools, query-based analytic tools (chiefly SQL-driven), and, of course, predictive analytic tools.

This last class is perhaps the most challenging, Russom indicates, because it "demand[s] a very specific data structure, typically denormalized." Elsewhere, he adds, predictive analytic tools use "multiple algorithms, each with a unique data requirement ... [and] most algorithms are optimized to run fast and accurately with a flat record structure, so data flattening may be required."

It's a lot like a juggling act. After all, in the process of prepping data so it can be consumed by a wide variety of analytic technologies, adopters must be careful to preserve as much detail as possible.

"Even more important [than the size of the data set] are the details within raw source data, because much of the clustering and relationship definitions produced by advanced analytics are based on those details," Russom says.

Similarly, shops should focus on improving data after they work with it—not before. It sounds paradoxical, Russom concedes, but there's an undeniable logic to it. "[I]mprovements to the data may occur only after business analysts have worked with the analytic data set. These tasks ... are risky if done too early, for fear of losing the data details that discovery-oriented analytics depends on."

Finally, Russom urges, adopters should also think about applying the products of their advanced analytic practices to existing, and notionally separate, BI and DW activities. "[T]he early discovery phases of advanced analytics ... often lead to later phases where the analytics becomes part of daily business intelligence ... activities," he concludes. "For instance, a business analyst may mine a data set in an ad hoc manner to understand a new customer behavior, then develop predictive models that are scored on a recurring basis to anticipate the new behavior so it can be acted on appropriately."

Stephen Swoyer is a New York–based freelance journalist who writes about technology. Contact him at stephen.swoyer@spinkle.net.

Data Mining: Sometimes Coincidences Are Just Coincidences

BY MIKE SCHIFF

With the increasing recognition that data mining is an area of business intelligence that can yield a significant competitive advantage, it is important to recognize that sometimes a coincidence is just that. For example, do hemline lengths and Super Bowl wins really predict the direction of the stock market or the economy? Any perceived relationship may simply be due to coincidence rather than causation. After all, a result said to be significant at a 90 percent level also means that 10 percent of the time it could be attributed to chance.

Furthermore, although there may be no direct relationship between a cause and a perceived effect, there could be a strong relationship between the cause (the independent variable) and another variable, and a strong relationship between this other variable and the predicted result or effect (the dependent variable). For example, when data mining a database containing city demographics and incidents of crime, you are likely to find that the more houses of worship there are in a city, the more crimes have been committed.

Does this mean that religious people are robbing collection plates? Of course not! The simple explanation is that population size has a positive correlation with the number of houses of worship and that the larger the city population, the more crimes are committed. Taking the data mining result at face value, without considering what it really means, can lead to incorrect conclusions. At the very least, the predicted variable should have been crime rates (e.g., crimes per 10,000 inhabitants) rather than the absolute number of crimes.

Knowing Your Domain

On the other hand, I have heard of a data mining analysis that showed an insurance company had its highest sales in the cities in which its offices were in older buildings. At first these results were going to be tossed out as a statistical anomaly. However, one of the company's executives mentioned that once it opened an office in a city, it rarely changed its location and that the age of the building in which it had an office directly correlated with how long the company had sold insurance in the city. All other things being equal, the longer it had sold insurance in a city, the higher its sales volume was likely to be.

The executive who pointed this out would qualify as a "domain expert" or someone who understands the topic (and the data) under study. A data mining best practice is to make sure that data mining results are reviewed by a domain expert to see if they make sense.

Organizations need to appreciate the competitive advantage that data mining and predictive analytics can offer while recognizing that if they are not using it, their competitors might very well be. They need to remember that data mining is only one component of the overall business analytics spectrum. Query and OLAP analysis complement data mining and can be used to investigate data mining results to determine if they make sense.

These other business intelligence technologies should be used in concert with data mining to achieve the best results. Most organizations have made significant investments in their data warehouses; they are doing themselves and their constituents a disservice if they don't utilize all the tools in their arsenal to analyze their collective data wealth.

Michael A. Schiff is a principal consultant for MAS Strategies. He can be reached at mschiff@mas-strategies.com.

Answers to the Seven Most Commonly Asked Questions about MDM

BY WAYNE ECKERSON

Master data management (MDM) enables organizations to maintain a single, clean, and consistent set of reference data about common business entities (e.g., customers, products, accounts, employees, partners) that can be used by any individual or application that requires it. In many respects, MDM applies the same principles and techniques that apply to data warehousing—clean, accurate, authoritative data.

Not surprisingly, many data warehousing (DW) professionals have taken the lead in helping their organizations implement MDM solutions. Yet even grizzled DW veterans pose fundamental questions about how to get started and succeed in this new arena. Here are answers to the seven most common questions:

1. What's the best place to start with MDM?

People want to know if it's best to start with customer, product, or account data, or if the finance, service, or marketing department is most receptive to MDM. The actual starting place is determined by your organization and the amount of pain that different groups or departments feel due to lack of conformed master data.

The only surefire advice is to start small and work incrementally to deliver an enterprise solution.

2. How do you fund MDM?

Few people have succeeded in funding standalone MDM projects, especially if their company has recently funded data warehousing, data quality, and CRM initiatives. Executives invariably ask, "Weren't those initiatives supposed to address this?" Saying that MDM makes those initiatives more efficient and effective just doesn't cut it.

The best strategy is to bake MDM projects into the infrastructure requirements for new strategic initiatives.

3. How do you architect an MDM solution?

The right architecture depends on your existing infrastructure, what you're trying to accomplish, and the scope and type of reference data you need to manage. A classic MDM hub is essentially a data reconciliation engine that can feed harmonized master data to a range of systems, including the data warehouse.

MDM hubs come in all shapes and sizes: on one extreme, a hub serves as the only source of master data for all applications; on the other, it simply maintains keys to equivalent records in every application. Most MDM solutions are somewhere in the middle.

4. What's the role of the data warehouse in MDM?

There is no reason you can't designate a single application to serve as the master copy. For example, you could designate the data warehouse as the master for customer data or an Oracle Financials application as the master for the chart of accounts. These approaches are attractive because they reuse existing models, data, and infrastructure, but may not be suitable in all situations. For instance, you may want an MDM solution that supports dynamic bidirectional updates of master data in both the warehouse and operational applications. This requires a dynamic matching engine, a real-time data warehouse, and Web services interfaces to integrate both ends of the transaction.

5. What organizational pitfalls will I encounter?

Managing the expectations of business and IT stakeholders is nothing less than a make-or-break proposition. "Change management can derail an MDM project," says one chief technology officer at a major software manufacturer that implemented a global MDM project. "When you change the data that end users have become accustomed to receiving, it can cause significant angst. You have to anticipate this, implement a transition plan, and prepare the users."

In addition, don't underestimate the need to educate IT professionals about the need for MDM and the new tools and techniques required to implement it.

6. What technical pitfalls will I encounter?

First of all, MDM requires a panoply of tools and technologies, some of which may already exist in your organization. These include database management systems, data integration tools, data matching and quality tools, rules-based systems, reporting tools, scheduling, and workflow management. Buying a packaged solution alleviates the need for you to integrate these tools, but if you already have the tools that exist in a package, negotiate a steep discount.

Early MDM adopters say the biggest challenges are underestimating the time and talent required to define and document MDM requirements, analyze source data, maintain high-performance Web services interfaces, and fine-tune matching algorithms to avoid under- or over-matching.

7. How do I manage a successful MDM implementation?

To succeed, MDM requires business managers to take responsibility for defining master data and maintaining its integrity. This involves assigning business executives to stewardship roles in which they drive consensus about data definitions and rules and oversee processes for changing, managing, auditing, and certifying master data. Good data governance may or may not involve steering committees and meetings, but it always involves establishing clear policies and processes and holds business people accountable for the results.

The Last Word

MDM is a major undertaking and there is much to learn to be successful. The answers to these seven questions will get you moving in the right direction.

Wayne W. Eckerson is the director of TDWI Research at The Data Warehousing Institute. Eckerson is an industry analyst and the author of Performance Dashboards: Measuring, Monitoring, and Managing Your Business *(John Wiley & Sons, 2005). He can be reached at weckerson@tdwi.org.*

BEST PRACTICES AWARDS 2009

TDWI's Best Practices Awards recognize organizations for developing and implementing world-class business intelligence and data warehousing solutions. Here are summaries of the winning solutions for 2009.

For more information, visit www.tdwi.org/bpawards.

PREDICTIVE ANALYTICS

⊙ ARC

ARC is an airline-owned company that provides financial settlement solutions and data and analytical services to the travel industry. For years, travel agency fraud was identified at the physical travel agency location by performing an audit of paper coupons and weekly reports. It typically took two days to review the volumes of paperwork and prepare a report on findings drawn from patterns and trends from 13 weeks of data.

With the ARC industry data warehouse, along with the implementation of predictive fraud models, ARC can now analyze 39 months of data in minutes to detect patterns and trends across an entire industry.

ARC's advanced predictive models are flexible enough to meet changing business and industry needs. Curtailing fraud involves predictive modeling of real-time data; ticketing anomaly monitoring; scrubbing data for known fraud schemes; providing information for taking counter-measures; and creating and promoting best practices for the industry. ARC now responds, in near real time, to emerging scenarios and identified trends, rapidly adapting and adjusting its predictive models to meet and counter new challenges.

DATA GOVERNANCE

⊙ BMO FINANCIAL GROUP

Established in 1817 as Bank of Montreal, BMO Financial Group is one of North America's largest diversified financial services providers. In 2004, the Bank's Board of Directors approved a policy that declared information a strategic asset. The policy includes all information media: paper and electronic. Data warehouses, marts, and unstructured data repositories are all within scope.

The bank instituted a multi-year program to develop and institutionalize the roles, standards, and processes to support the policy. The governance program has focused on creating trust in the bank's information through education and awareness; processes and supporting technology; monitoring and reporting; and emerging risk management. The program has evolved to become an ongoing department within the bank's information management function with close ties to operational risk.

Defining great customer experience and meeting regulatory requirements both demand accurate and timely information collected from around the bank. BMO has demonstrated increased information management maturity and is realizing the benefits of taking a formal, holistic, and integrated approach to managing information.

⊙ CHARLOTTE-MECKLENBURG SCHOOLS

SOLUTION SPONSORS: MARINER & MICROSOFT CORPORATION

Charlotte-Mecklenburg Schools is a consolidated city-county school district that has been nationally recognized for academic achievement and business innovation. The district, North Carolina's second largest, has more than 137,000 students in pre-kindergarten through 12th grade, 19,000 employees, and 180 schools.

CMS decision making is guided by its Strategic Plan 2010: Educating Students to Compete Locally, Nationally and Internationally. Among the plan goals was the creation of a Data Dashboard as requested by the Charlotte-Mecklenburg Board of Education. The Data Dashboard, built in collaboration with Mariner and Microsoft, was launched in the fall of 2008. It has provided an accessible visual interface that allows parents, school administrators, and citizens to monitor district progress on the plan's goals. The Data Dashboard has increased the district's transparency and credibility by making available in-depth information about schools and academic progress.

The Data Dashboard helps administrators and the public proactively monitor district performance on strategic plan goals, as well as a wide range of academic and operations indicators.

ENTERPRISE BI

⊙ FREESCALE SEMICONDUCTOR

SOLUTION SPONSOR: TERADATA CORPORATION

Freescale Semiconductor designs and manufactures embedded semiconductors for the automotive, consumer, industrial, and networking markets. Freescale launched an enterprisewide data and analytics platform to enable faster and more informed business decision making. A first for the semiconductor industry, this joint business and IT enterprise business intelligence (EBI) program combines factory, engineering, and business data into a single data warehouse, enabling cross-domain analytics. EBI-enabled new analytic capabilities have cut business process cycle times from days to hours or even minutes.

Since going live in mid-2007, the EBI program has become the information and analytics backbone of Freescale's business application programs. It has enabled the successful launch of reengineering initiatives in supply chain, manufacturing, customer service, quality, and finance, and has improved yields, reduced customer quality incident-response times, improved sales and marketing's pricing process, and consolidated financial data and reporting.

The EBI program has delivered significant business value by observing many best practices, including use of an enterprise data model, a consistent focus on providing end-to-end analytical capabilities, and effective leverage of ERP data for analytics.

BI/DW ON A LIMITED BUDGET

⊙ IMPAX LABORATORIES, INC.

IMPAX Laboratories, Inc., a technology-based specialty pharmaceutical company, applies its formulation expertise and drug delivery technology to developing controlled-release and specialty generics as well as branded products.

IMPAX's enterprisewide single data warehouse platform (SQL), single report tool (IBM-Cognos) integrated data from source ERP, operational systems, spreadsheets, and third-party data. The project was created to deliver one centrally located "version of the truth" and provide timely, accurate, and actionable information to all levels of the organization. It allows business users to modify existing reports and create new BI reports for themselves, saving an estimated 2,600 hours of labor monthly.

Portals or dashboards were key. The BI team asked mid- and upper-level managers for five key performance indicators; resulting dashboards delivered data relevant to each manager's functional business area.

The implementation across an 800-employee company in four locations—from business requirements gathering and data modeling to reporting and training—was successfully completed by a three-member BI team, with assistance from outside consultants.

RADICAL BI

⊙ INGERSOLL RAND, INDUSTRIAL TECHNOLOGIES SECTOR

Ingersoll Rand Industrial Technologies Sector provides products, services, and solutions that enhance its customers' energy efficiency, productivity, and operations. Products include complete compressed air systems, golf and utility vehicles, tools and pumps, as well as material and fluid handling systems and environmentally friendly microturbines.

ITS's BI initiative began in response to impaired visibility and timeliness of information across discrete systems. BI was expected to radically accelerate the access and transparency of information across the globe. By having the flexibility to source data from multiple disparate legacy and strategic data sets, staff could focus on performance improvements days earlier rather than data collection.

Today, IR ITS has an enterprise BI solution that spans four geographic regions, five market channels, eight disparate data sources, and 137 product categories. It includes analysis on presales, order management, services, procurement, supply chain, and operations. The solution's agility, breadth, and rapid implementation are proving invaluable given the volatility and turbidity in the current market. BI has reduced the time to benefit for both visibility and decisions.

MASTER DATA MANAGEMENT
❯ NATIONAL INSTRUMENTS

SOLUTION SPONSOR: INITIATE SYSTEMS, INC.

National Instruments (NI) transforms how engineers and scientists design, prototype, and deploy systems for test, control, and embedded design applications.

NI's customer-centric master data management platform (CDI hub) project addressed duplicate and disparate customer data. Without a single, trusted, and complete view of its customers, NI was unable to deliver excellent technical support; NI employee productivity was decreased; and the company could not fully understand its customers.

NI implemented Initiate Organization and Initiate Consumer from Initate Systems, Inc. Source system customer contact records are loaded into the CDI hub in near real time utilizing SOA. Initiate's comparison algorithm identifies and links together duplicate customer contacts.

NI can now consistently deliver the correct level of service (technical support) to its customers. Users now have a 360-degree view of each contact: leads, opportunities, quotes, orders, service requests, installed products, and notes, associated with all the duplicate contacts. The new internal search leverages Initiate's probabilistic search and match capabilities to find contacts on the first try with 99 percent accuracy.

DASHBOARDS AND SCORECARDS
❯ RBC WEALTH MANAGEMENT

SOLUTION SPONSOR: BIRST

RBC Wealth Management, a wholly owned subsidiary of Royal Bank of Canada, is one of the nation's largest full-service securities firms with more than 2,300 financial consultants and 5,000 employees.

RBC WM had been delivering a reporting and sales development tool to their field advisors, but delivered information was stale; was Excel-based (labor intensive); and reports had to be run manually.

RBC WM implemented the RBC Dashboard to provide greater visibility to its business, customers, and revenue-growth opportunities. After a brief implementation period,

financial advisors saw immediate value in the information and positive business impact from the dashboard. Delivering the right information to the right people who can use it daily empowers its financial advisors and their clients.

RBC Dashboard has been live for over three years, exceeded its targets, and is now used by hundreds of financial advisors. RBC Dashboard has become a core operating platform that an ever-increasing user base considers essential to their success and profitability.

CUSTOMER INTELLIGENCE
❯ SPOKANE TEACHERS CREDIT UNION

Established in 1934, STCU is the Inland Northwest's largest and most successful credit union. With more than $1 billion in assets, STCU is a full-service financial institution with more than 350 employees serving 80,000 members through 13 branch locations.

An ambition of every progressive retail financial institution is to provide employees with the tools to help optimize members' financial lives. By leveraging its data warehouse as the analytical engine behind a simple front end programmed in-house, STCU is achieving this objective with its "Conversation Engine" solution.

The tool studies each member's individual portfolio of services and transaction behaviors, and identifies specific opportunities for members to (1) improve their rates or lower their fees by adjusting their product mix, (2) save time by adding member services that deliver greater convenience, (3) improve the quality of member data to bolster accuracy and security, or (4) recognize and celebrate the individual members. The tool's radical simplicity was critical to its highly successful adoption in the company, and its rich source of information has been paramount to a service revolution for STCU.

ENTERPRISE DW
❯ TELENOR PAKISTAN

SOLUTION SPONSOR: T-BIRD

Telenor Pakistan is the world's seventh largest mobile operator, with 164 million mobile subscriptions in 13 countries. In just four years, the company has become the fastest-growing mobile operator in Pakistan.

The initial DW solution suffered from serious granularity and history restrictions. The BI team realized it was inadequate for Telenor Pakistan's long-term BI road map and market ambitions. Three months after launch, the team started to plan, design, and build a state-of-the-art, Teradata-based enterprisewide data warehouse.

The EDW is based on the Teradata Communication Logical Data Model; it integrates information from all major network and IT sources (13 months of call detail records, customer data, billing and payment information, customer interactions, and more) to build a 360-degree view around the customer—a challenge for a company with 20 million subscribers and huge traffic volumes.

Multiple applications are running on the EDW (campaign management, revenue assurance, Google Earth, dashboards, customer portals, etc.) to fully capitalize on this rich information resource and 360-degree customer view. This fully integrated EDW will be one of the key differentiating factors that will help the company to outperform and be a leading service provider in Pakistan's dynamic telecom market.
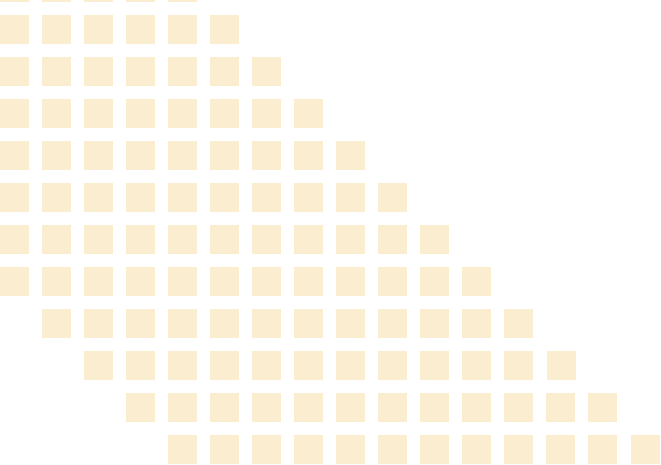
OPERATIONAL BI
❯ GE RAIL SERVICES

GE Rail Services (GERS), a North American transportation and leasing service provider, provides repair and maintenance services for leased railcars.

GERS uses a variety of IT operational systems and interfaces with external partners and industry service providers. One of its most powerful BI applications to date is Shoptimizer, a real-time operational analytics tool that finds the optimal shop to provide railcar repairs subject to over 20 constraints and dynamic parameters.

Prior to Shoptimizer, repair shop selections were made by customer service representatives without critical knowledge of shop capacity, shop capability, railcar movement patterns, and overall railcar condition. Railcars could wait weeks for repair or be transferred to another shop. Now, Shoptimizer calculates shop capacity dynamically and allocates capacity based on railcar type and predicted work requirements. It displays other recent repairs and predicts the full scope of likely required repairs based on just one defect reported by the customer. It also predicts the probable destination for the railcar upon completion. In addition, constraints are applied for international moves and overall transit distance and route probabilities. These features are critical in eliminating unnecessary GERS shipping and leasing costs.
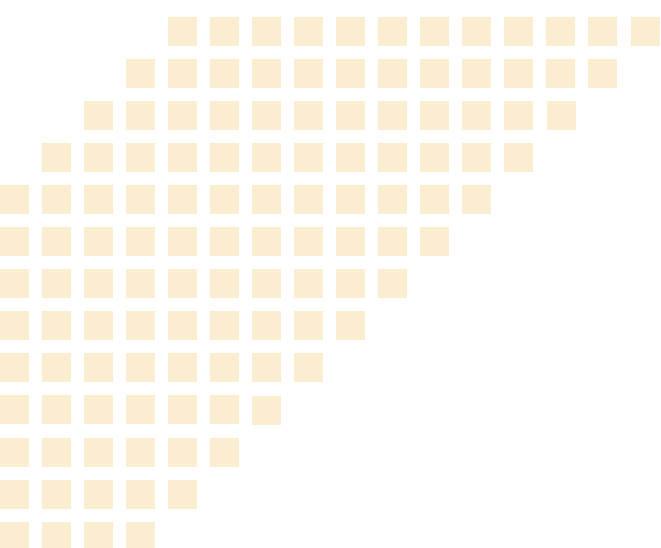
BI SOLUTIONS
Transforming Technologies

Our sponsors present their solutions in the following business intelligence categories:

- Analytics and Reporting
- Business Intelligence and Data Warehousing
- Dashboards, Scorecards, and Visualization
- Data Governance
- Data Integration
- Enterprise Business Intelligence
- Predictive Analytics

Acxius
www.acxius.com

BI CATEGORY: Business Intelligence and Data Warehousing

As a best-in-class consulting firm, Acxius serves clients around the globe, providing high-performance, intelligent, user-friendly, and scalable solutions for their big and complex data and information challenges.

Acxius delivers full lifecycle, high-value, quality results that allow clients to achieve goals in an increasingly competitive marketplace.

Data Management: Providing clients with seamless access to data and integration of data.
- Enterprise data strategy and planning
- Enterprise data architecture
- Enterprise data warehouse and data marts
- Data governance
- ETL/data movement/data integration
- Metadata management
- Master data management (MDM)

Business Performance Management: Leveraging data as a consistent, effective way to assess business health.
- Business performance measures/KPIs
- Process improvement

Information Management: Providing user-friendly access to the right data at the right time.
- Enterprise information strategy and planning
- Enterprise information architecture
- Business intelligence
- Customer analytics
- ERP and SCM analytics
- Financial analytics
- Predictive analytics

Project Management: Delivering in scope, on time, and on budget.
- Thought leadership
- Program management/PMO
- Change management

Birst

www.birst.com

BI CATEGORY: Analytics and Reporting

Birst is the only end-to-end business intelligence suite built for the cloud. Birst's integrated SaaS BI suite comprises analysis, reporting, dashboarding, automated ETL functionality, and data warehousing—all delivered on demand. With Birst, conducting powerful data analysis and creating ad hoc reports and dashboards is simple and fast. Powered by Smart Dashboards, the ability to simply "drag and drop" pivot tables and other reports into place makes it easy for business managers to explore data on their own, improving business results and reducing the reporting burden on the IT department. Birst's unrivaled end-user self service, unparalleled integration, and unprecedented automation enables IT departments to deploy an on-demand BI solution at a fraction of the cost and within a fraction of the time of traditional BI solutions.

Cisco

www.tidalsoftware.com

BI CATEGORY: Data Integration

Business intelligence requires complex scheduling and processing for data to be accessed in the proper order and processing to be completed within the operating window. Tidal Enterprise Scheduler's advanced BI integrations enable you to build and automate complex data flows across systems and applications to ensure the ETL processes that feed your BI systems are completed correctly and in the appropriate sequence every time, and that the reports are delivered on time, every time. It goes beyond managing ETL complexity to providing integration, recovery, and auditability—far more than is available with basic tools or scripting solutions. To further streamline the ETL process, Tidal helps ensure that other operational applications aren't degraded, and that the ETL process completes on schedule.

Using Tidal solutions reduces data center load and increases corporate confidence in the business intelligence solution and quality of its results—a significant return on investment according to any calculation. Tidal offers enterprise adapters for off-the-shelf integration with SAP BW, SAP BusinessObjects, Cognos, Informatica, Microsoft SQL Server Reporting Services, SAS, and IBM Websphere Datastage, and custom integrations are available for other applications.

DataFlux

www.dataflux.com

BI CATEGORY: Data Governance

Organizations today are faced with a daunting challenge: how to control the information that serves as the very foundation of their business success. However, with the recent exponential growth in data and the proliferation of siloed, disparate data, organizations are realizing that the data that is fundamental to their success doesn't meet their needs.

DataFlux enables business agility and IT efficiency by providing innovative data management technology and services that transform data into a strategic asset and enable enterprise data governance. DataFlux helps organizations manage critical data through unified technologies and expertise that provides the benefits of data quality, data integration, and master data management (MDM).

The unified development and delivery environment helps business and IT work together on critical aspects of data management.

- Build a foundation in data governance. Create, enforce, and monitor business rules across your organization with visibility and transparency.

- Enable real business and IT collaboration. Business users can build rules that reflect the changing needs of the business while IT can manage and apply the rules across the enterprise.

- Realize a faster time to value. Rapidly demonstrate ROI and show the material value of data.

By combining these capabilities into a unified platform, DataFlux helps companies achieve data governance and deliver reliable, trusted data across the enterprise.

Jaspersoft

www.jaspersoft.com

BI CATEGORY: Enterprise Business Intelligence

Enterprise BI for Any Size Company

END-TO-END BI CAPABILITIES
End-user query, reporting, and analysis: Powered by Web-based technologies, users can create their own ad hoc queries, reports, and analyses—without IT intervention.

Dashboards and mash-ups: End users can design, configure, and deploy their own interactive BI dashboards and mash-ups in minutes.

Production reporting: Generate and distribute Web and printable invoices, forms, and all varieties of complex reports from production systems.

Data integration: Develop, manage, and execute data integration processes for accurate and comprehensive reporting and analytics.

Data analysis: Whether you want to explore your data in-memory or in a powerful expressive OLAP server, Jaspersoft's Data Analysis does the work that would be too difficult, time-consuming, or expensive to perform using standard SQL-based reporting.

ROBUST, SECURE, AND ENTERPRISE READY
- Embedded or standalone
- Leverages existing IT infrastructure servers and services
- Deploys quickly for fast ROI
- Internationalized and localized for global deployments

AFFORDABLE COMMERCIAL OPEN SOURCE
Power of community: Developers and businesses truly appreciate and participate in worthwhile open source projects, which collectively improves the power and functionality of the products.

Backed by a commercial company: Providing commercial licensing, enhanced functionality, certification, support, warranties and indemnification, documentation, training, and expert professional services.

Lowest TCO: The open source subscription model provides the lowest cost, pay-as-you go solutions for your critical BI needs.

MicroStrategy

www.microstrategy.com

BI CATEGORY: Enterprise Business Intelligence

MicroStrategy, a global leader in business intelligence and performance management technology, provides reporting, analysis, and monitoring software that enables leading organizations to make better business decisions every day. Designed to support the most demanding business intelligence applications, MicroStrategy is ideal for enterprisewide BI standardization. Companies choose MicroStrategy for its advanced technical capabilities, sophisticated analytics, and superior data and user scalability. MicroStrategy is built from a single architectural foundation, making it the most integrated and efficient BI architecture available. With an intuitive Web interface, MicroStrategy enables business users to seamlessly access enterprise data for enhanced decision making.

MicroStrategy's Dynamic Enterprise Dashboards™ combine advanced data visualization and animation with MicroStrategy's industrial-strength business intelligence platform to deliver highly intuitive information dashboards that yield greater business insight than traditional graphs and grids. Business users can intuitively flip through many perspectives of corporate performance, allowing them to quickly and easily identify problems and diagnose root causes.

Learn more about our latest release at www.microstrategy.com/integratedenterprisebi.

Spotfire, TIBCO Software Inc.

http://spotfire.tibco.com

BI CATEGORIES: Analytics and Reporting; Enterprise Business Intelligence; Dashboards, Scorecards, and Visualization; Predictive Analytics

TIBCO Software Inc. (Nasdaq: TIBX) is a leading provider of enterprise analytics software for next-generation business intelligence. Spotfire Analytics products offer a visual and interactive experience that helps professionals quickly discover new and actionable insights in information. Distinguished by its speed to insight and adaptability to specific business challenges, Spotfire rapidly reveals unseen threats and new opportunities, creating significant economic value. Spotfire Analytics customers include industry leaders among the Global 2000 that have deployed Spotfire Analytics to gain an information advantage over their competitors.

Spotfire Analytics software equips users throughout the enterprise—whether in critical business, technical, or scientific roles—to freely analyze data and create analytic applications and interactive dashboards. Spotfire Analytics delivers a unique combination of powerful analytics and an engaging visual experience that is both powerful and intuitive. Spotfire Analytics gives end users more control, which speeds "time to answers" while reducing typical bottlenecks within IT building new business intelligence reports or reconfiguring databases. And unlike traditional business intelligence systems, Spotfire Analytics is completely adaptable to business processes across the organization, giving IT an extensible analytics platform and allowing them to reduce the number of custom and packaged applications they must support.

talend*
*open data solutions

Talend
www.talend.com

BI CATEGORY: Data Integration

Talend is the recognized market leader in open source data integration. After three years of intense research and development investment, and with solid financial backing from leading investment firms, Talend revolutionized the world of data integration when it released the first version of Talend Open Studio in 2006.

Talend's solution portfolio includes data integration (operational data integration and ETL for business intelligence), data quality, and master data management (MDM).

Unlike the small—and quickly consolidating—number of traditional vendors offering proprietary, closed solutions, which can only be afforded by the largest and wealthiest organizations, Talend offers a completely new vision. The company shatters the traditional proprietary model by supplying open, innovative and powerful software solutions with the flexibility to meet the needs of all organizations. Talend makes data integration solutions available to organizations of all sizes, and for all integration needs.

Talend's solutions are the most widely used and deployed data integration solutions in the world. The company has major offices in North America, Europe, and Asia, and a global network of technical and services partners. For more information, please visit www.talend.com.

About TDWI

TDWI, a division of 1105 Media, Inc., is the premier provider of in-depth, high-quality education and research in the business intelligence and data warehousing industry. TDWI is a comprehensive resource for industry information and professional development opportunities. TDWI sponsors and promotes quarterly World Conferences, regional seminars, onsite courses, a worldwide Membership program, business intelligence certification, resourceful publications, industry news, an in-depth research program, and a comprehensive Web site: www.tdwi.org

MEMBERSHIP

www.tdwi.org/membership

In a challenging and ever-changing business intelligence and data warehousing environment, TDWI Membership offers a cost-effective solution for maintaining your competitive edge. TDWI will provide you with a comprehensive and constantly growing selection of industry research, news and information, online resources, and peer networking opportunities developed exclusively for its Members. TDWI offers a cost-effective way to keep your entire team current on the latest trends and technologies. TDWI's Team Membership program provides significant discounts to organizations that register individuals as TDWI Team Members.

WORLD CONFERENCES

www.tdwi.org/conferences

TDWI World Conferences provide a unique opportunity to learn from world-class instructors, participate in one-on-one sessions with industry gurus, peruse hype-free exhibits, and network with peers. Each six-day conference features a wide range of content that can help business intelligence and data warehousing professionals deploy and harness business intelligence on an enterprisewide scale.

SEMINAR SERIES

www.tdwi.org/seminars

TDWI Seminars offer a broad range of courses focused on the skills and techniques at the heart of successful business intelligence and data warehousing implementations. The small class sizes and unique format of TDWI Seminars provide a high-impact learning experience with significant student-teacher interactivity. TDWI Seminars are offered at locations throughout the United States and Canada.

CHAPTERS

www.tdwi.org/chapters

TDWI sponsors chapters in regions throughout the world to foster education and networking at the local level among business intelligence and data warehousing professionals. Chapter meetings are open to any BI/DW professional. Please visit our Web site to find a local chapter in your area.

ONSITE EDUCATION

www.tdwi.org/onsite

TDWI Onsite Education brings TDWI courses to customer sites and offers training for all experience levels. Everyone involved gains a common knowledge base and learns in support of the same corporate objectives. Training can be tailored to meet specific business needs and can incorporate organization-specific information.

CERTIFIED BUSINESS INTELLIGENCE PROFESSIONAL (CBIP)

www.tdwi.org/cbip

Convey your experience, knowledge, and expertise with a credential respected by employers and colleagues alike. CBIP is an exam-based certification program that tests industry knowledge, skills, and experience within five areas of specialization—providing the most meaningful and credible certification available in the industry.

WEBINAR SERIES

www.tdwi.org/webinars

TDWI Webinars deliver unbiased information on pertinent issues in the business intelligence and data warehousing industry. Each live Webinar is roughly one hour in length and includes an interactive question-and-answer session following the presentation.