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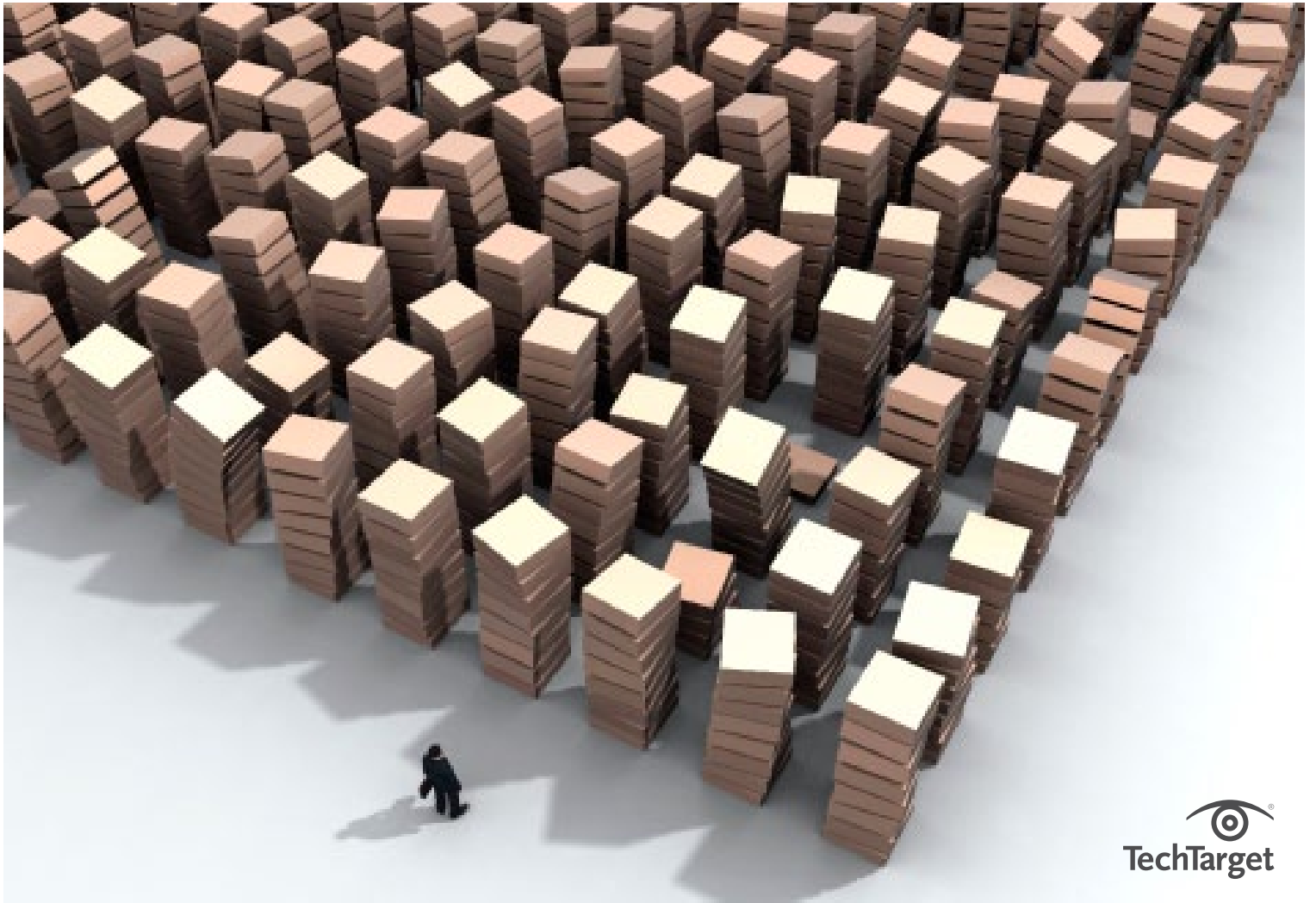
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*Trends +  
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# BI AND ANALYTICS GETS EASIER —AND MORE COMPLICATED

By Jean Schauer, *Editor in Chief, BeyeNETWORK*

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**IN MANY WAYS**, the world of business intelligence (BI) and analytics has become easier—more user-friendly, faster and loaded with more features and functionality. Unfortunately, the availability of such products coupled with the overwhelming quantity of data has undoubtedly complicated your life, as you find that the status quo you've worked so hard to achieve isn't going to provide your organization with the BI and analytics capabilities required to remain competitive.

The three articles in this inaugural issue of *BI Trends + Strategies* offer sound advice that will assist you in ensuring your organization is on track to keep up with the rapidly changing landscape of BI and analytics.

In "[Big Data: Separating the Hype from Reality](#)," Barry Devlin, a BeyeNETWORK expert and an authority on pushing beyond the boundaries of traditional BI, defines big data, describes its sources and discusses the impact it will have on BI and data warehousing from both business and

IT perspectives.

When building a data warehouse or any type of analytical database, the traditional data-driven approach can be slow and expensive. Jim Gallo, a BI and data warehousing consultant who is BeyeNETWORK's Agile BI expert, describes the Agile development methodology and its potential benefits in his article, "[Applying Agile Methods to Data Warehouse Projects](#)."

While data visualization has become a mainstream technology, complex visual analytics applications can pose stiffer challenges. Nonetheless, a recent survey by The Data Warehousing Institute found advanced data visualization to be the fastest-growing big data technology among respondents. In "[Advanced Data Visualization Helps Curtail Copper Thefts](#)," SearchBusinessAnalytics.com News Editor Nicole Laskowski reports on one electric utility's use of visual analytics to aid in its fight against thieves in search of copper wire. ■

# BIG DATA: SEPARATING THE HYPE FROM REALITY

*The air is thin at the top of the hype curve, so breathe deeply as we explore the reality of big data—and the changes it entails for BI and data warehousing systems. By Barry Devlin*

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**B**IG DATA IS everywhere these days. Marketing materials are bursting with references to how products have been enhanced to handle big data. Consultants and analysts are busy writing new articles and creating elegant presentations. But the sad reality is that big data remains one of the most ill-defined terms we've seen in many a year.

The problem is that data volume is a metric that tells us little about the data characteristics that allow us to understand its sources, its uses in business and the ways we need to handle it in practice. Even the emerging approach of talking about big data in terms of volume, velocity and variety leaves a lot to be desired in terms of clarity about what big data really is.

## BUSINESS DRIVERS AND ORIGINS

So, what is the problem? And, more to the point, is there an answer? The problem is that big data in a technical sense, beyond the common characteristic of "bigness," has little else in common. Hence the difficulty in coming up with a single, all-encompassing definition.

However, in a business sense, there is one common theme—predicting the future. Based on statistical analysis of past and present reality, we try to predict and/or influence future events, behaviors and so on. This is the same goal that we've seen in data mining since the 1990s. In simple terms, the business driver for big data is a logical extension of data mining. The novelty lies in the fact that with ever larger data volumes and new data sources, we can obtain more statistically accurate results

and, hopefully, make more accurate predictions.

Thus, we return to data volumes. The origins of big data as a concept and phrase can be traced back to the scientific community. Researchers in astronomy, physics, biology and other fields have long been at the forefront of collecting vast quantities of data from ever more sophisticated sensors. By the early 2000s, they encountered significant problems in processing and storing these volumes and coined the term *big data*—probably as a synonym for big headaches. We see here the beginnings of the business driver mentioned above, as science today is founded largely on statistical analysis of collected data. What begins in pure science moves inexorably to engineering and finally emerges in business and, especially, marketing.

#### DEFINITION AND HANDLING

It is that evolution in usage that leads to the conclusion that no single definition of big data is possible—it's a phrase that takes meaning from the context of its use. Do not despair, however. This thinking also leads directly to a more useful understanding of four different classes of big data, each with specific characteristics and uses, as shown in **FIGURE 1** (see page 5) laid out according to their sourcing and structure.

The first class is metrics and measures, emanating more or less

directly from sensors, monitoring devices and less complex machines, including RFID readers; ZigBee devices and the multitude of sensors in modern airplanes, cars and even cameras; and, perhaps most interestingly, in smartphones. Such data is highly structured and reflects discrete events or characteristics of the physical world.

**WITH EVER LARGER DATA VOLUMES AND NEW DATA SOURCES, WE CAN OBTAIN MORE STATISTICALLY ACCURATE RESULTS AND, HOPEFULLY, MAKE MORE ACCURATE PREDICTIONS.**

The second class, also machine-sourced, consists of computer event logs tracking everything from processor usage and database transactions to clickstreams and instant message distribution. While machine-generated, data in both of these classes are proxies for events in the real world. In business terms, those that record the results of human actions are of particular interest. For example, measurements of speed, acceleration and braking forces from an automobile can be used to make inferences about driver behavior and thus insurance risk.

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In the top half of **FIGURE 1**, in classes three and four, we have social media information directly created by humans, divided into the more highly structured textual information and the less structured multimedia audio, image and video categories. Statistical analysis of such information gives direct access to people’s opinions and reactions, allowing new methods of individual marketing and direct response to emerging opportunities or problems. Much of the

current hype around big data comes from the insights into customer behavior that Web giants like Google and eBay and mega-retailers such as Walmart can obtain by analyzing data in these classes—especially the textual class, so far. However, in the longer term, machine-generated data, particularly from the metrics and measures class, is likely to be the big game-changer simply because of the number of events recorded and communicated.

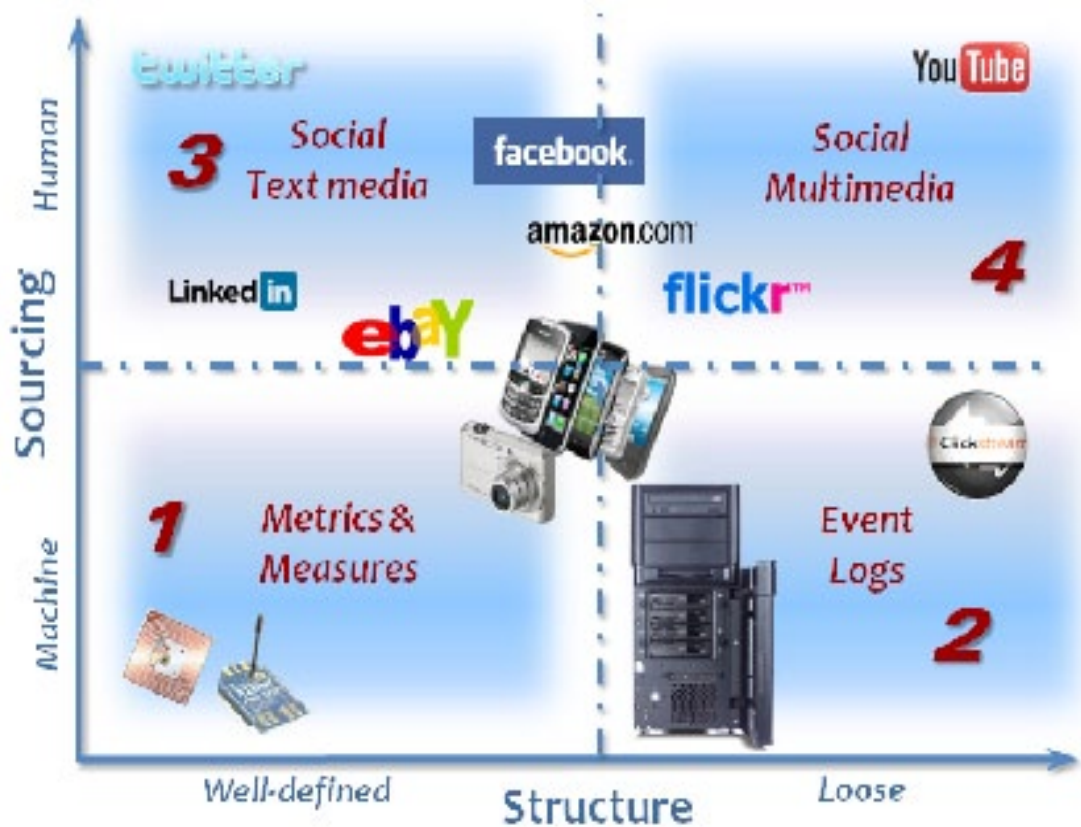
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**FIGURE 1:** *The four classes of big data*

## BUT WHAT ABOUT MY CURRENT BI SYSTEM?

From a business viewpoint, big data significantly shifts the emphasis in business intelligence (BI) from reporting and problem-solving to prediction. The former won't go away, of course, and high levels of competence and investment in those aspects will continue to be needed—just to stay in the game. However, the ability to anticipate changes in the market provided by advanced analytics on large data volumes will separate the leaders from the also-rans.

From an IT point of view, the issue divides largely between the top and bottom halves of the diagram in **FIGURE 1**. In the bottom half, we deal with data that is structurally similar to that on which traditional BI is based. At the high end, volumes and velocity will continue to demand innovative technological solutions. Lower down the scale, traditional tools and techniques will likely stretch upward to larger slices of the middle ground. However, one thing is clear: The old thinking that all data must be funneled through an enterprise data warehouse cannot survive.

This becomes even clearer when we look at the top half of the picture. The data found there has different characteristics than traditional BI data. Not only does it have far less structure, but that structure is also fluid and its semantics largely

unfavorable for the type of prior modeling that is the foundation of traditional data warehousing. This socially sourced data will most

## THE ABILITY TO ANTICIPATE CHANGES IN THE MARKET PROVIDED BY ADVANCED ANALYTICS ON LARGE DATA VOLUMES WILL SEPARATE THE LEADERS FROM THE ALSO-RANS.

likely continue to require a different environment and approach to analysis and management. However, it will need to be linked to classic BI systems via summary-results data imported into the data warehouse environment and metadata that bridges the semantic gap between the two areas.

The reality is that big data is going to provide BI with a significant growth stretch and that the technology is evolving and merging rapidly to meet this challenge. ■

**Barry Devlin** has worked in the IT industry for more than 25 years, primarily as a Distinguished Engineer for IBM in Dublin. He is now founder and principal of 9sight Consulting and is a consultant and lecturer on business insight, data warehousing and related topics. Devlin is also the author of the book *Data Warehouse: From Architecture to Implementation*. He can be contacted at [barry@9sight.com](mailto:barry@9sight.com).

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# APPLYING AGILE METHODS TO DATA WAREHOUSE PROJECTS

*Agile development processes can take a lot of the pain out of building data warehouses and enable project teams to deliver functionality, and business value, on a rolling basis. By Jim Gallo*

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**R**APIDLY GAINING IN popularity, the Agile approach to data warehousing solves many of the thorny problems typically associated with data warehouse development—most notably high costs, low user adoption, ever-changing business requirements and the inability to rapidly adapt as business conditions change.

The Agile approach can be used to develop any analytical database, so let's begin with two familiar definitions:

- A **DATA WAREHOUSE** (DW) is simply a database that contains integrated and homogenized information from one or more sources brought together to support analysis and reporting. These sources can be your internal online transac-

tional processing (OLTP) systems such as finance, accounting, sales, marketing, payroll, supply chain, etc., or external sources such as supplier files, purchased marketing lists, Facebook, Twitter or census data, etc.

In addition to the data warehouse, you may also be using additional types of databases for analysis and reporting. The most common types include data marts and operational data stores (ODSs).

- **BUSINESS INTELLIGENCE** (BI) refers to the different mechanisms used to leverage and interact with the data stored in the databases. Types of BI applications include query, reporting, analysis, dashboards, statistics, predictive models and key performance indicators (KPIs), etc.

These two concepts of BI and data warehousing are depicted in **FIGURE 1**. This article focuses on applying Agile methods to the creation of the databases.

In order to simplify the discussion, I will use the generic term *analytical database* to refer to all types of data stores—including data warehouse, data mart, operational data store, etc.

**WHY AGILE?**

There are several key reasons why Agile methods are well suited to building analytical databases. Among them are business-driven vs. data-driven development, and reduced risk and complexity.

**Agile Methods Take a Business-Driven Approach.** Simply stated, creating analytical databases is

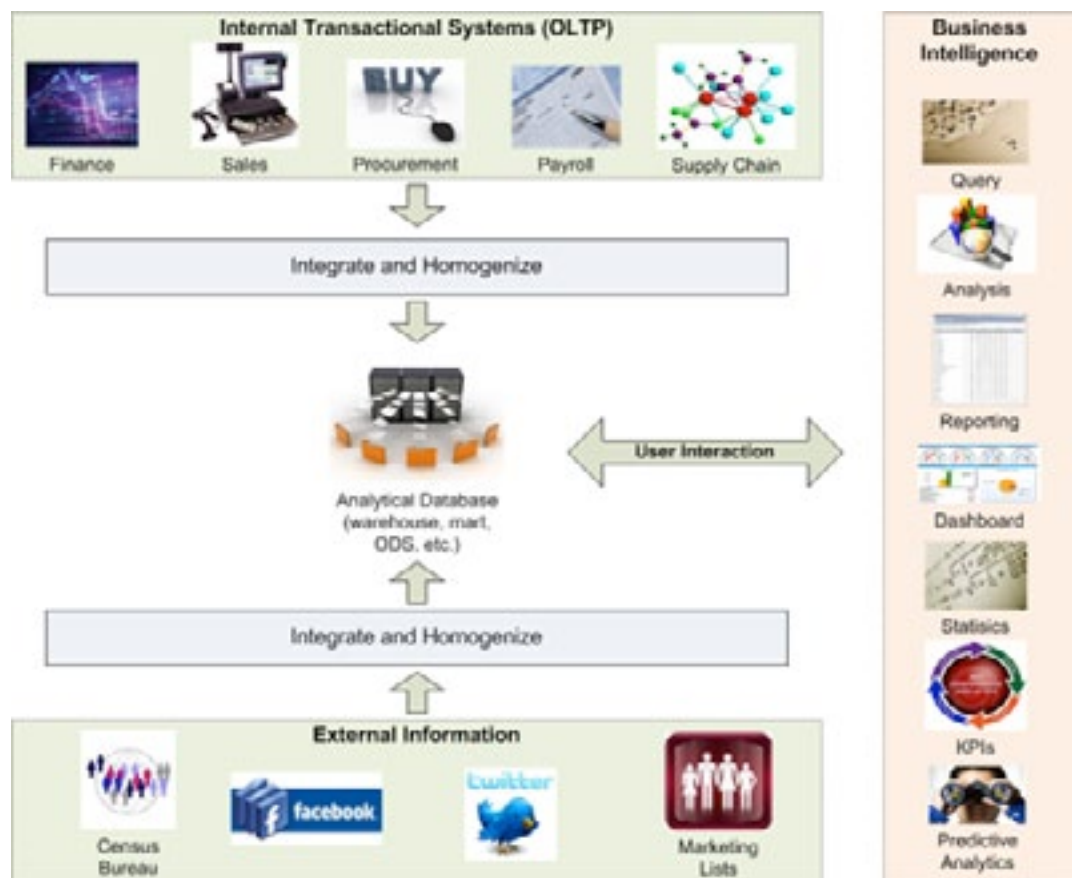
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**FIGURE 1:** An overview of a BI and data warehousing architecture that integrates both internal and external data and makes the information available for analytical uses.

complex, time-consuming and often-times overly expensive, especially when traditional data-driven methods are used. A fundamental truth of BI and data warehousing is that data integration and homogenization account for 70% to 80% of the project budget and an even higher percentage of the risk.

Let's take a simple example. Assume your organization has four internal OLTP systems and one external data source. On average, each system has 30 database tables, and each table contains 30 columns. This means that:

**(4 OLTP systems + 1 external system)  
x 30 tables x 30 columns  
= 4,500 data elements**

In a data-driven approach, it's not uncommon to want to integrate and homogenize most—if not all—of the data before the first query or report can be written. This means that 70% to 80% of the project budget will be expended before any business value can be realized. Similarly, integrating thousands of fields can take upwards of 12 months to complete. What this means is that your goal should be to minimize the amount of effort associated with data integration and homogenization.

In an Agile delivery model, only data needed to answer specific business questions or to solve specific business problems is sourced. (These need statements are cap-

tured in a series of business “stories.”) So instead of first trying to “boil the ocean” via a massive data integration effort, Agile practitioners work with the business community to define the hundred or so data elements that drive performance. This means that the business will be in a position to receive value much more quickly—in weeks or months rather than quarters or years.

**Agile Methods Reduce Risk and Produce Systems with High Adoption Rates.** Organizations that apply traditional waterfall methods to BI/DW projects accrue unnecessary risk and may find out what they've created does not satisfy the business's needs. Waterfall methods mean it's all or nothing. In other words, design cannot begin until all of the requirements are defined, and coding cannot begin until design is complete. This means that the project takes on ever-increasing levels of risk and that business value is delivered at the end of the project (see **FIGURE 2**, page 10).

It's not unusual to find that once an analytical database has been deployed using a data-driven and waterfall approach, it suffers from low adoption and usage. The primary culprit seems to be that business needs and priorities will have shifted between the time the requirements were originally defined and when the analytical database was deployed.

For the most part, the delivery

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team’s efforts are seen as a black hole. What ends up being delivered is based on assumptions and interpretations of the requirements and

## WHEN AGILE METHODS ARE APPLIED, VALUE CAN BE SHOWN ON A RECURRING BASIS.

may not contain the information the business really needs. Reality hits when that first report is written, oftentimes making the data integration effort completely moot.

When Agile methods are applied,

value can be shown on a recurring basis. The key tasks of database design—data quality remediation, and data integration and homogenization—are broken into short, time-boxed and scope-boxed delivery cycles, or “sprints,” that generally last two to four weeks each. These data-focused tasks are paired with prototyping in the BI layer, allowing the business to interact with the data multiple times, helping to assure that the analytical database truly contains useful information (see **FIGURE 3**, page 11).

The use of delivery sprints keeps business value at the forefront and drives project risk down to a mini-

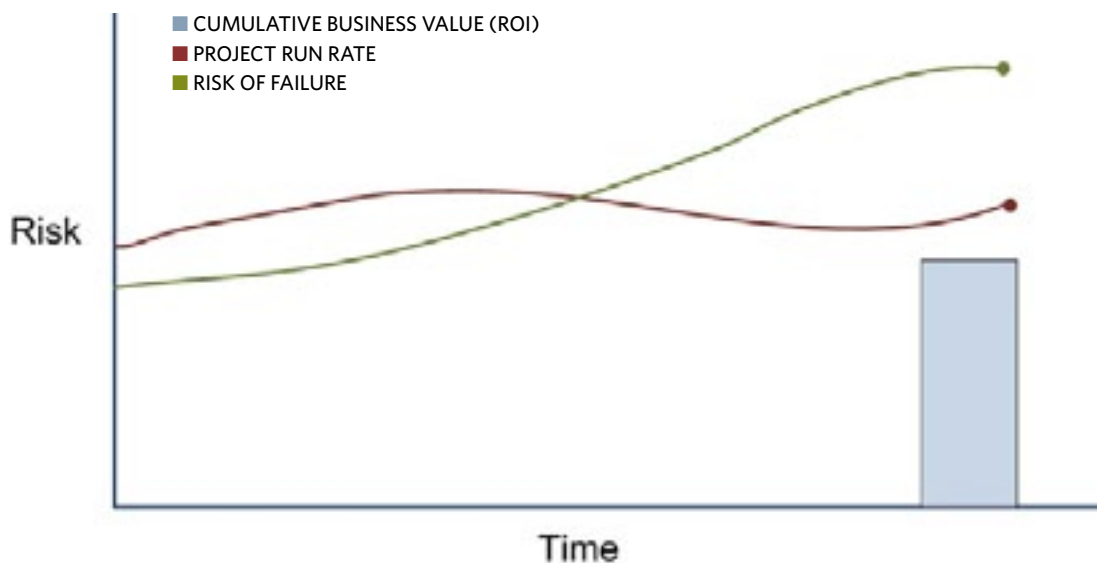
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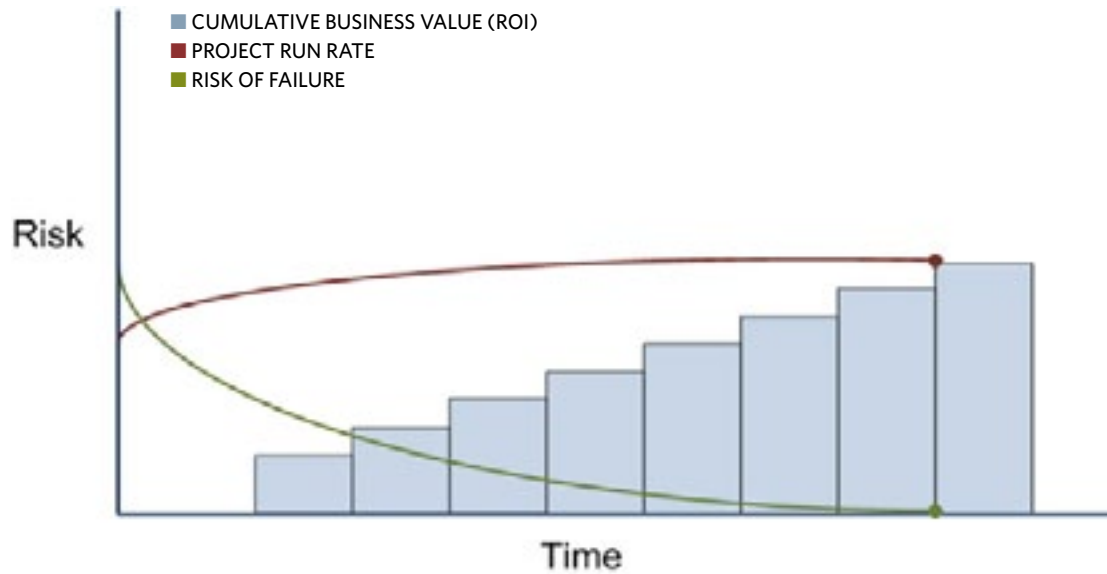
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**FIGURE 2:** Projects based on traditional waterfall development methods often have a high risk of failure and don’t deliver immediate business value.



**FIGURE 3:** Agile projects are designed to minimize the risk of failure and to deliver functionality and business value on an incremental basis.

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mum. At the end of each two- to four-week sprint cycle, the delivery team is required to demonstrate what they have produced, making their work much more visible to the business and allowing for midcourse corrections because another tenet of Agile is to “fail quickly.”

**BUSINESS VALUE  
DELIVERED QUICKLY**

Agile methods can easily be applied to the building of analytical databases—data warehouses, data marts, operational data stores, etc. When the work associated with designing the databases and integrating the data is driven from the business side, project costs can be held to a

minimum and business value can be delivered more quickly. By organizing the work into short sprint cycles, everyone can be assured that the expensive and risky part of the project—data integration and homogenization—will surely meet the business’s ever-increasing appetite for impactful and actionable information rather than suffer from misinterpreted requirements and low business adoption. ■

**Jim Gallo** is a senior business intelligence and data warehousing consultant with Information Control Corp. Gallo has led BI projects for Fortune 1000 companies, federal and state governments, and international clients. In addition, he has published numerous articles on the practical realities of BI and data warehousing and is a regular conference speaker. He can be contacted at [jgallo@iccoho.com](mailto:jgallo@iccoho.com).

# ADVANCED DATA VISUALIZATION HELPS CURTAIL COPPER THEFTS

*Energy utility Dominion Resources is relying on advanced data visualization, geospatial data and visual analytics to stay a step ahead of thieves who've taken a shine to copper wires. By Nicole Laskowski*

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**L**IKE GOLD, THE price of copper has skyrocketed in recent years. But the increase in copper demand and its rising cost has become problematic for businesses. One way to fight back is through the use of advanced data visualization tools.

"We, like everybody else in our business for the past few years, have had a growing and chronic problem with the theft of copper," said Dan Jenkins, director of corporate security for Richmond, Va.-based Dominion Resources Inc., an electric and natural gas utility that serves customers in 15 states.

Building construction and electrical and electronic products—both of which the electricity industry invests heavily in—are the top two end uses for copper in the U.S., accord-

ing to copper-industry data cited in a 2007 report by the U.S. Department of Energy. As a result, utilities have become a continual target of

**THE INCREASE IN COPPER DEMAND HAS BECOME PROBLEMATIC FOR BUSINESSES. ONE WAY TO FIGHT BACK IS THROUGH DATA VISUALIZATION TOOLS.**

thieves in search of copper wire to sell in the booming scrap copper market. Frequently, the thefts occur at unmanned electrical substations, which can be found in remote locations across the country.

## GEOSPATIAL DATA, VISUAL ANALYTICS HELP FIGHT CRIME

For the past year, Dominion Virginia Power, a Dominion subsidiary that provides electricity to 2.4 million customers in Virginia and North Carolina, has teamed up with Virginia law enforcement officials and other utility companies in an effort to combat copper thievery. Part of their joint strategy is based on advanced data visualization images and visual analytics reports produced by Herndon, Va.-based GeoEye Inc., which uses a combination of information and images captured by satellites, aircraft and ground stations to provide geospatial data and mapping and analytics services to organizations for uses such as antiterrorism, fraud detection and fighting crime.

Dominion Virginia Power has provided details on its facility locations—it has more than 1,000 substations alone—to GeoEye Analytics, an operation formed after GeoEye's acquisition of geospatial analytics services firm Spadac Inc. in December 2010. The energy company then furnishes the longitude, latitude, date and time for every incident of copper theft and related damage that occurs at its facilities. GeoEye takes that data and, through the use of predictive modeling, sifts out patterns of activity and behavior to generate a monthly report of the top 10 facilities likely to be targeted next, with supporting images and visualizations.

The security team at Dominion

Virginia Power uses the findings to help plan its facilities security strategy—for example, where to install permanent or portable security systems. During 2011, the company had seen a 57% decrease in the total amount of damage compared with

## THE USE OF GEOSPATIAL DATA AND VISUAL ANALYTICS IS JUST ONE IN A SERIES OF MEASURES DOMINION VIRGINIA POWER HAS UNDERTAKEN TO HELP CURTAIL COPPER THEFTS.

the year before as of early December, Jenkins said, although he added that the use of geospatial data and visual analytics is just one in a series of measures Dominion Virginia Power has undertaken to help curtail the copper thefts.

Data visualization is becoming an increasingly mainstream technology. For example, the 2011 Gartner *Magic Quadrant for Business Intelligence Platforms* highlighted the growing momentum of data discovery vendors such as Qlik Technologies Inc., Tableau Software and Tibco Software Inc. Those companies offer tools for mashing up and mining data, creating visual, easy-to-digest reports that produce more than stat-

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ic charts and graphs. Such products enable business users to “author applications and content themselves, without having extensive technical skills,” said Rita Sallam, a research director at Stamford, Conn.-based Gartner Inc.

### THE ADVANCE OF ADVANCED DATA VISUALIZATION

But advanced data visualization tools also appear to be etching out a more pronounced place for themselves as more organizations face an increasing influx of data as well as different data types, including geospatial data.

According to a recent survey by The Data Warehousing Institute (TDWI), advanced visualization tools are viewed by many IT professionals, business users and technical consultants as necessary when analyzing big data. In fact, Philip Russom, research director for data management at TDWI and the author of a report about the survey, admitted his surprise when a question designed to find the fastest growing big data technology showed advanced data visualization as No. 1. “I expected a lot more nerdy, techy, deep database stuff,” Russom said when the report was released last summer.

Advanced visualizations push at the boundaries of what businesses can visually produce with basic tools such as Excel. In addition, the level of analytics capabilities that are needed to make sense of the visu-

alizations can vary depending on the use case, Sallam said. “You can find creative ways to visualize data without necessarily having advanced

## ADVANCED DATA VISUALIZATION TOOLS APPEAR TO BE ETCHING OUT A PRONOUNCED PLACE FOR THEMSELVES AS MORE ORGANIZATIONS FACE AN INCREASING INFLUX OF DATA.

analytics [tools], but sometimes to find advanced patterns and then to visualize that data requires a more sophisticated type of analytics,” she said.

While the analytics reports that GeoEye provides to Dominion include text, most of the content is satellite imagery layered with a variety of advanced data visualizations formatted in a way that’s designed to make it easy for non-analysts to understand them.

### VISUALIZATIONS OFFER CLUES ON POSSIBLE COPPER HEISTS

“The satellite imagery isn’t military grade, it’s more like Google Earth, [and] then has different layers of data containing information, color coding and so on,” Jenkins said. For

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example, the reports can include overlays showing a facility's proximity to secondary roads and scrap dealer locations, which are characteristics that can contribute to a higher risk for copper thefts.

## REPORTS CAN INCLUDE SHOWING A FACILITY'S PROXIMITY TO SECONDARY ROADS AND SCRAP DEALER LOCATIONS.

For Dominion Virginia Power's security team, working with Geo-Eye's reports has been an introduction to utilizing geospatial data and visual analytics in general. But even if the security workers were able to produce the reports in-house, Jenkins said the intelligence that Dominion is receiving now likely would be better informed because of the participation of other utilities, such as Verizon, in the analytics program.

Jenkins and other members of the security team aren't privy to the data of other participating companies. But, he said, "we see the end product, which is a more sophisticated look at the trends than we would ever be able to do [on our own]." ■

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