BI Leadership RESEARCH

A TECHNOLOGY GUIDE

Visual Discovery Tools: Market Segmentation and Product Positioning

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Background

What are visual discovery tools? They are self-service, in-memory analysis tools that enable business users to access and analyze data visually at the speed of thought with minimal or no IT assistance and then share the results of their discoveries with colleagues, usually in the form of an interactive dashboard.

Who are the target users? Visual discovery tools are used by (1) power users to explore and analyze data in a variety of systems, (2) superusers and BI specialists to create interactive dashboards for colleagues and (3) casual users to view and work with those dashboards.

MARKET POSITIONING

As depicted in **Figure 1**, visual discovery tools straddle top-down and bottom-up approaches to business intelligence and are typically deployed more quickly and at a lower cost than enterprise-centric BI tools. Visual discovery tools often replace desktop analysis tools like Excel and share most characteristics with multidimensional online analytical processing (OLAP) tools except write-back capabilities.

Visual discovery tools are now starting to bleed into other BI segments, particularly ad hoc and operational reporting, relational OLAP and big data analytics platforms. Today, visual discovery tools are primarily geared toward departmental applications, not enterprise ones. But as functionality

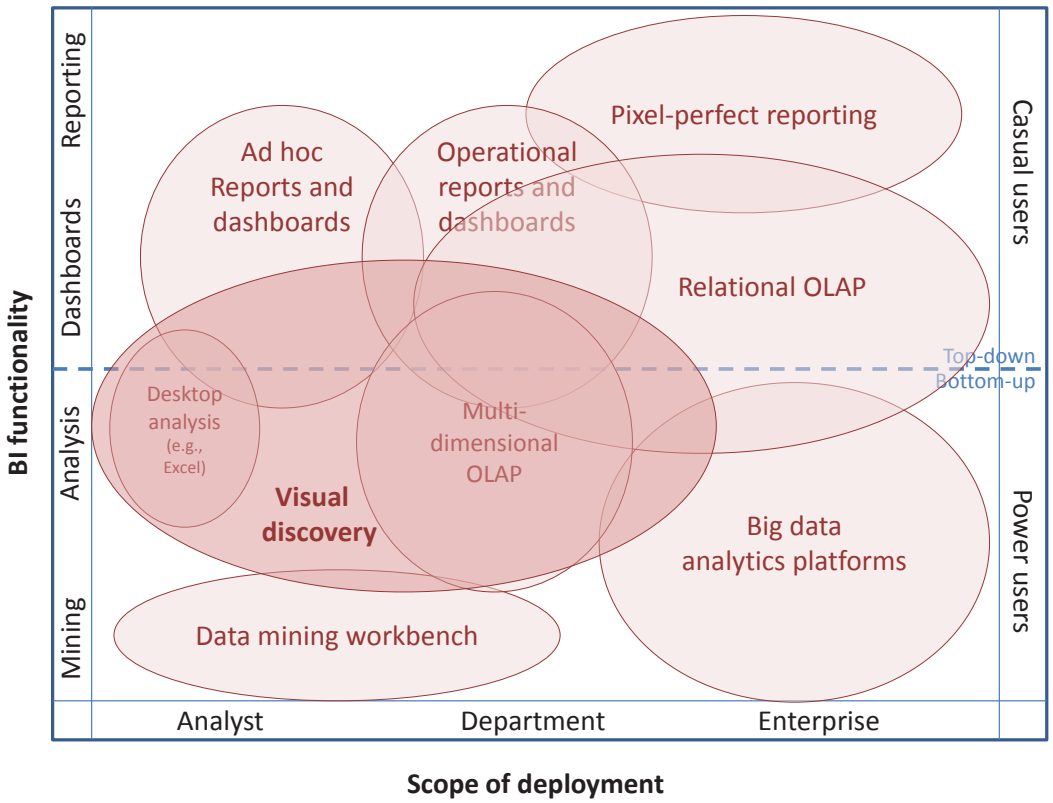
DEFINITIONS

Power Users
Business users who are paid to crunch data on a daily basis, including business analysts, statisticians and data scientists

Superusers
Business users who master the use of a BI tool and quickly become the go-to people in each department to create hoc reports and dashboards

Casual Users
Business users who use information to do their jobs, including executives, managers, front-line workers, customers and suppliers

FIGURE 1. BI Tools Framework



SOURCE: WAYNE ECKERSON, BI LEADERSHIP RESEARCH

evolves in the next year or two, visual discovery tools will compete more directly with relational OLAP and big data analytics platforms for dominance in enterprise deployments (See **APPENDIX 1** for a detailed breakdown of the BI market). ■

TYPES OF INTELLIGENCE

Top-down intelligence consists of reports and dashboards that answer predefined questions or monitor business processes using metrics aligned with strategic objectives

Bottom-up intelligence consists of ad hoc analysis and mining tools that answer unanticipated questions arising from new and changing business conditions

Key Characteristics

VISUAL DISCOVERY TOOLS share the following characteristics, which distinguish them from other categories of BI tools:

1. Desktop tools with in-memory processing and an optional server. Most visual discovery tools run on Windows desktops and contain an embedded in-memory database or cache. Some of these desktop tools are Web "fat clients" such as Flash, Silverlight or Asynchronous JavaScript and XML that connect to server-based cubes or in-memory databases. And some rely less on in-memory processing than on querying data sources directly—for example, Tableau. Most visual discovery tools offer optional server software that enables analysts and dashboard authors to upload content, apply security, manage data connections and publish their output for authorized users to view. The server also handles communications with Web browsers that render the published dashboards.

50 MILLION ROWS

A visual discovery tool running on a laptop with a 64-bit operating system and 16 GB of RAM can store 50 million rows of data, which is the equivalent of most small data marts.

2. Analysis, not reporting. Visual discovery tools are designed for visual data exploration, analysis and lightweight data mining. Although they can be used to create interactive dashboards for departmental users and briefing books for executives, they do not generate pixel-perfect or page-oriented reports and dashboards.

3. Universal data connectivity. To ensure that business analysts can get the data they need, visual discovery tools support connectors to almost any data source, including files—Excel and comma-separated values—and relational databases, largely through Open Database Connectivity or Java Database

Connectivity drivers. Many also connect directly to applications—for example, SAP Business Suite and Salesforce.com, XML and Hadoop—usually through separately priced adapters. Once connected to a data source, visual discovery tools download predefined sets of data into local memory, although some also let users query the data directly in source systems.

4. In-memory processing. To deliver speed-of-thought analysis, most visual discovery tools store data in an in-memory database or cache to avoid the performance bottleneck associated with accessing data from a rotating disk. The tools aggregate or calculate base-level data dynamically and scale linearly as customers add more RAM and CPU. But since RAM is quickly consumed by data, users and visual controls, most visual discovery tools are designed to manage workgroup and departmental applications, not enterprise ones—for example, data marts instead of data warehouses. But the memory footprint of servers is expanding quickly, making it possible for companies to store ever-larger volumes of data in memory, even terabyte-scale data warehouses

VISUALIZATION TECHNIQUES

Auto-suggest. Suggests chart types based on the shape of the data

Linking. Links charts to each other or to a data source so changes in one are automatically applied to the others

Brushing. Highlights a variable in a chart when a user selects a variable in another chart

Lassoing. Lets users select data values in a chart by circling them with a cursor. Often used with brushing and linking

Keyword search. Lets users quickly find one or more attributes in a long list or drop-down box

Mouseovers. Displays tips, metadata or available functions when users move the cursor over an object on the screen

Context-sensitive icons. Associated with data objects that indicate available functions

Animations. Show how data values change over time

Snapshots. Save the current view as a live link that users can email to others

Custom objects. Let users create custom hierarchies, groups, calculations and metrics for use in a visual display

in the near future. Moreover, visual discovery tools are following the lead of Tableau and augmenting their in-memory databases with direct query connectivity, so there is no longer a finite limit to the amount of data the tools can access.

5. Simple and flexible data design. As self-service tools, most visual discovery products model data on the fly, minimizing the amount of up-front design required to implement and use the software. Unlike top-down BI tools, visual discovery tools don't require a specific data model like a star schema or semantic layer of user-friendly data objects. Most visual discovery products focus on one data set at a time and automatically link tables using shared keys, making a best guess at data relationships, which users can override if desired. Of course, the tradeoff for this design simplicity and flexibility is complexity. Most visual discovery tools don't deal well with complex enterprise applications with thousands of tables and dirty data. Like most BI tools, they work best when run directly against a data warehouse or another clean set of integrated data.

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6. Visual design and exploration. Visual discovery tools query data visually rather than visualize query results, that is, numeric tables. As a result, analysis and design is one and the same and thus highly interactive and iterative. Their WYSIWYG interface enables users to drag and drop metrics, dimensions and attributes onto a visualization canvas and instantaneously view results in graphical form using a variety of chart types that the tools automatically select or suggest based on the shape of the data.

While most BI tools constrain the number of available metrics or attributes that users can view, visual discovery tools do not. Users can easily associate any metric or attribute with an axis, color, size or shape to create a multidimensional display that makes it easy to visualize patterns and outliers in the data. (See **"Visualization Techniques"** for a list of some of the more commonly used approaches used by visual discovery tools.)

7. Affordable pricing. Analysts can purchase desktop tools for between $500 and $2,000, or in some cases, download them for free with limited data connectivity (Excel and CSV files only). Since most organizations have only a handful of analysts, department heads can buy the tools using their operating budgets. For a small workgroup of 10 to 20 users with a publishing server, organizations can get started for about $50,000, not including training and professional services. Enterprise deployments can easily exceed six figures because of the costs of managing clusters of high-performance servers with lots of RAM and CPU. Interestingly, enterprise BI vendors often bundle visual discovery tools into their BI suites at no extra cost. This is great for existing customers but an expensive proposition for prospects. ■

Market Trends

THE MARKET FOR visual discovery tools is evolving quickly. This section looks at market trends in user organizations and the vendor marketplace.

USER ORGANIZATIONS

Organizations are figuring out how to integrate visual discovery tools in an enterprise BI environment—or not. Here are the key trends:

1. Dashboard development. Department heads are increasingly using visual discovery tools as dashboard development platforms instead of treating them as self-service tools for business analysts. In most cases, department heads who are dissatisfied with the cost, delay and quality of analytics applications developed by the corporate BI team buy the tools and hire superusers or consultants to build custom interactive dashboards for their departmental users.

Increasingly, corporate BI teams are getting in front of these departmental initiatives before they hit a scalability or complexity wall.

2. IT backlash. Until recently, corporate BI teams have viewed visual discovery tools as renegade BI environments, since department heads often build dashboards without consulting with the BI team or adhering to corporate data standards. Increasingly, however, corporate BI teams are getting in front of these departmental initiatives before they hit a scalability or complexity wall. They convince department heads to point relevant queries at data warehouses and data marts to ensure consistent use of enterprise data.

3. Big data analytics. With the advent of big data, analysts want to use visu-

al discovery tools to explore large volumes of data in an iterative fashion. Consequently, visual discovery vendors are improving the scalability of their tools by letting users directly query Hadoop and large analytical databases and download subsets of that data into memory for deeper analysis. Most are also expanding the scalability of their in-memory capabilities, running their server software in clustered environments and adding statistical and other analytical functions to support predictive analysis. As such, the line between visual discovery tools and big data analytics tools and platforms is starting to blur.

VENDOR ORGANIZATIONS

Vendors are rapidly evolving their tool sets to capitalize on market opportunities and prevent new competitors from making inroads into their customer accounts. Here are the key trends:

1. Market encroachment and rear-guard actions. Visual discovery tools shipped by startups or small BI vendors threaten enterprise vendors that offer predominantly top-down BI tool sets. As a result, leading enterprise BI players—IBM Cognos, SAP BusinessObjects, MicroStrategy, Microsoft and SAS Institute—have all shipped their own visual discovery tools in the past 12 months. Besides offering new self-service and visualization functionality to customers, they desperately need to protect their flanks from incursion by pure-play visual discovery vendors whose "land and expand" strategies of selling to departmental business users have eroded their account control. To maintain it, enterprise BI players are largely giving away their visual discovery tools by bundling them into enterprise suites. Most don't have plans to sell their visual discovery tools to net new customers, at least until their products are mature enough to compete head on with pure-play vendors.

Most visual discovery products were designed for individual users and then scaled to support workgroup and departmental applications.

2. Scalability wall. Although organizations can store ever-larger amounts of data in memory thanks to compression and larger RAM footprints, visual discovery vendors must deal with the performance cliff that forms when

customers consume all addressable memory and begin paging data to disk. To help customers avoid this problem, more vendors now let users run queries directly against remote databases—a kind of drill through to detailed data that reduces the amount of data that customers must cram into RAM, ultimately reducing costs and improving scalability. Some vendors, such as Tableau, are moving in the reverse direction, adding in-memory capabilities to complement their direct query architectures. As such, vendors are now debating whose dynamic query capabilities are most flexible and useful.

As mentioned, many visual discovery vendors are also taking steps to improve the scalability of their embedded databases. Some, such as SAP and SAS, are running their in-memory databases on extensible massively parallel processing (MPP) grids, while others, such as SiSense and Platfora, are deploying specializing analytical databases that tightly align memory and disk to optimize performance.

So the race is on: Pure-play vendors are busy developing enterprise capabilities, while enterprise vendors are quickly adding visualization and design functionality to catch up.

3. Enterprise wall. As more customers deploy visual discovery tools across multiple departments, many will want to consolidate these operations to achieve economies of scale and standardize their BI environments. The only problem is that most pure-play visual discovery tools were not designed to handle enterprise deployments. Besides scalability, most vendors haven't invested significantly in failover, load balancing, disaster recovery, clustering, monitoring and administration utilities. They also haven't sufficiently addressed enterprise data management issues, such as data quality, data profiling, data transformation, metadata management and team-based development. This is where enterprise BI players offer an advantage—at least for customers who have already implemented their enterprise BI architectures. So the race is on: Pure-play vendors are busy developing enterprise capabilities, while enterprise vendors are quickly adding visualization and design functionality to catch up. ■

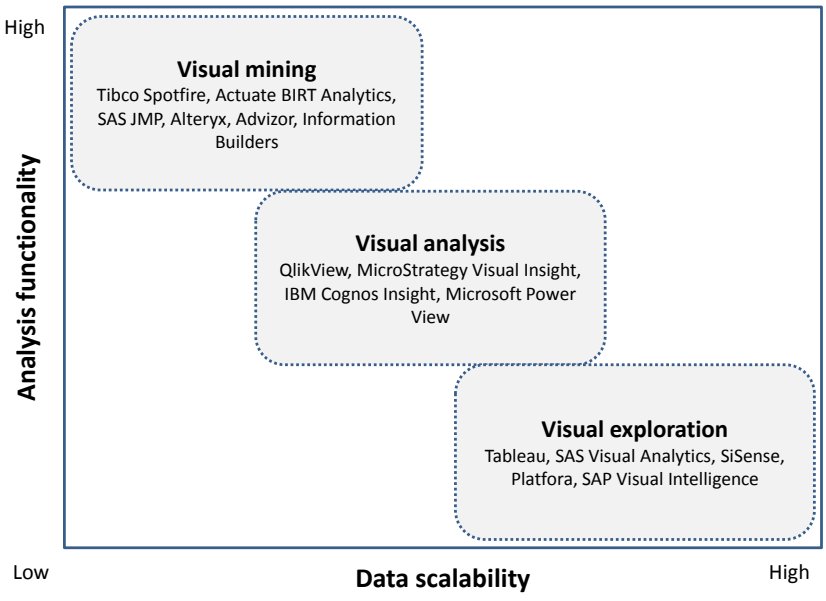
Types of Visual Discovery Tools

SO FAR I HAVE defined visual discovery tools, described their common characteristics and explained how the market is evolving. Now I will differentiate among visual discovery products so you can create a short list of vendors that make sense for your organization.

There are three types of visual discovery tools: visual exploration, visual analysis and visual mining. Vendors in each category exhibit specific traits and share similar architectures, although these distinctions are starting to fade as vendors expand their functionalities to match the competition. These segments are depicted in **FIGURE 2**.

FIGURE 2. Segments of the Visual Discovery Market

There are three segments of the visual discovery market, based on analytical functionality and scalability. These distinctions are blurring fast but will never fully disappear.



SOURCE: WAYNE ECKERSON, BI LEADERSHIP RESEARCH

1. Visual exploration. Visual exploration tools are geared toward business analysts and data scientists who need to explore large data sets. These tools excel at connecting to various source systems. They enable business analysts to model data on the fly without scripting, making them easy to deploy as long as source data is not overly complex. Tableau, one of the most visible vendors in this segment, uses an innovative visual query language, VizQL, to connect directly to most data sources using native ODBC connections to more than 30 data sources. Other exploration tools embed specialized analytical databases that support high-performance queries against large volumes of data. These products straddle the "big data analytics platform" market depicted in the BI Tools Framework in **FIGURE 1**.

2. Visual analysis. Visual analysis tools are geared toward superusers and BI specialists who want to build interactive dashboards for departmental users. In effect, they are dashboard development platforms that excel at visual design, interactive analysis, collaboration and mobile delivery. Their dominant focus is to make it easier for casual users to analyze data using interactive visualizations. These tools turn superusers into authors and analysts into developers who build elegant interactive dashboards for departmental use. Most visual analysis tools use in-memory databases as their primary data management architecture.

3. Visual mining. Visual mining tools are geared toward sophisticated business analysts or statisticians who need to create analytical models or dig deeply into the patterns of underlying data. These tools contain libraries of statistical, data manipulation and analytical functions that enable analysts to prepare data for modeling operations. Most

VISUAL DISCOVERY TOOLS

VISUAL EXPLORATION

Best known: Tableau

Comparable: SAS Visual Analytics, SiSense, Platfora

Target users: Business analysts and data scientists

VISUAL ANALYSIS

Best known: QlikView

Comparable: MicroStrategy Visual Insight, Cognos Insight, Microsoft Power View

Target users: Superusers and business users

VISUAL MINING

Best known: Spotfire

Comparable: Advizor Visual Discovery (same as Information Builders Visual Discovery), SAS JMP, Alteryx, Actuate BIRT Analytics

Target users: Statisticians and sophisticated business analysts

also embed data mining software or integrate with third-party tools, such as R, or spatial analysis packages, such as Esri's ArcGIS, to support the full analytical modeling lifecycle. Most use an in-memory database as their primary data architecture.

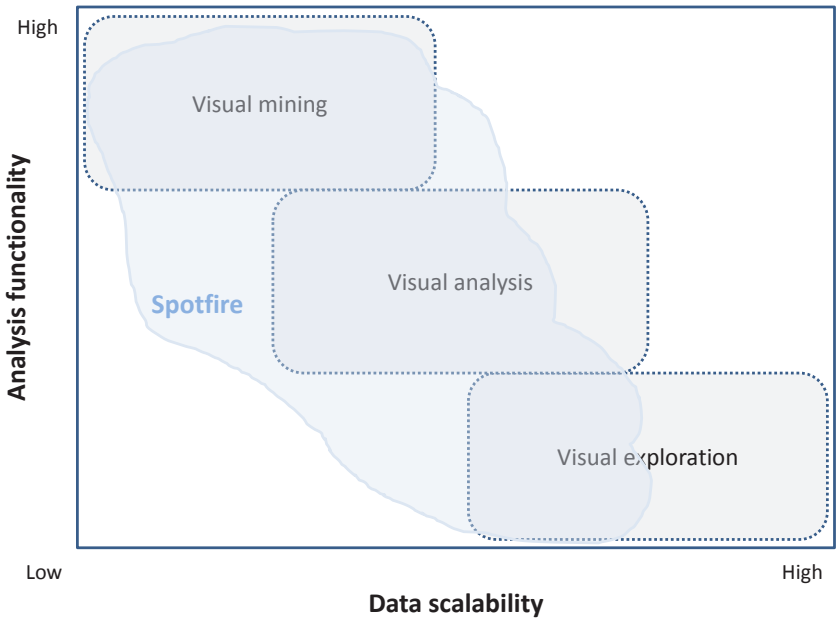
MAPPING VENDORS TO MARKET SEGMENTS

To be honest, vendors don't fall neatly into any one of the three market segments. Most span all three segments to one degree or another. The designations simply indicate clusters of strengths different vendors have.

For example, Tibco Spotfire embeds its own data mining tools and integrates with the R statistical analysis package. As such, it's classified as a visual mining vendor. But Spotfire can be used to build interactive dashboards as well as explore data. So its capabilities span all three areas but its core strength is in visual mining. **FIGURE 3** demonstrates how Spotfire maps to the three segments of the visual discovery market.

FIGURE 3. Mapping Spotfire to Market Segments

Most visual discovery vendors span all three subsegments of the visual discovery market but exhibit core strength in one of the three.



SOURCE: WAYNE ECKERSON, BI LEADERSHIP RESEARCH

Of course, vendors in the visual discovery market are acutely aware of the competition and how they stack up. Consequently, most are aggressively closing the functionality gap with their closest rivals. For example, visual exploration vendors, such as Tableau, have added in-memory capabilities to offer comparable performance to QlikView and Spotfire. Conversely, QlikView and Spotfire have recently added direct query capability to compete better with Tableau as visual exploration tools.

Two of the oldest visual discovery tools, QlikView and Spotfire, were both invented in Sweden, where visual design is a cultural hallmark (think "Scandinavian design").

In a few years, these three segments will virtually disappear as vendors offer comparable functionality, at least on paper. Every vendor will report nearly identical capabilities on a functional matrix in a request for proposal. But after 20 years of evaluating commercial software, I've discovered that vendors never stray far from their origins. They will shine in their areas of initial strength and fall short of the competition in their areas of initial weakness. For example, Tableau will likely always offer superior data exploration capabilities, while it may never catch up with QlikView in publishing or Spotfire in mining.

PURE-PLAY VERSUS ENTERPRISE VENDORS

The market for visual discovery tools is neatly divided into pure-play and enterprise vendors. Pure-play vendors only sell visual discovery tools, while enterprise vendors also offer a comprehensive BI stack, and in some cases, other enterprise software as well (see **TABLES 1** and **2**).

With two exceptions—Platfora and SAS JMP—pure-play vendors are also the most mature; they have been shipping visual discovery software much longer than enterprise vendors, most of which entered the market just last year. In contrast, QlikView shipped in 1993 and Spotfire in 1996. Curiously, these two tools were both invented in Sweden, where visual design is a cultural hallmark (think "Scandinavian design").

Mature pure-play vendors offer superior visualization and analytical functionality, while enterprise vendors offer better enterprise management capabilities. Enterprise vendors built their visual discovery tools on an existing BI

TABLE 1.

Pure-Play Vendors Sorted by Founding Date

VENDOR	PRODUCT	LAUNCH DATE	PRIMARY ARCHITECTURE	PRIMARY TYPE
QlikTech	QlikView	1993	In-memory DBMS	Analysis
Tibco[1]	Spotfire	1996	In-memory DBMS	Mining
Alteryx	Alteryx	1997	Direct Connect	Mining
Tableau	Tableau	2003	Direct Connect	Exploration
Advizor Solutions	Visual Discovery	2003	In-memory DBMS	Mining
SiSense	Prism	2004	MPP Analytic DBMS	Exploration
Platfora	Platfora	2012	Hadoop	Exploration

(1) Tibco, an enterprise middleware vendor, acquired pure-play vendor Spotfire in 2007 but does not have any other BI tools.

TABLE 2.

Enterprise Vendors Sorted by Initial Product Launch Date

VENDOR	PRODUCT	LAUNCH DATE	PRIMARY ARCHITECTURE	PRIMARY TYPE
SAS Institute	JMP	1992	Local disk	Mining
Actuate	BIRT Analytics[2]	2003	Hybrid/in-memory columnar DBMS	Mining
Information Builders[3]	Visual Discovery[1]	2006	In-memory DBMS	Mining
MicroStrategy	Visual Insight	2011	ROLAP cubes	Analysis
IBM Cognos	Cognos Insight	2012	In-memory DBMS	Analysis
SAS Institute	Visual Analytics	2012	MPP Analytic DBMS	Exploration
SAP	Visual Intelligence	2012	MPP in-memory DBMS	Exploration
Microsoft	Power View	2012	SQL Server/SharePoint	Analysis

(2) Actuate purchased Quiterian Analytics in 2012 and relaunched the product as BIRT Analytics in February 2013.

(3) Information Builders embeds Advizor Solutions' Visual Discovery product.

stack that offers rich metadata and data management features, a scalable platform, and mature administration and monitoring utilities. As a consequence, enterprise visual discovery tools have many software dependencies; that is, customers have to purchase the vendor's enterprise BI edition to get access to the full power of the visual discovery tool (with the exception of Cognos Insight). These software dependencies effectively increase the cost and complexity of deploying enterprise visual discovery tools, except for existing customers who have already deployed the vendor's BI stack.

THE FUNCTIONALITY GAP

This gap in functionality between pure-play and enterprise vendors will close rapidly in the next three years as pure-play vendors build or acquire enterprise capabilities and enterprise vendors add better analytical and visual functionality. For example, QlikTech recently purchased Expressor, an enterprise extract, transform and load (ETL) tool to offer graphical data management capabilities to customers that are deploying QlikView on an enterprise scale. ■

ORACLE

Oracle is the only major enterprise vendor without a true visual discovery tool, Oracle Exalytics and Endeca notwithstanding. So I expect Oracle to purchase one of the pure-play vendors in the next year or two.

Evaluation Criteria

BEFORE CHOOSING A VISUAL discovery vendor, there is a host of criteria you should evaluate. I've defined seven major criteria below that can serve as a starting point for a more thorough evaluation:

1. Maturity. How many years has the product been deployed? How many active customers and partners does the product have? Does the vendor support an active marketplace of third-party add-on products and an active gallery of user-generated applications? Does the vendor offer an application programming interface for third parties to develop product extensions or embed the product in other applications, such as portals?

2. Analysis. To what degree does the tool support the full spectrum of BI analysis capabilities, from dashboarding to analysis to data mining? How easy is it to create custom metrics, calculations, hierarchies and groups and use these in comparative visualizations? Does the tool support forecasting, histograms, variance charts, correlation matrices, descriptive statistics and other calculations and functions?

3. Visualization. Is the graphical interface functional enough for power users and easy enough for casual users? Which chart types—including text—are available? How effectively does the tool suggest which chart types to apply based on the shape of the data? How easy is it to find and apply attributes to existing visualizations?

4. Design and publishing. How easy is it to design and publish interactive dashboards? To what degree can you and your team control layouts and manage user access to pages, objects and data values? How easy is it to create a presentation or briefing book and tell a story with the data? To what degree can dashboard users share content with one another and collaborate? How

much functionality is available through mobile devices, Web browsers, portals and Microsoft Office?

5. Scalability. Does the tool deliver consistently fast performance as more users and data are added to the system? Can it scale linearly as more CPU and memory are added? Does the tool connect directly to remote databases to support end-user queries? Can users toggle between in-memory and direct query modes? Can users drill from an in-memory database to data in a remote database? What level of data compression is available? Does the in-memory database run on an MPP infrastructure?

6. Data management. Does the tool offer data quality, cleansing, profiling, transformation, load and metadata management tools? Does the tool support affect analysis and lineage, that is, metadata, and enable reuse and team-based development when constructing data sets and packages?

7. Enterprise-ready. What administrative capabilities are available to support clustering, failover, recovery, load balancing, monitoring, security and administration? How well does the tool integrate with third-party utilities and applications, including other BI tools, event-driven dashboards, portals and enterprise software? How well does the product work in corporate data centers and with private cloud infrastructure? ■

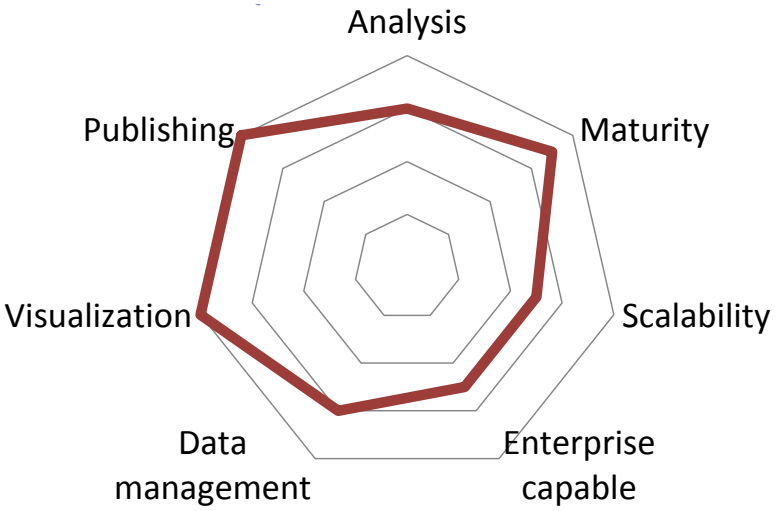
Vendor Assessments

THE FOLLOWING OFFERS a brief synopsis of vendor discovery products, with an emphasis on the best-known and most widely deployed products, QlikView, Tableau and Spotfire.

BEST KNOWN

- **QlikView.** QlikTech popularized the visual discovery segment by growing faster than any other BI vendor, culminating in a successful public offering in 2010. The company, which sells a single product, QlikView, generated $320 million in sales in 2011. With an effective departmental "land and expand" strategy and a vast partner network, QlikTech now has its sights set on dominating the even more lucrative enterprise BI market (see **FIGURE 4**).

FIGURE 4. QlikTech Evaluation



SOURCE: WAYNE ECKERSON, BI LEADERSHIP RESEARCH

QlikView's most distinctive feature is its associative graphical user interface, which displays relationships among the values of all displayed objects on a screen without excluding any of them. Conceptually, this is like an outer join of all tables in a data model, allowing any field to act as a filter or aggregation dimension. Unlike most BI tools, which narrow users' views as they drill into a data set, this associative interface enables users to view all relationships and patterns—as well as those that don't exist—at once and has resonated with business users. To cement its attractive graphical user interface, QlikTech now delivers the same interactive visual display on mobile devices and supports state-of-the-art collaboration capabilities.

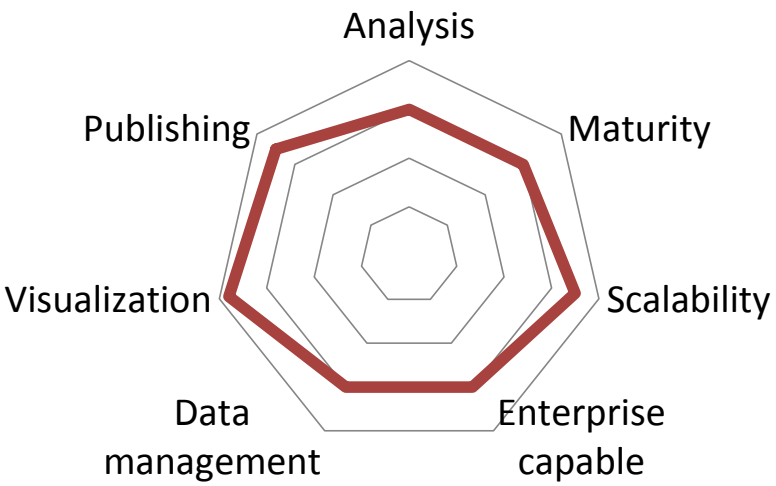
To better support enterprise deployments, QlikTech recently shipped a utility that scans and catalogs all QlikView data elements and tasks in a network, improving an administrator's ability to perform impact analyses, track data lineage and design enterprise architectures. It also recently acquired Expressor, a modern ETL tool that will minimize the need for developers to write scripts and better manage back-end data acquisition and governance processes. It also has recently expanded its in-memory architecture to support dynamic queries of remote databases, improving the overall scalability and flexibility of the environment.

■ **Tableau.** By having the right product at the right time, Tableau has doubled in size and now exceeds $100 million in revenue. Many insiders expect it to go public shortly. Tableau's direct query architecture—enabled by its unique and patented VizQL query language—makes it better suited to exploration of big data sets compared with in-memory competitors that are limited by the amount of data they can hold in memory. Tableau is also suited to exploration because it lets analysts model data on the fly without scripting (see **Figure 5**).

To round out its portfolio, Tableau shipped an in-memory columnar database in 2011 to optimize performance when source systems are bogged down or access is constrained. It also recently shipped a new data management feature that lets desktop users query predefined workbooks on the server instead of on remote databases. This feature in effect enables administrators to implement a standard metadata layer to improve information consistency in enterprise deployments.

Tableau is perhaps best known for its visualization capabilities and graphical interface that make it easy for business analysts to explore data by

FIGURE 5. Tableau Evaluation



SOURCE: WAYNE ECKERSON, BI LEADERSHIP RESEARCH

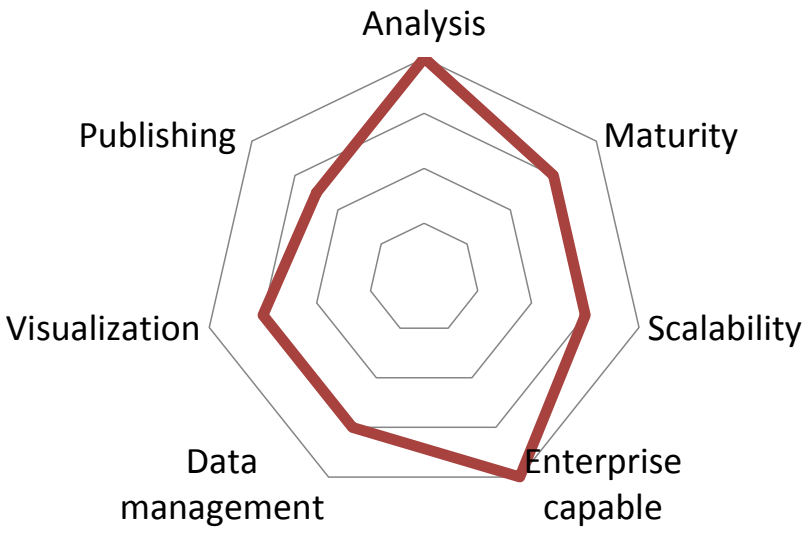
dragging and dropping attributes and metrics onto chart dimensions. The tool's ease of use and versatility is on display at Tableau Public, a free hosted website where more than 30,000 Tableau users have published workbooks that others can comment on, share or tag.

■ **Tibco Spotfire.** After its acquisition by Tibco in 2007, Spotfire lay dormant, losing ground to QlikTech and Tableau just as the visual discovery market shifted into overdrive. But now, Spotfire is gaining momentum, reasserting itself as a mature visual discovery tool that supports sophisticated analytics and enterprise deployments. IDC projected its 2010 revenues to be $68 million.

Because of its support for advanced statistics and data mining, Spotfire is heavily used by financial services firms and pharmaceutical companies. Its statistical server—which is an optional add on—provides S-Plus data mining tools, a runtime engine for R, and access to SAS data mining objects without scripting (see **FIGURE 6**).

Already well represented in the Fortune 1000 with Tibco products, Spotfire is capitalizing on its association with Tibco to further cement its enterprise credentials. For example, Spotfire integrates with Tibco Silver Fabric, a private

FIGURE 6. Spotfire Evaluation



SOURCE: WAYNE ECKERSON, BI LEADERSHIP RESEARCH

cloud infrastructure that supports load balancing, failover and dynamic provisioning of new Spotfire servers. Spotfire also integrates with Tibco tibbr, an enterprise collaboration platform, and Tibco Business Events, a complex event processing environment in which Spotfire displays real-time events and alerts. Finally, Spotfire expanded the scalability of its in-memory engine and added dynamic query capabilities to access remote data and connectivity to Hadoop and NoSQL data environments, including Attivio's Active Intelligence platform.

OTHERS

- **Actuate BIRT Analytics.** Actuate Corp. jumped into the visual discovery market last month with a gem of a product that it unearthed in Barcelona, Spain. Called BIRT Analytics, the product is a rebranded version of Quiterian Analytics, which first shipped in 2003. As such, BIRT Analytics is a fairly mature visual discovery tool that runs on a super-fast and highly scalable columnar database that leverages both memory and disk storage. As a visual mining tool, it also offers some very nice visualizations and analytical functions, including Venn diagrams, forecasting, statistical and machine learning

algorithms, and the ability to easily create derived fields and use any field or combination of fields as a filter.

- **Advizor.** Leveraging data visualization and in-memory data technology developed at Bell Labs, Advizor Solutions Inc. offers a full-featured visual discovery tool that offers some of the most unique visualizations on the market and blends them with multivariant regression algorithms to support predictive analytics. The product, which comes in desktop, Web and iPad versions, is used extensively in higher education to support fundraising activities and forms the basis of Information Builders' Visual Discovery product.

- **Alteryx.** For many years, Alteryx Inc. specialized in spatial analytics but recently extended its platform with data mining, ETL, data quality, in-memory processing, and business and industry content, and made it available via both private and public clouds. The company is now working to raise its market profile and gain traction for its new and innovative all-in-one strategy.

- **IBM Cognos Insight.** Shipped in February 2012, Cognos Insight is both a low-cost standalone Windows desktop tool with an embedded, writable in-memory database, Cognos TM1, as well as a client to Cognos Express, Cognos Enterprise and Cognos Planning. Users of the standalone version can publish their designs without alteration to a Cognos BI server edition. This tight integration enables Cognos to seed the market with the low-cost Cognos Insight product ($500) and then up-sell those customers to one of its more comprehensive BI suites.

- **Microsoft Power View.** Shipped in April 2012, Power View extends Microsoft's SQL Server Reporting Services product with interactive visualization features. The tool requires Silverlight-compliant browsers and SQL Server 2012. Users query PowerPivot models or SQL Server Analysis Services tabular models stored in SharePoint. The tool's exquisite desktop publishing features—think PowerPoint—make Power View ideal for creating visual interactive briefing books.

MicroStrategy Visual Insight. Shipped in 2011, MicroStrategy Visual Insight is a Flash-based client that is bundled for free in MicroStrategy Report Services 9.2 or later, and runs both on-premises and in the cloud. Customers use the tool to perform free-form analysis, create ad hoc dashboards and prototype

pixel-perfect dashboards. It runs against predefined MicroStrategy in-memory cubes created with MicroStrategy design tools.

■ **Platfora.** Launched in the fall of 2012, Platfora enables data scientists to analyze Hadoop data, which it loads into an in-memory cache that sits on or adjacent to a Hadoop cluster. Platfora is one of the first pure-play visual discovery tools that run against Hadoop and big data.

■ **SAP Visual Intelligence.** Shipped in May 2012, Visual Intelligence is a Windows desktop tool that runs against SAP's new HANA in-memory database. It is similar to SAP BusinessObjects Explorer, which has caused confusion among customers, except that it provides more free-form data access, transformation and charting capabilities than Explorer, which is a server-based tool that IT staffers—not business analysts—set up, design and maintain.

■ **SAS JMP.** Unveiled in 1993, SAS JMP helps statisticians better understand the shape of their data by applying a vast array of statistical functions and visualizations to desktop data sets. The company offers an advanced version that enables statisticians to create and compare predictive models. It also offers two versions for the life sciences industry, one to analyze drug development and another to analyze genomics data.

■ **SAS Visual Analytics.** Shipped in May 2012, SAS Visual Analytics can be considered a server-based version of JMP that runs on a high-performance in-memory database which sits on MPP grids from Dell and Hewlett-Packard or MPP database appliances from EMC Greenplum and Teradata. It also supports various statistical functions and report design features and is geared toward creating models against big data.

■ **SiSense Prism.** Founded in Israel in 2004, SiSense has ramped up its presence in the U.S. during the past year, claiming it's the "world's smallest big data solution." It recently showed how to analyze 1 TB of data at the speed of thought using a $750 laptop with 8 GB of RAM. The tool uses a vectorwise, columnar, in-memory database, the D3 visual library, and lightweight ETL tools. It is offered on a subscription basis via the cloud or on-premises. ■

Recommendations

BEFORE PURCHASING A VISUAL discovery tool, there are several things you should consider.

If you are a departmental buyer:

1. Identify the types of users you want to empower. If you are trying to empower business analysts and data scientists, choose a visual exploration tool, like Tableau; if you want to empower casual users, choose a visual analysis tool, like QlikView, that makes it easy to create polished interactive dashboards; if you want to empower statisticians and sophisticated analysts, choose a visual mining tool, like Spotfire, that embeds advanced analytical functions.

2. Investigate whether other departments already use a visual discovery tool. If so, you might as well join the parade and enjoy volume discounts, unless you can prove that the de facto visual discovery tool won't support your department's requirements.

3. Be ready to explain why a corporate BI standard doesn't meet your visual discovery requirements. If your corporate BI standard doesn't include visual discovery, you will need to explain why you need to deploy a nonstandard tool set. Use this report, especially **Figure 1**, to make your case that an organization needs many different types of BI tools to address user requirements, and that visual discovery is a distinct market segment best addressed with a dedicated tool.

4. Point the visual discovery tool at the data warehouse. Although your corporate data warehouse probably doesn't contain all the data you need, you don't want to risk creating duplicate data and definitions. So leverage the data warehouse and load unique local data into your visual discovery tool to

deliver all the data you need to support your requirements. This approach will appease IT staffers and make them more aware of your data requirements for the data warehouse. It will also make them better allies if your visual discovery tool hits the scalability or complexity wall and you need them to bail you out.

If you are a corporate buyer:

1. Remember that a visual discovery tool won't meet all your BI needs. A visual discovery tool does a nice job of addressing a large percentage of BI requirements, including both top-down (reporting, dashboarding) and bottom-up (ad hoc exploration and analysis) tasks. But it doesn't support ad hoc, operational and pixel-perfect reporting, relational OLAP, data mining and big data analytics. So don't expect a visual discovery tool to be your only BI purchase.

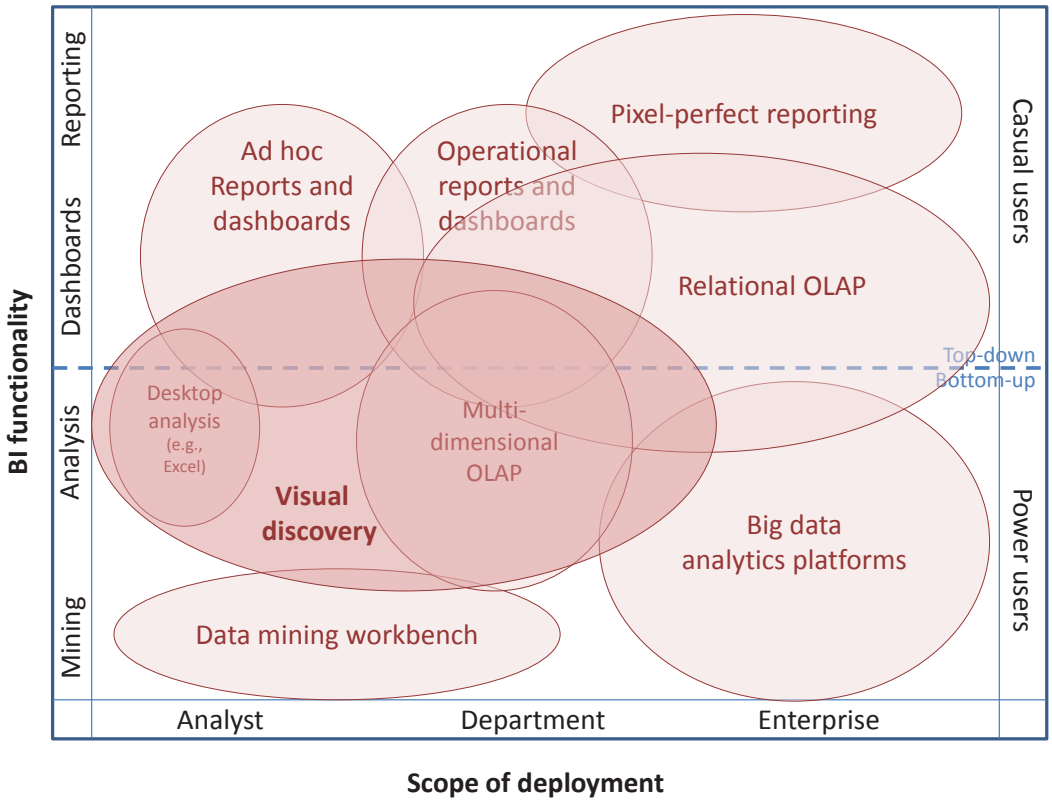
2. Evaluate the enterprise capabilities of your short list of visual discovery tools. Most pure-play visual discovery tools started life as desktop tools designed for analysts and later evolved to support workgroup and departmental applications. Most don't yet support the data management, administration and infrastructure required to support risk-free enterprise deployments. Inquire about the enterprise capabilities of your short-listed vendors.

3. Don't outlaw nonstandard visual discovery tools. First, you can't win this battle unless your corporate BI team has consistently proven that it can deliver exquisite applications on time and under budget and has no backlog of requests. Second, you should focus your team's efforts on managing data consistency rather than arbitrating tool standards. Sure, having multiple tools requires more support, but as long as users are running the majority of queries against your corporate standard data, you'll have plenty of time to support their tool requirements. ■

Appendix: BI Tools Framework

CREATED BY BI LEADERSHIP RESEARCH, the BI Tools Framework (see **FIGURE 1**) positions categories of BI tools by functionality, scope of deployment and type of intelligence (top-down versus bottom-up). To deliver a comprehensive set of BI capabilities, organizations need to implement BI products or suites that span all dimensions of the BI Tools Framework.

FIGURE 1. BI Tools Framework



SOURCE: WAYNE ECKERSON, BI LEADERSHIP RESEARCH

BI TOOLS FRAMEWORK

Here are definitions of the key terms in the framework:

- **Top-down intelligence:** This type of intelligence consists of reports and dashboards that answer predefined questions or monitor business processes using metrics aligned with strategic objectives. Top-down tools query data sets with predefined schema, including data warehouses and data marts. Top-down tools are installed, designed and maintained by the IT department but operated by power users and superusers.

- **Bottom-up intelligence:** The term refers to ad hoc analysis and mining tools that answer unanticipated questions arising from new and changing business conditions. Bottom-up tools query any type of data in any application or system and use flexible schema and rich visualizations to effectively manipulate and analyze data. Bottom-up tools are used by business analysts, statisticians and data scientists with minimal or no IT assistance.

TOP-DOWN BUSINESS INTELLIGENCE TOOLS

- **Pixel-perfect reporting:** Also called production or managed reporting tools, pixel-perfect reporting tools enable professional report developers to create pixel-perfect and complex reports and distribute them to large numbers of users on a scheduled basis.

- **Relational OLAP (ROLAP):** Such tools provide a dimensionalized view of data held in relational databases, using a combination of specialized schema and end-user metadata, that is, a semantic layer. IT developers use ROLAP tools to create interactive reports and dashboards that run against large data warehouses. Because ROLAP tools span reporting, dashboarding and analysis, they are ideal for delivering layered enterprise dashboards that provide three-click access to any data from a top-level view, assuming adequate performance.

- **Operational reports and dashboards:** Unlike ROLAP tools, which connect to data via specialized schema and architected metadata, operational reports and dashboards tools connect directly to source systems that run the business. Also called data mashups, these tools are used to create operational or

executive dashboards that monitor near-real-time business activity across multiple applications and systems. Some higher-end operational dashboards monitor real-time event streams.

- **Ad hoc reports and dashboards:** Set up by IT professionals, these tools enable motivated business users, that is, superusers, to create ad hoc reports and dashboards. Superusers create reports by selecting data elements (metrics, dimensions, attributes) from a scrubbed list of data objects (semantic layer) and then format the result set. They create ad hoc dashboards—"mashboards"—by dragging and dropping predefined content (charts, tables, controls) from a library onto a dashboard canvas. Ad hoc tools are often extensions of ROLAP or pixel-perfect reporting tools.

BOTTOM-UP BUSINESS INTELLIGENCE TOOLS

- **Desktop analysis:** Epitomized by Microsoft Excel (and now PowerPivot), desktop analysis tools are designed for business analysts who want free-form SQL access to any data and the flexibility of a desktop tool to merge, integrate and model data to answer any question they need to answer.

- **Visual discovery:** Such tools are self-service, in-memory analysis components that enable business users to access and analyze data visually at the speed of thought with minimal or no IT assistance and then share the results of their discoveries with colleagues, usually in the form of an interactive dashboard.

- **Multidimensional OLAP:** These tools store data in a specialized multidimensional format and either precalculate or dynamically calculate data values at the intersection of every level in the dimension hierarchy, providing fast query performance. Designed for business analysts, the tools require IT professionals to set up, design, load and manage the databases. They are constrained in size because of the explosion of data caused by the calculation of dimensional values.

- **Data mining workbench:** These tools provide a drag-and-drop development environment for statisticians who need to design, build and manage analytical models, either individually or in a team.

■ **Big data analytics platforms:** These are highly scalable analytical systems that run on grids of computers, including Hadoop and MPP database appliances, and contain libraries of analytical functions that enable statisticians and data scientists to explore, manipulate and model large volumes of data without having to move the data to a workstation or departmental server. They also support analytical sandboxes that enable analysts to upload private data and mix it with corporate data to conduct analyses. ■

ABOUT BI LEADERSHIP RESEARCH

BI Leadership Research is an education and research service run by TechTarget Inc. that provides objective, vendor-neutral content to business intelligence (BI) professionals worldwide. Its mission is to help organizations make smarter decisions through the judicious use of data-driven technologies, such as data warehousing, BI, analytics and big data. Its team of experienced industry analysts conduct in-depth research on industry trends, evaluate commercially available software and host conference events, webcasts and seminars.

ABOUT TECHNOLOGY GUIDES

Technology Guides from BI Leadership Research are designed to help BI leaders craft a short list of vendors to evaluate a product in an emerging BI market segment before purchasing it. Each report defines the segment, describes the salient market and technology trends, defines criteria for evaluating products and positions products against one another. Each report evaluates between six and 12 vendors and compares their market strategies, architectural approaches and product differentiators. Although Technology Guides can help narrow down product choices, they are no substitute for a proof of concept that assesses vendor products using an organization's internal data.

ABOUT THE AUTHOR

Wayne Eckerson is the director of BI Leadership Research and president of BI Leader Consulting, which provides strategic planning, architectural reviews, internal workshops and long-term mentoring to user and vendor organizations. He has conducted numerous research studies and is a noted speaker, blogger and consultant. He is the author of two widely read books, *Performance Dashboards: Measuring, Monitoring, and Managing Your Business* and *The Secrets of Analytical Leaders: Insights from Information Insiders*.