

# Hype Cycle for Business Intelligence, 2011

**Published:** 12 August 2011

**Analyst(s):** Andreas Bitterer

This Hype Cycle highlights the main components of today's business intelligence arena, related data management technologies and emerging trends. New entries this year include information semantic services and natural language question answering.

## Table of Contents

Analysis.....	3
What You Need to Know.....	3
The Hype Cycle.....	3
Overview.....	3
Technology Trigger.....	4
Hype Topics.....	5
The Priority Matrix.....	8
On the Rise.....	10
Collaborative Decision Making.....	10
Information Semantic Services.....	12
Search-Based Data Discovery Tools.....	14
Natural Language Question Answering.....	16
At the Peak.....	17
Enterprisewide Metadata Repositories.....	17
Business Intelligence SaaS.....	20
Visualization-Based Data Discovery Tools.....	23
Mobile BI.....	24
In-Memory Database Management Systems.....	25
Sliding Into the Trough.....	28
Real-Time Decisioning.....	28
Analytics.....	29
Content Analytics.....	30

Open-Source Business Intelligence Tools.....	32
In-Memory Analytics.....	33
Text Analytics.....	34
Interactive Visualization.....	36
Climbing the Slope.....	37
Business Intelligence Consulting and System Integration.....	37
Business Activity Monitoring.....	39
Column-Store Database Management Systems.....	41
Dashboards.....	43
Data Quality Tools.....	44
Predictive Analytics.....	46
Excel as a BI Front End.....	47
Entering the Plateau.....	49
Business Intelligence Platforms.....	49
Data-Mining Workbenches.....	50
Appendixes.....	51
Hype Cycle Phases, Benefit Ratings and Maturity Levels.....	53
Recommended Reading.....	55

## List of Tables

---

Table 1. The Three Main Areas of Innovation for Business Intelligence Technology.....	4
Table 2. Hype Cycle Phases.....	53
Table 3. Benefit Ratings.....	54
Table 4. Maturity Levels.....	54

## List of Figures

---

Figure 1. Hype Cycle for Business Intelligence, 2011.....	7
Figure 2. Priority Matrix for Business Intelligence, 2011.....	9
Figure 3. Hype Cycle for Business Intelligence and Performance Management, 2010.....	52

## Analysis

### What You Need to Know

---

The business intelligence (BI) market, although very mature, keeps reinventing itself. While the core technologies have been around for a few decades, there are always a few new capabilities entering the market that enable BI professionals to benefit from better performance, better scalability, higher adoption, more pervasive use, better user experiences, and more.

CIOs and BI strategists should use this Hype Cycle, along with its three siblings (the Hype Cycles for performance management, analytic applications and data management), to help prioritize their investments in BI and broader information management initiatives.

Collaborative decision making remains at the Technology Trigger, as the few attempts by the vendor community to promote it have not generated much traction. Mobile BI, a new entry on last year's Hype Cycle, has progressed markedly, due to the massive hype around tablets, particularly the Apple iPad. Two new entries on this year's Hype Cycle are information semantic services and natural language question answering. In addition, two entries have been added from the Hype Cycle for data management, as they play an important role in many BI implementations: in-memory database management systems (DBMSs), and column-store DBMSs.

### The Hype Cycle

---

This Hype Cycle should be read alongside its three siblings, "Hype Cycle for Performance Management, 2011" (forthcoming), "Hype Cycle for Data Management, 2011" and "Hype Cycle for Analytic Applications, 2011" (forthcoming), as these reports correspond to the major components of Gartner's BI, analytics and performance management (PM) framework: namely core BI technology, PM applications, the underlying data management infrastructure components, and subject-specific BI applications. A small number of technologies are intentionally repeated in multiple Hype Cycles if they are considered important from more than one perspective.

### Overview

Gartner's yearly survey of over 1,500 CIOs worldwide still shows BI as a top technology priority, so it comes as no surprise that BI investments continue. In fact, the recent economic downturn has increased the pressure on organizations to focus on better decision making, using BI initiatives to reduce costs, run more targeted campaigns through better customer segmentation, or detect fraud, for example. To make the most of their investments, organizations should focus on technologies with high or transformational impact, but they should still keep an eye on technologies at the Technology Trigger and on non-mainstream technology areas, as the BI market continues to show much innovation that could have a considerable impact. Many technologies and trends — such as mobile BI, discovery tools, software as a service (SaaS) and open-source BI — have the potential to disrupt the BI market significantly.

Although the BI technology market can be considered mature, it continues to evolve. BI platforms, which are obviously the major market driver, have reached the Plateau of Productivity, while many

complementary technologies are following the main development trends. Other technologies — such as business activity monitoring, predictive analytics and dashboards — are maturing quickly and have passed the Trough of Disillusionment. The most interesting part of the Hype Cycle to watch, as always, is the Technology Trigger, where emerging technologies are positioned. The number of new technologies entering the Hype Cycle demonstrates the ongoing innovation that the BI market is experiencing, despite its maturity and consolidation. Interestingly, many technologies at the Technology Trigger phase are not so much about new technical capabilities, but rather are innovations in semantics and "information understanding"; examples are enterprisewide metadata repositories, information semantic services and natural language question answering, as showcased in IBM's Watson technology. Open-source BI tools and in-memory analytics have progressed quite a bit, as these technologies have improved, adoption has increased and the vendors have gained greater visibility.

### Technology Trigger

The earliest phase on the Hype Cycle is the place to look for innovative technologies. In relation to BI, there are three main areas of technology innovation, as shown in Table 1.

**Table 1. The Three Main Areas of Innovation for Business Intelligence Technology**

Innovation Area	Technologies	Rationale
Consumerization	Search, mobile, visualization, data discovery	To drive adoption
Decision support	Collaborative decision making, predictive analytics	To extend the scope of BI beyond measurement and classification, and to apply information directly to decision making
Non-traditional data, "big data"	Content, text analytics, semantics, in-memory analytics, in-memory DBMSs, columnar DBMSs	To expand the scope of BI to new data types and sources

BI = business intelligence; DBMS = database management system

Source: Gartner (August 2011)

"Collaborative decision making," which first appeared on the Hype Cycle in 2009, is still at the Technology Trigger phase, as it will require a significant cultural change for this technology to be widely adopted. Gartner is aware of some hype about this term from vendors such as SAP and IBM, but general adoption remains very low. Organizations must bear in mind that adding collaborative functionality to BI platforms, while useful, is not enough to deliver collaborative decision making.

The focus area for new technology entrants in 2011 is semantics. Both information semantic services (a new entry on the Hype Cycle) and enterprisewide metadata repositories (an updated entry) are clearly targeting the "meaning of information." The much talked about victory of IBM's

Watson computer on the television show "Jeopardy" has prompted us to add natural language question answering to the Hype Cycle. While being described by IBM as a proof-of-concept technology, Watson and its "brute force" approach to finding answers may eventually find its way into BI technology, which is similarly intended to provide answers for decision making.

## Hype Topics

Last year's newcomers, mobile BI and analytics, have progressed significantly along the Hype Cycle. Both terms have been used by vendors and users for some time, but only in the last 12 to 18 months have market developments pushed the associated technologies into the spotlight. Mobile BI has been the subject of incredible hype from the BI vendor community following the arrival of user-friendly and graphically rich devices such as Apple's iPhone, Android smartphones and, more recently, the Apple iPad. Analytics became a center of attention after IBM's acquisition of SPSS. Many vendors that traditionally considered themselves providers of BI platforms are dropping the "business intelligence" moniker and attempting to differentiate themselves by using "business analytics" instead. Following the hype, even small vendors are jumping on the analytics bandwagon, although their products do not do much more than build sums and averages, rather than provide highly sophisticated algorithms based on clustering, decision trees, correlation engines or neural networks. The term "analytics" has been used loosely for years (see "Clarifying the Many Meanings of 'Analytics'"), and is now used in marketing campaigns by every vendor, whether or not they define or explain it.

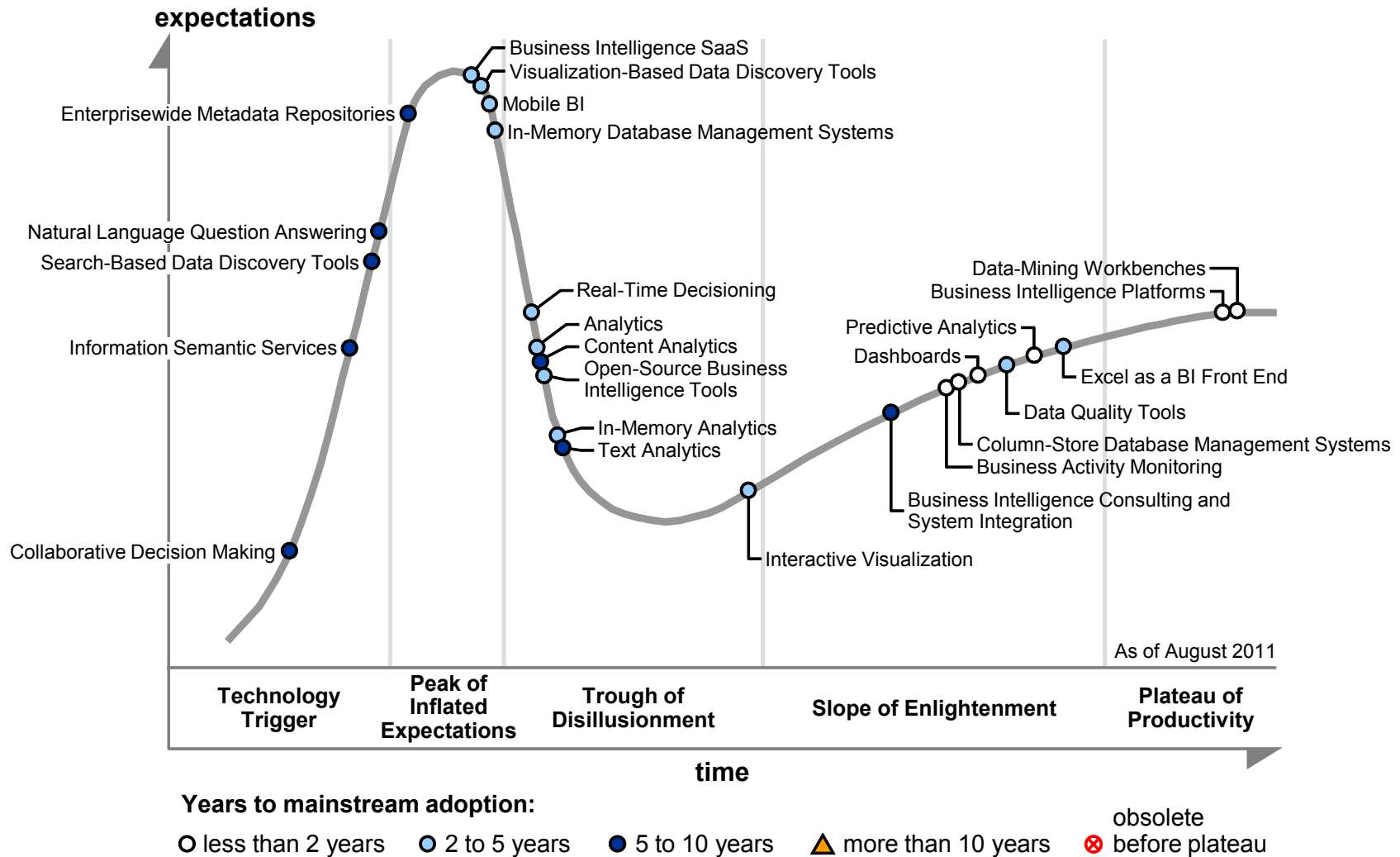
Another relatively new approach to BI is through SaaS, a technology that we position at the peak of the Hype Cycle. Although there seems to be very little demand from Gartner clients to invest in BI SaaS, more and more mainstream vendors are offering their reporting or analysis capabilities to the market using this hosted model. Unsurprisingly, this makes up only a tiny part of their business. Demand from end-user organizations remains very low for a variety of reasons, such as concerns about security and privacy, legal restrictions, data volumes, and most importantly, trust in the vendor. Large organizations in particular do not plan to outsource their data warehouse (DW) and its affiliated technologies. It is mostly small and midsize businesses that use hosted applications, such as CRM and Web analytics, and which are using the reporting services as part of the hosted model. While the BI community has been slow to embrace alternative delivery models, the SaaS model makes sense for midsize organizations that lack a large IT staff, but still need to meet comprehensive BI requirements. The real opportunity for SaaS-based BI is not as a wholesale replacement for an existing data warehouse or BI program but to enable a narrowly scoped application. The best example of this is website analytics. SaaS provides a great way to enable organizations to do website analytics. We expect to see more domain-specific analytic applications delivered via SaaS for easy delivery and consumption. Another emerging example of this is industry analytic services where information from trusted data aggregators is combined with analytical expertise and delivered via a SaaS application.

Although not a core BI technology, data quality tools play an important role as a BI insurance policy. However, data quality remains a challenge for almost every organization and should be considered a top priority in every BI or performance management initiative. Poor data quality has an adverse effect on an organization's efficiency and can jeopardize what are often large investments in data warehousing, BI and PM. Data quality tools are maturing, and investment in this area —

accompanied by the necessary cultural changes and the introduction of a data stewardship program — has an obvious impact on the quality of decision making, increasing the trust in information provided by reporting, analysis and PM applications.

Open-source BI technology still has a relatively low adoption rate but it is steadily increasing, particularly through its inclusion in OEM solutions by independent software vendors and system integrators. However, open-source BI still suffers from some technology gaps, compared with commercial offerings. For most Global 2000 enterprises, open-source BI is rarely considered an option for enterprisewide deployments. However, available open-source offerings are increasingly considered "good enough" for, and their low entry price makes them attractive to, smaller organizations and for departmental solutions. However, although some vendors position themselves as open-source providers, gaining full functionality from the BI platform means paying a license or maintenance fee. The most obvious difference, though, is the entrenched nature of the traditional BI platform vendors that dominate the market. While open-source BI has advanced beyond a grassroots movement, decision makers continue to rely mostly on BI software from the established brands. At the same time, while central BI and PM teams and architects are not shifting to open-source solutions, it is quite common for open-source software to grow outside central BI teams by becoming embedded in various application development initiatives. To counter the threat from open-source BI vendors, commercial providers have started to offer "freemium" versions of their BI platforms, some of which are limited by number of users or functionality.

Figure 1. Hype Cycle for Business Intelligence, 2011



Source: Gartner (August 2011)

## The Priority Matrix

---

To help organizations prioritize investments in relation to their level of impact, we provide a Priority Matrix (see Figure 2), although impact is not the only consideration when selecting vendors and products — applicability, budget, time to implement and receive payback, and return on investment are also important considerations.

Vendors are enabling BI with a wide variety of technologies, in different ways and at different rates. The Priority Matrix shows the degree of benefit attainable relative to a technology's progression along the Hype Cycle. It is intended as a general guide because the benefits from, and the maturity of, any technology depend partly on industry conditions and the organization's ability to use the technology effectively.

The Priority Matrix shows technologies in the following categories:

- **Transformational benefit, less than two years to mainstream adoption.** These technologies are ready to be deployed today and provide instant benefits. Column-store DBMSs, while not a new technology, have finally been recognized by the wider BI community; their high-performance capabilities and compression ratios make them ideal BI infrastructure components.
- **Transformational benefit, two to five years to mainstream adoption.** These technologies are fundamentally changing the way BI is consumed, but are suitable for every BI scenario. Similar to column-store DBMSs, in-memory DBMSs leverage rapid technology advancement to increase the performance of a BI platform. The limiting factor is the amount of memory that can be built into a system.
- **Transformational benefit, five to 10 years to mainstream adoption.** These technologies are aimed at changing the way organizations interact with information. Because of a required cultural change, collaborative decision making or content analytics will take a while before broad adoption, but will have transformational influence on how users consume, share and analyze information.
- **Transformational benefit, more than 10 years to mainstream adoption.** These technologies can enable a transformational change to an organization's BI initiatives. Because of the high complexity of delivering information infrastructures, investments in this area are more strategic in value than tactical. This Hype Cycle has no technologies in this area.
- **High benefit, less than two years to mainstream adoption.** These technologies are, without exception, mature and on, or approaching, the Plateau of Productivity. They may be applicable to a specific function or role, such as executive dashboards or data mining, or they may address wide user requirements for a large number of constituents, such as BI platforms.
- **High benefit, two to five years to mainstream adoption.** These technologies have been around for a number of years and are deployed in mostly Type A organizations. Interactive visualization and data quality tools and real-time decisioning are found here. Also, investment in analytics is considered to deliver high benefit in the midterm.



- **High benefit, five to 10 years to mainstream adoption.** These technologies are more strategic and require long-term planning and incremental investment. Technologies in this group enable improvements to broad BI and analytics initiatives in various domains; they include content analytics and search-based data discovery tools.
- **High benefit, more than 10 years to mainstream adoption.** This Hype Cycle has no technologies in this area.
- **Moderate benefit, two to five years, or five to 10 years, to mainstream adoption.** These technologies add incremental benefits to existing BI deployments. Depending on the time frame, they can be implemented with existing tools (for example, Microsoft Excel), or require new devices (for example, mobile BI) or a new BI delivery model (for example, open-source software or SaaS).
- **Low benefit.** Technologies in this group are not viewed as large contributors to BI and PM initiatives. Therefore this Hype Cycle has no technologies in this area.

Figure 2. Priority Matrix for Business Intelligence, 2011

benefit	years to mainstream adoption			
	less than 2 years	2 to 5 years	5 to 10 years	more than 10 years
transformational	Column-Store Database Management Systems	In-Memory Database Management Systems	Collaborative Decision Making Natural Language Question Answering	
high	Business Activity Monitoring Business Intelligence Platforms Dashboards Data-Mining Workbenches Predictive Analytics	Analytics Data Quality Tools Interactive Visualization Real-Time Decisioning	Business Intelligence Consulting and System Integration Content Analytics Enterprisewide Metadata Repositories Search-Based Data Discovery Tools Text Analytics	
moderate		Business Intelligence SaaS Excel as a BI Front End In-Memory Analytics Mobile BI Open-Source Business Intelligence Tools Visualization-Based Data Discovery Tools	Information Semantic Services	
low				

As of August 2011

Source: Gartner (August 2011)

## On the Rise

---

### Collaborative Decision Making

**Analysis By:** Rita L. Sallam

**Definition:** Emerging collaborative decision making (CDM) platforms combine business intelligence (BI) with social networking, collaboration and decision support tools/algorithms and models to help knowledge workers make and capture higher quality decisions.

CDM improves the quality, transparency and auditability of decisions by bringing together the right decision makers and information, assisted by the relevant decision tools and templates to examine an issue, brainstorm and evaluate options and agree on a course of action and then capture the process to audit and mine for best practices.

Operational decisions that can be made based on well-known decision logic and business rules and are highly structured, predictable and repeatable (such as loan approvals and fraud detection, or real-time decisions about promotions and offers), can be automated by embedding decision rules and workflow in analytic applications.

However, collaborative decision making fills the gap in decision support for improving tactical and strategic decisions that are less frequent in nature, but individually have a higher impact on the organization. These types of decision are typically made by knowledgeable workers who are often managers and they involve iterative thinking, ad hoc analysis and importantly, require collaboration with others.

**Position and Adoption Speed Justification:** Collaborative decision making is currently post-Trigger 15% on the Hype Cycle because while there are no commercial offerings that comprehensively deliver on its vision, a number of products have emerged over the past two years, such as Decision Lens, SAP StreamWork, IBM Lotus Connections, Microsoft SharePoint, Lyzasoft and Purus integrate multiple pieces and could be enhanced to enable a broader CDM vision.

Over the past year in particular, we have seen these vendors enhance their collaboration and social capabilities, add decision tools and in the case of SAP StreamWork, provide integration with SAP's enterprise applications. Moreover, a number of business intelligence vendors, such as QlikTech and Panorama are adding social software capabilities to their BI platforms to facilitate collaboration among decision makers around specific BI content (such as the ability to collaborate on a result in a dashboard or a specific analysis), with many more BI vendors planning to release similar capabilities over the next year.

Gartner characterizes these initiatives as collaborative BI, which is a small part of what a broader CDM platform would enable, but nonetheless, is a step closer toward broad and deep support for collaborative decision making.

While many vendors already provide the capability for users to tag comments to specific reports, analysis or dashboards, collaborative BI also includes social capabilities to find the right people (based on social profiles), to include in a discussion thread to comment, rate and blog on a specific

result and then dynamically recommend additional analysis based on past user behavior and similar content.

In collaborative BI the focus is really on the BI artifact, such as a performance measure or query result. In collaborative decision making the focus is on the decision itself, such as "do we change our pricing model or hire more employees?" A complete environment for CDM now is likely to require some custom integration and development. However, technology is not the barrier to collaborative decision making.

Most large IT organizations could customize a social software environment with some basic templates for decision making that visually depict a decision, options, pros/cons and tags to relevant information. The real challenge to CDM adoption is cultural. This just isn't how most companies make decisions and will tend to be adopted in more progressive companies that eschew the traditional hierarchical style of management.

Gartner believes that CDM will continue to ascend the Hype Cycle during the next 18 months because much of the technological foundation is in place to support this use case. Additionally, recent high-profile decision-making failures in the public and private sector have acted as a catalyst for improved decision quality and transparency. Finally, software vendors have a vested interest in promoting collaborative decision making to increase the value of their respective BI, collaboration, decision tools and performance management and information management software.

Typical BI and performance management deployments emphasize information delivery and analysis to support fact-based decision making, but information from these systems and other decision inputs are typically disconnected from collaboration around decisions and the decision-making process and outcome. Many BI and performance management vendors have plans to begin to change this by adding new collaboration and social software capabilities to their platforms in upcoming releases.

Capturing this thread with decisions made and connecting it to BI and performance management systems extends their business value. The technology exists, users have the need and vendors have a vested interest to supply it. However, there are barriers, particularly cultural and organizational issues, that may resist more transparent decision making. To overcome these barriers requires companies to embrace the consensus-driven leadership that CDM can ignite.

**User Advice:** The following considerations are important when instigating CDM platforms:

- Find a senior executive willing to sponsor cultural change in support of fact-based, transparent decision making. This champion should excel at collaboration and the use of BI and analytics in decision making.
- Demonstrate the value of CDM through pilot projects, decision audits and simulations. Linking decisions to performance metrics, documenting and training decision makers on decision-making best practices and using BI in trade-off decisions, will further demonstrate the value of CDM and build cultural acceptance of decision optimization as a core competency.
- Provide incentives for decision collaboration and transparency to help reduce resistance.

**Business Impact:** Collaborative decision-making platforms can dramatically improve the quality and auditability of decision making by alerting decision makers to events and changing patterns that indicate an early need to act.

These include:

- Incorporating the right decision makers and information into a decision.
- Capturing collaboration.
- Establishing what information and assumptions were used to make decisions.
- Providing tools to optimize decisions.
- Alerting decision makers to best practices that reduce decision bias.
- Incorporating group thinking and identifying the factors in decisions that most affect the outcome.

**Benefit Rating:** Transformational

**Market Penetration:** Less than 1% of target audience

**Maturity:** Emerging

**Sample Vendors:** Decision Lens; IBM; Lyzasoft; Microsoft; Purus; SAP BusinessObjects

**Recommended Reading:** "Tutorial for Collaborative Decision Making"

"The Rise of Collaborative Decision Making"

"Overcoming the Gap Between Business Intelligence and Decision Support"

### Information Semantic Services

**Analysis By:** Mark A. Beyer; Yvonne Genovese; Ted Friedman

**Definition:** Information semantic services are a layer of services that provides a specific entry or "gate" into information management functions or capabilities. Information semantics follow styles or approaches, and those approaches support specific assumptions on how an application interfaces with the data it uses. Categories of information semantic services include:

- Dedicated applications — Assume they have priority and the authority to manage the underlying information — e.g., legacy applications.
- Registry — Applications assume the authority for management is derived from governance processes in other data handlers — e.g., reading from other applications, master data management (MDM) or ERP.
- Consolidation — Applications assume the authority to collect and collate information in a physical repository — e.g., data integration and data warehouse.

- External — Applications read data from another single source of information governance, usually external to the organization but can be external to the application — e.g., reading from an ERP app.
- Auditing — Applications read metadata or data as created in a governance model (e.g., taxonomy/ontology), and use comparative analysis (e.g., business intelligence).
- Orchestration — Applications use a convergence of multiple information assets, including reformatting or enrichment, as needed — e.g., complex-event processing.

**Position and Adoption Speed Justification:** Information semantic services are basically rule engines that indicate the balance of application rights to manage data with the business process demand to define and manage master data assets, as well as all information assets. Simply put, if an application is designated as the authoritative source for a given information asset, then it has a dedicated style of semantic interface, and all other processes and applications using that information are subordinate to its internal management rules.

On the other hand, if multiple business processes need a shared-governance model over even more applications, then a consolidation, registry or even external semantic style of interface is needed to deploy effective business rules. Throughout 2011 and beyond, composites of fine-grained services, in combination with coarse-grained services, must be used to reflect the business-process-driven information governance model.

When data governance rules are declarative, absolute and managed centrally, it's possible to write coarse-grained services or even create a silo of information management (in an application, a centralized MDM program or using an external source, such as postal information). When data governance rules are decentralized and collaborative, information services are more fine-grained and the semantic services have the job of creating the appropriate composite approach for each application. Importantly, tools and solutions are emerging in the market to enable semantic management among information artifacts that were previously considered too difficult, obscure or proprietary to a given application (see "Duet Enterprise by Microsoft and SAP Unlocks User-Centric ERP With SharePoint").

Significant barriers include legacy applications, issues with information abstraction (such as ontology and taxonomy resolution) and a reluctance by organizations to adopt formal business process modeling (to demonstrate reusable application flows). Organizations should not try to implement sweeping replacements of legacy systems with loosely coupled, independent services in their information management architectures. Rather, organizations should create a targeted approach to experiment with each of the six semantic styles and combinations of them.

**User Advice:** Continue to build the data service layer with a downward orientation toward the file management and repository needs. The proper abstraction of information assets and the appropriate management of metadata will enable a more flexible future architecture.

Pursue a more formal business process design and documentation standard in the organization to promote the identification of shared application processing flows. When business processes cross, their information and their information processing flows cross as well. The advice here refers to

reviewing and modeling business process flows, not enterprise data objects, such as those addressed in MDM.

Evaluate application development platforms and data management and integration — such as database management systems, data integration tools, data modeling tools and metadata tools — for their ability to share metadata, call external services and the commonality of the developer's interface. Interoperability of development tools should be a highly rated selection criteria.

**Business Impact:** Overall, the business impact remains limited, due to the reluctance of business management to define information assets, which is necessary for sharing assets across what are frequently highly diverse business processes, as well as the reluctance of IT organizations to revise legacy and production systems. The ability to model processes by the business and have tool-based change detection processes in place to inform IT will decrease the time to delivery for new information processing demands. Similarly, by placing process modeling at the center, the true owner of information assets — the process, not people applications or databases — begins to push requirements simultaneously to the information design and the application design. This prevents the inappropriate subordination of the information to application flows, or the reverse, from taking place. However, shared application flows also means shared ontology is equally important, including identifying when assumed ontological sharing is incorrect.

This architectural approach and its incumbent design demands help businesses identify gaps in their knowledge regarding business processes and in identifying inappropriate linking. The design of information assets becomes a business process clarification exercise.

**Benefit Rating:** Moderate

**Market Penetration:** Less than 1% of target audience

**Maturity:** Embryonic

**Recommended Reading:** "Duet Enterprise by Microsoft and SAP Unlocks User-Centric ERP With SharePoint"

"The Emerging Vision for Data Services: Logical and Semantic Management"

### Search-Based Data Discovery Tools

**Analysis By:** James Richardson; Whit Andrews

**Definition:** Search-based data discovery tools enable users to develop and refine views and analyses of structured and unstructured data using search terms. Like visualization-based data discovery tools, they have three attributes: (1) a proprietary data structure to store and model data gathered from disparate sources, which minimizes reliance on predefined business intelligence (BI) metadata; (2) a built-in performance layer using RAM or indexing that lessens the need for aggregates, summaries and pre-calculations; and (3) an intuitive interface, enabling users to explore data without much training. However, as well as having a broader scope (visualization-driven data discovery tools focus exclusively on quantitative data) they differ at the user interface layer, with

search-based data discovery tools using text search input and results to guide users to the information they need.

**Position and Adoption Speed Justification:** Search-based data discovery tools have been around for some years, but they have not been taken up as quickly as their visually driven cousins — and there is some activity to suggest the two may come together eventually as one category. Although the use of search to find pre-existing BI platform artifacts (such as reports) is becoming more common, the broader use of search as a means to explore varied data types in a more free-form manner remains low. While the inclusion of key word search of BI platform objects and object content (reports, queries, dashboards, metadata including keywords, date, time, author and so on) is a valuable addition to standard BI interactions, this does not constitute search-based data discovery, which covers a broader set of use cases, specifically with respect to unstructured and semi-structured data.

**User Advice:** BI managers wanting to give users the chance to go beyond the analysis and reporting of structured data alone should examine the potential use of search-based data discovery tools (for more information on combining BI and search, see "Integrating BI and Content Analytics Gives Better Results Than Using Them Separately"). In addition, firms looking to make BI more pervasive might consider using these technologies, as they make it easier for workers not accustomed to traditional BI tools to find the information they need to make decisions. However, BI leaders should consider how they'll fit search-based data discovery into their BI solution architecture and, more widely, how it relates to their enterprise search tools, by working with the IT staff (often remote from BI) that "own" search in the organization. It should be noted that the evaluation and adoption of search-based data discovery is something that IT must drive as, unlike visualization-based data discovery tools, these products tend not to be sold directly to individual lines of business, so this technology is unlikely to self-propagate without IT leadership.

**Business Impact:** The business impact of search-based data discovery technology is potentially significant, as it can extend the frame of reference beyond that commonly associated with BI and help drive adoption in areas resistant to normal models of interaction with data. Critically, search-based data discovery can unify fact and context, enabling users to explore the "what" and the "why" in one step; for example, using search to combine a classic structured query with qualitative, often external, information (for example, "show my 50 best performing products by revenue and region with associated online reviews and ratings"). In addition, it can assist users who would normally be too intimidated to use an ad hoc query tool, but who are quite comfortable with a search engine, to find the information they need in a structured database.

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Attivio; Endeca; IBM; Information Builders; SAP BusinessObjects

**Recommended Reading:** "The Rise of Data Discovery Tools"

## Natural Language Question Answering

**Analysis By:** Whit Andrews

**Definition:** Applications that provide users with a means of asking a question in plain language that a computer or service can answer with a meaningful response in a reasonable time frame.

**Position and Adoption Speed Justification:** IBM's virtuosic performance with its Watson application-computer combination on television quiz show "Jeopardy" was enormously successful from a marketing perspective and captured the attention of the world. It was a benchmark in the progression toward cognitively effective reasoning by artificial actors. It joins a long line of immediately fascinating if broadly constrained custom-made knowledge calculation devices. (Another example is Wolfram Alpha, a Web answer engine that converts queries to mathematical values and does some natural language analysis.) However, the challenges in effective interpretation of idiomatic interrogative speech, matching it to knowledge bases of potentially infinite scope, and the selection of a limited number of answers (even just one) remain profoundly difficult. Simple answers such as the one answer available for a trivia question are far easier than the multivariate, nuanced answers inherent in real human communication (cold or flu? why not cold AND flu!).

Solutions ultimately must discover means of communication with humans that are intuitive, effective, swift and dialogic. The ability to conduct even a brief conversation, with context, antecedent development and retention, and relevancy to individual users is well beyond conception — for now. However, non-conversational, information-centered answers are indeed already possible, with the right combination of hardware and software, and surely as in all technology categories, the availability of such resources can only become cheaper and easier. More than five years will pass before such capabilities are commonplace in industry, government or any other organizational environment, but they will be available to leaders in such categories.

**User Advice:** The computing power required to accomplish a genuinely effective trivia competitor is great, but will become more accessible with time. Any projects founded on such facility must be experimental, but in the foreseeable future will include diagnostic applications of many kinds, as well as commercial advice and merchandising and strategic or tactical decision support. "Augmentation" is the key thought. No decision support application springs, fully formed, from the ether — it will be expert humans who build it, design the parameters and develop the interface, and humans will, similarly, evaluate its advice and decide how to proceed.

**Business Impact:** Ultimately, the ability for line workers or unschooled consumers to achieve effective responses from machines without using expertise in framing queries (which is the necessary case even in simple-interface applications such as Google.com) will generate new kinds of information exploitation by diminishing information friction yet more. Given a limited set of answers and an effective means of capturing plain language requests, it is easy to see computers more effectively providing guidance in various environments.

**Benefit Rating:** Transformational

**Market Penetration:** Less than 1% of target audience

**Maturity:** Emerging



**Sample Vendors:** Autonomy; EasyAsk; IBM; Wolfram Alpha

At the Peak

---

## Enterprisewide Metadata Repositories

**Analysis By:** Mike Blechar

**Definition:** Gartner defines metadata as "information that describes various facets of an information asset to improve its usability throughout its life cycle." Generally speaking, the more valuable the information asset, the more critical managing the metadata about it becomes, because the contextual definition of metadata provides understanding that unlocks the value of data. Examples of metadata are abstracted levels of information about the characteristics of an information asset, such as its name, location, perceived importance, quality or value to the organization, as well as its relationship to other information assets.

Metadata can be stored as artifacts in "metadata repositories" in the form of digital data about information assets that the enterprise wants to manage. Metadata repositories are used to document and manage metadata (in terms of governance, compliance, security and collaborative sharing), and to perform analysis (such as change impact analysis and gap analysis) using the metadata. Repositories can also be used to publish reusable assets (such as application and data services) and browse metadata during life cycle activities (design, testing, release management and so on).

In "The Eight Common Sources of Metadata" we explore a range of solutions to meet "enterprisewide" metadata management needs. These include several categories of metadata repositories, such as those used in support of tool suites (tool suite repositories), project-level initiatives and programs (community-based repositories), and those used to federate and consolidate metadata from multiple sources (enterprise repositories) to manage metadata in a more "enterprisewide" fashion. Here we focus on the state of the repository markets — since there are now many sub-markets — in terms of this need to federate and consolidate metadata in an enterprisewide manner.

The positioning of metadata repositories on the Hype Cycle may be surprising to some who have followed the metadata repository market since the 1970s, since most Global 1000 enterprises own one or more repositories that purport to address the need for enterprisewide metadata management. However, few organizations are using their solutions effectively in an "enterprisewide manner" to either federate their metadata across tool suite or community-based repositories, or to consolidate the metadata into one main enterprise repository. Hence the positioning of the dot is early in the Hype Cycle due to the difficulties related to integrating metadata with an enterprisewide breadth of scope.

The 1970s market of buyers of a single enterprisewide metadata repository is gone — but the need has not disappeared, especially given organizations' increased focus on information management. The growth in volume, velocity, variety and complexity of information, and the new use cases with insatiable demand for real-time access to socially mediated and context-aware information, will

dramatically increase the need for improved metadata management. And these in turn also raise new enterprisewide governance, risk and compliance needs which require more integrated (federated or consolidated) repository solutions (which is the focus of this technology summary). Unfortunately, there are no easy solutions to managing metadata on an enterprisewide basis, so, not surprisingly, there is no ideal solution in terms of the metadata repository market to meet the need at this point in time.

We are seeing more and more organizations — even those that already own enterprise repositories — acquiring several other "best of breed" repositories, each focused on different communities of users in projects and programs involving data warehousing, master data management, business process modeling and analysis, service-oriented architecture (SOA) and data integration, to just name a few "types of communities." In each case, these community-focused repositories have shown benefits in improved quality and productivity through an improved understanding of the artifacts, the impact queries and the reuse of assets, such as data and process artifacts, services and components. This has resulted in the "subsetting" of what once was the enterprise repository market into smaller "communities of interest," using solutions that are less expensive and easier to manage. However, attempting to federate metadata across multiple repositories to provide an "enterprisewide view of metadata" is no simple task — and why the movement of the dot on the Hype Cycle remains so slow.

Because of these metadata federation issues, enterprise repository vendors are now marketing their solutions "a piece at a time" — in other words, starting with just the subset required for the needs of the first community (for example, data warehousing) and then adding other components for the needs of the second, third and other communities (like master data management or SOA). This has the advantage of allowing each community to work within its own area of focus without having to worry about the issue of federating multiple community repositories when other communities are added. Or, in some cases, organizations are starting with the best-of-breed community repositories and, instead of federating across them, are passing subsets of metadata from each of the community repositories to an enterprise repository for consolidation and easier reporting. However, even in these cases, organizations are not reverting back to the use of enterprise repositories on the scale seen in the 1970s.

**Position and Adoption Speed Justification:** Regardless of the approach to metadata federation or consolidation, the need for enterprisewide metadata management is not being met by current technologies (and hence why we position the dot so early on the Hype Cycle). We position the adoption speed of metadata repositories as being five to 10 years from the Plateau of Productivity, because most Global 1000 companies have purchased metadata repositories that they are using on a scaled-down basis and are not yet aggressively seeking replacements. In addition, most new buyers are less sophisticated IT organizations looking to large independent software vendors (ISVs) to improve their federation capabilities before committing to the new tools.

As a result, most repository purchases have been, and will continue to be, made with more of an eye on the needs of specific communities — such as data warehousing, master data management and SOAs — rather than on the broader enterprisewide needs for metadata management. However, the biggest enabler of repositories may well be an increased focus by organizations on using data to improve business operations, which requires greater information and metadata management.

**User Advice:** Organizations should have a program and strategy which drives the focus of metadata management based on the most important information assets and use cases. They will find that the metadata for these assets resides in multiple places and formats, including tool suite repositories, community-based repositories and enterprise repositories. Where there is a lack of needed repository support, organizations should consider acquiring a community-based repository (or use a subset of an enterprise repository for each community) to enhance the metadata management capabilities of those communities.

Existing solutions may come with some limited bridging or synchronization to promote the reuse and leveraging of metadata knowledge and effort across repositories in a more federated manner. But federation has challenges, not least of which involve differences in how the metadata is defined to and managed by the disparate repositories, and cross-community governance issues over when metadata or its relationships can change and who can authorize it. Therefore, organizations must evaluate the benefits versus cost and risk for federating or consolidating their metadata beyond the current environment. Those organizations that have a need for more integrated enterprisewide management and reporting of key metadata than is possible through federation of repositories should consider supplementing their community-based repositories with an enterprise repository to support that subset of key metadata. But they should be cautious not to extend the scope too much to the point of becoming defocused and unmanageable.

Therefore, we recommend that for mainstream IT organizations, the most pragmatic approach to enterprisewide metadata management is to have multiple, community-based repositories with some limited cross-community federation and synchronization of metadata. Leading community-based metadata repositories are well positioned to meet the needs of individual communities with some limited cross-community federation. We expect competitors to emerge, including large ISVs, which will look to provide more integrated and federated metadata capabilities in their tool suites. Large vendors, such as IBM, Oracle and SAP, have, or are improving, their repository support for design-time and run-time platforms to enhance metadata management support for their development, deployment and operational environments. As a result, Gartner expects to see increased acceptance by customers, along with greater consolidation in this market, in an evolutionary manner, as they implement community-based solutions in the foreseeable future. A wild card will be how quickly cross-community metadata management needs are driven by governance, risk and compliance requirements and technologies.

**Business Impact:** By providing understanding, governance, change impact analysis and improved levels of reuse of information assets, the impact of the metadata repositories on the business can be significant.

Repositories cover an even wider spectrum of metadata/artifacts, such as those related to business processes, software components, data/information, organizational structure and services and software in support of such focus areas as application development, business process management, data architecture and data warehousing. In other words, while repositories are key to supporting enterprise information management, they also support other platforms, including those related to business process management SOA and governance, risk and compliance.

Still, the decision on how high to rate the benefits of metadata repositories is subjective, because it is possible to manage metadata in multiple technologies without a repository. Therefore, it could be argued that the other technologies deserve a high business impact rating, and that the metadata repositories deserve a low or moderate rating because they are simply a supplementary technology. However, when looking at the breadth of problems in trying to manage metadata across tools and architectures, especially in terms of the challenges of metadata governance, compliance and risk, it is pragmatically difficult to accomplish without addressing enterprisewide metadata management using repositories. This is why compliance laws (such as the Sarbanes-Oxley Act in the U.S.) specify the need for a metadata repository; hence the "high" benefit rating we ascribe to this technology.

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Sample Vendors:** Adaptive; ASG Software Solutions; Data Advantage Group; IBM; Oracle; Software AG; SOA Software

**Recommended Reading:** "Gartner Clarifies the Definition of Metadata"

"Metadata Business Threats and Opportunities, 2H10-1H11"

"Metadata Management Technology Integration Cautions and Considerations"

"Best Practices for Metadata Management"

"Metadata Management Trends in Master Data Management and Data Warehousing"

"Applying Data Mart and Data Warehousing Concepts to Metadata Management"

"Metadata Management Is Important for MDM's Long-Term Success"

## Business Intelligence SaaS

**Analysis By:** Neil Chandler

**Definition:** Software as a service (SaaS) is owned, delivered and managed remotely by one or more providers. The provider delivers an application based on a single set of common code and data definitions that is consumed in a one-to-many model by all contracted customers anytime on a pay-for-use basis, or as a subscription based on use metrics. SaaS-based business intelligence (BI) enables customers to quickly deploy one or more of the prime components of BI without significant IT involvement or the need to deploy and maintain an on-premises solution. The prime components are:

- **Analytic applications** — support performance management with prepackaged functionality for specific solutions, such as Webtrends for Web analytics, Adaptive Planning and Host Analytics for corporate performance management (CPM), and Inform (part of SuccessFactors) for

workforce analytics, which are industry analytics services that deliver industry-specific performance benchmarks and analytical capabilities.

- **BI platforms** — provide a development and integration environment, information delivery and analysis, such as SAP BusinessObjects and SAP Crystal Reports for reporting, as well as platforms from PivotLink, Birst and Oco (acquired by Deloitte in May 2011).
- **Information management infrastructure** — provides the data architecture and data integration infrastructure, such as Informatica for data and application integration, Pervasive Software and 1010data for database management, and Oco for broad data management.

**Position and Adoption Speed Justification:** Initially, the on-demand vendors focused on CRM applications, such as salesforce.com and Siebel CRM On Demand; travel expense management, such as Concur; and Web analytics software, such as Webtrends and Google Analytics. SaaS-based BI enables business users — particularly small or midsize businesses (SMBs) and enterprise departments — to quickly and easily implement solutions. These solutions can provide front-end reporting and analysis, as well as back-end integration and data management, without significant IT involvement. Lower startup costs, easier support without an IT contribution and easier deployments, rather than sophisticated functionality, are driving the adoption of SaaS-based BI.

During the past few years, there has been considerable growth in the number of vendors offering BI as a service, including SAP BusinessObjects, SAS, IBM Cognos Now!, PivotLink, Oco, Dimensional Insight and OnDemandIQ. The percentage of revenue from products that offer BI as a service has also grown significantly, although it remains small, compared with the overall BI platform market. There is a conflict between the compelling value proposition that SaaS BI provides (the ability to create BI solutions in a scalable manner without an upfront investment) and the two primary barriers to SaaS-based BI:

- Trusting data to a third party.
- Overcoming the inertia involved with moving to a new architecture.

Now that the core BI markets are better-established, vendors have turned to other areas, such as performance management, and on-demand vendors have started to gain momentum. Although SaaS-based BI is still a growing market, it has passed the Peak of Inflated Expectations, and we have seen a considerable increase in the number of independent offerings (including Birst and PivotLink), and in client acceptance of this form of pricing and delivery model. Service providers are gearing up to provide BI and analytics as a service, such as Deloitte purchasing Oco.

The expected benefits for these types of solutions are now marketed more realistically, with long-term total cost of ownership (TCO) less than on-premises, but not by the margins originally claimed (see "BI Platforms User Survey, 2011: Customers Rate Their BI Platform Vendor Cost of Ownership"). However, with the exception of the SAP BusinessObjects OnDemand products, none of the major BI platform vendors has a significant presence with BI as a service offering in the market. Nonetheless, larger leading vendors are beginning to pursue SaaS-/cloud-based strategies, with most building interoperability with cloud computing platforms, such as Amazon Elastic Compute Cloud (EC2), Google's platform-as-a-service (PaaS) offering and Microsoft's Azure

platform. These same BI vendors are also increasing their OEM efforts with SaaS application vendors and industry data providers.

The merging of analytics with industry data and by industry data providers delivered via a SaaS model has been one of the more widely adopted use cases for BI delivered as a service, and is another key growth driver. Early adopters have been in the midmarket and at the departmental level of large enterprises; however, the size and sophistication of implementations have started to expand to become more enterprisewide, but have yet to reach the scalability of on-premises alternatives.

**User Advice:** Enterprises with more-straightforward requirements should consider using BI as a service. SaaS-based BI tends to do better for more narrowly defined use cases as opposed to broad deployments (e.g., replacement for the entire BI/data warehouse infrastructure). Those with more-complex requirements should evaluate traditional vendor offerings and should consider consuming on-premises software, but on a hosted basis. On-demand BI poses integration challenges for enterprises that need to export data to and extract data (and metadata) from the service provider for incorporation into their BI infrastructures. IT managers must ensure that the SaaS vendors they select provide assurances through adequate SLAs, govern how a SaaS-based BI application will coexist with internal applications and infrastructures, and overcome privacy and security issues. Furthermore, IT organizations should consider contingency plans if they decide to drop their SaaS-based BI vendors — particularly as to how they'll get their data back and make it functional again.

**Business Impact:** Business users are becoming increasingly frustrated with the long deployment cycles, high costs, complicated upgrade processes and IT infrastructures demanded by traditional BI solutions. SaaS-based BI offers a quick, low-cost and easy-to-deploy alternative that has proved popular, particularly in SMBs and in the individual departments of large enterprises that lack or do not want to support internal BI resources.

Instead of disrupting the enterprise BI platform (and CPM suite) market, a more likely scenario is for SaaS-based BI to tap into new opportunities, particularly with midmarket companies that have yet to invest in BI. However, there has been limited growth in this area during the past year. The penetration of SaaS-based BI into the midmarket will be a key factor in the time taken for this technology to become mainstream.

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Sample Vendors:** Birst; GoodData; Oco; Pervasive Software; PivotLink; SAP

**Recommended Reading:** "BI Platforms User Survey, 2011: Customers Rate Their BI Platform Vendor Cost of Ownership"

"Emerging Technology Analysis: SaaS, Business Intelligence and Performance Management"

## "Magic Quadrant for Business Intelligence Platforms"

### Visualization-Based Data Discovery Tools

**Analysis By:** Dan Sommer

**Definition:** Visualization-based data discovery tools are an increasingly prominent class of business intelligence (BI) offering. They provide three attributes: (1) a proprietary data structure to store and model data gathered from disparate sources, which minimizes reliance on predefined drill paths and dimensional hierarchies; (2) a built-in performance layer that obviates the need for aggregates, summaries and precalculations; and (3) an intuitive interface that enables users to explore data without much training.

Vendors of data discovery tools fall into two groups: those that take an interactive visualization approach, and those that take a search-based approach. Both groups provide the three attributes described above but employ different technologies and often have different use cases (see "The Rise of Data Discovery Tools"). This analysis focuses on visualization-based data discovery tools, which are more widely used and therefore at a different position on the Hype Cycle.

**Position and Adoption Speed Justification:** While visualization-based data discovery is still emerging (it currently holds roughly 4% of total BI, analytics and performance management revenue), it is on a fast track to become mainstream. The successful QlikTech initial public offering and the fast growth of Tableau Software during 2010 are opening opportunities for other small vendors to gain access to capital from investors. Larger vendors are also making moves, such as Microsoft with PowerPivot and MicroStrategy with Visual Insight.

Both technological and user aspects are driving the rapid adoption and hype. 64-bit computing has helped the cause for the in-memory data aggregation paradigm. Usability is now the most important BI selection criterion, and we are seeing a move away from managed reporting for information consumption to dashboards and ad hoc querying. Today there are hundreds of reference customers across the many vendors that offer this technology. Even so, most organizations are still learning about this technology and its role in their BI portfolio. As these tools proliferate, IT leaders increasingly find that they have another "spreadmart" problem on their hands, with business users not connecting to sanctioned data sources, metadata and business glossaries. Hence, the technology has started down the slope toward the Trough of Disillusionment.

**User Advice:** This technology is a major advance for users wanting to explore relationships in their data. It marks a substantial improvement in terms of flexibility over traditional online analytical processing architecture, as well as over data dumps in Microsoft Excel and Access — the original analyst "playgrounds."

Also, a data discovery tool can often be centrally managed and used as an enterprise's standard BI platform. However, centralized BI teams should be prepared for the emergence of this technology beyond their control since many vendors sell directly to individual lines of business. Instead of trying to prevent this approach, BI leaders should position data discovery tools for use as IT-sanctioned analyst "sandboxes" or playgrounds. Users of these playgrounds will make discoveries that should

be shared with the broader user community. In this situation, centralized BI teams should facilitate requests for new information views and data models in the corporate standard data warehouse and BI platform. This tighter collaboration between IT and analysts will help prevent data discovery tools turning into a plethora of "rogue" data mart solutions.

**Business Impact:** When used properly — that is, not as rogue solutions — visualization-based data discovery tools offer a very powerful environment in which to explore trends in data, by, for example, making it easier to spot trends amid large amounts of information. The focus on simplicity and ease of use will help stimulate a pace of adoption about three times as fast as traditional BI tools, especially since the intuitive interface will also appeal to mainstream users. As many more vendors, large and small, start providing offerings in this space, it is expected to more than double in size and be a \$1 billion market as early as 2013 (see "Emerging Technology Analysis: Visualization-Based Data Discovery Tools").

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Advizor Solutions; QlikTech; SAS; Tableau Software; Tibco

**Recommended Reading:** "The Rise of Data Discovery Tools"

"Emerging Technology Analysis: Visualization-Based Data Discovery Tools"

## Mobile BI

**Analysis By:** Andreas Bitterer

**Definition:** With the rapidly increasing mobility of the workforce, mobile business intelligence (BI) is a new, or rather renewed, focus area for BI vendors, and BI customers are excited once again about the potential possibilities. In prior years, vendors attempted to leverage the laptop as the endpoint device, pushing online analytical processing (OLAP) cubes onto the PC platform for disconnected reporting and analysis, with very limited success. Today, with new software delivery modes and applications on smaller form factor devices, such as smartphones or the new tablets, BI vendors are once again attempting to explore those market segments. Mobile BI capabilities will be initially focused mostly on reporting and dashboarding; however, limited write-back capabilities from the mobile platform to the back-end are also available. An interesting new user experience will be the ability to navigate around and drill into reports through touchscreen interfaces and finger gestures, such as tapping, squeezing or swiping through the content. In addition, the location awareness of mobile devices will lead to a whole new set of use cases with new roles that have traditionally not been expected as "BI users."

**Position and Adoption Speed Justification:** Mobile BI, while not a new idea, is more or less starting from scratch, but rarely has the BI market seen such a sudden and huge spark of interest in a new BI capability, with the hype engine at full speed. That is why mobile BI is positioned at the Peak of Inflated Expectations. While general interest in the topic is very high, adoption is expected



to be relatively sluggish. While mobile devices are flying off the shelves, and every knowledge worker has at least one mobile device, sending potentially sensitive data to a mobile phone half-way around the world will not become mainstream anytime soon. At the same time, many organizations are still struggling with rather mundane BI issues and are not necessarily ready to invest huge sums in yet another idea, however cool it may appear. Mobile BI is great demoware, particularly on the iPad, but only a few implementations are already under way. For the time being, we expect a flurry of development efforts by the vendor community trying to grab attention and position the mobile device as an attractive BI delivery mechanism. However, end-user organizations will carefully invest in a new platform for all their employees and will likely enable only a small user group to test the viability of the new generation of mobile BI applications and devices.

**User Advice:** The Apple iPad has become a runaway success with top management and is currently considered the ultimate executive gadget. To that end, the cool new tablet devices may work as a means to inject new life into stumbling BI initiatives. While there are alternatives, there are reports of companies buying hundreds of iPads to be distributed to the top management ranks, despite no plan being in place as to what to do with those devices. Organizations that can identify use cases in which mobile users have a need for easy access to up-to-date information held in back-office applications or data warehouses should run a small pilot testing the mobile BI applications. Only when it is proven that new tablet devices, whether an iPad, Playbook, Xoom, or Galaxy Tab, have had a positive impact of faster decision making leading to quantifiable business benefits should a larger deployment be considered. However, the main infrastructure, consisting of the data warehouse, BI platform, data integration and, of course, data quality, must be in good shape before you even start to think about mobile BI. There is no point supplying modern devices to a mobile workforce so they can get access to BI anywhere when the submitted data is all wrong.

**Business Impact:** Decision making is not something only for the back-office or the boardroom. Decisions are being made on the road, in a warehouse, in a supermarket, in client meetings or in airport lounges, where the decision maker often only needs quick access to a few key metrics shown on a mobile device. This can reduce decision bottlenecks, increase business process efficiency and enable broader input into the decision at hand.

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Sample Vendors:** IBM; Information Builders; MeLLmo; MicroStrategy; Oracle; Pentaho; QlikTech; SAP BusinessObjects; Targit

## In-Memory Database Management Systems

**Analysis By:** Donald Feinberg; Roxane Edjlali

**Definition:** An in-memory database management system (IMDBMS) is a DBMS that stores the entire database structure in memory and accesses the database directly, without the use of input/output instructions, allowing the applications to run completely in-memory. This should not be

confused with a caching mechanism, which stores disk blocks in memory cache for speed. All application transactions take place in-memory, without the use of traditional disk or disk substitutes such as solid-state disk (SSD) or flash. Access to the database is through direct memory access and without the use of a disk controller. We do allow for logging to disk, as well as transaction results written to disk for persistence when required. IMDBMSs are available in both row-based and column-based models.

**Position and Adoption Speed Justification:** IMDBMSs have been around for many years (for example, solidDB and TimesTen, owned today by IBM and Oracle respectively), but most available now are new within the past two or three years. New offerings continue to come to market in 2011, such as SAP's High-Performance Analytic Appliance (HANA) using the SAP In-Memory Computing Engine (ICE), while others (such as VoltDB and Sybase ASE) were new in 2010. Placement on the Hype Cycle is difficult, because several IMDBMSs are mature but many (including ICE) are new and untested; we have, therefore, moved the position only slightly from the previous year.

The mature IMDBMSs — such as solidDB, StreamBase and TimesTen — were originally developed for high-speed processing of streaming data for applications such as fraud detection, with the data then written to a standard DBMS for further processing. Newer column-store IMDBMSs, such as Exasol or SAP ICE, are dedicated for in-memory analytical use cases.

During the past year, hardware systems have become available at reasonable prices with very large amounts of memory — some greater than 3TB. As these systems become more widely available, larger, more mature and lower priced, the speed of adoption will increase. Some of these IMDBMSs have produced simulated Transaction Processing Performance Council Benchmark C (TPC-C) benchmarks of greater than nine million transactions per second (TPS), compared to the leaders in traditional disk-based systems of 400,000 TPS.

The primary inhibitor to adoption is the perceived risk involved with memory failures and lack of reliable high-availability solutions, disaster recovery, and sufficiently fast backup and recovery techniques. As this functionality is added, becomes generally available, and matures, this inhibitor will (over time) decrease in importance.

**User Advice:** Continue to use IMDBMS as a DBMS for temporary storage of streaming data where real-time analysis is necessary, followed by persistence in a disk-based DBMS.

For the next several years, IMDBMS can be used for online transaction processing (OLTP) with the understanding that extra care must be exercised to assure a high-performance environment and logging to a persistent store, such as disk or SSD.

IMDBMS for analytic acceleration (available now) is an effective means to achieve increased performance.

The single most important advancement will come as IMDBMS matures as a column-store, combined OLTP and online analytical processing model as a basis for new, previously unavailable applications; taking advantage of real-time data availability, with IMDBMS for increased performance and reduced maintenance.

Organizations should evaluate the business innovation opportunities from new IMDBMSs as they mature — to address OLTP and real-time analytical use cases.

**Business Impact:** Once these IMDBMSs become mature and proven — especially for reliability and fault-tolerance — and as the price of memory continues to decrease, the potential to the business is transformational.

First, these systems utilize hardware systems that require far less power (as low as 1% of the power of an equivalent disk-based system, according to several hardware vendors) and cooling — leading to huge cost savings.

Also, the high performance implies that smaller systems will do the same work as much larger servers, again with major cost savings.

However, cost is not the only benefit, as shown by some of the new models — such as the column-store IMDBMS announced by SAP in May 2010. This model has the potential for a combined OLTP and data warehouse (DW) single database model. Using an in-memory column-store DBMS for both, will enable an entire set of new applications that were not possible in the past due to the latency of data moving from the OLTP system to the DW. Also, the speed of the IMDBMS for analytics has the potential to simplify the DW model, removing aggregates, summaries and cubes while reducing maintenance on the DW. This will enable real-time analytics for planning systems, inventory control and many other pattern-based applications requiring real-time access to data from OLTP applications in the DW. This not only reduces the duplication of data between the OLTP systems and the DW — saving on data integration and storage — but also reduces the maintenance on multiple database models.

IMDBMSs have the potential to change the way we think about, and design, databases and the necessary infrastructure to support them.

**Benefit Rating:** Transformational

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Exabyte Corp.; Exasol; IBM; McObject; Oracle; SAP; StreamBase Systems; Sybase; VoltDB

**Recommended Reading:** "SAP Launches BusinessObjects 4.0"

"Cool Vendors in Data Management and Integration, 2011"

"Cool Vendors in Open-Source Software, 2011"

"SAP SAPPHIRE NOW, 2010: Plenty of Innovation, but Potential Disruption Too"

## Sliding Into the Trough

---

### Real-Time Decisioning

**Analysis By:** Gareth Herschel

**Definition:** Real-time decisions combine predictive analytic and decisioning capabilities to identify the optimal next action to take in a real-time process, such as a customer service interaction or website visit. The analysis can be based on a variety of approaches (for example, product affinities or customer behavioral predictions), but the solution must include an arbitration (rule) capability to select the optimal next action (based on the enterprise's strategy) of several possible treatments. This concept is also referred to as intelligent decision management, intelligent decision automation, next-best action, next-best offer and enterprise decision management.

**Position and Adoption Speed Justification:** This technology is moving from a niche capability, offered by a few best-of-breed vendors, to a standard component of larger suites, offered by mainstream vendors. Its application to cross-sell recommendations is increasingly mature, but the possibilities for a wider variety of applications that combine predictive analysis and business rules (such as insurance claims processing, field service dispatch, warranty analysis or customer retention) haven't been broadly adopted.

**User Advice:** Consider this approach initially for high-risk interactions (that is, the most difficult or expensive to reverse if improperly handled), such as customer churn, fraud or risk assessments. Cross-selling is the easiest approach to cost-justify, but the need for real-time analysis and selecting the best offer isn't as pressing as interactions associated with risk. In the long term, consider this technology for domains beyond CRM, such as quality control or supply chain management.

**Business Impact:** Early adoption has primarily focused on the contact center, turning a purely service-oriented interaction into a blend of marketing/sales and service. Other channels of interest include retail stores (and bank branches) and websites. The application of this technology to offline, but process-oriented, decisions (such as credit approvals) is likely to have a profound impact on the way enterprises make decisions, with more competitive differentiation on the creation of insight to feed the decision, and on the business logic of how to make a decision, rather than on the mechanical operation of the decision.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Convergys; IBM; Infor; Oracle; Pegasystems; Pitney Bowes Business Insight; ThinkAnalytics

**Recommended Reading:** "How to Achieve Real-Time CRM"

"Select Customer Data-Mining Vendors Based on Focus and Vision"

## "Automating Decisions With Intelligent Decision Automation"

### Analytics

**Analysis By:** John Hagerty

**Definition:** "Analytics" has emerged as a catch-all term for a variety of different business intelligence (BI)- and application-related initiatives. For some, it is the process of analyzing information from a particular domain, such as website analytics. For others, it is applying the breadth of BI capabilities to a specific content area (for example, sales, service, supply chain and so on). In particular, BI vendors use the "analytics" moniker to differentiate their products from the competition. Increasingly, "analytics" is used to describe statistical and mathematical data analysis that clusters, segments, scores and predicts what scenarios are most likely to happen. Whatever the use cases, "analytics" has moved deeper into the business vernacular. Analytics has garnered a burgeoning interest from business and IT professionals looking to exploit huge mounds of internally generated and externally available data.

**Position and Adoption Speed Justification:** Today, analytics exist at the confluence of independent but related streams of work. For years, enterprises have been capturing a stunning volume of internally generated information, coupled with masses of externally available data, that only continues to expand, and much of it has yet to be tapped. With huge amounts of capital already spent on systems to capture data, both business users and IT now want to use that investment; they know there are insights hidden away but realize they have only scratched the surface. While the technology to drive analytics has been available for decades, it has largely been in the hands of specialists and applied in discrete niches. Many companies do not know where to begin or even how to frame the issues at hand.

More recently, academics and some pundits have shone an ever brighter light (largely through case studies) on the value of analytics to improve business performance, be it in increased revenue, optimized profit, and/or streamlined processes. That caught the attention of executives seeking to employ best practices developed in leading-edge organizations, and a top-down performance culture has begun to emerge. Software providers have begun embedding analytics within business applications and making analytics easier to use for the masses.

Finally, consultants, system integrators and outsourcers have come into the fray to provide the last ingredients: skills, expertise and even their own intellectual property to kick-start analytics programs. These services firms have begun creating analytic platforms that they will use to create even more analytic applications for clients, some even offering these "products" as services in the cloud.

For analytics, the stars have finally aligned and all market participants, buyers and sellers, continue to scramble to figure out how best to proceed.

**User Advice:** Recognize that "analytics" has multiple meanings. Whenever you discuss the topic, ensure that there is agreement on the definition in use to avoid missteps later. Do not say

"analytics" when you mean reporting or dashboarding. Make sure you understand the difference between "analytics" and "analysis."

No one questions the value of better insight; the point of contention is usually "at what cost?" Analytics is no different from any other BI or performance management program; it is always best to start in a targeted area and prove the capability and value of your approach and the technology. Once you have had some success it is easier to justify additional funding. If early programs go well, demand can quickly inundate available capacity.

Skills development takes time and should be part of your overall plan to expand analytics savvy across the firm. Consider creating an analytics center of excellence to spread scant knowledge to the broader community (see "Case Study: Cisco Improves Demand Forecast Accuracy With Advanced Analytics, Domain Expertise and a Consensus Process"). If you feel that your company just does not have those skills, you can hire consultants to augment your own team, or even possibly outsource the activity to a third party for build-out and ongoing execution.

**Business Impact:** At its core, analytics technology applies in all industries. But technology for technology's sake will not get you far. When it is fused with business content and industry perspective, the results come alive. For example, predicting a customer's next likely move can result in incremental revenue. Analyzing transaction patterns can identify fraud before the impact is severe. Optimizing production schedules can reduce the need for scarce and expensive capital. Understanding the likelihood of component failure in an automobile can lead to preventative maintenance and/or recall, and even save lives. The possibilities are everywhere.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Adolescent

**Sample Vendors:** IBM (SPSS); KXEN; Microsoft; Oracle; SAP BusinessObjects; SAS Institute

**Recommended Reading:** "Gartner's Business Intelligence, Analytics and Performance Management Framework"

"Clarifying the Many Meanings of 'Analytics'"

## Content Analytics

**Analysis By:** Whit Andrews

**Definition:** Content analytics defines a family of technologies that processes content and the behavior of users in consuming content to derive answers to specific questions. Content types include text of all kinds, such as documents, blogs, news sites, customer conversations (both audio and text), and social network discussions. Analytic approaches include text analytics, rich media and speech analytics, and behavioral analytics. Applications of the technology are broad; it can serve to aid in sentiment analysis; reputation management; trend analysis; affinity; recommendations; face recognition; industry-focused analytics (such as voice of the customer) to

analyze call center data; fraud detection for insurance companies; crime detection to support law enforcement activities; competitive intelligence and understanding consumer reactions to a new product.

Multicomponent functions are constructed by serializing simpler functions. The output of one analysis is passed as input to the next. As virtually all content analytics applications use proprietary APIs to integrate functions, today there's no way to construct analyses from applications created by different vendors. In the future, the Unstructured Information Management Architecture (UIMA), governed by the Organization for the Advancement of Structured Information Standards (OASIS), may serve this purpose. Such a standard for unstructured data would serve a similar purpose to Structured Query Language (SQL) for structured data.

**Position and Adoption Speed Justification:** In 2009, we "slowed" the adoption speed of content analytics due to increased analytics complexity. In 2010, we advanced its position and adoption speed because of the explosion of social networking analyses, particularly sentiment analysis. Use of both general- and special-purpose content analytics applications continues to grow as stand-alone applications and as extensions to search and content management applications. The greatest growth comes from generally available content resources, such as contact center records and postsale service accounts, leading to uptake, especially in customer relationship management. Also, open-source intelligence is seeking to use content analytics for more effective understanding of public and semipublic sentiment.

**User Advice:** Enterprises should employ content analytics to replace time-consuming and complex human analyses, such as reading and summarizing service records or social media resident postings. Firms should identify the analytics most able to simplify and demystify complex business processes. Users should identify vendors with specific products that meet their requirements, and they should review customer case studies to understand how others have exploited these technologies. An oversight group can support application sharing, monitor requirements and understand new content analytics to identify where they can improve key performance indicators. Appropriate groups for such a role may already exist. They might already be devoted to associated technologies or goals, such as content management, social software, people-centered computing or specific business application categories, such as CRM, security or worker productivity. Social networking applications should be used wherever possible to deliver information, gain access to customers and understand public opinion that may be relevant.

**Business Impact:** Content analytics is used to support a broad range of functions. It can identify high-priority clients, product problems, and customer sentiment and service problems; analyze competitors' activities and consumers' responses to a new product; support security and law enforcement operations by analyzing photographs; and detect fraud by analyzing complex behavioral patterns. Increasingly, it replaces difficult and time-consuming human analyses with automation, often making previously impossible tasks tractable. Complex results are often represented as visualizations, making them easier for people to understand.

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Emerging

**Sample Vendors:** Attensity; Autonomy; Basis Technology; CallMiner; Clarabridge; ClearForest; Connotate; IBM; IxReveal; Nexidia; Nice Systems; Raytheon BBN Technologies; SAS; Temis; Trampoline Systems; Transparenssee; Utopy

**Recommended Reading:** "Exploiting Content Analytics"

"Content Analytics Category: Text Analytics"

"Definition of Content Analytics"

## Open-Source Business Intelligence Tools

**Analysis By:** Andreas Bitterer

**Definition:** Open-source business intelligence (BI) tools are BI technologies and application development components that are subject to open-source licensing terms. Open-source BI platforms follow the same BI paradigms as their commercial counterparts, but their vendors generate revenue mainly through support subscriptions. Vendors typically provide limited-function open-source "community" versions of their software packages, leaving their full-function commercial packages to generate revenue.

**Position and Adoption Speed Justification:** Interest in open-source BI technology is moderate to high, particularly in the public sector, as organizations look for alternatives to higher-priced commercially available products. While this technology is often subject to an OEM agreement and adopted by independent software vendors enhancing their own applications with reporting or dashboarding capabilities, adoption by enterprises as replacements for commercial BI platforms remains relatively low, though growth is increasing. This is due to the additional development skills required to match the capabilities available with commercial BI platforms (in relation to security, scalability, administration, end-user self-service and metadata, for example). But improved marketing and positioning efforts by open-source BI vendors are generating more "pull" in the market, so open-source platforms are being used more often in project-based deployments, often complementing commercial BI platform standards.

Open-source vendors are recreating the traditional architecture of the commercial vendors that pioneered the BI platform space. They are doing a good job of providing traditional functions such as reporting, ad hoc querying, online analytical processing and even data mining, and they are supporting them well. However, as in every software domain that is targeted by open-source vendors, open-source BI providers also tend to lag behind their commercial counterparts in delivering innovative, emerging capabilities, such as interactive visualization, in-memory analytics and search-based BI.

**User Advice:** Potential customers should be aware that, in practice, open-source BI tools generally ought not to mean free software. Customers should always subscribe to fee-based service agreements to guarantee product support, unless the tools are to be used in non-critical environments. Also recognize that, while the larger vendors have reasonable support structures, some small-scale open-source BI projects are supported solely by the open-source community and



lack any SLAs. In addition, customers should know that the skills required for open-source BI products are generally harder to find, and that many open-source BI projects are defunct. Unless users aim to develop the source code further, they should steer clear of unsupported projects. Potential users must also understand that the initial cost of an open-source BI software platform is only a small portion of its total cost of ownership. For more information on BI platform cost of ownership, see "BI Platforms User Survey, 2011: Customers Rate Their BI Platform Vendor Cost of Ownership." Finally, don't expect open-source BI products to be very appealing to non-IT departmental BI buyers and analysts. To get larger traction outside of IT development, open-source BI vendors would need to expand their non-technical marketing messaging.

**Business Impact:** Some open-source BI platform vendors have started to round out their technology portfolios and the "BI stack" to catch up with their commercial competitors. Although there is still a significant gap in terms of functionality, scalability and usability, open-source BI tools have advanced significantly to become viable alternatives. However, many smaller open-source BI projects largely provide developer components for adding low-volume reporting capabilities to applications, wrapped in open-source development environments such as Eclipse. The skills required to develop, maintain and integrate these technologies can be much greater than those required for many of the more complete commercially available BI platforms.

**Benefit Rating:** Moderate

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Actuate; Jaspersoft; Jedox; Knime; Pentaho; Rapid-I; Revolution Analytics; SpagoBI

**Recommended Reading:** "Who's Who in Open-Source Business Intelligence"

"Open-Source Business Intelligence: State of the Market"

"Open-Source Won't Kill the Commercial Data Integration Tools Market Yet"

## In-Memory Analytics

**Analysis By:** James Richardson

**Definition:** In-memory analytics is an alternative business intelligence (BI) performance layer in which detailed data is loaded into memory for fast query and calculation performance against large volumes of data. In theory, this approach obviates the need to build relational aggregates and precalculated cubes.

**Position and Adoption Speed Justification:** Declining memory prices, coupled with widespread adoption of 64-bit computing, which provides a large addressable memory space, will continue to prime the market for in-memory analytics. IBM (Cognos), MicroStrategy, QlikTech, SAP, Tableau and Tibco Software are positioning in-memory analytics as a key component of their BI platforms,

but other vendors have been slower to embrace it. Most users still rely on traditional approaches, such as summary tables, to improve performance. There has been enormous hype about in-memory computing, particularly from SAP at its Sapphire conferences. SAP's vision of in-memory computing goes beyond in-memory analytics to include transactional and analytical processing.

**User Advice:** For response-time issues and bottlenecks, IT organizations should consider the performance improvement that in-memory analytics can deliver, especially when run on 64-bit infrastructure. Users should be careful to use in-memory analytics as a performance layer, not as a substitute for a data warehouse. In fact, users considering utilizing in-memory analytics should also be aware of how their requirement for speedier query processing and analysis is impacted by the use of in-memory processing in the underlying databases feeding BI.

Adopters need to be aware that in-memory analytics technology has the potential to subvert enterprise-standard data integration efforts. Where it is used in a stand-alone manner, organizations need to ensure they have the means to govern its usage and to ensure that there is unbroken chain of data lineage from the report to the original source system, particularly for system-of-record reporting. Finally, it is becoming apparent as the scale of in-memory analytics deployments grow that there is still a need for performance tuning either by the return of some aggregation at data load, or by managing application design against user concurrency requirements and the sizing of hardware and available RAM.

**Business Impact:** BI programs can benefit broadly from the fast response times delivered by memory-based processing, and this in turn can improve end-user adoption of BI. The reduced need for database indexing and aggregation enables database administrators to focus less on optimization of database performance and more on value-added activities. Additionally, in-memory analytics by itself will enable better self-service analysis because there will be less dependence on aggregates and cubes. However, in-memory analytics is of most value to users when coupled with interactive visualization and data discovery tools for highly intuitive, unfettered and fast exploration of data.

**Benefit Rating:** Moderate

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** IBM; Microsoft; MicroStrategy; Panoratio; QlikTech; SAP; Tibco Software

**Recommended Reading:** "BI Applications Benefit From In-Memory Technology Improvements"

"Need for Speed Powers In-Memory Business Intelligence"

## Text Analytics

**Analysis By:** Gareth Herschel

**Definition:** Text analytics is the process of deriving information from text sources. These sources can be diverse, ranging from formal publications to tweets on the Twitter website to cryptic notes

taken by an employee about a customer interaction. Text analytics is used for a variety of purposes that can be broadly described as summary (what is the nature of commentary on an issue including sentiment analysis), explicative (what is driving that commentary) or investigative (what are the particular cases of a specific issue). Each of these purposes can prompt the others; thus, text analytics usually serves a combination of these purposes, even if the initial decision to investigate the technology was driven by only one.

**Position and Adoption Speed Justification:** Often, interest in text analytics has been cyclical, with several false starts for the technology moving toward mass adoption. However, interest in the application of text analytics in three areas has resulted in accelerating interest among users and more serious vendor support. These three areas are voice of the customer, which looks at direct (for example, surveys) and indirect (for example, blog commentary) customer feedback, fraud (identifying claims that require further investigation) and public security (looking for patterns of behavior that characterize serial criminal activity or a terrorist conspiracy). Although it is unlikely that text analytics will be the panacea that many organizations hope for, it is past the unsubstantiated hype phase of its evolution, and eventually will become a ubiquitous tool for organizations.

**User Advice:** Text analytics will be an increasingly important tool for organizations, as exhaustive analysis of structured data yields increasingly little competitive advantage. However, the text analytics solutions market is still immature (the vendors with the longest track records do not yet have software-as-a-service offerings), and some of the underlying capabilities are not as robust as the attractive user interface may suggest (for example, dealing with non-English-language documents and documents with many domain-specific terms). The lack of understanding on the part of most users about the subtleties of information extraction theory makes most selection processes dependent on a proof of concept and careful evaluation of the resulting insights. Organizations considering investing in this space should do so incrementally. They should consider limited pilots to ensure that the application will work effectively in the chosen domain, and to establish business processes for dealing with the results before investing in a full-scale deployment.

**Business Impact:** The impact of text analysis varies depending on the context. When providing a summary of the nature of commentary on an issue, the benefits are usually seen in better resource allocation, identifying areas of concern or opportunity so that action can be taken. When providing explicative analysis, the benefits usually come from faster and more accurate identification of the underlying issue. For example, customer dissatisfaction with a product may be traced to misrepresentation of its capabilities by marketing, to a design flaw that makes it unsuitable for a specific purpose or to misuse by an untrained customer. The benefits of investigative analysis may be easily quantified (detecting fraudulent insurance claims) or more difficult to quantify (preventing a crime or identifying dissatisfied customers). In many cases, the largest impact of text analytics will come from combining it with traditional structured data to provide a more complete view of the issue that can then be analyzed using traditional data-mining or BI tools.

**Benefit Rating:** High

**Market Penetration:** 1% to 5% of target audience

**Maturity:** Adolescent

**Sample Vendors:** Attensity; Autonomy; Clarabridge; IxReveal; Megaputer; Nice Systems; SAP BusinessObjects; SAS; SPSS

## Interactive Visualization

**Analysis By:** James Richardson

**Definition:** Interactive visualization technology enables the exploration of data via the manipulation of chart images, with the color, brightness, size, shape and motion of visual objects representing aspects of the dataset being analyzed. These products provide an array of visualization options that go beyond those of pie, bar and line charts, including heat maps, geographic maps, scatter plots and other special-purpose visuals. These tools enable users to analyze the data by interacting with a visual representation of it — for example, users can filter, drill or pivot the data by clicking on an image, or use slider bars to filter a dataset.

Note that there is a difference between interactive visualization and data discovery tools. Interactive visualization is often a component of a data discovery tool, but the terms are not synonymous.

**Position and Adoption Speed Justification:** Representing complex or multidimensional data on a 2D screen and giving users the chance to actively explore the data visually helps them understand and assimilate it more effectively than rows, columns, figures or static charts ever could. Techniques like brushing, trellising, map overlays and animation all help the data come alive and are compelling to end users. Interactive visualization techniques have been used in the academic and scientific communities for years, and are now beginning to be adopted more widely in government and business organizations. Gartner analysts are seeing increased evaluation and adoption of these techniques as part of business intelligence (BI) solution architectures — 25% of customers surveyed for "Magic Quadrant for Business Intelligence Platforms" reported that they were now making "extensive use" of interactive visualization capabilities. As such, interactive visualization remains on track to reach the Plateau of Productivity in two to five years, with a key driver being the growing adoption of Adobe Flash, Microsoft Silverlight, Ajax, HTML5 and other Web 2.0 technologies that enable animated, interactive displays of data.

**User Advice:** Many vendors are promoting their products as easy to use without the help of IT. BI competency centers must ensure that visualization technologies are integrated well with their BI architectures and are easy for the enterprise to use. In the same way as IT groups are struggling to rein in "spread marts," IT organizations must ensure that visualization applications are supported and developed as part of their portfolio of BI standards.

**Business Impact:** These technologies deliver information more effectively, enabling users to quickly ascertain trends and anomalies in the data based on visual cues.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** Advizor Solutions; MicroStrategy; Panopticon Software; QlikTech; SAP BusinessObjects; Tableau Software; Tibco Spotfire; Visual i/o

**Recommended Reading:** "Who's Who in Interactive Visualization for BI"

"Business Intelligence Applications Benefit From Interactive Visualization"

## Climbing the Slope

---

### Business Intelligence Consulting and System Integration

**Analysis By:** Susanne Matson; Alex Soejarto

**Definition:** Business intelligence (BI) consulting and system integration (C&SI) solution services are offerings to optimize an enterprise's processes and integrate related technology applications and platforms, which include application-related work. Included in this segment are business and infrastructure applications for BI platforms, analytics needs and data warehousing infrastructure, as defined in "Gartner's Business Intelligence, Analytics and Performance Management Framework." Solutions include areas such as corporate performance management (CPM) and analytics, in addition to the traditional BI platform, data warehouse/data infrastructure and data quality areas.

**Position and Adoption Speed Justification:** With the increased demand for strategic alignment and as a consequence of the improving economic outlook, we are observing more demand for C&SI firms to deliver BI in operations and at a corporate level. Penetration of consulting services is increasing year to year as the technology matures and as service providers increase their capabilities in this area. The building blocks are mature, but the complexity of solutions is increasing because the supporting information management infrastructure is becoming more of a limiting factor to some organizations that want to consider "big data" or need to address data alignment through "master data" to optimize their reporting and analytics. Analytics offerings in different forms are becoming increasingly popular and are made even more reachable in the market as the BI technologies mature. Nonetheless, there is interest in leveraging more BI in operations and strategy, leading to some type of predictive capability. Demand for business application solutions many times includes some portion of BI, accelerating demand for BI and analytics. BI projects can be smaller in nature than other application projects; they can be executed with little incremental spending on software; and they can show fast return on investment (ROI) — all important when revenue agility is required for new functionality and capability. External service providers are taking new industry and domain strategies to market. Because BI projects are expanding in scope, the influence of BI is steadily moving beyond reporting on data to operational considerations linked with business domains, such as CRM and supply chain management (SCM). In addition, addressing pressing financial compliance and information management (IM) challenges extends the reach of BI solutions into performance management initiatives that are now extending beyond just CPM into areas such as marketing and IT management. As a consequence, investment and preparation for BI projects can be strategic, while tactically important, which requires continuous executive attention and alignment with the business strategy. It therefore also requires improved predictability of the business value of BI projects, which goes beyond the internal capabilities of many organizations. All

these contribute to faster penetration of BI technologies in organizations. As BI technologies become mature, there is a growing expectation that BI will be part of any application implementation, rather than being added later. Therefore, service providers have been challenged to add BI knowledge and include it in solutions more broadly than just BI.

**User Advice:** Companies have previously relied on internal staff for a majority of their BI needs because there were no standard approaches to BI projects in given vertical markets, and system integrators were "tool jockeys," not process engineers. It's easier to learn a tool than it is to learn a business approach. But as the breadth and complexity of products increase, the speed to market becomes more important and industry best practices are better-known, we find organizations are seeking the experiences in the market as aggregated by these third parties. It's all about the knowledgebase. As service providers learn more, they can do more. Furthermore, third-party consulting providers are becoming a reliable option to fill skills gaps, offer solution development and deployment, provide strategic advice on BI needs and use, and establish governance of information strategy. In other words, they know the tools that provide good time to market, but they also have learned the vertical, which allows for leveraging. For more-mature services, such as applications for BI platforms, many options exist for C&SI partners. There is still some art involved in data warehousing and modeling, which is dependent on the technology and context of the solution. Analytics interest continues to be a hot discussion area, and service providers have been investing because it requires consultants with a more-statistical and scientific mind-set that can complement technology, domain and function understanding. Many organizations seek help for data quality projects. Master data management (MDM) — although not part of BI — is an adjacent technology area that is important to effectively execute BI strategies, and C&SI companies offer complementary services for MDM. This is also an area in which many C&SI companies are qualified to deliver. BI C&SI service providers need to present their industry knowledge in all their BI offerings to distinguish themselves in a growing provider market.

**Business Impact:** BI solutions enable the analysis of datasets for faster information access and insight. More-informed decisions can be made with transactional and historical information. And predictive capability requires richer datasets. With the move toward analytical applications, more users, such as executive users, traditional analysts and operational users, have access to BI. As IM infrastructure matures and as data integration spreads beyond transactional systems, the delivery of BI across organizations increases. Distributing this information widely has a high impact on the organization and its ability to stay in step with the business cycle. Service providers must now look beyond single areas of a business cycle to all processes that affect that cycle. It's a broader mandate to help an organization that demands more consulting expertise as part of a BI solution.

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Mature mainstream

**Sample Vendors:** Accenture; Business & Decision; Capgemini; Ciber; Cognizant Technology Solutions; CSC; Deloitte; HP; IBM Global Business Services; Infosys; Logica; PricewaterhouseCoopers; Tata Consultancy Services; Wipro Technologies

**Recommended Reading:** "Magic Quadrant for Global Business Intelligence and Performance Management Service Providers"

"The Gartner BI, PM and IM Services Vendor Guide"

"Clarifying the Many Meanings of 'Analytics'"

"Gartner's Business Intelligence, Analytics and Performance Management Framework"

## Business Activity Monitoring

**Analysis By:** Bill Gassman

**Definition:** Business activity monitoring (BAM) describes the processes and technologies that provide real-time situation awareness, as well as access to and analysis of critical business performance indicators, based on event-driven sources of data. BAM is used to improve the speed and effectiveness of business operations by keeping track of what is happening now and raising awareness of issues as soon as they can be detected.

BAM applications may emit alerts about a business opportunity or problem, drive a dashboard with metrics or status, make use of predictive and historical information, display an event log and offer drill-down features. Events from a BAM system may trigger another application or service, communicated via a messaging system. The processing logic of a BAM system may use query, simple-stream or complex-event processing (CEP).

**Position and Adoption Speed Justification:** In 2011, the degree of hype about BAM is midway between the Slope of Enlightenment and the Plateau of Productivity. Inquiries continue to increase in volume and complexity and developments of BAM applications are being seen that are greater in scale and scope. For example, BAM applications are used to monitor airline baggage handling and predict flight delays, drive decisions about supply chain logistics and monitor for faults in electricity power distribution.

Growth in deployment continues to be steady, with most new deployments embedded within business applications, rather than developed on a multipurpose BAM or CEP platform. There are vendors with stand-alone BAM application development platforms, but most offerings are included as part of a software bundle, with various degrees of integration into other products.

The most common business applications to embed BAM applications are in enterprise resource planning, especially the horizontal areas of supply chain, customer relationship management and compliance.

Frequently, software-as-a-service applications offer BAM functionality, integrated with their offerings. Business intelligence (BI) platforms, even Excel, may be used to build simple BAM applications that don't require low latency. Some sophisticated BAM applications have been built in-house, especially for complex operations, such as those in the airline and rail industries. However, most business is going to multifaceted vendors that provide applications, process workflow and orchestration, and application development stacks.

The growth of BAM adoption is linked to an organization's need for and ability to deal with real-time awareness and alerts and is rapidly gaining interest. There is no single BAM market and because the hype is distributed across multiple application areas, visibility is diluted. For revenue counting purposes, we count BAM and CEP platforms together, because CEP platform vendors have added dashboards and alerting to their products. The market for business process management (BPM) suites is where BAM is most visible, because it is a required element in a BPM suite.

In many cases, BAM functionality is not called out by name. Instead, business users ask for a "real time" business dashboard, decision support or operational BI and many applications come with "continuous intelligence" built in. These silos of BAM are educating users on how to use real-time information, but often do not lead to cross-organizational BAM projects.

Business users need to drive the broader scope projects, but there is still limited understanding of the value of cross-organizational BAM. In 2011, we believe that two years is a realistic time frame within which to expect the technology to enter the Plateau of Productivity stage, which means achieving adoption by more than 20% of the target market. While more than 50% of large companies have at least one application with a real-time dashboard, with metrics going to some users, we are looking for broader deployment of BAM that extends beyond a single application.

**User Advice:** Begin adoption now to gain experience, giving priority to projects led by business users. Look for business "pain points" that could be solved with more rapid awareness of critical conditions. Start with simple projects, or expand the use of BAM if early projects have been successful. Look for and use the BAM features within business applications and BPM suites. Look to the CEP platform market to address very low latency or complex pattern requirements.

Allocate time and resources to gain trust in the system and to define effective actions based on real-time alerts. Depending on specific industry or process needs, look for BAM products that include process context and specialized task knowledge, such as supply chain optimization, deadline management, compliance monitoring and fraud detection.

Promote success and share best practices with other groups in the enterprise. Products will come and go, but it takes time to build a culture that can understand how to use real-time alerts and information to drive rapid decisions and responses.

**Business Impact:** BAM provides real-time situation awareness and detects patterns and anomalies in the processes of supply chain operations, event-based marketing, business-to-business value-added networks, compliance activities and orchestrated business processes and workflow.

BAM applications are appropriate for time-sensitive business processes, to understand status, identify problems and opportunities and to raise alerts better. The value of BAM is greater when tied to BI, BPM resources and collaborative decision making. BAM is a key component to organizations implementing a Pattern-Based Strategy.

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream



**Sample Vendors:** IBM; Information Builders; Microsoft; Oracle; Progress Software (Apama); SAP; SL; Software AG; Systar; Tibco Software; Vitria

**Recommended Reading:** "The Role of CEP and EDA in Business Intelligence"

"Business Activity Monitoring Architecture Evolution"

"A Pragmatic Approach to Integrating BI Within Automated Human Workflows"

"Business Activity Monitoring Helps Execute a Pattern-Based Strategy"

## Column-Store Database Management Systems

**Analysis By:** Donald Feinberg

**Definition:** A column-store database management system (DBMS) is a DBMS that indexes each column of a table, storing the indexes in lieu of row data; unlike traditional relational DBMSs using a row-store — where data is stored in rows, with indexes optional. In addition, most column-store DBMSs include additional optimization techniques (such as compression and tokenization) to further compress the data — using less storage and increasing input/output (I/O) performance. We do not include row-based DBMS engines that offer columnar forms of compression only.

**Position and Adoption Speed Justification:** Like many technologies, column-store DBMS technology is a mix of mature products (such as from Sand and Sybase's IQ Analytics Server) and newer products (such as from 1010data, Exasol, Infobright, ParAccel and Vertica). Largely because of Sybase, there are several thousand installations of column-store DBMSs today — used for multiple purposes, from small analytics data marts to full data warehouses (DWs). With the increased popularity of data marts and interest in analytics in the past few years, the column-store DBMS has gained market share as an analytic engine; leading to a growing number of new products (see Gartner's "Magic Quadrant for Data Warehouse Database Management Systems"). Most analytic applications require a minimum number of columns when retrieving data and this, coupled with the compression abilities of the column-store DBMS, leads to lower I/O ratios and higher performance.

Over the past several years, we have seen an increased use of column-store DBMS solutions as the DW; primarily due to the vendors enabling more sophisticated workload management software. With workload management and the high compression available, the column-store can handle the more complex workloads found in today's DW environments. Several vendors have added column-store technology to their DBMS products for this reason (notably, Aster Data [recently acquired by Teradata] and Greenplum [acquired by EMC]).

The other major technical breakthrough has come with creative methods of loading data into the column-store; traditionally an issue due to the high number of disk writes required. Many of the vendors have achieved much faster loading techniques, allowing for near-continuous loading of data.

Finally, due to the high-level of compression, the column-store has begun to be used as an in-memory DBMS, where terabytes of source data can fit into gigabytes of memory. Products such as Microsoft's PowerPivot, SAP's BI Accelerator and QlikTech make use of an in-memory column-store. Recently we have seen a number of new entries to the in-memory column-store DBMS; notably from SAP (with its in-memory computing engine used in its HANA appliance), Exasol (see "Cool Vendors in Data Management and Integration, 2011") and ParStream from empulse in Germany. Due to this influx of new in-memory, column-store engines, we have decided not to move this technology further along on the Hype Cycle.

**User Advice:** Column-store DBMSs should be considered:

- As primary candidates for analytic data marts — because of I/O performance gained from compression and retrieval of fewer columns (typical of analytic applications).
- In an overall archiving strategy — as one of the "near line" alternatives, because of their high compression ratios while making the data available with standard relational tools.
- For data warehouse implementations — as they continue to improve mixed-workload management capabilities and the ability to load data with much lower latencies — approaching continuous loading.
- For leading-edge organizations — begin using in-memory column-store DBMS implementations for applications requiring high performance. Many of these applications cannot be implemented on a traditional DBMS due to the resources and execution time needed.

**Business Impact:** As the column-store DBMS broadens its appeal within an IT architecture, so its business and IT impact is also growing. The column-store's original function was in archiving solutions, although it is no longer the primary use case. The automatic compression achieved by storing data in column form (reported by clients to be as great as 20 to one, or more), makes column-store DBMSs a good choice for moving data out of the primary storage DBMS, while maintaining the relational structure of the data. In addition to the obvious advantages of the reduced storage necessary for data (a clear cost saving), compression has also been shown to increase performance due to lower I/O. This has implications for reducing the size of servers required for the DW, another clear cost saving.

As the hardware systems with large amounts of memory become more available during the next few years, coupled with reducing costs, we will see an increased use of the column-store as an in-memory DBMS structure. In addition, tests are showing that in-memory, column-store technology reduces the need for complex structures such as aggregation, summaries and cubes, reducing maintenance while further increasing performance. This development will not only allow for faster performance, for many classes of applications in business intelligence (BI) and analytics, but will also enable the column-store to have a potential use as an online transaction processing (OLTP) DBMS. In the past, this has been prevented by the large number of disk writes to insert, or update, a row — no longer an issue when used in-memory. The potential for the column-store to be used for both OLTP and the DW has far-reaching implications; not only to the design of systems, but also to major cost savings over slower disk systems with higher power and cooling requirements. Due to this influx of new in-memory, column-store engines, we believe that this technology hasn't yet

reached the plateau, and so its position on the Hype Cycle hasn't changed; however it is the rationale for moving to Transformational.

**Benefit Rating:** Transformational

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** 1010data; Exasol; Greenplum; illuminate Solutions; Infobright; ParAccel; Sand; SAP; Sybase; Vertica

**Recommended Reading:** "Cool Vendors in Data Management and Integration, 2011"

"Magic Quadrant for Data Warehouse Database Management Systems"

"The State of Data Warehousing in 2011"

"SAP SAPPHIRE NOW, 2010: Plenty of Innovation, but Potential Disruption Too"

## Dashboards

**Analysis By:** John Hagerty

**Definition:** Dashboards are a reporting mechanism that aggregate and display metrics and key performance indicators (KPIs), enabling them to be examined at a glance by all manner of users before further exploration via additional business intelligence (BI), performance management (PM) and analytics tools. Dashboards help to improve decision making by revealing and communicating in-context insight into business performance. They display KPIs or business metrics using intuitive visualization, including charts, dials, gauges and "traffic lights" that indicate the progress of KPIs toward defined targets. They enable users to then drill down to successive levels of detail, as defined by the dashboard developer, to explore why a KPI may be off target. Dashboards can be deployed on a myriad of device types — desktops, laptops, tablets and/or smartphones — in a connected or disconnected mode.

**Position and Adoption Speed Justification:** Dashboards provide an easy to consume and understand presentation layer for BI, PM and analytic tools that is visually attractive to users. Business consumers often demand that performance data be delivered to them in the context of their role and/or business activity, and dashboards suit that need well. Increasingly, mobile devices are the medium of choice. However, they are sometimes implemented as tools that are not properly connected to underlying data sources and systems. In these circumstances, they fail to deliver much benefit and fall into disuse because they can't easily adapt to ongoing changes in the business (much like the executive information systems of 20+ years ago). Increasingly, users are realizing that dashboards are especially valuable when implemented as part of a broader BI, analytics and PM strategy. But they are often a discrete-buying agenda item. As such, some companies will continue to implement dashboards on a stand-alone basis for the foreseeable future.

Many dashboard capabilities can also be found in interactive visualization and data discovery tools that enable users to interactively explore the data. Typical dashboards, by contrast, represent highly summarized data, they are more static in their presentation of information, and interactivity is defined by the dashboard developer.

**User Advice:** Dashboards should form an integral part of BI, analytics and PM initiatives because they are good formats for presenting financial and nonfinancial information to specific types of users that need highly aggregated, role-specific KPIs. Most of the factors that make a successful dashboard implementation are technology-independent, such as defining and measuring the right metrics, ensuring sufficient involvement by senior management, and considering the deployment as part of a wider BI initiative. Dashboards are often requested by management as "cockpits" for monitoring critical business metrics. However, it is often poorly understood that dashboards require complex underlying infrastructure to work properly; a simple dashboard populated by spreadsheet data may be a stop-gap solution, but is inherently not sustainable.

**Business Impact:** Dashboards can make it easy for senior executives, managers and business users to understand quickly how their organization is performing against its business objectives. Tablets and smartphones are increasingly a deployment target and can be delivered with live connection to the data, as well as in a disconnected mode with the necessary data encapsulated in the object. Dashboards can be deployed at any level of an organization, and are good tools for fostering discussion about action plans to achieve goals. They can also be used to promote collaboration outside an enterprise by sharing KPIs with customers, suppliers and partners. When widely adopted in an organization, dashboards are an effective aid to leadership and to aligning people and resources to meet strategic objectives. They can have a significantly positive impact on the monitoring of corporate and operational performance and on the taking of appropriate action when certain conditions are indicated by dashboard alerts.

**Benefit Rating:** High

**Market Penetration:** More than 50% of target audience

**Maturity:** Mature mainstream

**Sample Vendors:** Corda Technologies; IBM (Cognos); Information Builders; Microsoft; MicroStrategy; Oracle; QlikTech; SAP BusinessObjects; SAS

**Recommended Reading:** "Scorecard or Dashboard: Does It Matter?"

"Tips for Implementers: The Basics of Good Dashboard Design"

"Magic Quadrant for Business Intelligence Platforms"

## Data Quality Tools

**Analysis By:** Andreas Bitterer

**Definition:** The term "data quality" refers to the process and technology for identifying and correcting flaws in the data that supports operational business processes and decision-making.

Packaged tools are available that include a range of critical functions for data quality initiatives such as profiling, cleansing, matching, enrichment and monitoring.

**Position and Adoption Speed Justification:** While general adoption of data quality tools is on the increase in many industries, the majority of organizations continue to neglect data quality as a critical factor for successful business intelligence (BI), customer relationship management (CRM) and other enterprise application scenarios. While customer name and address data is still the dominant data domain for data quality initiatives, more organizations are warming to the idea of extending their data quality efforts to product data. Other data domains, such as financial data or document data, only play niche roles. Organizations that are more mature in the information management processes are making the connection between accurate data and good decision-making, process efficiencies and increased revenue. As a result, they are beginning to focus strongly on data quality within their BI, data warehouse and CRM initiatives. In addition, more organizations have started information governance initiatives that include data quality as a major component. Regulatory compliance is a particularly important driver for deploying data quality tools. Therefore, the speed at which these tools are adopted will increase, and they will reach the Plateau of Productivity within two years. However, the convergence of data quality and data integration platforms, and potentially also master data management technology, may slow down the individual adoption speed in lieu of building an integrated product covering all quality and integration technologies in a single platform. This convergence is already under way, as demonstrated by quite a few market leaders in both the data integration and data quality markets.

**User Advice:** If no data quality program exists in your organization, start one — better today than tomorrow. Refer to the Gartner Data Quality Maturity Model to select proper starting points. Identify problem areas in data quality and assess the impact. Look into data profiling, cleansing, matching, validation and enrichment technologies to increase the value of corporate data. Make data quality tools part of the corporate software portfolio, and capitalize on profiling and cleansing capabilities in more than one corporate initiative, such as BI, business-to-business data exchange and application integration. Service-oriented architecture and master data management initiatives, in particular, must include quality services in application development and integration projects. Data quality tools are also needed downstream, as, without complete and accurate data, decisions based on data warehouse and BI applications are likely to be flawed; also, operational processes, such as those associated with CRM applications, may well fail to deliver expected efficiencies. Evaluate data quality tools by looking at the breadth of their functionality (profiling, standardization, matching, enrichment and so on), being "domain-agnostic" (that is, not focused on a single data subject area, such as customer data), and considering their suitability for deployment in an enterprisewide service, rather than in a project-specific, silo-oriented manner. Overall, the maturity of data quality tools is far ahead of the maturity of most organizations' data quality efforts. As a potential kick start, organizations new to data quality should look at the freely available profiling tools or a cloud-based solution to keep initial costs in check.

**Business Impact:** Bad data quality works like a poison pill for many application initiatives. Without a firm focus on data quality, BI and data warehousing projects, CRM, master data management, information governance and various other types of initiatives are liable to fail. If business users lack faith in the data, acceptance will be limited and benefits will not be achieved. Organizations should refrain from trying to cleanse data using their own development efforts (for example, with COBOL or

C++ routines). Instead, they should redeploy and train developers to capitalize on commercially available toolsets. These toolsets are mature and typically uncover more data issues than custom applications can. In addition, their providers keep up with international postal standards, address changes and so on — something that user organizations often struggle to do on their own.

**Benefit Rating:** High

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Mature mainstream

**Sample Vendors:** Datactics; DataFlux; DataLever; DataMentors; Human Inference; IBM; Informatica; Innovative Systems; Oracle; Pitney Bowes Business Insight; SAP BusinessObjects; Talend; Trillium Software; Uniserv

**Recommended Reading:** "Magic Quadrant for Data Quality Tools"

"Organizing for Data Quality"

"Gartner's Data Quality Maturity Model"

"Who's Who in Open-Source Data Quality"

"Strategic Focus on Data Quality Yields Big Benefits for BT"

"Data Quality Methodologies: Blueprints for Data Quality Success"

"2009 Survey on Data Quality Tools Highlights Broadening Deployments With Focus on Proven Functionality"

## Predictive Analytics

**Analysis By:** Gareth Herschel

**Definition:** The term "predictive analytics" has become generally used to describe any approach to data mining with four attributes: an emphasis on prediction (rather than description, classification or clustering), rapid analysis measured in hours or days (rather than the stereotypical months of "traditional" data mining), an emphasis on the business relevance of the resulting insights (no "ivory tower" analyses), and (increasingly) an emphasis on ease of use, thus making the tools accessible to business users (no more "Ph.D.s with lab coats").

**Position and Adoption Speed Justification:** The algorithms underpinning predictive analytic applications are reasonably mature. Although new techniques continually emerge from research laboratories, the 80/20 rule firmly applies with most of the commonly used algorithms (such as CHAID decision trees and k-means clustering) that have been in existence for over a decade. The applications themselves are also approaching maturity, although the development of packaged applications to address specific business problems (compared with the generic approach of turning more-traditional data mining workbenches into predictive analytic solutions) is less mature and more diverse in its maturity. When predictive analytic applications have added project and model

management capabilities and more enhancements to aid ease of use, they will have achieved maturity.

**User Advice:** Predictive analytics is effectively a more user-friendly and business-relevant equivalent of data mining, but the distinction is more. Although potentially lacking some of the mechanisms to fine-tune the model performance that a traditional data mining workbench might deliver, the benefits of rapid model development and easier maintenance tend to be appealing for most analytical initiatives. The bigger distinction tends to be between predictive analytic solutions and packaged applications built on these solutions for specific business issues. In these cases, the selection decision should be based on the domain expertise the vendor has been able to package into the application, versus the domain expertise the business analyst can bring to the analysis.

**Business Impact:** The ability to detect nonobvious patterns in large volumes of data is a standard benefit of data mining and predictive analytic solutions. Compared with traditional data mining workbenches, predictive analytic solutions deliver high value, primarily through broader end-user access to analytic capabilities (enabling power business users to perform analysis, rather than relying on specialist data miners) and better maintenance of existing models (improving the reuse and the performance of the organization's models).

**Benefit Rating:** High

**Market Penetration:** 5% to 20% of target audience

**Maturity:** Early mainstream

**Sample Vendors:** IBM (SPSS); KXEN; Pitney Bowes Business Insight; SAS; ThinkAnalytics

### Excel as a BI Front End

**Analysis By:** James Richardson

**Definition:** Microsoft Excel is often employed as one of the information delivery capabilities of business intelligence (BI) platforms. In this case, Excel is used solely as an alternative user interface (UI) to those capabilities supplied as part of the BI platform to render information to end users, within the frame of reference defined by the BI metadata.

**Position and Adoption Speed Justification:** Many users still meet their "BI" needs on a stand-alone basis with Excel because of its perceived ease of use (erroneously, familiarity is not the same as usability), its formatting capabilities and its capability to create local spreadsheets that can be shared with other users. In response to its popularity and ubiquity, almost all BI platform vendors offer support for spreadsheets as a UI to their BI platforms, integrating with Excel as an output capability for data extracts and additional reporting. As a result, in some (albeit rare) cases, Microsoft Excel acts as the primary BI client, while the BI platform is used to manage, secure and execute BI tasks. To meet this need, integration with Microsoft Office Excel has become increasingly sophisticated, going beyond support for formulas, graphs, data "refresh" and pivot tables to include advanced functions such as cell locking and write-back (to support what-if analysis and the building of planning applications). This is leading to wider adoption of Excel as a

front end for BI, although it is less mature than when used as a UI to financially focused corporate performance management applications. This functionality and use case is well understood and explains why Excel for BI is positioned in the later stages of the Slope of Enlightenment.

A further driver for the use of Excel as a preferred UI for BI is that it supports Multidimensional Expressions (MDX) and can, therefore, directly query online analytical processing (OLAP) cubes, a strong combination for financially-oriented BI use cases (in fact, front-ending OLAP cubes is arguably Excel's most common BI usage). Moreover, capabilities in Excel 2010 such as slicers, filters and sparkline charts increase its suitability for BI usage, as does its use as a front end for SQL Server PowerPivot — Microsoft's end-user mashup-able in-memory BI tool.

**User Advice:** Over-dependency on stand-alone Excel workbooks for BI is risk-prone due to lack of transparency, formula errors and so on. As such, the Excel integration capabilities of BI platforms should be part of any evaluation. BI leaders should enable the use of Excel as a UI for BI for the types of users most comfortable with this approach (especially users in finance). This represents an ideal opportunity to reduce an organization's reliance on uncontrolled spreadsheets by offering a managed alternative with a familiar user experience. The BI vendor offerings that support Excel do differ somewhat, so carefully evaluate the management, security and administration of these capabilities. Organizations using SharePoint should look at how spreadsheets can be shared and authored by multiple users in collaboration using Excel Services in Microsoft Office SharePoint Server 2010.

**Business Impact:** By using Excel integrated with BI platforms, rather than on a stand-alone basis, companies will see improvements in information quality. This approach will reduce the amount of analysis performed by users in spreadsheets that are not directly connected to underlying data sources. Using integrated Excel will also have a positive impact on compliance, because the proliferation of uncontrolled (and, therefore, difficult to audit) spreadsheets is a common failure in information audits. Note, however, that to preserve this auditability users should get additional training in new reporting processes to assure compliance with good work practices, otherwise they are likely to continue to compromise the audit trail with local, undocumented changes to data.

**Benefit Rating:** Moderate

**Market Penetration:** 20% to 50% of target audience

**Maturity:** Mature mainstream

**Sample Vendors:** IBM (Cognos); Microsoft; MicroStrategy; Oracle; SAP; SAS

**Recommended Reading:** "Embrace or Replace Your Spreadsheets for Performance Management"

"What Is SQL Server PowerPivot?"



## Entering the Plateau

---

### Business Intelligence Platforms

**Analysis By:** James Richardson

**Definition:** Business intelligence (BI) platforms enable enterprises to build BI applications by providing capabilities in three categories: analysis, such as online analytical processing (OLAP); information delivery, such as reports and dashboards; and platform integration, such as BI metadata management and a development environment.

**Position and Adoption Speed Justification:** BI platforms are widely used by enterprises to build custom analytical applications and to service information delivery requests. The BI platform market is well defined with many established vendors. The most commonly used BI platform capabilities — such as reports, ad hoc queries and OLAP — are mature, and there is less and less significant differentiation between the vendors' core offerings. However, the market is still dynamic because emerging technologies, such as in-memory analytics, interactive visualization and mobility, are having an effect on how BI platforms are deployed, used and bought. In addition, as organizations climb the BI maturity curve they are beginning to use the less widely deployed, but arguably more valuable, BI platform capabilities, such as predictive modeling and data mining. A cluster of major releases from the megavendors (Oracle BI 11g, IBM Cognos 10, SAP Business Objects 4.0), further integrating their acquired BI offerings, will focus many organizations on how they use and get value from their core BI platforms in 2011.

**User Advice:** Organizations should deploy BI platforms to describe the dimensions and measures that run the business, using reporting and flexible querying to meet the majority of users' information delivery needs, while applying the more sophisticated analysis capabilities for the few in the user community that need them. BI platforms are a "build" technology, so successful usage and, therefore, ROI, depends on the skills of the IT departments and service providers in understanding users' requirements and implementing a solution that meets them — see "Succeed With Business Intelligence by Avoiding Nine Fatal Flaws." Organizations need to be careful that their use of a BI platform does not lead to the over-centralization that either misses out on requirements by having too broad a view, or becomes too unwieldy to respond fast enough to business changes and instantiate them in its BI platform definitions.

**Business Impact:** BI platforms enable users, typically managers and analysts, to learn about and understand their business. Increasingly, though, BI platforms are being used more pervasively by a wider community inside and outside organizations. When used to their fullest, BI platforms can have a dramatic effect on the business by changing the focus from primarily reporting to process optimization and strategic alignment.

**Benefit Rating:** High

**Market Penetration:** More than 50% of target audience

**Maturity:** Mature mainstream

**Sample Vendors:** Actuate; IBM (Cognos); Information Builders; Microsoft; MicroStrategy; Oracle; SAP BusinessObjects; SAS

**Recommended Reading:** "Magic Quadrant for Business Intelligence Platforms"

"Enterprisewide BI and Performance Management Initiatives Are on the Rise"

## Data-Mining Workbenches

**Analysis By:** Gareth Herschel

**Definition:** Data-mining workbenches address a diverse range of data-mining needs, rather than a specific application requirement. They provide a selection of analytic functions and mining algorithms (such as decision trees, neural networks or clustering algorithms) from which analysts can model virtually any data for predictive or exploratory insights. Data-mining workbenches also facilitate the data preparation steps that need to be performed prior to analytic modeling and the post-model-building scoring and deployment phases of the data-mining process.

**Position and Adoption Speed Justification:** This technology is mature, with a long history and widespread sets of best practices. The integration of text mining (to expand the scope of the data available for analysis) with database platforms (to improve the efficiency of data access and model deployment activities) indicates a technology that is slowly being incorporated into the mainstream of enterprise analysis. Although data-mining workbenches exist (and will continue to exist) somewhere in most organizations, most of the growth in the data-mining user community will come from the adoption of data-mining-enabled analytical applications.

**User Advice:** Organizations should compare data-mining workbenches with the emerging class of data-mining applications (also known as predictive analytics). Data-mining workbenches support extensive reuse: The same tool that analyzes the risk of customer churn can be used in the future to analyze credit defaults or perform warranty claim analysis. In contrast, data-mining applications have user interfaces and a subset of functionality designed to deliver rapid return on investment regarding a specific business issue. These applications are typically linked to processes in specific business functions, such as marketing, logistics or finance. Most organizations will eventually rely on a combination of data-mining workbenches and applications, identifying the correct portfolio of tools and the number of applications that will be needed to complement the "core" data-mining workbench. Such determinations will differentiate enterprises' adoption and use of this technology. Although many data-mining workbenches are mature applications, with significant numbers of experienced users and implementation consultants, the rapid growth of interest in data mining and the relatively slow growth in the numbers of "qualified" data-mining users mean that many organizations seeking to begin or increase their level of data-mining activity struggle to find skilled users.

**Business Impact:** When used effectively, data-mining workbenches can have a significant impact. Data mining is most useful when attempting to understand large volumes of data with multiple factors involved in determining the outcome. As such, it is used extensively in situations such as the analysis of customers (for marketing, retention and risk assessments), products (for product development, quality control and support) and corporate activities, such as identifying key

performance indicators and forecasts for performance management activities like demand forecasting.

Data-mining workbenches are particularly useful when dealing with heterogeneous types of analysis — multiple issues from different parts of the enterprise in which there may not be a "standard" approach to the analysis, or in situations with heterogeneous data sources (text analysis combined with clickstream analysis and demographic data). Data-mining workbenches offer enterprises the greatest potential for discovering unique insights that are unavailable to competitors. Although they come with a correspondingly higher level of difficulty, compared with packaged data-mining applications, data-mining workbenches provide valuable assistance in assembling the correct population of skilled users and in deploying the results of the analysis to effect business change.

**Benefit Rating:** High

**Market Penetration:** More than 50% of target audience

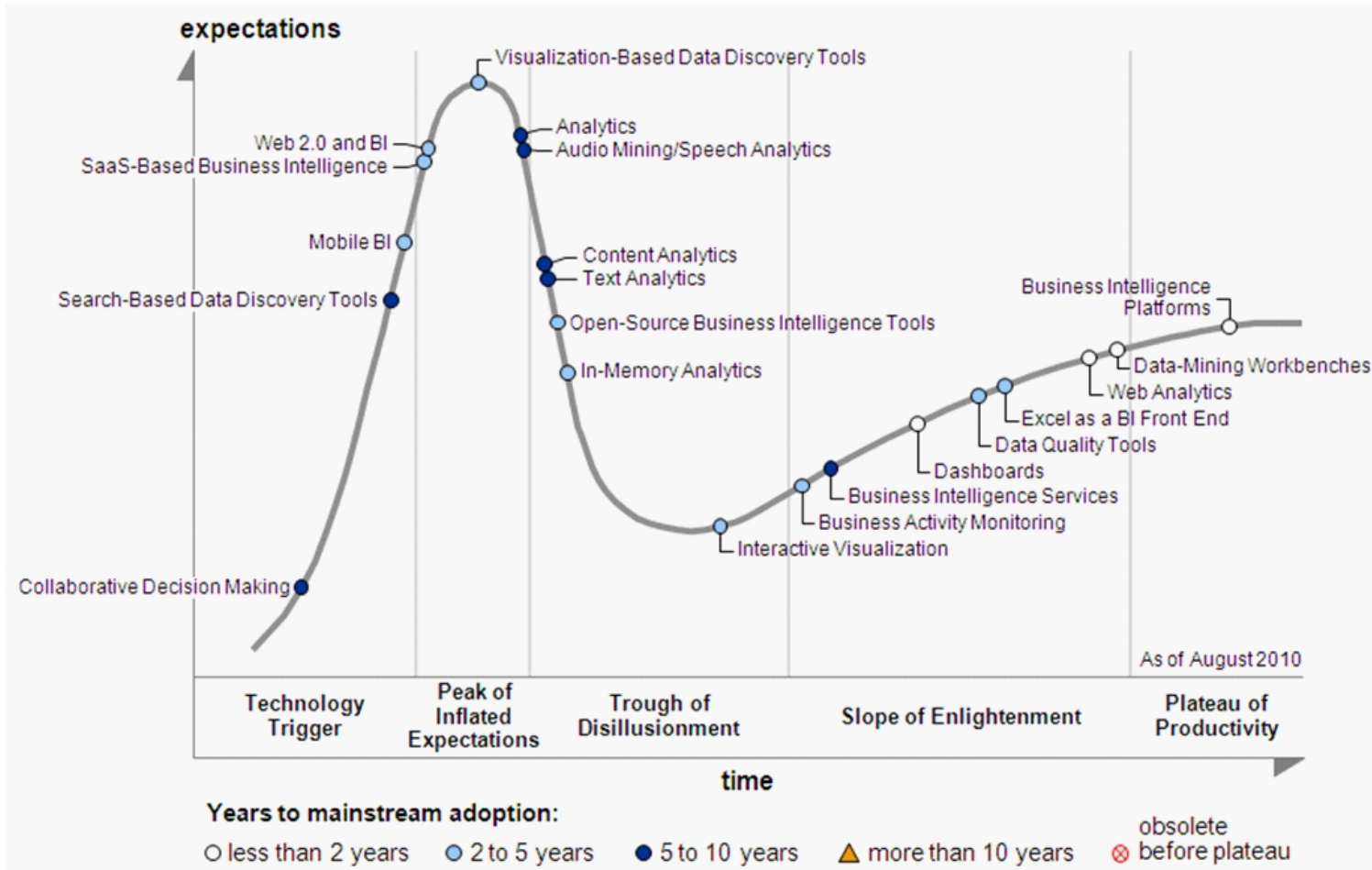
**Maturity:** Mature mainstream

**Sample Vendors:** Angoss; IBM (SPSS); Microsoft; Oracle; SAS; Tibco Software (Insightful)

## Appendixes

---

Figure 3. Hype Cycle for Business Intelligence and Performance Management, 2010



Source: Gartner (August 2010)

## Hype Cycle Phases, Benefit Ratings and Maturity Levels

Table 2. Hype Cycle Phases

Phase	Definition
<i>Technology Trigger</i>	A breakthrough, public demonstration, product launch or other event generates significant press and industry interest.
<i>Peak of Inflated Expectations</i>	During this phase of overenthusiasm and unrealistic projections, a flurry of well-publicized activity by technology leaders results in some successes, but more failures, as the technology is pushed to its limits. The only enterprises making money are conference organizers and magazine publishers.
<i>Trough of Disillusionment</i>	Because the technology does not live up to its overinflated expectations, it rapidly becomes unfashionable. Media interest wanes, except for a few cautionary tales.
<i>Slope of Enlightenment</i>	Focused experimentation and solid hard work by an increasingly diverse range of organizations lead to a true understanding of the technology's applicability, risks and benefits. Commercial off-the-shelf methodologies and tools ease the development process.
<i>Plateau of Productivity</i>	The real-world benefits of the technology are demonstrated and accepted. Tools and methodologies are increasingly stable as they enter their second and third generations. Growing numbers of organizations feel comfortable with the reduced level of risk; the rapid growth phase of adoption begins. Approximately 20% of the technology's target audience has adopted or is adopting the technology as it enters this phase.
<i>Years to Mainstream Adoption</i>	The time required for the technology to reach the Plateau of Productivity.

Source: Gartner (August 2011)

Table 3. Benefit Ratings

Benefit Rating	Definition
<i>Transformational</i>	Enables new ways of doing business across industries that will result in major shifts in industry dynamics
<i>High</i>	Enables new ways of performing horizontal or vertical processes that will result in significantly increased revenue or cost savings for an enterprise
<i>Moderate</i>	Provides incremental improvements to established processes that will result in increased revenue or cost savings for an enterprise
<i>Low</i>	Slightly improves processes (for example, improved user experience) that will be difficult to translate into increased revenue or cost savings

Source: Gartner (August 2011)

Table 4. Maturity Levels

Maturity Level	Status	Products/Vendors
<i>Embryonic</i>	<ul style="list-style-type: none"> <li>In labs</li> </ul>	<ul style="list-style-type: none"> <li>None</li> </ul>
<i>Emerging</i>	<ul style="list-style-type: none"> <li>Commercialization by vendors</li> <li>Pilots and deployments by industry leaders</li> </ul>	<ul style="list-style-type: none"> <li>First generation</li> <li>High price</li> <li>Much customization</li> </ul>
<i>Adolescent</i>	<ul style="list-style-type: none"> <li>Maturing technology capabilities and process understanding</li> <li>Uptake beyond early adopters</li> </ul>	<ul style="list-style-type: none"> <li>Second generation</li> <li>Less customization</li> </ul>
<i>Early mainstream</i>	<ul style="list-style-type: none"> <li>Proven technology</li> <li>Vendors, technology and adoption rapidly evolving</li> </ul>	<ul style="list-style-type: none"> <li>Third generation</li> <li>More out of box</li> <li>Methodologies</li> </ul>
<i>Mature mainstream</i>	<ul style="list-style-type: none"> <li>Robust technology</li> <li>Not much evolution in vendors or technology</li> </ul>	<ul style="list-style-type: none"> <li>Several dominant vendors</li> </ul>
<i>Legacy</i>	<ul style="list-style-type: none"> <li>Not appropriate for new developments</li> <li>Cost of migration constrains replacement</li> </ul>	<ul style="list-style-type: none"> <li>Maintenance revenue focus</li> </ul>
<i>Obsolete</i>	<ul style="list-style-type: none"> <li>Rarely used</li> </ul>	<ul style="list-style-type: none"> <li>Used/resale market only</li> </ul>

Source: Gartner (August 2011)

## Recommended Reading

*Some documents may not be available as part of your current Gartner subscription.*

"Understanding Gartner's Hype Cycles, 2011"

"Hype Cycle for Data Management, 2011"

"Hype Cycle for Performance Management 2011" (forthcoming)

"Hype Cycle for Analytic Applications, 2011" (forthcoming)

"Reimagining IT: The 2011 CIO Agenda"

"Magic Quadrant for Business Intelligence Platforms"

"Magic Quadrant for Data Quality Tools"

"Gartner's Business Intelligence and Performance Management Framework"

"Business Intelligence Platform Capability Matrix"

## Regional Headquarters

---

**Corporate Headquarters**

56 Top Gallant Road  
Stamford, CT 06902-7700  
USA  
+1 203 964 0096

**European Headquarters**

Tamesis  
The Glanty  
Egham  
Surrey, TW20 9AW  
UNITED KINGDOM  
+44 1784 431611

**Asia/Pacific Headquarters**

Gartner Australasia Pty. Ltd.  
Level 9, 141 Walker Street  
North Sydney  
New South Wales 2060  
AUSTRALIA  
+61 2 9459 4600

**Japan Headquarters**

Gartner Japan Ltd.  
Aobadai Hills, 6F  
7-7, Aobadai, 4-chome  
Meguro-ku, Tokyo 153-0042  
JAPAN  
+81 3 3481 3670

**Latin America Headquarters**

Gartner do Brazil  
Av. das Nações Unidas, 12551  
9° andar—World Trade Center  
04578-903—São Paulo SP  
BRAZIL  
+55 11 3443 1509

---

© 2011 Gartner, Inc. and/or its affiliates. All rights reserved. Gartner is a registered trademark of Gartner, Inc. or its affiliates. This publication may not be reproduced or distributed in any form without Gartner's prior written permission. The information contained in this publication has been obtained from sources believed to be reliable. Gartner disclaims all warranties as to the accuracy, completeness or adequacy of such information and shall have no liability for errors, omissions or inadequacies in such information. This publication consists of the opinions of Gartner's research organization and should not be construed as statements of fact. The opinions expressed herein are subject to change without notice. Although Gartner research may include a discussion of related legal issues, Gartner does not provide legal advice or services and its research should not be construed or used as such. Gartner is a public company, and its shareholders may include firms and funds that have financial interests in entities covered in Gartner research. Gartner's Board of Directors may include senior managers of these firms or funds. Gartner research is produced independently by its research organization without input or influence from these firms, funds or their managers. For further information on the independence and integrity of Gartner research, see "Guiding Principles on Independence and Objectivity" on its website, [http://www.gartner.com/technology/about/ombudsman/omb\\_guide2.jsp](http://www.gartner.com/technology/about/ombudsman/omb_guide2.jsp).