HURWITZ & ASSOCIATES

Dynamic Warehousing and Beyond

Driving Business Value through End-to-End Analytics

Authors, Dr Fern Halper
& Robin Bloor

HURWITZ RESEARCH

■ 233 Needham Street ■ Newton MA 02464 ■Tel: 617-454-1030 ■

www.hurwitz.com

Contents

Analytics in Business Intelligence

If you were to build the best possible Business Intelligence (BI) capability, what would it look like? How would it work?

Business Intelligence can be defined as "the provision of timely and relevant information to the business from the data gathered by operational systems or available from external sources." The goal of BI is ultimately to help an organization use information to become more successful. As time has passed, more and more BI capabilities have emerged and, looking forward, it is possible to conceive of BI not as a complement to operational systems, but as capabilities woven into the fabric of each business process. We can think of it as the critical feedback loop for the business, which allows the business to alter its plans and tactics in flight.

If we were to build the best possible Business Intelligence (BI) capability, what would it look like? How would it work?

The pattern of the past

With early computer systems, BI was elementary, consisting primarily of management reports generated directly from operational systems. The first generation of dedicated BI software, developed in the 1980s, wasn't called BI at all – it was termed "decision support". It consisted mainly of statistical software packages feeding from operational databases. The database was either queried directly and reports produced or, it was dumped into a flat file and fed into a statistical package to be analyzed. The data being examined was ***structured data*** - data that had a well-defined format, courtesy of the database. Analysis consisted of two activities:

1. Slicing and dicing the data
2. Applying statistical methods

The first technique usually cut the data by two or three dimensions, such as sales by region, or sales by region by time period. The second technique made use of advanced statistical models, such as predictive models. Early adopters of this kind of BI often parlayed the decision support system into some sort of Executive Information System, to provide an easily understood graphical display of the information. This was a huge step forward in analytical capabilities, but only very large companies that hired statisticians and quantitative analysts were able to take advantage of such systems.

The second generation of BI emerged in the 1990s with the advent of Online Analytical Processing (OLAP) and data mining technology that worked in conjunction with data warehouses and data marts. Data warehouses stored structured data coming from multiple sources, including home-grown applications and, often, a company's ERP and CRM systems. The data for the warehouse was extracted and transformed (to a standardized format) and then loaded into separate databases for reporting and analysis, typically referred to as data warehouses.

Data marts were subsets of the data warehouse that focused on specific "subject areas" dealing with specific aspects of company activity. The data marts might simply be relational databases or they might be OLAP servers that stored the data in a structure that was suitable for multidimensional analysis. The OLAP "cube" made slicing and dicing data easy. BI vendors provided user interfaces that empowered non-statisticians to perform such business analysis.

Other analytic techniques that became prevalent included:

- Data mining. This is software that uses statistical correlation algorithms or neural networks to find patterns in large volumes of structured data.
- Data visualization. Going far beyond simple pie charts and bar charts, powerful visualization techniques were employed which drew attention to patterns and trends in data. They provided color-coding, linking, clustering, multidimensional visuals of "data surfaces" all coupled with drill down from summary to detail.
- Business performance management. Key performance indicators defined a set of metrics that companies could use to steer the business. They would be defined for different areas of focus - financial, customer satisfaction, employee satisfaction, and so on - making it possible to keep "scorecards" on key activities. The performance management systems captured the information for the metrics that could then be displayed on special-purpose "dashboards".

Nevertheless the information is after-the-fact; it fails to address the dynamic decision making needs of an organization

The rear-view mirror

The second generation of BI made great strides in both analytical capability and data management, but the information it provided was always seen through the rear view mirror. Data warehouses store historical data, providing information for analysis that can reveal trends and hidden correlations and feed predictive modeling. Nevertheless, the information is after-the-fact; it fails to address the dynamic decision making needs of an organization.

What does this mean? Consider the following typical example of a second generation BI implementation:

A large "bricks-and-clicks" retail operation has stores throughout North America and parts of Europe and boasts a state-of-the-art online presence. Consumers can order electronics online for home delivery or buy or return merchandise at a local store. The company's operational systems include order entry, point of sale, inventory, billing and customer care, and accounting. The data from these systems, combined with demographic data from external sources, feeds the

company's data warehouse. This enables the analysis of sales trends, channel trends and customer experience.

The company appreciates the value of analytics to inform its decision making. It has a data warehouse and multiple data marts in place. It uses business intelligence software as well as predictive analytic and data mining tools to predict churn, the effects of product promotions, and so on. All of the data collected is rolled up to provide corporate performance measurements and scorecards that are delivered to executives via customized dashboards.

The company has a strong customer focus and seeks customer feedback on a continuous basis. This includes providing a website where customers answer detailed questionnaires in exchange for discounts on future purchases. This site collects structured data as well as unstructured text from customers explaining their opinions, both positive and negative. The information is subsequently analyzed and, where appropriate, acted on.

Timeliness means having the information you need in time to act upon it - at the right time

What's missing from this picture?

There are weaknesses and gaps in the scenarios described above. To really help companies use their vast amounts of information more effectively requires additional technology. The five critical elements that must be included are:

- Timeliness – the ability to get relevant information as part of real-time operational processes
- Analysis in context – the ability to analyze this information at the point of action, as opposed to after the fact
- Information coverage – the ability to analyze information other than structured data
- Presentation in context – the ability to interact with this analysis where needed
- BI integration – the ability to carry out analysis of all relevant information on a regular basis within a database

Let's examine each of these five elements.

Real-Time and Right-Time

Timeliness means having the information you need in time to act upon it - at the right time. It doesn't necessarily require "real-time" information (analyzing the data from the current process against data that was received less than two minutes prior), although in some instances it can. It just means being able to use the data from the current process or activity to retrieve relevant information needed to make a better business decision.

For example, while they are on a call with a customer, customer care representatives should have access to relevant information and business

intelligence needed to better service that customer, enabling them to compare what just happened to the customer with recent transactions in the customer's history. When they enter new information about the customer, it should be used to determine what other relevant information is needed. Of course, capturing this new information into the warehouse immediately can be beneficial: it can quickly be incorporated for future analysis and customer calls.

Raw information is rarely sufficient in many business contexts and analytical information can make a huge difference, if it is available

Analysis in context

Timely analysis can be just as important as timely information. Raw information is rarely sufficient in many business contexts and analytical information can make a huge difference, if it is available. The customer care representative should have access to analytical information about the customer. This may include information about buying habits and profile, taste preferences, specific up-sell opportunities, and so on.

A sales representative on a call should know what that customer has spent in the last few months at the store (and online) and whether they qualify as a "gold customer" who should receive exceptional support to ensure that their satisfaction remains high. They need to know what else the customer might be willing to buy and how they should be approached to gauge their possible interest.

Information coverage

Not all of the important information stored by a company is held as structured data in databases. So-called ***unstructured information*** accounts for up to 80% of enterprise content, and includes formats such as email, contracts, customer contact reports, presentations, graphics, and even a lot of information stored in free-form text fields in databases, such as customer comments, call center notes, technician comments, product details, problem descriptions, etc. A great deal of valuable knowledge can be extracted from unstructured or semi-structured data (such as text data or web content held in databases), but until recently, there were few tools that could deal with this kind of data.

For example, the information in call center records can let a company know how many customers are having problems with a particular product. Information from external sources, such as news feeds and blogs, can provide a company with greater insight into their brand reputation. As businesses make more sophisticated use of VoIP (voice over Internet protocol) and video, they will accumulate even more unstructured data that contains important information that is difficult to analyze. Some analysts predict that unstructured information will nearly double over the next year.

Presentation in context

While BI had delivered a wealth of ways to analyze information, the focus of BI vendors on the user's context has been minimal. Aside from dashboards and the

inclusion of BI capabilities as components of portals, neither of which are ideal, there has been little focus on making capabilities available in a way that fits with how specific users carry out their tasks. The user's context has been neglected.

Consider our example of the customer care representative. When a call comes in from a "Gold customer" it is useful for the representative to be able to discover that information, but it will be far better if that information is presented immediately as an alert or within the call center application being used. Similarly with the sales representative on a call, it will be best if the rep's screen is flashing up appropriate suggestions to make to the customer, rather than having to pull up a separate application and hunt for the information.

The user's context is now coming to the fore as BI slips out of its "rear-view mirror" perspective...

The user's context is now coming to the fore as BI slips out of its "rear-view mirror" perspective and starts to be included as a natural part of business processes.

BI Integration

There are many areas where BI as it is currently implemented could be improved by integration. It would improve matters if a good deal of BI analysis were carried out automatically as operational systems gathered new data and stored it. The analysis that a business knows it needs to carry out regularly could be embedded in databases. It would be useful if all structured data could be integrated through federated access to multiple databases. It would be even more useful if the whole information resource, encompassing both structured and unstructured data, could be managed as a single resource.

Consider the customer care representative in the bricks-and-clicks retail company responding to a customer who calls with a complex question. Imagine that the customer bought a computer on-line and, after its delivery, bought related equipment in the local store, such as a printer and scanner, wireless mouse and keyboard. He is complaining that a DVD drive bought over a year ago has stopped working, but is also enquiring about a maintenance contract that covers every computing device he has, including those recently acquired.

In this instance, the goal of the customer care representative includes maintaining customer satisfaction as well as selling additional services. There is a variety of useful information that can help her: Is this a "gold" or "platinum" customer? Does the customer already have any maintenance contracts? If so, for what? Have these worked out well? Is the DVD drive out of warranty? Was it covered by a maintenance contract? When complex situations like this arise, most organizations simply cannot assemble the information that will help the representative deal with the call in a timely and customer- specific manner. In addition, she is unable to know how many similar requests have been made and whether this points to a business opportunity.

Towards the dynamic warehouse

The approach to BI that addresses these issues is referred to as ***dynamic warehousing***. Dynamic warehousing is not based on the idea of accumulating a static warehouse of data that serves up data to data marts and BI tools. Instead it is based on a dynamic process that continually defines and serves information to meet known and anticipated needs. This approach distributes all types of relevant information in the right form at the right time and provides the business with dynamic **end-to-end analytics**.

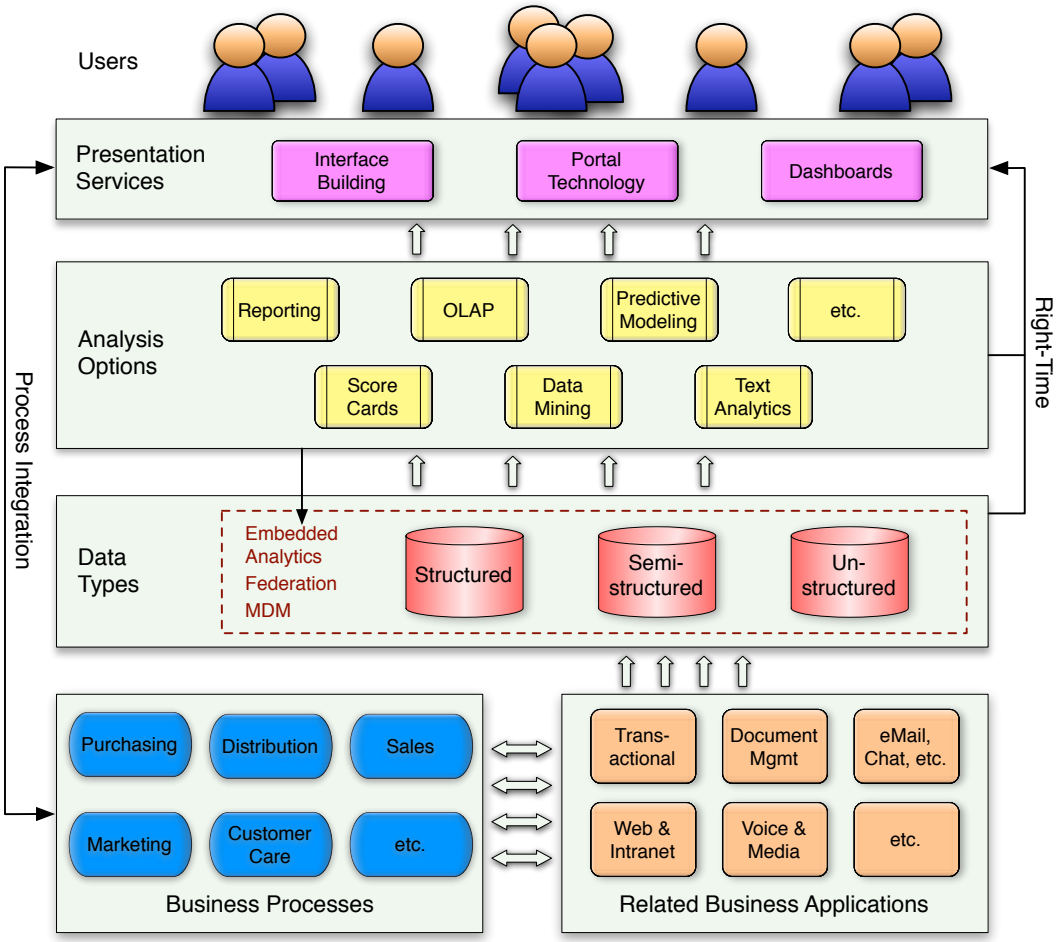

Figure 1. Dynamic Warehousing

Figure 1 illustrates the dynamic warehousing approach in detail. Information used in decision making derives from the applications that drive the business processes and, to some degree, from external sources. The business applications include the traditional transactional systems, such as order entry or point of sale systems, finance and accounting systems, marketing systems and so on.

The other sources of information that a company can make use of include document management systems and communications systems such as email and chat. They also include content management systems for the company's web sites as well as external web sites and blogs, and will soon include VoIP systems, video sources and more. The number of potential data sources has mushroomed in the last decade and will continue to grow.

All of this information has to be organized for analysis purposes. This will involve links to operational databases and will most likely involve aggregated data and historical data from data marts and a data warehouse. The whole data pool will be a mix of structured data, semi-structured data and completely unstructured data distributed across the corporate network.

If the analysis of data is to be timely then it will be necessary to embed some analytical capabilities directly within the databases...

If the analysis of data is to be timely, then it will be necessary to embed some analytical capabilities directly within the databases, as indicated in the diagram, so that analysis happens "in flight". If analysis is happening in real time, then results will be available at the right time.

The pool of data thus organized will be available to the wide variety of BI tools that are currently available, including relatively new capabilities such as real-time Business Activity Monitoring tools and, indeed, any new BI capabilities that emerge. Finally there needs to be a devoted set of presentation services that deliver the results of BI to the users at the right time and in a context that is tailored to their activity. While presentation services such as dashboards and portals can provide a general capability, an ability to build and tailor appropriate user interfaces is necessary if information is to be put to best use.

The Nature of Orchestrated Business Intelligence

We have provided a view of an ideal BI system and its associated architecture. As far as we are aware, no comprehensive system exists that has every single one of the components described. This section discusses IBM's approach to BI that includes most of the components we have mentioned.

IBM DB2® Warehouse is at the heart of IBM's approach to enable dynamic warehousing. Its product philosophy is based on the idea of deriving information from both structured and unstructured data, and delivering it either as analytics within a process or in the more traditional (historical) manner. Information is delivered as a service to people and processes in the context of individual business activities in order to provide dynamic business insight.

Information is delivered as a service to people and processes in the context of individual business activities to provide dynamic business insight.

IBM DB2 Warehouse

IBM delivers the following building blocks for dynamic warehousing and end-to-end analytics. Specifically, DB2 Warehouse includes:

- The ability to integrate with multiple applications and related processes
- The ability to analyze both structured and unstructured data
- A variety of data mining extensions and OLAP capabilities
- The ability to embed right-time analytics directly within business processes
- Embeddable presentation components for delivering information and analysis directly into an application or portal

We discuss each of these below.

The ability to integrate with multiple applications and processes

IBM's DB2 engine can handle large volume transactional OLAP systems and very large data warehouses. IBM's DB2 Warehouse combines these capabilities with the goal of delivering business information at the right time. DB2 Warehouse delivers a versatile distributable environment that, with a considered design approach, can simultaneously cater to these two distinctly different workloads. IBM has recently added to this capability through the acquisition of DataMirror, a company whose products were built to deliver data capture and replication in real time. DataMirror does not provide additional analytics capabilities, but enables existing analytics capabilities to be applied to more real-time information as data changes in other systems across the enterprise.

DB2 Warehouse is able to deliver a range of BI capabilities, either through a traditional data warehouse architecture or, if necessary, in a continuous and far more immediate manner.

Structured and unstructured information

While many organizations have implemented extensive data warehousing and associated BI capabilities, there are not many whose capabilities extend to the ability to leverage their unstructured data assets, such as the data contained in free-form comments fields, email, presentations and contracts.

IBM addresses this need with new unstructured analysis capabilities built into DB2 Warehouse. Central to these capabilities is the Unstructured Information Management Architecture (UIMA) standard which enables developers to build UIMA-compliant components called annotators, which embody the logic to analyze unstructured data. For example, one annotator might contain the UIMA-compliant logic needed to extract a person's name from a text document. Another annotator might contain UIMA-compliant logic to extract a phone number.

The product set is based on a modular SOA design, so the extraction processes can be called as services by applications if needed

IBM delivers further capabilities through its enterprise search and information access products which are grouped together under the IBM OmniFind™ product umbrella, including OmniFind Analytics Edition, which is IBM's platform for application-specific annotators and interactive text mining tools. These capabilities help turn unstructured or semi-structured information into sources of actionable insight.

Because DB2 Warehouse's unstructured analytics services are compliant with the UIMA standard, it is also possible to use text extraction annotators from other vendors to extract structured information from unstructured sources.

The product set is based on a modular SOA design, so the extraction processes can be called as services by applications if needed.

Data mining extensions and OLAP

Traditionally, both data mining and OLAP capabilities have been implemented as separate activities with specific data subject areas being extracted from a data warehouse and moved to a data mart, either for data mining activity or to serve as an OLAP database. IBM takes the view that such an approach may cause an unacceptable delay to providing actionable information to the business.

So, IBM provides in-database OLAP capabilities and a series of in–database mining capabilities as part of DB2 Warehouse. Technically, OLAP is delivered in the form of memory cubes, which are managed by DB2 Warehouse itself. DB2 Warehouse now delivers the multi-dimensional views that characterize OLAP by providing metadata support for dimensions, hierarchies, attributes and analytical functions. Users can create metadata objects to dimensionally model OLAP structures, and these objects are stored in a DB2 catalog. Users can also create summary tables which are aggregates of information based on an analysis of an OLAP dimensional model.

DB2 Warehouse also provides embedded data mining capabilities, which include segmentation analysis and market basket analysis, as well as predictive analysis which might use a variety of techniques, such as neural networks, logistic regression and decision tree analysis. The data mining activity is not confined to structured data. IBM also provides text analytics capabilities to help mine unstructured data.

Most data mining and analytic tools require data to be extracted from the warehouse for scoring, with the results then sent back to the warehouse for use by query and reporting tools after the fact. However, with DB2 Warehouse, data mining and scoring are performed directly within the database, as a native process. This enables more scalable analytics that can be delivered in real time.

The presentation layer is critical because this is how the organization interacts with the data

The in-database data mining capabilities utilize IBM's SQL-based language that can invoke data mining activity. This language is easily adopted by anyone conversant with industry standard SQL because they only need to familiarize themselves with a number of SQL extensions.

Presentation with Embedded Analytics

The presentation layer is critical because this is how the organization interacts with the data. This capability is provided by DB2 Alphablox, a feature included with DB2 Warehouse Enterprise Edition, which can be thought of as an interface development tool for seamlessly integrating analytic components directly into enterprise applications and portals, as opposed to developing standalone query and reporting applications.

It also provides organizations with a tool for defining and embedding analytic capabilities called Blox® and, as an open-standards-based development platform, is able to integrate with other development tools. The analytic capabilities that Alphablox can deliver can either be embedded directly into other applications or made available as a service to multiple applications. The product provides the components, an application framework, a programming model and tools for assembling applications that run on J2EE application servers. Alphablox provides the following:

- A series of report templates called the FastForward framework
- The ability to build applications that process real time data and display continuously updated results via charts, grids, drop-down lists, check boxes, and many other interface features
- Analytical interface capabilities, such as drill down, pivot, and sorting
- A federated data access capability that can draw data from multiple data sources including relational and multidimensional databases

Taken as a whole, dynamic warehousing allows analytics to be transparently embedded into process-related applications and made available when needed, in right-time.

DB2 Warehouse in Summary

Having described all the analytic components of DB2 Warehouse, we can now see how they fit into the dynamic warehousing model that we described and illustrated earlier.

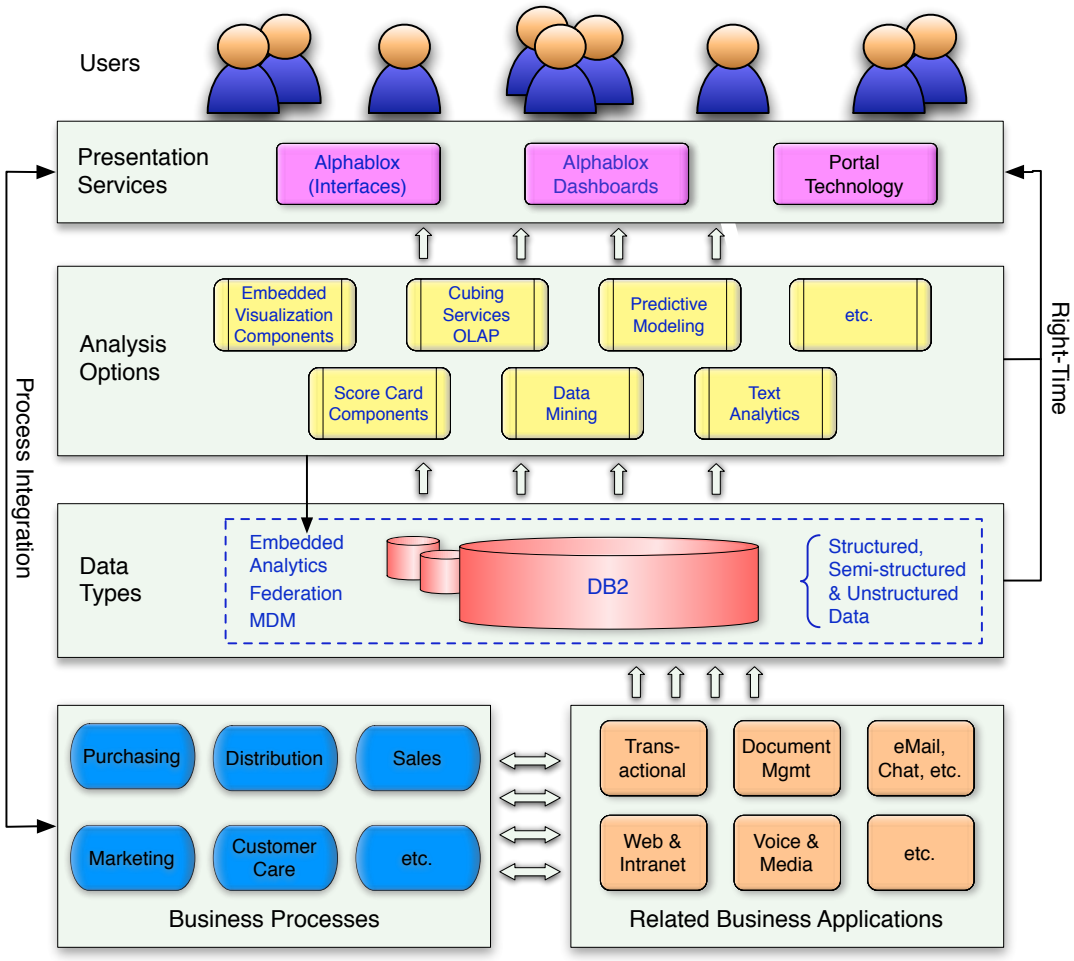

Figure 2. DB2 and the Dynamic Warehouse

Figure 2 is, in essence, the same illustration that we previously provided except that we have now indicated all the components that IBM provides in DB2 Warehouse. We have used blue rather than black lettering to indicate the DB2 Warehouse components.

It is clear from the diagram that DB2 Warehouse delivers a comprehensive capability, delivering real-time analytical capabilities within the warehouse, which can be embedded directly into operational applications.

DB2 Warehouse acts as a comprehensive data store for both structured and unstructured data, and the associated federation capabilities enable other data stores to be seamlessly leveraged. The DB2 Warehouse Cubing Services OLAP capability (illustrated as an analysis option) is in practice delivered directly from the database, which also provides access to embedded data mining capabilities.

This set of capabilities can easily be augmented by third-party BI tools to provide a total platform for query and reporting, to address all of an organization's BI requirements.

End-to-end analytics: an example

So, what does this architecture provide to the bricks-and-clicks operation that a static warehouse can't? Let's consider how our bricks-and-clicks retail company would profit from implementing IBM's dynamic warehousing solution to achieve more effective and more sophisticated BI.

With dynamic warehousing, an organization can analyze a broader collection of data that includes textual call center data, surveys and other unstructured information

With dynamic warehousing, an organization can analyze a broader collection of data that includes textual call center data, surveys and other unstructured information. This data can be merged with structured information to create a customer perspective that is more complete and more detailed. Such information can be analyzed using data mining techniques or sliced and diced via OLAP. With embedded analytics, such information will be available to customer care representatives, as a service, at the time when a customer calls in.

Consider a particular example. Assume that the retail company has a promotion on digital cameras. It has augmented its market basket analysis by combining structured and unstructured information. The structured information revealed that customers who buy digital cameras also buy batteries, a memory card and may also buy a printer and ink. However, by incorporating the unstructured information from survey responses and customer feedback through the web site, the marketing group discovers a very definite desire from a proportion of customers for a recycling program for the ink cartridges, since ink is expensive and printing photographs consumes it in great volume.

The company decides to offer a promotion to those customers who have purchased at least $1,200 in merchandise with the company in the last year. As part of the promotion, in addition to the camera, the company provides deep discounts on mini-printers and a cartridge recycling program. When the company rolls out the program, it is well-received, contributing to increased sales volumes.

Meanwhile, back in the customer care group, customers are starting to call to ask questions about their cameras. Some of the questions are about the range of

printers available - indicating that not all of those who bought cameras took advantage of the printers that were part of the promotion. Questions include a very definite interest in the capacity of ink cartridges and frequent queries about battery life.

Alerted to these possibilities by the text analytics capabilities, the customer care representative can tell customers about the recycling program and explain the printer promotion. At the same time, the comments that customers are making about the batteries are being fed through a text analytics process that causes marketing to consider a battery program of some kind.

Riding the wave: The benefits of end-to-end analytics

What are the benefits of incorporating end-to-end analytics into the fabric of business processes? Hurwitz & Associates believes that the advantages run through the organization in many ways, providing both tactical and strategic benefits. End-to-end analytics provides a comprehensive and timely feedback loop for the business. These capabilities allow the business to alter its tactics "in flight", and to make better long-term strategic decisions. The outcome is a company that is more competitive, inspires customer loyalty and can grow profitably.

This is similar to traditional warehousing, but the information is broader and more dynamic.

Tactical benefits

At the tactical level, analytics provide the right information at the right time to those that need it across the organization. This includes all staff involved in customer-facing activities, but it also includes any staff who need information to make short-term decisions. In our retail example, it includes those on the store floor, those who are managing the web retail operation, and customer care representatives who need precise customer information to help close a sale, cross-sell or up-sell, or service customers. It also includes the marketing department which, on the one hand, uses the information to monitor customer and market activity and to make decisions about campaigns, while on the other needs to maintain an accurate view of the customer base at any point in time.

Process related information can also be used by those involved in inventory management or supply chain-related activities. There are numerous consequential benefits to obtaining this information in process. They include increased sales, increased customer satisfaction and retention, and an improved ability to compete more successfully.

Strategic benefits

All of the information gained from the analytics embedded in a company's processes, together with traditional warehouse data, provides executives with a more complete view of relevant internal and external information. This is similar to traditional warehousing, but the information is broader and more dynamic. It now includes information from multiple unstructured sources -- not just customer complaints from call center data, but information from news feeds, competitor Web sites and industry Web sites, market surveys, blogs and virtually any source of relevant information.

It can assist in many areas of activity including assessing the company's brand image or considering the possibilities of an acquisition or merger. Clearly such information, together with a more comprehensive view of how each part of the organization is performing, can drive much more powerful performance metrics and business insight.

The critical feedback loop

The tactical and strategic information that the business gains via end-to-end analytics establishes a critical feedback loop between the tactical and the strategic. Short-term information is needed to guide tactical decisions, but the information gained also helps to determine the company's strategic direction. Likewise, performance measures and other indicators of company performance help drive tactical decision-making. The result is a much more finely tuned decision making engine.

The value is cross-industry

Dynamic warehousing, with its end-to-end analytics capability, is valuable to any organization interested in making better real-time decisions This includes industries that view customer service as a top priority, those looking to improve effectiveness of their sales people, those concerned about customer retention, as well as health care staff needing access to relevant information to determine treatment options.

With the added sophistication of the dynamic warehouse, a real-time picture is available and the analysis can be used by financial advisors when they check in with their clients

In financial services, dynamic warehousing with end-to-end analytics can help organizations compete more effectively and increase profitability. For example, a retail bank will analyze its information to determine the characteristics of the most profitable customers, including the financial products that they buy. With the added sophistication of the dynamic warehouse, a real-time picture is available and the analysis can be used by financial advisors when they check in with their clients. The up-sell opportunity will drive more revenue per customer. For insurance companies, banks and other financial services businesses, the number of products sold per customer -- a key metric -- can be brought into continual focus.

Insurance organizations can use end-to-end analytics as part of their claims processing system. Text analytics might be used to extract relevant pieces of information from an adjuster's notes to identify suspicious activity. Then, when a new claim arises, this analytic component is available to a claims processing agent who can flag the claim as potentially fraudulent.

A major issue for telecommunications companies is customer churn. A dynamic warehousing approach, with end-to-end analytics, can help to reduce this churn. A telecommunications company might offer both wireless and wireline service. Unstructured information to call centers about the problems customers have with their service or phone or questions about their plan or bill can be extracted from the logs and merged with structured data about the customer-- and then integrated across products. Predictive modeling, using decision tree analysis, might be used to determine who is at risk of dropping the service. These models can be run in real time or on a periodic basis, as new data came in. The model output would be used by marketing and customer care representatives to help to retain the customer. The important point is that the analysis can identify which customers are likely to

change their service provider at the right time. Marketing could use the results that they see on their dashboards to help create an incentive program. Customer service representatives would get alerts on their screens, if a customer they are speaking to fits the profile of a potential disconnect. They would now have a set of tactics to try to retain these customers.

In healthcare, dynamic warehousing will help with claims processing and customer service, but can also be used to help understand patient records. A comprehensive view of the patient can be established by incorporating the unstructured text in patient records, which will enhance the details of the patient's medical history, allergies to medicines, courses of treatment employed at various times, and so on. Aggregating such data over different patient groups may identify factors that can improve patient treatment. Healthcare administration can benefit as administrators use such information to analyze the outcomes of treatment and the costs of care.

...it has become possible to provide an information service that delivers better information and delivers it at the right time so that the business can be proactive rather than reactive

The inevitability of dynamic warehousing

Traditional BI has been built and delivered as a set of systems that trails behind the transactional systems that run the business. The picture it has provided has been incomplete, with a good deal of the information gathered by the business being excluded from the picture because it is unstructured. Now, by exploiting the ever-increasing power of computer hardware and deploying a fully integrated BI architecture, it has become possible to provide an information service that delivers better information and delivers it at the right time so that the business can be proactive rather than reactive.

In Hurwitz & Associates' view, the move to dynamic warehousing is an inevitable development that is already beginning to take place. However, it's clear that this trend has space to grow. For example, the current data streaming analysis capabilities deployed almost exclusively in the financial sector will enter the mainstream and feed further intelligence to the business. With the adoption of VoIP, new and valuable sources of data will be gathered to be mined. It is likely, too, that video data will at some point be pulled into the mix. And as such technologies mature, they will be incorporated by dynamic warehousing, which will become the hub of business intelligence for the corporation.

About Hurwitz & Associates

Hurwitz & Associates is a consulting, research and analyst firm that focuses on the customer benefits derived when advanced and emerging software technologies are used to solve business problems. The firm's research concentrates on understanding the business value of software technologies, such as Service Oriented Architecture and Web services, and how they are successfully implemented within highly distributed computing environments. Additional information on Hurwitz & Associates can be found at www.hurwitz.com.