

WHITE PAPER

BusinessFactor: Event-Driven Business Performance Management

Sponsored by: TIBCO

David Sonnen (ISSI)

Henry D. Morris

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IDC OPINION

Corporate users require data that is relevant to their immediate needs, such as business performance data. Generally, this data is "out there" but difficult to assemble and analyze quickly enough to be most useful. In response, the IT industry has fielded a wide range of technologies that address parts of the data access/analysis problem, including data warehouses and business intelligence systems. These technologies provide a useful, but inadequate, structure for assembling enterprise data into timely and effective information. The user is still faced with disjointed access that inhibits immediate and effective use of relevant business performance information.

Addressing this problem, TIBCO has developed a technology platform, BusinessFactor, that focuses on the events that make up business activities in a way that makes business performance visible. TIBCO BusinessFactor makes it easier to understand operational performance in the context of business objectives, past performance, and related activities. TIBCO's approach enables the business user and analysts to more quickly and intelligently identify and address operational performance throughout the business day.

Looking forward, IDC sees the emergence of a new class of technology platforms that provide more immediate and robust data integration and analysis so that users have greater visibility into their business performance metrics. TIBCO's BusinessFactor concepts and technology are important steps in that direction.

IN THIS WHITE PAPER

Data access problems began sometime in the 14th century, when accounting records and inventories became too big to memorize. Responding to the problem, Arab and European scribes wrote records on newly invented paper. Inevitably, paper stacked up, and one fateful day, some merchant couldn't find the right record, thus creating the first data access problem. Those problems have since gotten worse.

Today, the *New York Times* publishes more information daily than a 19th century business person would have seen in a lifetime. Fiber optic technology lets us transmit all the data ever published in the *Times* plus about three Libraries of Congress per second down a single cable. Finding the right record is like finding a needle in the Gulf of Mexico. Without adequate data access, huge data flows inhibit the process of

managing business activities — leading to the familiar "information overload" conundrum.

The IT industry has evolved toward reasonable data access solutions, but fundamental problems remain. Finding complete and relevant data is still an issue for business people, particularly for managing business performance.

TIBCO has taken a unique approach to solving business performance management problems with their BusinessFactor platform. First, BusinessFactor manages data about the events that make up business activities. Second, BusinessFactor organizes data about those events via a contextual framework, including time and location. We discuss both these concepts in some detail further in this paper.

By providing immediate access and analysis of corporate data, TIBCO's approach becomes a valuable adjunct to standard data warehouse/business intelligence processes. IDC believes that TIBCO's technology is an important step toward improved business performance monitoring and enhanced collaboration. In this paper, we examine current data access issues and TIBCO's approach to addressing them.

SITUATION OVERVIEW

The Data Access Problem

Data access is about getting a complete, understandable, and relevant answer every time you ask a question. Think of the difference between asking an expert versus asking a librarian for information. An expert gives you a concise, relevant answer. A librarian helps you locate data. Once you're in the right place in the library, you still have the difficult tasks of finding the right shelves, finding the right books, sorting out the pertinent data, assimilating it, and developing an answer. Current data access systems are good librarians. Effective data access systems need to be more like experts, delivering relevant information in context.

Why is effective data access challenging? We see four major factors:

- ☒ **Data volume.** Data volumes have grown so large that it's hard to locate pertinent data among all that is available. In 1996, Veronica, an early search technology, could do keyword-in-title searches for all 15 million documents on the Internet. Today, Google, one of many sophisticated search engines, can index and search about 2.5 billion Web pages – impressive, but less than half of the Web. The Web is still growing at a near exponential rate, and most corporate data is not on the Web but is sequestered in diverse applications and private data stores.
- ☒ **Data context.** Every business activity consists of events. Every event occurs within a context — time, location, people involved, and so on. Information systems treat events as one-dimensional transactions, stripping contextual information. This approach allows systems to process transactions with amazing efficiency, but it leaves the user without valuable contextual information.

- ☒ **Ever-changing users and activities.** Increasingly, business activities involve not only employees but also a dynamic set of suppliers and customers. All these users need relevant data that supports all their mutual and constantly changing business activities. So, as processes and users change, information systems must change with them while still providing complete and pertinent data quickly.

- ☒ **eBusiness requires speed.** The Web changes the way people do business — the new prime currency is speed. Electronic business activities put a premium on the speed with which companies must stay ahead in terms of their knowledge about their business. This need for speed drives new requirements on business applications to enable users to quickly understand and act on observed changes in the business.

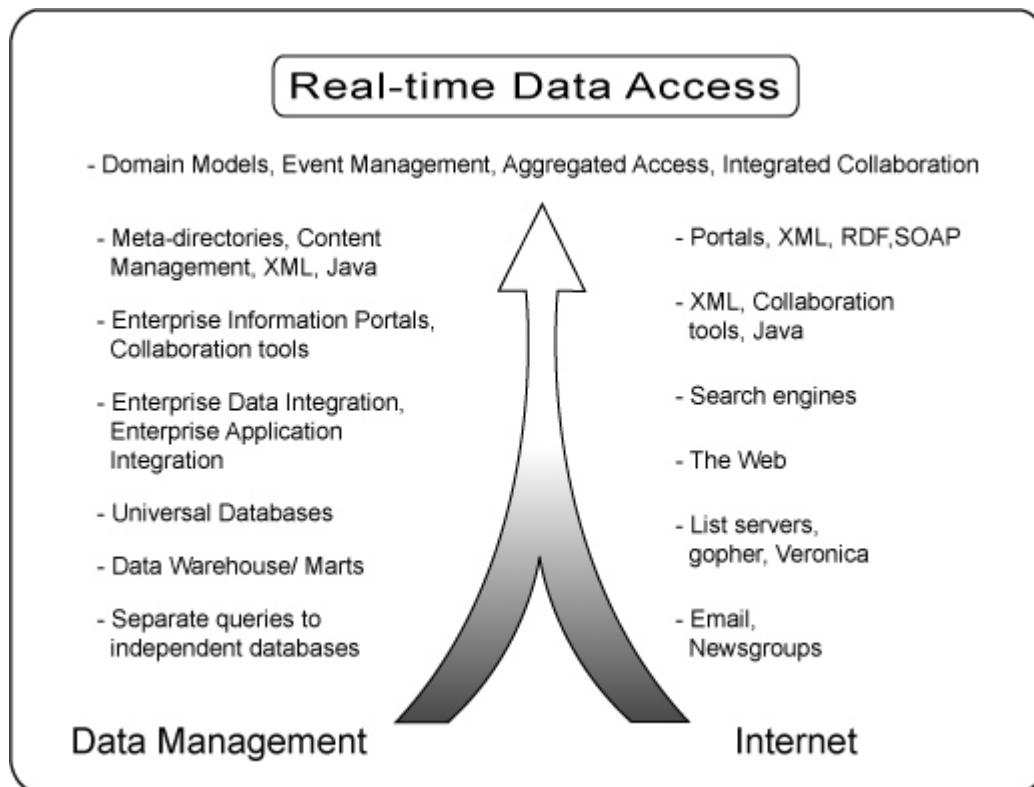
In response to these problems, information technology is evolving to the point that more effective and immediate data access is possible. Some of these technologies facilitate better business performance management.

Evolution of Data Management and the Internet

To understand potential data access technologies, it is useful to trace the history of data management. As shown in Figure 1, data management and the Internet are evolving and gradually converging on the ability to immediately access data. In the following sections we discuss some of the key steps in this convergence.

FIGURE 1

Evolution of Data Management and the Internet Toward Real-Time Data Access



Source: IDC, 2004

The Legacy Data Management Environment

In legacy data management environments, the worlds of structured, unstructured, and complex data are like parallel universes. Separate databases are deployed to house each type of data. Separate product ecosystems grew up around the separate databases to access and manipulate the data. As a result, organizations needed to implement different sets of technology to manage their data assets. Separate applications were built to leverage each database or information repository. In the legacy environment, it is rare for an application to access multiple types of data, largely because of the complex access logic that the application has to manage.

The Universal Database: A Partial Solution

Bringing data of different types together in the same database was the principal goal of the unified database pioneered by Michael Stonebraker with Illustra. Illustra featured access methods for each data type, reducing the complexity for database administrators and application developers.

In Illustra, applications still had to access each datatype separately by making separate calls to each data type-specific method. Also, the unified database approach assumed that data from specialized databases would be moved to a single database. This isn't always practical given the size of specialized databases and complexity of information systems. This approach represents unified data *management*, not unified data *access*.

The Limitations of Portals

Portals have been positioned to become the means for supporting the information access and delivery required for enterprise operations. However, they have not, to date, met the need for unified access to all relevant data.

Corporate portals have taken the idea of consumer portals, like Yahoo! and Excite, and adapted them for corporate intranets. These portals partition the "real estate" of the user's screen, running multiple applications side by side. The burden is placed upon the user to sort out any semantic or data quality inconsistencies between the meaning of information displayed in one part of the screen (via one application) and that on another part of the screen (via another application).

Advances in text mining, concept extraction, and content management have the potential to allow portals to become more effective. Integrating these capabilities into a portal is needed in order to move beyond current limitations, such as keyword search and document orientation.

Data Warehouse: In Support of Data Access

Data warehousing grew out of a need to separate data access and analysis from operational databases. The data warehousing workflow involves periodically gathering disparate data and cleansing, transforming, and integrating that data according to business rules. Then the data is loaded into persistent data structures and eventually to data marts for reporting and analysis. When implemented correctly this process provides a single version of the data across the enterprise. This uniform data becomes the basis for strategic analysis. For that reason, the data warehouse architecture serves an important role in business intelligence and analytic applications.

But the structure of warehouse-centric implementations is also their limitation. Warehouses focus on historical analysis, not operational situations. The workflow that moves data from operations-oriented databases to warehouses and marts takes time. Warehouse structures dictate the type of technologies necessary to implement the process. Warehouses lack the coordinated applications and integrated data needed to get a pulse on business performance throughout the day.

Perhaps most significantly, the warehouse workflow orders the data into one-dimensional structures and strips away context. Consequently, much business intelligence is incomplete and is often only available after it could be most useful for monitoring business performance. The processes of monitoring business performance and collaboration require near-real time data. So data warehouses inherent time lag makes them less useful for those applications. What's needed is the

ability to relate the historical information in the data warehouse with the real-time data on business performance that is monitored on an ongoing basis.

To improve business performance monitoring we need a more direct route to data sources to cut latency and to retain important context information.

Implications for Application Providers: The Need to Support Contextual, Real-Time, Integrated Data Access

From an application provider perspective, monitoring business performance means that supplying transactional applications to automate business operations is no longer sufficient. Business performance monitoring requires a combination of separate, though closely interoperating, transaction and analytic applications. A data warehouse and its associated analytic applications are part of the solution. But the data warehouse, in making available historical information, must preserve the context of the events captured, including time, location, and other contextual elements.

Support for analysis and collaboration can be significantly enhanced by access and analysis of contextual, real-time data. TIBCO addresses that need with a unique application: BusinessFactor.

BusinessFactor's Conceptual Framework

All business activities consist of events that occur at a time and place. For example, an automobile accident is an event that triggers a stream of data in many processes: police response, medical response, insurance claim, legal proceeding, and perhaps a news feed. Another example is the robot that makes a weld on a car on an assembly line. That event triggers a number of messages to different information systems — process control, inventory, and accounting.

TIBCO's foundational concept is that data is both more valuable and easier to manage if an information system maintains the integrity of data about events that make up business activities. TIBCO's technology platform, BusinessFactor, organizes each event's data within a context that includes time, location, and other elements. This approach simplifies data integration and gives users new tools for organizing and accessing data.

BusinessFactor's event concept is both tangible and amorphous. It is tangible when people identify a direct use and realize a direct benefit. It is amorphous because notions, like event and context, are ubiquitous — part of the invisible information infrastructure that we use intuitively and unconsciously.

The IT industry uses concepts like event, context, and data access widely. Among vendors, we see subtle semantic differences between the concepts and the words used to describe them. To make TIBCO's concepts clear, we define and discuss three of them: event, context, and unified data access.

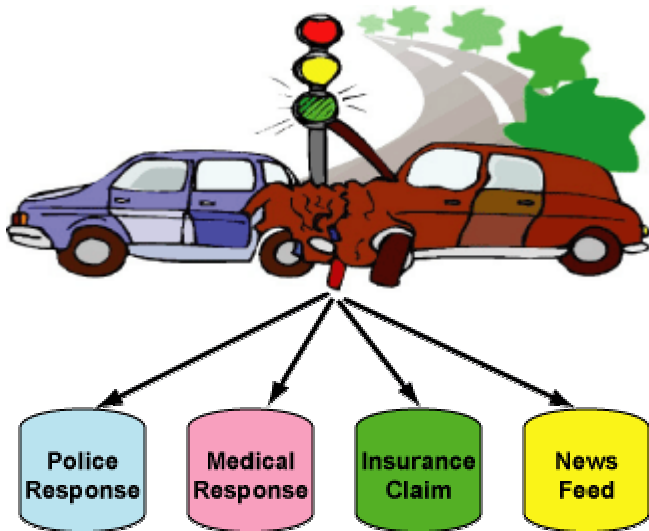
Event

The Merriam-Webster dictionary first defines event as, "something that happens." The dictionary then elaborates, "the fundamental entity of observed physical reality represented by a point designated by three coordinates of place and one of time."

In a business situation, an event is any action that produces data. This data may be in any form, including rich media, sensory data, structured or unstructured text. As illustrated in Figure 2, an auto accident event causes data to be generated in a number of different processes and data repositories. This event is something each data repository has in common, even though each repository is not aware of the others. So the event is useful in organizing and integrating the various repositories to give the user appropriate data access.

FIGURE 2

An Event as a Common Point Among Business Activities



Source: ISSI/IDC, 2004

Context

Again the Merriam-Webster dictionary is useful. It defines context as "the interrelated conditions in which something exists or occurs." The classic reporter's questions are "what, where, when, who, and why". "What" is the event; where, when, who and why provide the context that helps us understand the situation surrounding the event.

Two contextual elements, time and location, are a common reference frame for all events and, consequently, the data associated with events. So, time and location are useful for organizing data about events that is held within disparate repositories.

By improving an information system's ability to provide data in context, we increase the richness of communication between the people who use the system and thus make the information system more effective in communicating with users.

Unified Data Access

Within the IT industry, "unified data access" gets thrown around loosely. In older client-server environments, unified data access meant that the user could run different applications against a database. Portal vendors partition the "real estate" of the user's screen, running multiple applications side by side. The user still has to sort out any semantic or data quality inconsistencies between the meaning of information displayed in one part of the screen (via one application) and that on another part of the screen (via another application).

Under TIBCO's definition, unified data access means that data about events is organized by contextual elements like time and location. So, the user sees data within a consistent reference frame.

BusinessFactor's Architecture

To achieve unified data access, TIBCO pulls together many elements from the leading edge of information technology and standards. TIBCO frames their approach within the following four primary elements:

- ☒ Domain model
- ☒ Metadata manager
- ☒ Navigation/search engine
- ☒ Personal interfaces

Domain Model

A domain model represents a shared and common understanding of a domain that can be communicated among people and information systems.

In information systems, domain models are frameworks for industries and their business activities. These models separate the fundamental logic behind an information system from the specifics of the particular software that implements it. A domain model can help applications separate data that is relevant to the domain from data that is not.

TIBCO supports XML and the related Resource Description Framework (RDF) as standard ways to represent domain models. It models nonstructured data and rich data types through its metadata manager.

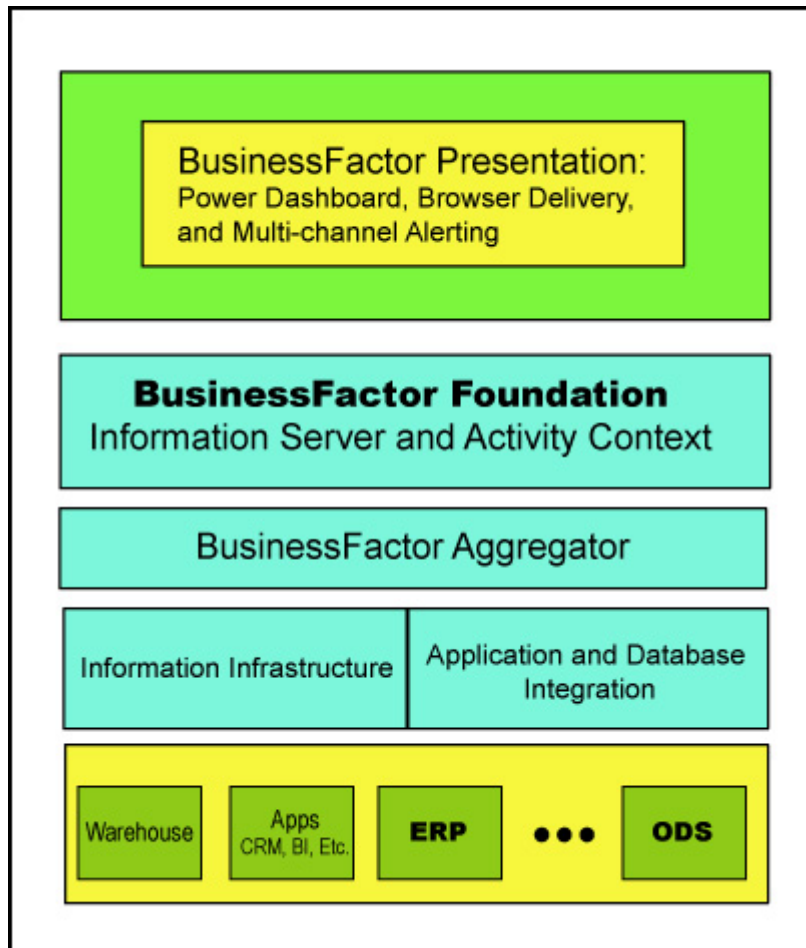
Metadata Management

TIBCO defines metadata as an information mechanism that provides the user with a common and integrated view of an organization's information within a consistent contextual framework.

As shown in Figure 3, TIBCO uses their BusinessFactor Aggregator to describe and access the structure of each data source. Aggregator maps these data structure definitions to a unified index. Aggregator uses constraint tables and a rules engine to define user-specified aggregation levels for each data source. Since, Aggregator linkages are dynamic, each user sees the most current data in the BusinessFactor presentation layer.

FIGURE 3

BusinessFactor Technology Stack



Source: TIBCO, 2004

Correctly implemented, BusinessFactor's Aggregator facility has the following capabilities:

- ☒ Captures the schemas/models of data sources and facilitates the mapping of data.
- ☒ Connects to integration infrastructures and Web Services to aggregate all data that is potentially useful to a user, regardless of the data's location or form.
- ☒ Maps incoming data in BusinessFactor's contextual data model.
- ☒ Prescribes appropriate information exchange among other enterprise applications.
- ☒ Provides a dynamic dictionary of data structures and data context represented by data elements.

Integrated Navigation and Search

Beyond keyword searching, integrated navigation and search makes the query and presentation environment the same. The user can look at the results of a query and then refine the query, rather than starting a new query from scratch. This approach reduces the latency in query processing and results display. So, the user can more quickly find the right results. BusinessFactor's navigation/exploration technology gives the user options to organize and display results by time, location, or in a traditional sequential list.

Personal Interfaces

BusinessFactor provides a customizable user interface (UI) that includes time and location organizers. It also allows standard HTML/XML interfaces to any standard browser. BusinessFactor provides tools for creating user interfaces that match each user's requirements.

Role for BusinessFactor in Business Performance Monitoring

BusinessFactor can serve as a performance management and visibility tool for the enterprise business performance manager and as an information delivery platform for a wide range of end users. BusinessFactor leverages TIBCO's well-established business integration platform, or platforms from other vendors, to provide a current and interactive view of any business activity.

It does this by incorporating real-time data from the enterprise's systems and transforms it into easily accessible information about business activities and the key performance indicators that measure them.

These visual representations can be images such as geographic maps, workflows, processes, blueprints, technical drawings, charts, or graphs, and give users the ability to quickly understand current conditions and performance for any level of location specificity or timeframe. BusinessFactor also gives users the ability to collaborate with

other users and interact with systems and processes so they can take appropriate action.

Because BusinessFactor links directly to data sources and information infrastructures, it can improve speed and effectiveness of business operations by providing visibility into the company's performance indicators. This direct data linkage also provides rapid opportunity and threat identification with tools to collaborate and take action.

Because BusinessFactor organizes events logically by multiple dimensions, including time and location, users can share visual business context and execute or assign appropriate actions.

TIBCO has seen early success with BusinessFactor. In May 2003, Telecom Italia's Domestic Wireline Unit completed its companywide rollout of a new DSL flow-through provisioning system. The system has the flexibility to handle no fewer than 25 separate DSL-based services and can process service peaks of 21,500 DSL orders per day. TIBCO BusinessFactor is used within the Telcom Italia system for business activity monitoring (BAM) to ensure service-level and sufficient business performance in digital subscriber line (DSL) provisioning.

CHALLENGES/OPPORTUNITIES

Today, a number of BI and data warehousing companies are beginning to address the problem of unified data access and analysis. Business performance monitoring is becoming a significant concern among corporate IT users and the vendors that serve them. TIBCO will have to differentiate themselves from the emerging field of competitors that seek to add an event-aware layer to the infrastructure for business intelligence. However, providing an event-aware layer is not sufficient in and of itself.

This situation presents an interesting opportunity for TIBCO. TIBCO is very familiar with the infrastructure required to handle real-time information. It also has substantial experience in relating real-time information to historical data. TIBCO's experience and technology position it to address the problem of integrating real-time business performance data with appropriate historical and contextual information.

CONCLUSION

TIBCO's BusinessFactor platform provides unified, near real-time data access within a contextual framework, including time and location. With BusinessFactor, TIBCO has been able to improve tools for business performance management through the integration of real-time event data with historical and contextual information.

TIBCO's primary challenge is differentiating itself from BI and data warehousing firms that are trying to restructure their offerings to solve the problems that TIBCO already addresses. If TIBCO continues along its current path with BusinessFactor, it will make a significant contribution to the requirement to monitor and analyze the events that indicate trends in business performance.

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