MANAGEMENT BRIEFING
WEB SERVICES FOR
BUSINESS INTELLIGENCE

By Richard Veryard, CBDi Forum
June 2003

Summary

The Business Intelligence space is being radically challenged by new forms of computing, including web services. Some of the BI vendors are now offering web service solutions that allow BI content to be integrated with other information, or fed into other applications. This creates exciting opportunities for building BI into the service-oriented architecture, and conversely for using the service-oriented architecture to short-circuit the labor of traditional BI solutions such as data warehousing.

To date, the deployment of web services technology for commercial transaction processing has been limited. However, Business Intelligence already uses many external sources of information, and may therefore be more receptive to the use of external web services where this provides economic or technical advantages. We therefore expect the convergence of BI and web services to become mainstream in a fairly short timeframe – possibly earlier than the use of web services for pure transaction processing.

Introduction

Web services are being widely discussed for integration of operational business processes. Many enterprises are starting to deploy web service technology for connecting applications internally. There is significant interest in deploying the same technologies externally, for connecting applications between multiple organizations, although this is currently inhibited by concerns about security and the immaturity of adequate standards.

Meanwhile, the use of the Internet as a platform for business intelligence (BI) is becoming more mature and sophisticated. There is an important role for web services in the business intelligence space, and some of the specialist BI vendors are starting to support web services.

Business intelligence is an important management function, and can undoubtedly benefit from a range of technological innovations, including web services and grid computing. We expect the deployment of these technologies, and the construction of a services-oriented architecture for the enterprise, to embrace management systems including BI, and not be restricted to operational systems.

In this briefing, we review the moves that the BI vendors have already taken to support web services, and offer a framework for integrating BI more comprehensively into the service-oriented world.

Expanding the Business Intelligence Framework

The Traditional View: Query, Reporting and Analysis

At the core of most BI systems are software products providing query, reporting and analysis functionality, sometimes referred to as OLAP. Traditionally, these functions have been based either directly on operational systems, or more commonly on a data warehouse or data mart, which assembles and restructures data from one or more operational data stores. This is shown in Figure 1.

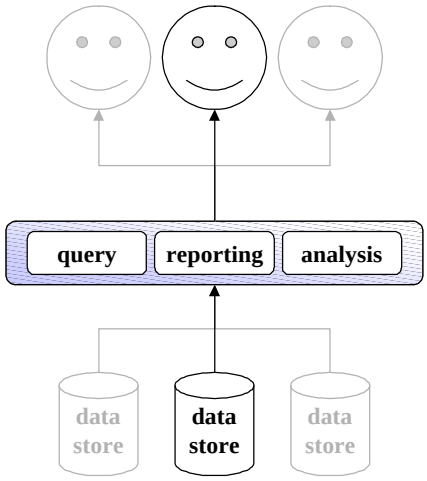

Figure 1 Traditional View of Business Intelligence

The result of the data combination can be stored in another data store, or may remain virtual. In many cases, the data are obtained from both relational and multidimensional OLAP schemas, and are combined into a hybrid schema (Hybrid OLAP or HOLAP) which is then usually virtual.

Web services can be used to make this functionality available remotely over the internet, and a number of BI vendors offer web service front-ends to their basic OLAP products. In some cases, however, the remote services merely provide access to a set of predefined reports, or generate predefined management alerts, with no ability to perform analysis dynamically. This limitation applies to many so-called portals or dashboards, in which the service can be understood simply as a one-way information flow from the data store to the manager.

Some BI vendors appear to think that the BI process terminates with information dissemination. And if the aim is solely to display information on remote users' screens, then it isn't obvious why delivering the information using web services is any better than simply delivering the information in HTML form to a standard browser – the so-called zero footprint solution that has been commonplace for some time. Fortunately, there are some BI vendors that take a broader view.

Closed Loop BI

Even with full functionality for query, reporting and analysis, the traditional view of business intelligence only gives us a partial picture of the process, lacking a broader system purpose and context of management control and action. Figure 1 encourages a misleading view of business intelligence as a passive activity by individual managers. It is a known pitfall for business intelligence to be taken over by clever number-crunchers, identifying fascinating statistical patterns with no practical relevance for management action.

In contrast, Figure 2 shows how business intelligence can be understood as a closed control loop. Managers use tools to process and interpret information; they then act upon this information and monitor the effects of their actions. If the actions have the expected effect on business performance, this helps to confirm the original interpretation; if management intervention doesn't work in the expected way, then this should trigger further analysis. This management feedback and learning loop is a key element of true business intelligence.

Closed loop business intelligence also includes the possibility of management actions whose primary purpose is to gain more information/intelligence – to learn something or to test a hypothesis. A major retailer offers a special price for a specified product in selected stores, and then watches the effect on sales volumes. The FBI may arrest a few minor members of a criminal gang in order to provoke the gang leaders into a detectable reaction.

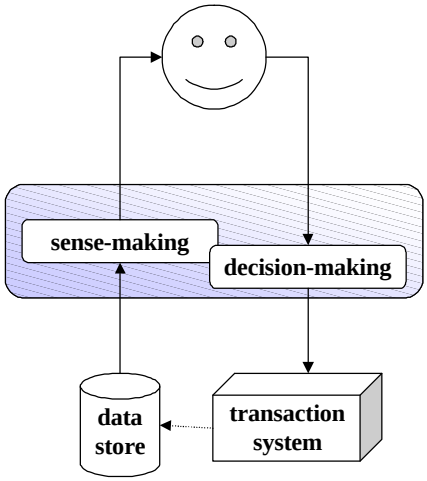

Figure 2 Closed-Loop Business Intelligence

Real-Time Enterprise

As well as web services for business intelligence, it is also worth mentioning the converse: business intelligence for web services. Service-oriented applications are becoming increasingly complex, and this creates further challenges for system management. Some specialized intelligence is already found in some system management platforms, especially to monitor security threats. However, there is clearly an opportunity to develop this kind of functionality further to achieve a broader range of autonomic system behavior.

Thus in the Real-Time Enterprise, as shown in Figure 3, transactions and events can be intercepted and analysed as they happen, without waiting for them to reach a data store, and this leads to the possibility of a real-time or near-real-time system response.

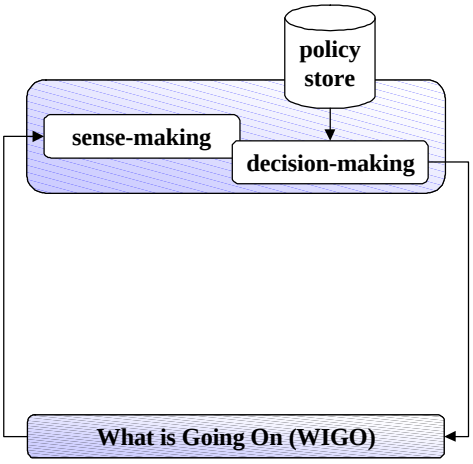

Figure 3 The Real-Time Enterprise

However, while web service and XML technologies generate many new and exciting opportunities for the Real-Time Enterprise, this usually needs to be placed within a broader business intelligence context. This is especially important where security is concerned, since a system that relies on a fixed set of rules and policies is usually vulnerable to intelligent attack. Further off-line analysis will allow the policies to be continually reviewed and refined.

There is still a role for stored data for business intelligence in the Real-Time Enterprise. Among other things, we usually need to be able to analyse data for the current period, and this requires reviewing transactions for the past 24 hours, or the past 7 days or whatever. Business intelligence is often about detecting changes, trends and patterns, finding "the difference that makes a difference", and is not just about the absolute numbers prevailing at the present. If we want to perform sophisticated statistics, we need to have enough data to produce statistically significant results. We need to be able to distinguish meaningful events from random noise.

There is also a role for off-line processing. Although we can expect a progressive shift towards autonomic systems in which some self-correction and self-protection functions can be coded as policies and executed automatically, at least for the foreseeable future there is always going to be a management/learning loop that goes through human brains and therefore requires some thinking time.

A Broader Framework for BI

Putting the closed-loop business intelligence shown in Figure 2 together with the real-time enterprise shown in Figure 3, we have produced the general framework for business intelligence shown in Figure 4.

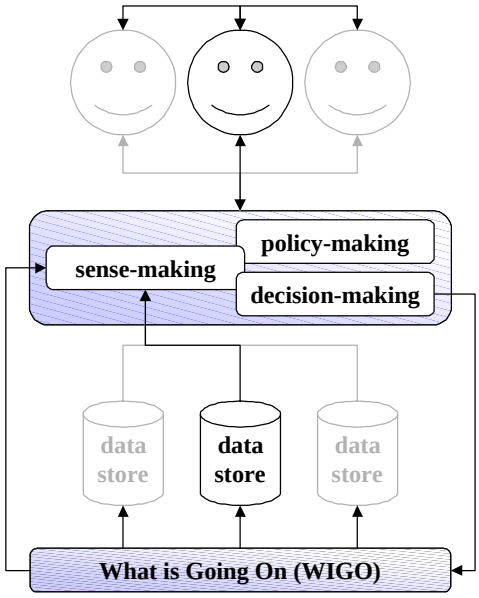

Figure 4 Broader View of Business Intelligence

With this broader view of business intelligence, we can now see several additional ways in which web services can play a useful role and help integrate the BI process.

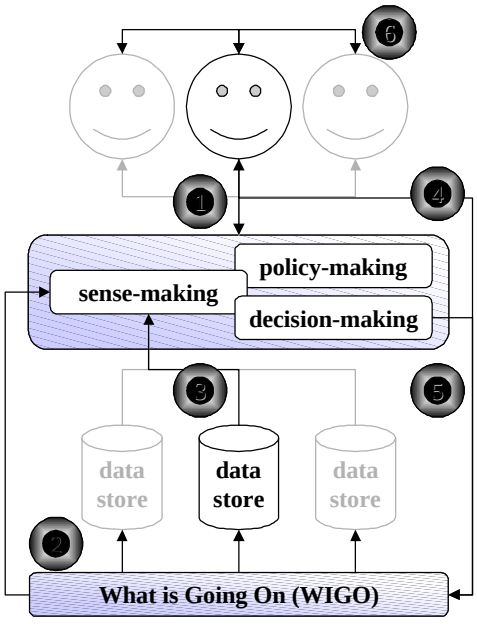

Figure 5 Place of Web Services in Business Intelligence

1. Provide query & reporting services to users.
2. Provide dynamic analysis services to users.
3. Obtaining real-time data via web services. Intercepting XML documents in transit.
4. Presenting a virtual data store as a web service.
5. Exercising management action through web services.
6. Disseminating management action through web services.
7. Using web services to support peer-to-peer communications between knowledge workers.

Further Material

This is an extract from a longer report published by the CBDi Forum in the June 2003 Journal. The full report describes the framework in greater detail, outlines a number of application scenarios, and identifies specific BI vendors and products performing many of the functions described in this briefing. Vendors mentioned include: Business Objects, Crystal Decisions, Cognos, IBM, Microsoft and Microstrategy.

The CBDI Journal is sent free to Gold/Silver subscribers; single issues can be purchased separately. Please visit http://www.cbdiforum.com for more details.