PROVIDING THE RIGHT TOOL FOR THE JOB: ORACLE'S INTEGRATED BUSINESS INTELLIGENCE TOOLS

Oracle Corporation

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SEGMENTING BUSINESS INTELLIGENCE USERS

When selecting business intelligence (BI) tools, it is important to select the right tool for the job depending on end user requirements. An understanding of end user requirements can be developed by segmenting the continuum of BI users according to various criteria, such as the user's position in the BI supply chain, the relative sophistication of functionality appropriate to the user, the BI tasks that the user must perform, and the archetype of the user.

Figure 1 illustrates multiple segmentation of BI users and aligns the segments to show their relationships. The framework presented in Figure 1 can help end users and IT organizations to select the right BI tool for a given BI job, as this white paper explains.

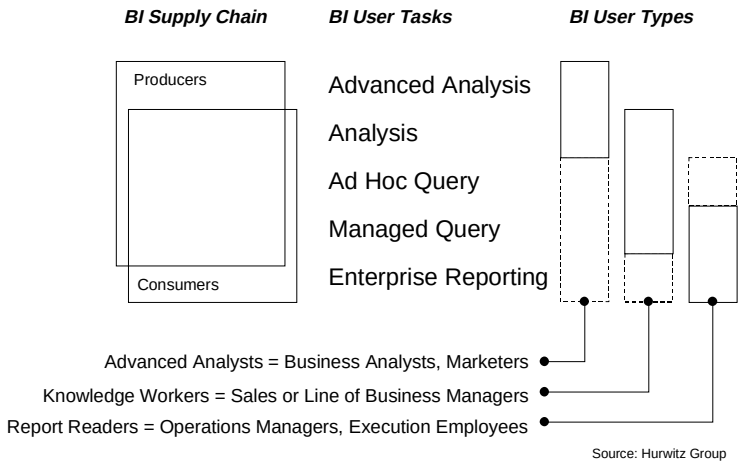

Figure 1. Multiple Segmentation of Business Intelligence Users

BI SUPPLY CHAIN

BI documents are produced and consumed along a BI supply chain. Typical BI documents include reports, queries, and analyses; sometimes the word "report" is applied to any of the three. Unlike the green-bar reports of previous decades, BI documents produced with up-to-date systems are electronic products that the consumer reads online. The author is like an application designer, the reader is like a user, and the BI document is like an application, which makes collecting, presenting, and viewing information a highly interactive experience. Hence, the modern report

is produced electronically, distributed through an electronic supply chain, and consumed electronically.

Relative to the BI supply chain, BI users can be segmented roughly into two extreme categories, based on their roles as BI document producers or consumers.

BI Producers

The BI producer typically uses enterprise reporting tools and ad hoc query and analysis tools to collect unique datasets and either produce standard, parameterized reports or analyze data using pivot, drill down, and visualization techniques. Producers may also use advanced analytical tools to build applications providing functionality such as 'what if' forecasting and modeling. Other members of the organization consume the analyses and reports from BI producers. Of course, IT personnel play the role of BI producer when they create reports for consumption across the organization. Other BI producers may include analysts, line of business managers, departmental level 'developers,' marketers or anyone else creating views or analyses.

BI Consumers

In terms of employee head count, the majority of organizations have many more BI consumers than BI producers. BI consumers typically use viewing software to read the analyses and reports produced by analysts, line of business developers or IT personnel. Most modern viewers enable a high level of interactivity. The BI consumer may alter the presentation, query the content of the report, and export content to other desktop or web-based software tools.

Overlapping Producers and Consumers

The left-most column in Figure 1 illustrates that the categories of BI producer and BI consumer have considerable overlap. As the traditional "knowledge workers," BI producers have always consumed BI documents. However, users who were previously BI consumers exclusively are evermore frequently crossing the line into production, driven by the following ongoing trends:

- The ease-of-use of analytic tools for non-technical users has advanced significantly in recent years.

- The level of integration between enterprise reporting, ad hoc query, and analysis functions has grown much tighter, providing a migration path into entry-level analysis.
- Many more users (even external ones, like suppliers and distributors) are now permitted access to corporate information, thanks to advancements in the web-based delivery of BI tools and a recognition that broader access to data leads to more empowered end users, which in turn leads to competitive advantage.

These trends indicate that the success of BI users today depends on having BI tools that are fully integrated, provide high ease of use and performance, and deliver information through a scalable web-based system.

NOTE: Some types of analytic applications are exceptions to the BI supply chain described here. For instance, an Executive Information System (EIS) is typically produced by IT personnel and consumed by a very small number of non-technical users at the highest levels of an organization's management. Reports from EISs typically track performance indicators that are tightly guarded within the company as confidential information. Thus, these reports are rarely shared with other consumers.

BI USER TASKS

Hurwitz Group has identified the five most common tasks performed by most corporate BI users: advanced analysis, analysis, ad hoc query, managed query, and enterprise reporting.

Analysis involves online analytic processing (OLAP), which compares data from two or more data dimensions representing corporate entities. For instance, comparing geography, sales, and time dimensions can reveal the western region sales figures for the first quarter. Advanced analysis also involves OLAP, but is applied to advanced analytic tasks such as forecasting, trend analysis, and business modeling. Dimensional data may be cached temporarily or persistently as cubes in a dedicated multidimensional server (MOLAP) or as a star schema in a relational database (ROLAP).

Ad hoc query refers to creation, by an end user, of a unique report in response to a request for information. Managed query refers to pre-defined parameterized reports that are created using an ad hoc query or enterprise reporting tool, although run by other users. Enterprise reporting refers to standard, perhaps highly complex, parameterized reports created by the IT department and distributed to many users in the organization.

BI USER TYPES

BI user tasks can be correlated to BI user types, as described by job titles. (See the bottom of Figure 1.) Business analysts and marketers typically perform advanced analysis, whereas a variety of line-of-business managers perform entry-level and mid-level analysis. Note that both levels of analysts perform ad hoc query to varying degrees. The dotted lines in Figure 1 show how BI user types break out of their mandates to perform other BI user tasks. For example, advanced analysts and knowledge workers are BI producers at the top of the BI supply chain, but they both regularly consume reports and analyses at the bottom of the chain. Likewise, report readers occasionally migrate upward into entry-level analysis.

ORACLE BUSINESS INTELLIGENCE TOOLS

To serve the needs of all the BI users identified in this white paper, Oracle Corporation offers a range of integrated and complementary BI tools, all of which are Internet or web-enabled:

- **Oracle Express** consists of analytic application development tools, a calculation engine, and a multidimensional data cache for MOLAP. However, Express can also be configured for ROLAP (where data is fetched from relational databases during run-time), as well as hybrid approaches that mix MOLAP and ROLAP. Additionally, Express's calculation engine provides advanced analytic functionality (such as forecasting and "what-if" scenarios) regardless of the implemented OLAP architecture.
- **Oracle Discoverer** is a ROLAP tool for ad hoc query and analysis of data in relational data warehouses/marts and operational databases. Discoverer has received awards for its ease-of-use, capability, and manageability. Its End User Layer provides a user-friendly presentation of relational data in terms business users can understand.

- **Oracle Reports** is an enterprise reporting tool designed to publish formatted views of data to distributed user communities in a variety of outputs, such as the Web, paper, email, and various file formats.

ORACLE BI TOOLS AND USER SEGMENTATION

Figure 2 shows that Oracle BI tools can be described in terms of the BI user tasks established earlier in this paper. Note that Oracle Express, Oracle Discoverer, and Oracle Reports cover the entire spectrum of BI user tasks.

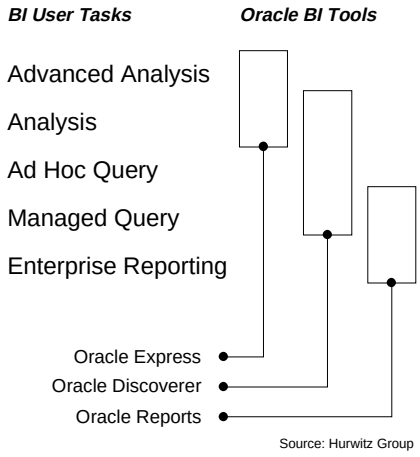

Figure 2. Oracle BI Tools correlated with BI User Tasks

INTEGRATION OF ORACLE BI TOOLS

Each Oracle BI tool is a best-of-breed product that focuses on the requirements of a well-defined BI user. Although they are autonomous products (so each can be the best of its breed), Oracle BI tools are fully interoperable with each other. They support several mechanisms for sharing data and BI documents, as well as mechanisms for moving from the user interface of one to that of another.

For example, a user analyzing summary data in an Express cube can drill through to Discoverer to audit the detailed source data from which the cube was summarized. A user can pass data from a Discoverer workbook to Express, which automatically builds a cube and starts the Express calculation engine for advanced analysis. BI producers using Discoverer or Express can generate an Oracle Reports report definition file (which the Oracle Reports server can schedule and distribute) to

publish to their BI consumers views of data from Discoverer workbooks and Express cubes.

Table 1 summarizes the complementary integration points of Oracle BI tools.

	Data Structures	Integration Points
Oracle Express	Multidimensional cubes	Supports relational and hybrid OLAP. Drill to detail in Discoverer. Batch reporting with Reports.
Oracle Discoverer	Source data in transactional systems and relational warehouses or marts	Supports Relational OLAP. Accepts Express dimension values as query parameters. Export to Reports format. Export to Express format.
Oracle Reports	Source data in transactional systems and relational warehouses or marts. Also source data from Express Server.	Batch reports against Express Server. Generate multiple style reports from Discoverer

Table 1. Express, Discoverer, and Reports compared by Data Properties

CASE STUDY NO. 1: GTE DIRECTORIES

GTE Directories Corporation, a leader in linking buyers and sellers, publishes over 1,000 GTE Yellow Pages directories worldwide and provides sales or other directory-related services for approximately 1,100 directory titles, representing a total circulation of 96 million. The company also develops new media services such as GTE's SuperPages.com (www.superpages.com), the Internet's leading online directory service. GTE Directories is a part of GTE Corporation, a leading provider of integrated telecommunications services. The Yellow Pages industry is a multi-billion dollar industry that demands data analysis as a competitive advantage.

That's why Peter Johnson, Manager of the Decision Support Group at GTE Directories, has developed applications using Oracle Express. For instance, Directory Trends is a software product for internal use that answers customer-oriented questions like: "Which customers are most likely to cancel?" or "What are the geographies where customers are likely to cancel?" Since Peter and his crew deployed Directory Trends, marketers and sales managers can now see increases and decreases in sales, as well as cancellation trends. Since the data is updated daily, users can manage their initiatives granularly.
"Most of our users are business managers or marketers," says Peter Johnson, "so they don't have the luxury of spending hours getting comfortable with it." Peter's group at GTE

Directories includes about a dozen advanced analysts, who produce Express cubes and reports that 300-400 business users consume.

According to Peter, the first Express prototype went online in less than 30 days. They started with data about a small cluster of telephone books, and progressively added more books, until today Express cubes hold historic data covering 3-4 years for 1200-1300 telephone books. Now up to 4Gb, Peter expects the Express cubes to grow by a gigabyte per year.

"Multiple years of information pulled together is why we turned to OLAP," says Peter. "A cube arranges data historically in a time series, which accommodates questions like 'What did these customers do last year compared to this year?'. And it avoids running massive queries against the database over and over."

Peter Johnson's group at GTE Directories also uses Oracle Discoverer, largely for its ability as an easy-to-use ad hoc query tool. Peter's analysts use Discoverer to create Express cubes and to hit data marts in Oracle databases. The data marts focus on specific business subjects (like customer complaints), but they all share virtual dimensions for cross-mart queries. Peter's group moved data into the marts to avoid hitting the entire database and to increase performance with iterative queries performed with Discoverer.

So, why did Peter Johnson's group at GTE Directories select Oracle Express and Discoverer as the right tools for the job?

"It always makes sense to have a centralized point of contact for a vendor," says Peter. GTE Directories chose Express and Discoverer for their integration with each other, as well as with Oracle data servers, Designer, and Developer. Plus, Peter's group will, in the near future, implement reporting with Oracle Reports. Furthermore, GTE Directories' BI solutions are dispersed from Florida to Alaska to Hawaii over a WAN-based intranet, so they needed the web support found in Oracle BI tools. "By sticking to Oracle," says Peter, "we have one vendor with a robust, integrated solution."

CASE STUDY NO. 2: MINISTRY OF ENVIRONMENT, LANDS, AND PARKS (MELP)

The Ministry of Environment, Lands and Parks (MELP) is responsible for the stewardship of land and environmental assets in the Canadian province of British Columbia. Because of its mandate, MELP's information systems manage data outside the realm of the usual business information, such as:

- Environmental data about endangered species and soil, air, and water quality
- Land usage data about logging, grazing, trapping, and groundwater drilling
- Park data about attendance, safety, security, and management status

Analyzing this data is critical to MELP's mission of maintaining a balance between land use and ecological quality. Yet such analysis requires people who are experts in ecology and land management, as well as very knowledgeable about data structures and BI tools.

To address this challenge, Andrew Faulkner, MELP's Data Warehouse Technical Architect, developed a unique BI supply chain. From each department within MELP, a domain specialist (such as a biologist or water licensing manager) was selected to become a "data manager." Andrew and his crew taught the data managers how to design data structures that are relevant to their work and how to perform analysis of them. Data managers now produce analyses and reports that are consumed by other departmental members. "This approach has reduced my group's commitment to producing analyses and reports," said Andrew, "and it has increased the quality of reports because they are produced by domain specialists."

To support the data managers' needs, Andrew's group deployed a central warehouse running on an Oracle data server, which feeds eight regional dependent data marts containing data specific to their regions. The warehouse extracts data from legacy operational systems across the province, contains about 100Gb of data, is refreshed nightly, and replicates its marts weekly or monthly. "I share the wide-area network with the rest of the provincial government," commented Andrew, "so I can't replicate the data marts as often as I would like."

Data managers use Oracle Discoverer to perform ad hoc query and analysis, accessing a regional data mart and/or the central warehouse through a semantic layer that shields them from complex schema designs and metadata. From Discoverer, the data manager typically

exports a data view to Oracle Reports or a web page. This way, report consumers access the report through the Oracle Reports server or a browser from anywhere on MELP's province-wide intranet. For example, the data manager might be a Recreational Development Officer who produces an analysis showing that park usage will increase dramatically in the next few weeks. The data manager can publish this information as a report or web page, which alerts Park Rangers and other park workers across the province.

Commenting on MELP's unique BI supply chain, implemented with Oracle's BI tools, Andrew Faulkner says it achieves his group's mandate, which is "to integrate data on the desktop for front-line workers."

HURWITZ GROUP ANALYSIS

The BI supply chain defined in this paper requires a variety of BI tools because the needs of BI producers and BI consumers vary along the chain. For example, the BI supply chain must accommodate two levels of analytic users, whether advanced analysts (as with the Express users at GTE Directories) or occasional analysts (as with the Discoverer users in British Columbia's Ministry of Environment, Lands, and Parks). Of course, the bulk of BI consumers simply need reports distributed to them through a production system (as with the Reports users at GTE and Ministry of Environment, Lands, and Parks).

However, if diverse BI tools are implemented, they must interoperate with the appropriate depth at the data level, even if each is an autonomous best-of-breed product. BI producers should be able to share data and documents between different BI tools, and BI consumers should be able to receive reports and data views drawn from the analytic work of the BI producers.

For IT organizations and end users to select the right tool for the job, they need a set of best-of-breed BI tools that are integrated at the data level and that support multiple analytic levels and enterprise production reporting.

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