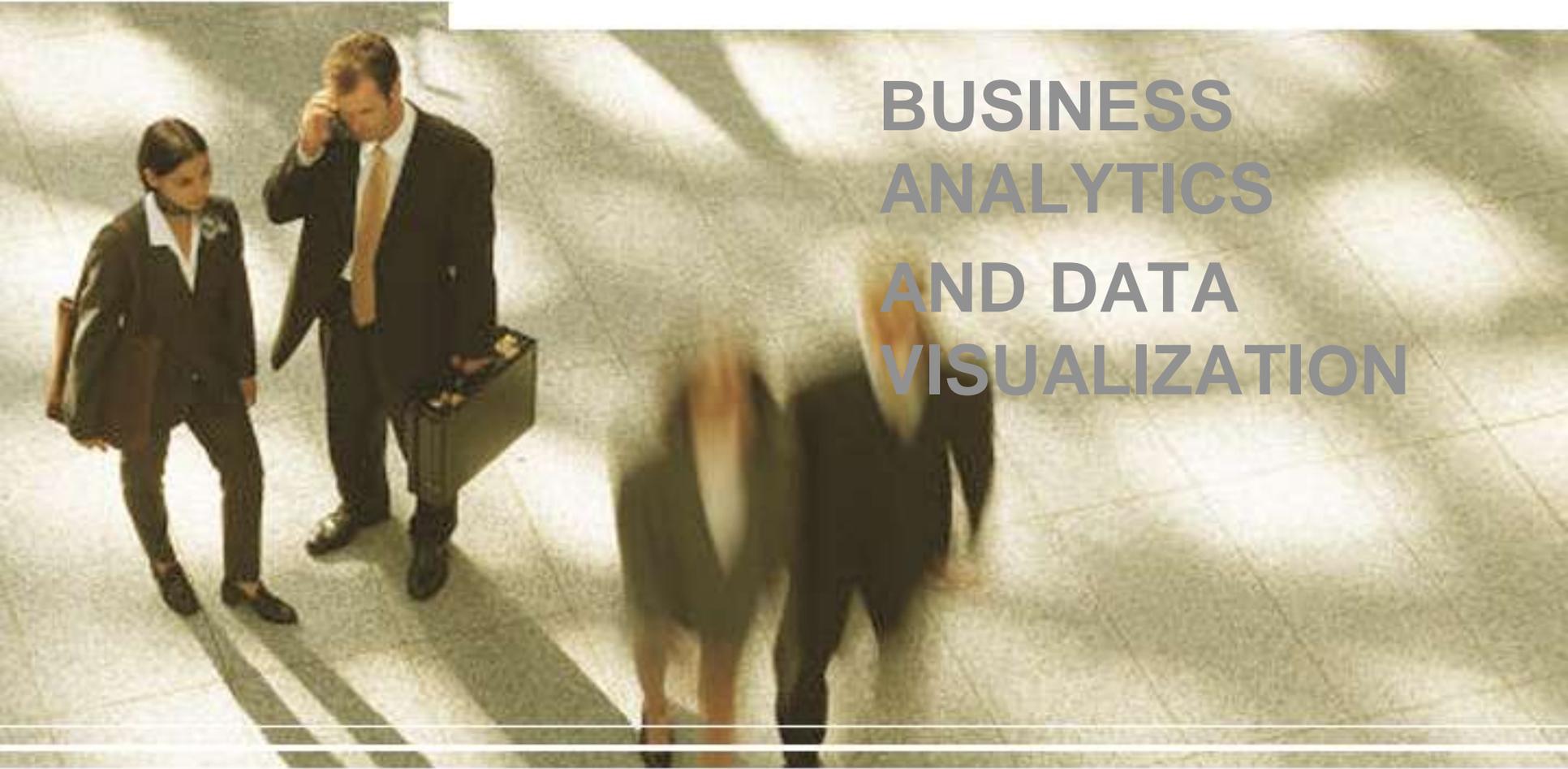


Chapter 2

**BUSINESS
ANALYTICS
AND DATA
VISUALIZATION**

A photograph of a busy office hallway. In the foreground, a man in a dark suit and tie is talking on a mobile phone while carrying a briefcase. A woman in a dark business suit is walking towards him. In the background, another person is blurred, suggesting movement. The floor is polished and reflects the overhead lights.

Learning Objectives

- Describe business analytics (BA) and its importance to organizations
- List and briefly describe the major BA methods and tools
- Describe how online analytical processing (OLAP), data visualization, and multidimensionality can improve decision making
- Describe advanced analysis methods

Learning Objectives

- Describe real-time BA
- Describe how business intelligence (BI) supports competitive intelligence
- Describe automated decision support (ADS) systems and their benefits
- Explain how the Web relates to BA
- Describe Web intelligence and Web analytics and their importance to organizations
- Describe implementation issues related to BA and success factors for BA

The Business Analytics (BA) Field: An Overview

- **Business intelligence (BI)**

The use of analytical methods, either manually or automatically, to derive relationships from data

The Business Analytics (BA) Field: An Overview

- **The essentials of BA**
 - **Analytics**

The science of analysis.
 - **Business analytics (BA)**

The application of models directly to business data. BA involves using MSS tools, especially models, in assisting decision makers; essentially a form of OLAP decision support

The Business Analytics (BA) Field: An Overview

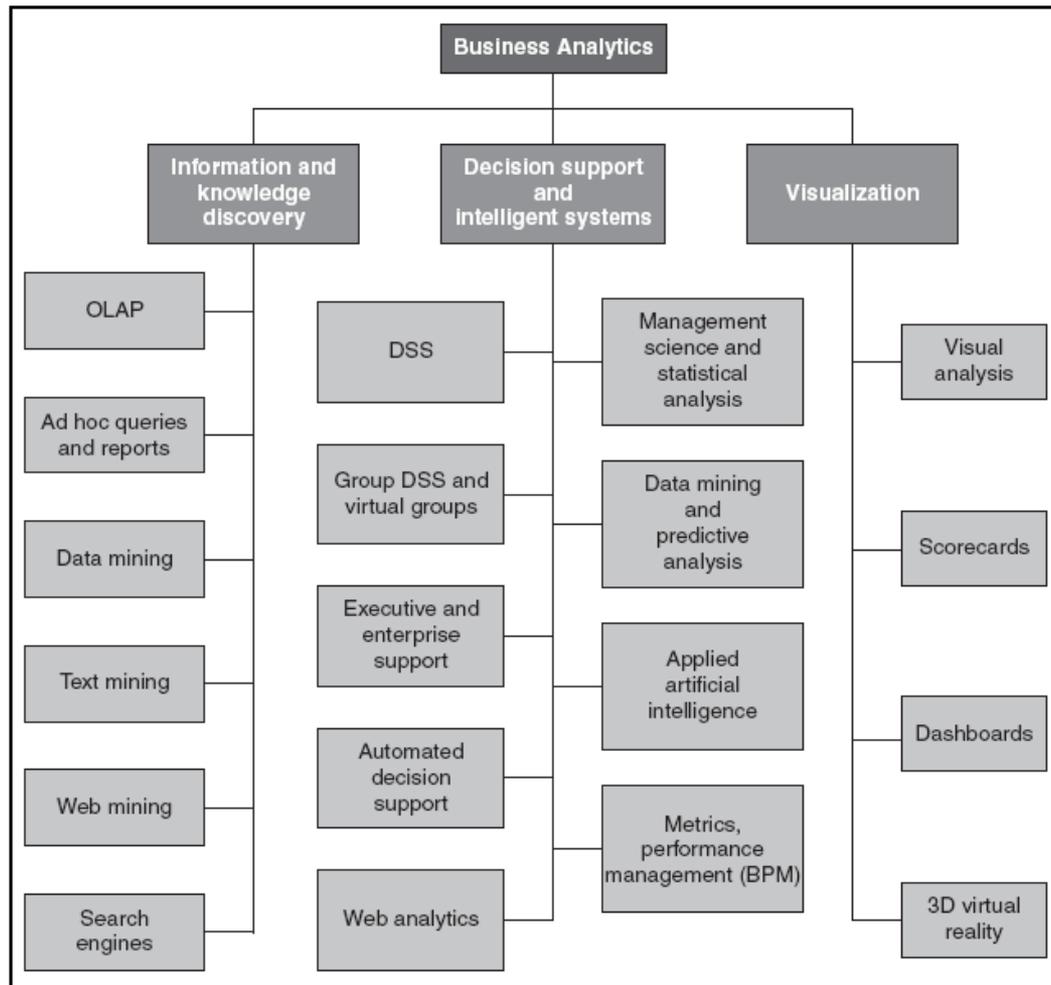


FIGURE 6.1 Categories of Business Analytics

The Business

Analytics (BA) Field: An Overview

- **MicroStrategy's classification of BA tools: The five styles of BI**
 1. Enterprise reporting
 2. Cube analysis
 3. Ad hoc querying and analysis
 4. Statistical analysis and data mining
 5. Report delivery and alerting

The Business Analytics (BA) Field: An Overview

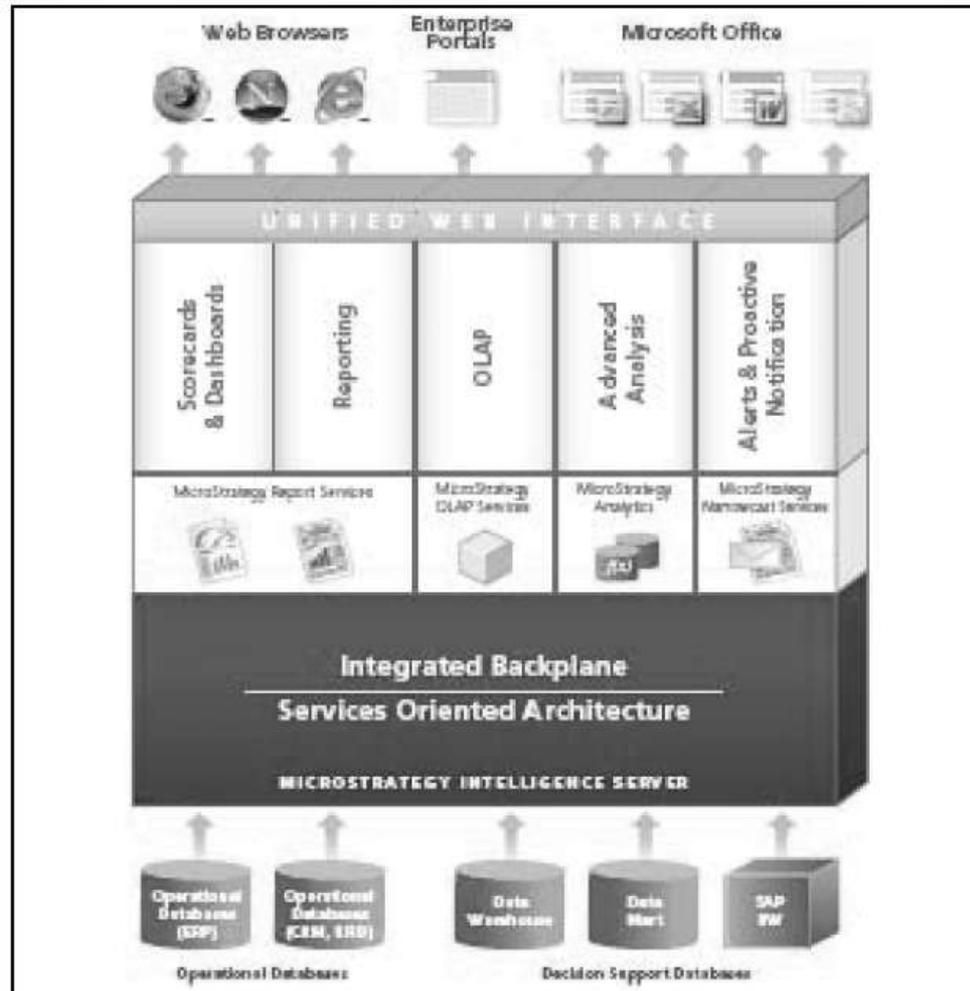


FIGURE 6.2 MicroStrategy 8 Architecture

The Business

Analytics (BA) Field: An Overview

- **SAP's classification of strategic enterprise management**
 - Three levels of support
 1. Operational
 2. Managerial
 3. Strategic

Online Analytical Processing (OLAP)

- **Drill-down**

The investigation of information in detail (e.g., finding not only total sales but also sales by region, by product, or by salesperson).
Finding the detailed sources.

- **Online analytical processing (OLAP)**

An information system that enables the user, while at a PC, to query the system, conduct an analysis, and so on. The result is generated in seconds

Online Analytical Processing (OLAP)

- **OLAP versus OLTP**
 - OLTP concentrates on processing repetitive transactions in large quantities and conducting simple manipulations
 - OLAP involves examining many data items *complex relationships*
 - OLAP may analyze relationships and look for patterns, trends, and exceptions
 - OLAP is a direct decision support method

Online Analytical Processing (OLAP)

- **Types of OLAP**

- **Multidimensional OLAP (MOLAP)**

- OLAP implemented via a specialized multidimensional database (or data store) that summarizes transactions into multidimensional views ahead of time

- **Relational OLAP (ROLAP)**

- The implementation of an OLAP database on top of an existing relational database

Reports and Queries

- **Ad hoc query**

A query that cannot be determined prior to the moment the query is issued

- **Structured Query Language (SQL)**

A data definition and management language for relational databases. SQL front ends most relational DBMS

Multidimensionality

- **Multidimensionality**

The ability to organize, present, and analyze data by several dimensions, such as sales by region, by product, by salesperson, and by time (four dimensions)

- **Multidimensional presentation**

- Dimensions
- Measures
- Time

Multidimensionality

- **Multidimensional database**

A database in which the data are organized specifically to support easy and quick multidimensional analysis

- **Data cube**

A two-dimensional, three-dimensional, or higher-dimensional object in which each dimension of the data represents a measure of interest

Multidimensionality

- **Cube**

A subset of highly interrelated data that is organized to allow users to combine any attributes in a cube (e.g., stores, products, customers, suppliers) with any metrics in the cube (e.g., sales, profit, units, age) to create various two-dimensional views, or *slices*, that can be displayed on a computer screen

Multidimensionality

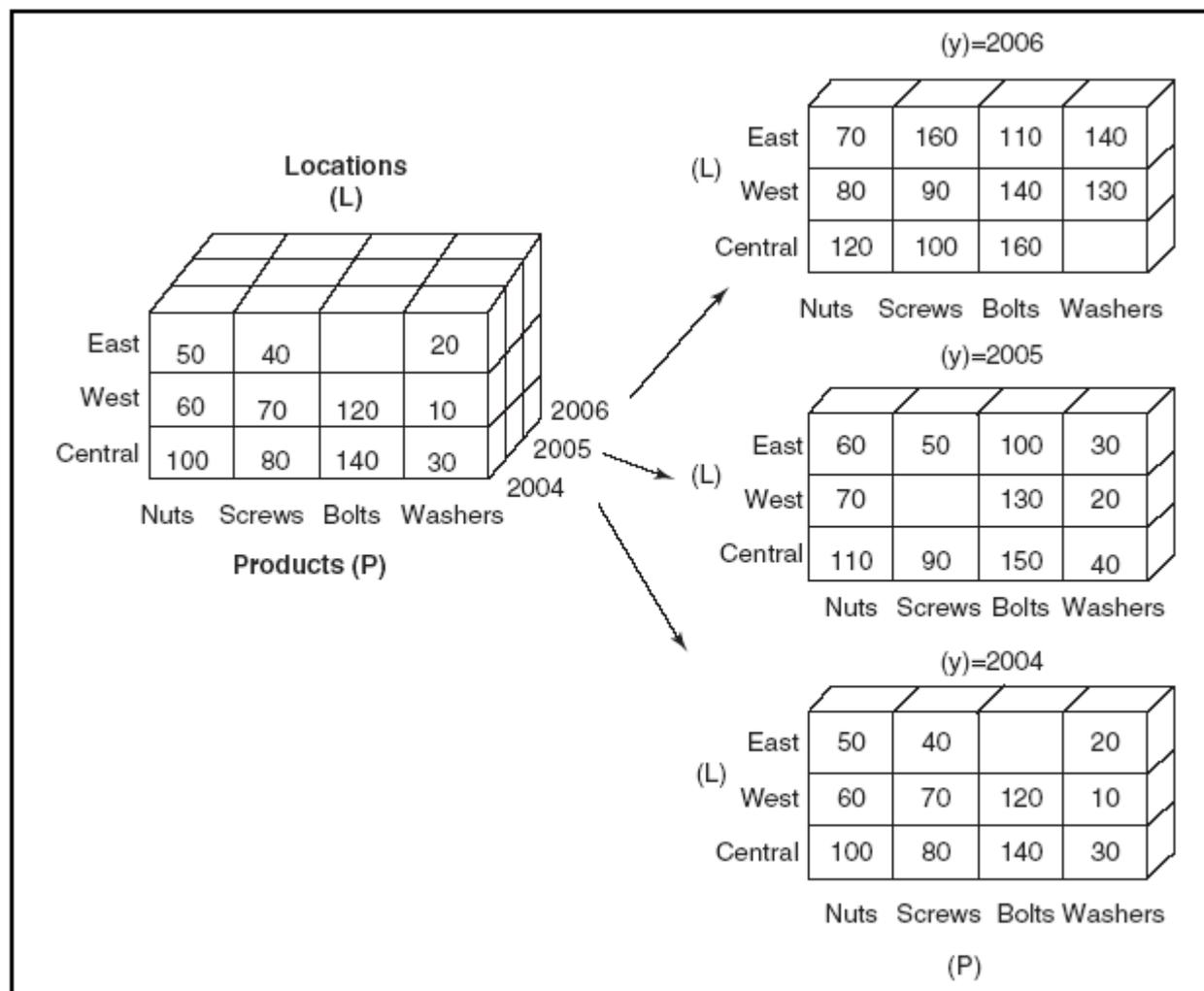


FIGURE 6.4 Cube Analysis and Views

Multidimensionality

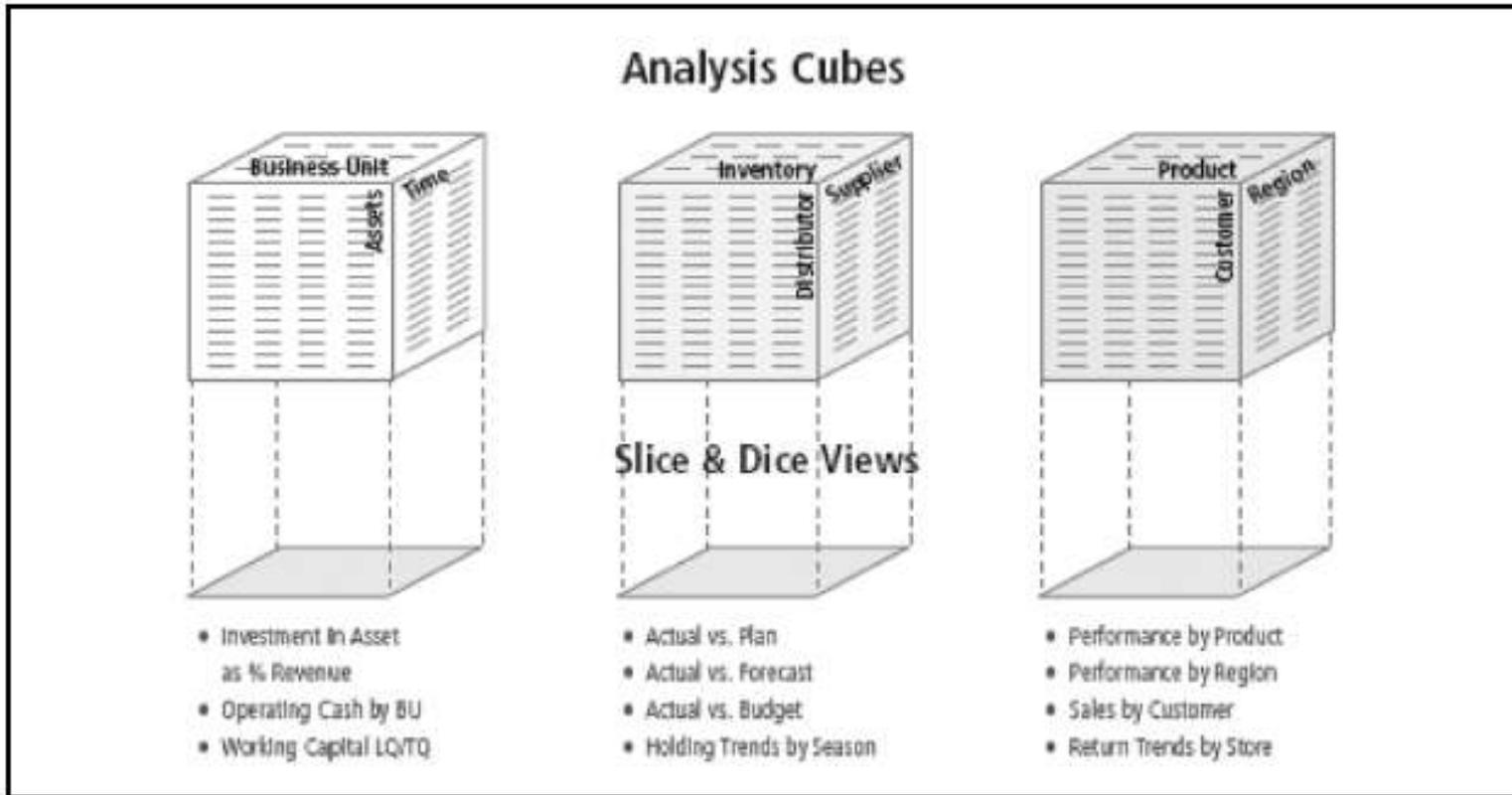


FIGURE 6.5 Slice-and-Dice Cubes

Multidimensionality

- **Limitations of dimensionality**
 - The multidimensional database can take up significantly more computer storage room than a summarized relational database
 - Multidimensional products cost significantly more than standard relational products
 - Database loading consumes significant system resources and time, depending on data volume and the number of dimensions
 - Interfaces and maintenance are more complex in multidimensional databases than in relational databases

Advanced BA

- **Data mining and predictive analysis**

- Data mining

- Predictive analysis

Use of tools that help determine the probable future outcome for an event or the likelihood of a situation occurring. These tools also identify relationships and patterns

Data Visualization

- **Data visualization**

A graphical, animation, or video presentation of data and the results of data analysis

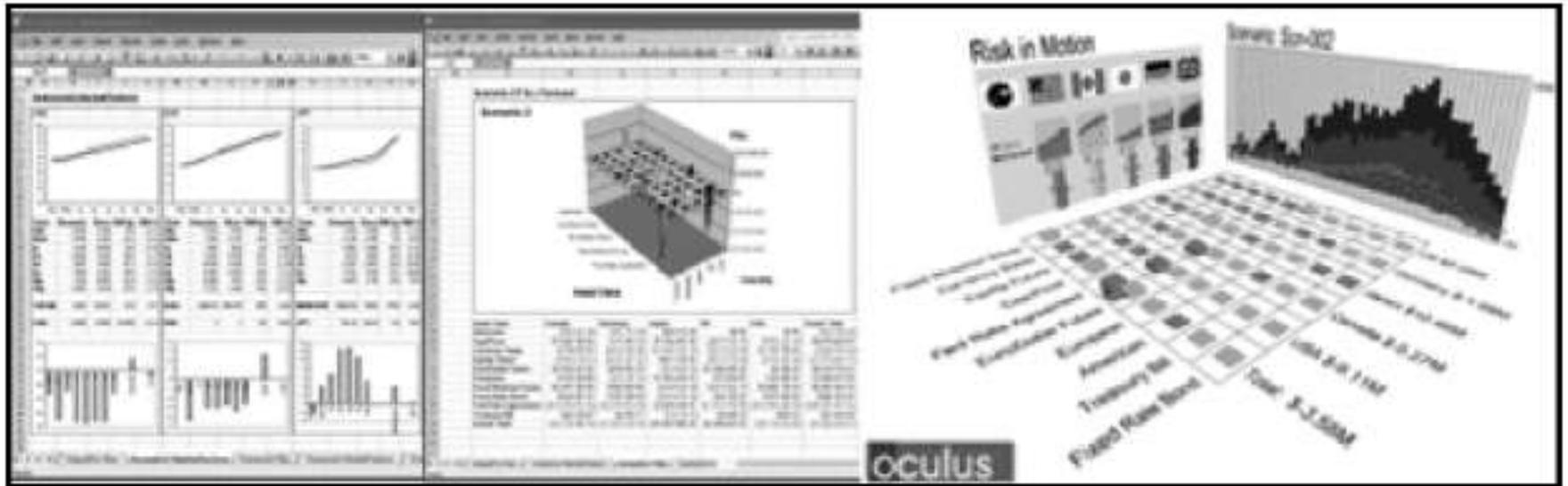
- The ability to quickly identify important trends in corporate and market data can provide competitive advantage
- Check their magnitude of trends by using predictive models that provide significant business advantages in applications that drive content, transactions, or processes

Data Visualization

- **New directions in data visualization**
- In the 1990s data visualization has moved into:
 - Mainstream computing, where it is integrated with decision support tools and applications
 - Intelligent visualization, which includes data (information) interpretation

Data Visualization

FIGURE 6.6 Visual Spreadsheet of Risk Analysis



Data Visualization

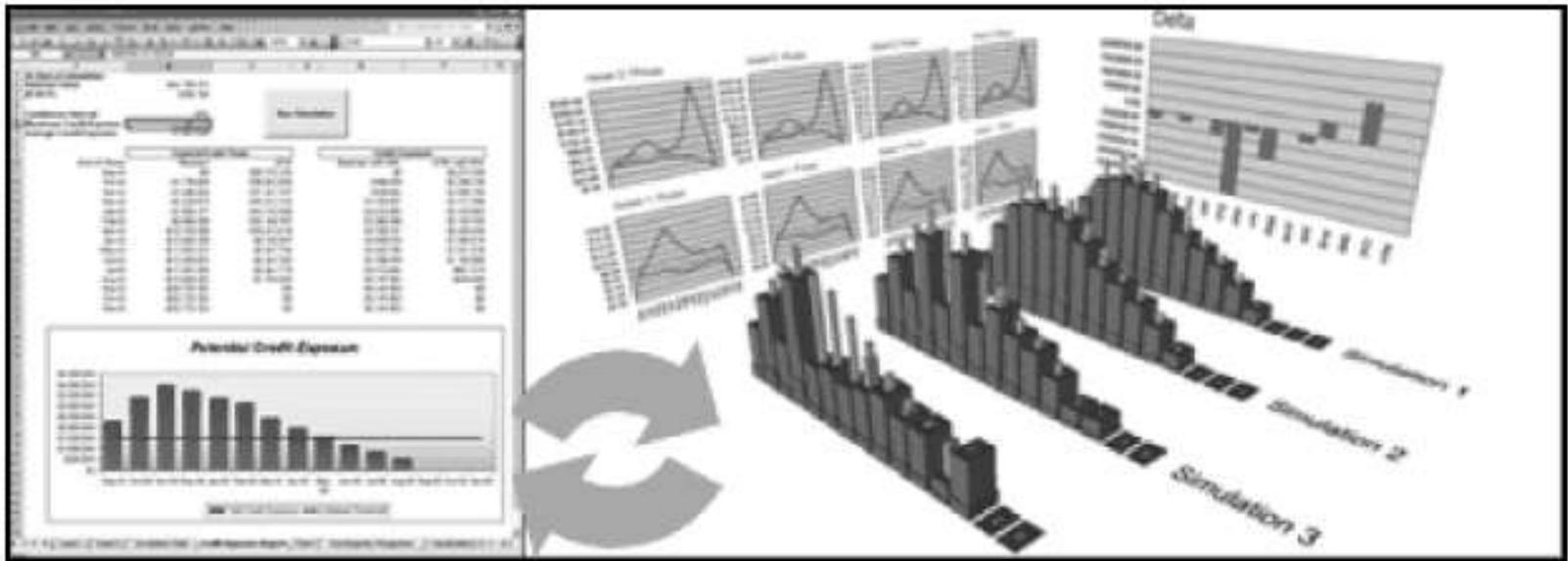


FIGURE 6.7 Visual Spreadsheet of Credit Modeling

Data Visualization

- **New directions in data visualization**
 - **Dashboards and scorecards**
 - **Visual analysis**
 - **Financial data visualization**

Real-Time BI, Automated Decision Support (ADS), and Competitive Intelligence

- **Real-time BI**

- The trend toward BI software producing real-time data updates for real-time analysis and real-time decision making is growing rapidly
- Part of this push involves getting the right information to operational and tactical personnel so that they can use new BA tools and up-to-the-minute results to make decisions

Real-Time BI, Automated Decision Support (ADS), and Competitive Intelligence

- **Real-time BI**

- **Concerns about real-time systems**

- An important issue in real-time computing is that not all data should be updated continuously
 - when reports are generated in real-time because one person's results may not match another person's causing confusion
 - Real-time data are necessary in many cases for the creation of ADS systems

Real-Time BI, Automated Decision Support (ADS), and Competitive Intelligence

- **Real-time BI**

- **Automated decision support (ADS) or enterprise decision management (EDM)**

- A rule-based system that provides a solution to a repetitive managerial problem. Also known as enterprise decision management (EDM)

Real-Time BI, Automated Decision Support (ADS), and Competitive Intelligence

- Real-time BI

- Business rules

- Automating the decision-making process is usually achieved by encapsulating business user expertise in a set of *business rules* that are embedded in a rule-driven workflow (or other action-oriented) engine

Real-Time BI, Automated Decision Support (ADS), and Competitive Intelligence

- **Real-time BI**

- **Characteristics and benefits of ADS**

- ADS are most suitable for decisions that must be made frequently and/or rapidly, using information that is available electronically

Real-Time BI, Automated Decision Support (ADS), and Competitive Intelligence

- Capabilities of ADSs
 - Rapidly builds rules-based applications and deploys them into almost any operating environment
 - Injects predictive analytics into rule-based applications
 - Provides services to legacy systems
 - Combines business rules, predictive models, and optimization strategies flexibly into state-of-the-art decision-management applications
 - Accelerates the uptake of learning from decision criteria into strategy design, execution, and refinement

Real-Time BI, Automated Decision Support (ADS), and Competitive Intelligence

- **ADS applications**
 - Product or service configuration
 - Yield (price) optimization
 - Routing or segmentation decisions
 - Corporate and regulatory compliance
 - Fraud detection
 - Dynamic forecasting
 - Operational control

Real-Time BI, Automated Decision Support (ADS), and Competitive Intelligence

- **Implementing ADS**—software companies provide these components to ADS:
 - Rule engines
 - Mathematical and statistical algorithms
 - Industry-specific packages
 - Enterprise systems
 - Workflow applications

Real-Time BI, Automated Decision Support (ADS), and Competitive Intelligence

- **Competitive intelligence**
 - Many companies continuously monitor the activities of their competitors to acquire *competitive intelligence*
 - Such information gathering drives business performance by increasing market knowledge, improving knowledge management, and raising the quality of strategic planning

BA and the Web: Web Intelligence and Web Analytics

- **Using the Web in BA**
- **Web analytics**

The application of business analytics activities to Web-based processes, including e-commerce

BA and the Web: Web Intelligence and Web Analytics

- **Clickstream analysis**

The analysis of data that occur in the Web environment.

- **Clickstream data**

Data that provide a trail of the user's activities and show the user's browsing patterns (e.g., which sites are visited, which pages, how long)

BA and the Web: Web Intelligence and Web Analytics

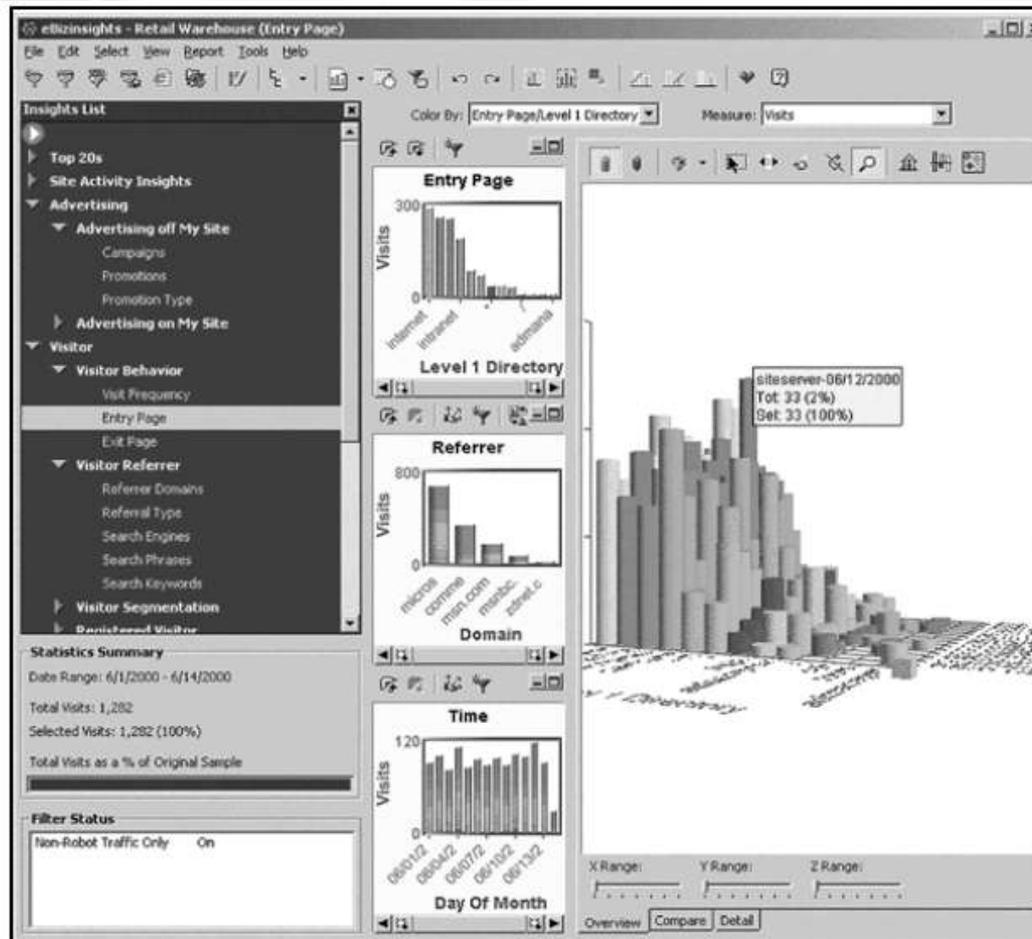


FIGURE 6.8 Screen Shot from the eBizInsights Visual Portal Analysis of Web Performance

Usage, Benefits, and Success of BA

- **Usage of BA**

- Almost all managers and executives can use some BA systems, but some find the tools too complicated to use or they are not trained properly.
- Most businesses want a greater percentage of the enterprise to leverage analytics; most of the challenges related to technology adoption involve culture, people, and processes

Usage, Benefits, and Success of BA

- **Success and usability of BA**
 - Performance management systems (PMS) are BI tools that provide scorecards and other relevant information that decision makers use to determine their level of success in reaching their goals

Usage, Benefits, and Success of BA

- **Why BI/BA projects fail**
 1. Failure to recognize BI projects as cross-organizational business initiatives and to understand that, as such, they differ from typical standalone solutions
 2. Unengaged or weak business sponsors
 3. Unavailable or unwilling business representatives from the functional areas

Usage, Benefits, and Success of BA

- **Why BI/BA projects fail**
 4. Lack of skilled (or available) staff, or suboptimal staff utilization
 5. No software release concept (i.e., no iterative development method)
 6. No work breakdown structure (i.e., no methodology)

Usage, Benefits, and Success of BA

- **Why BI/BA projects fail**
 7. No business analysis or standardization activities
 8. No appreciation of the negative impact of “dirty data” on business profitability
 9. No understanding of the necessity for and the use of metadata
 10. Too much reliance on disparate methods and tools

Usage, Benefits, and Success of BA

- **System development and the need for integration**
 - Developing an effective BI decision support application can be fairly complex
 - Integration, whether of applications, data sources, or even development environment, is a major CSF for BI