Business Analytics & Data Visualization

UNIT: 1

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Topics to be covered:

- What is BI?
- Comparing Business Intelligence with Business Analytics
- Few areas of its application
- Concept of OLAP
- Report & Queries
- Data Visualisation
- GIS

Business Intelligence (BI)

Business intelligence (BI) can be described as “a set of techniques and tools for the acquisition and transformation of raw data into meaningful and useful information for business analysis purposes”.

Business Analytics

Business analytics (BA) refers to the skills, technologies, practices for continuous iterative exploration and investigation of past business performance to gain insight and drive business planning. Business analytics focuses on developing new insights and understanding of business performance based on data and statistical methods

Comparison with Business Analytics

Business intelligence and business analytics are sometimes used interchangeably, but there are alternate definitions. One definition contrasts the two, stating that the term business intelligence refers to collecting business data to find information primarily through asking questions, reporting, and online analytical processes. Business analytics, on the other hand, uses statistical and quantitative tools for explanatory and predictive modeling.

The Business Analytics (BA) Field: An Overview

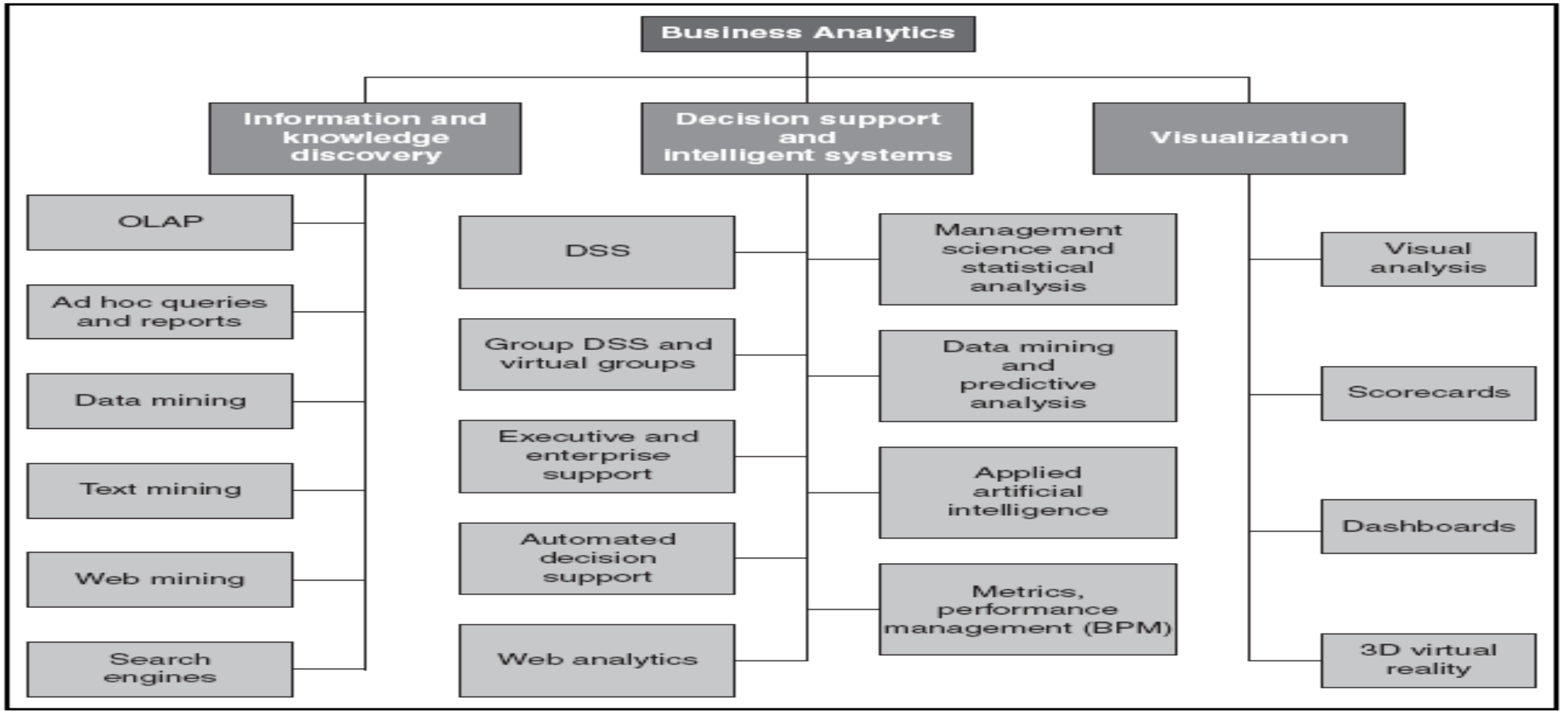


FIGURE 6.1 Categories of Business Analytics

Areas of B.A application

Financial Analytics- eg: Portfolio Management & Analysis in Banks

Market Analytics- eg: Trends using Google Analytics

Employee Analytics - eg: individual capacity & performance

Customer Analytics–eg: customer Acquisition & Retention

Online Analytical Processing (OLAP)

Codd's 12 Rules for OLAP

1. Multidimensional conceptual view for formulating queries
2. Transparency to the user
3. Easy accessibility: batch and online access
4. Consistent reporting performance
5. Client/server architecture: the use of distributed resources
6. Generic dimensionality
7. Dynamic sparse matrix handling
8. Multiuser support rather than support for only a single user
9. Unrestricted cross-dimensional operations
10. Intuitive data manipulation
11. Flexible reporting
12. Unlimited dimensions and aggregation level

Four types of processing that are performed by analysts in an organization:

1. **Categorical Analysis** – Analysis based on historical data as past performance can indicate future performance.
2. **Exegetical Analysis –** Also based on historical data but add capability of drill-down Analysis
3. **Contemplative Analysis –** Allows user to change single value and determine its impact
4. **Formulaic Analysis –** Permit changes to multiple variables.

Online Analytical Processing (OLAP)

- **Drill-down**

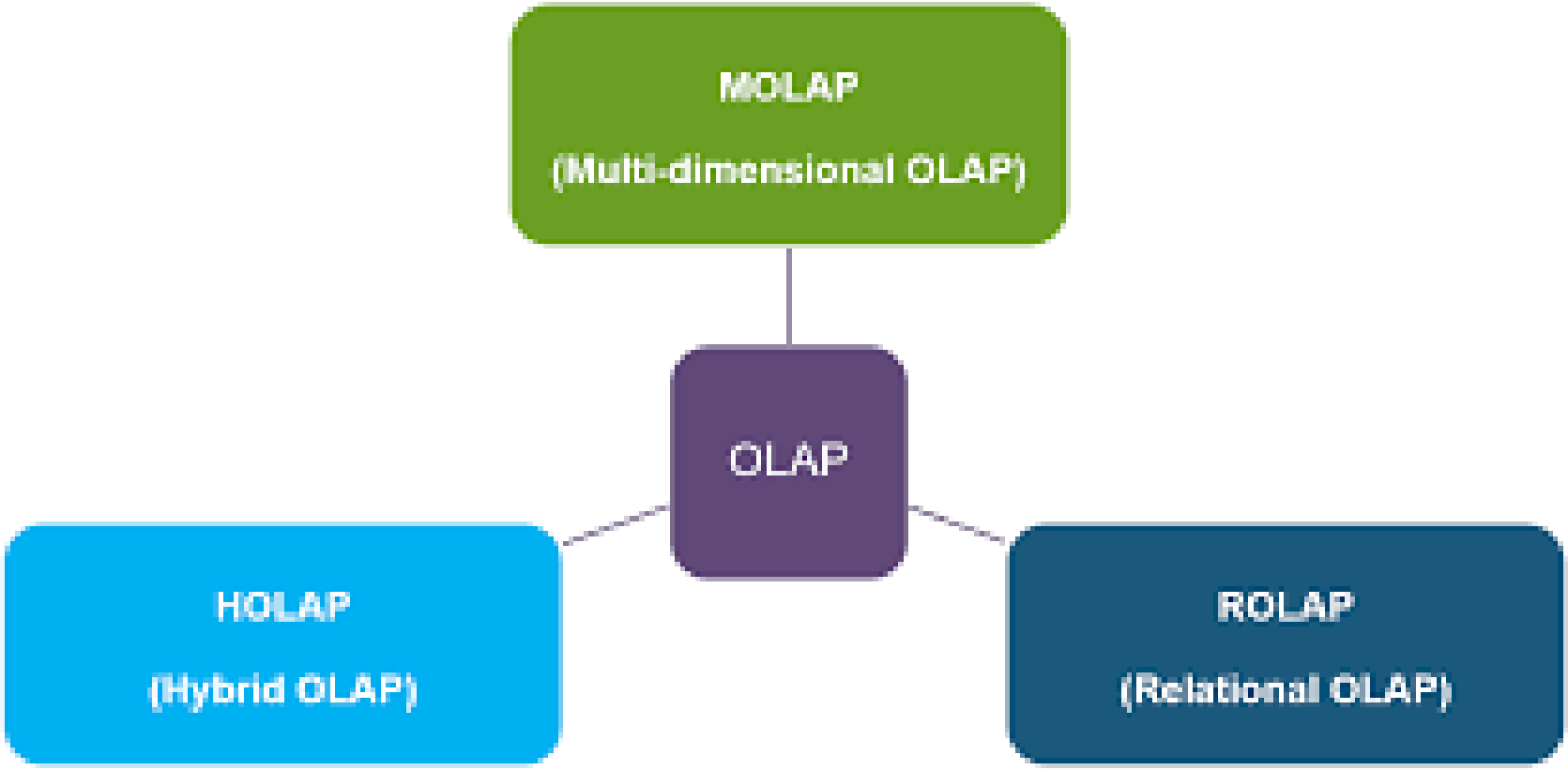
  The investigation of information in detail (e.g., finding not only total sales but also sales by region, by product, or by salesperson). Finding the detailed sources.
- **Online analytical processing** (OLAP)

  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

Types of OLAP



Reports & Queries

REPORTS

- Routine reports
- Ad hoc (or on-demand) reports
- Multilingual support
- Scorecards and dashboards
- Report delivery and alerting

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

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

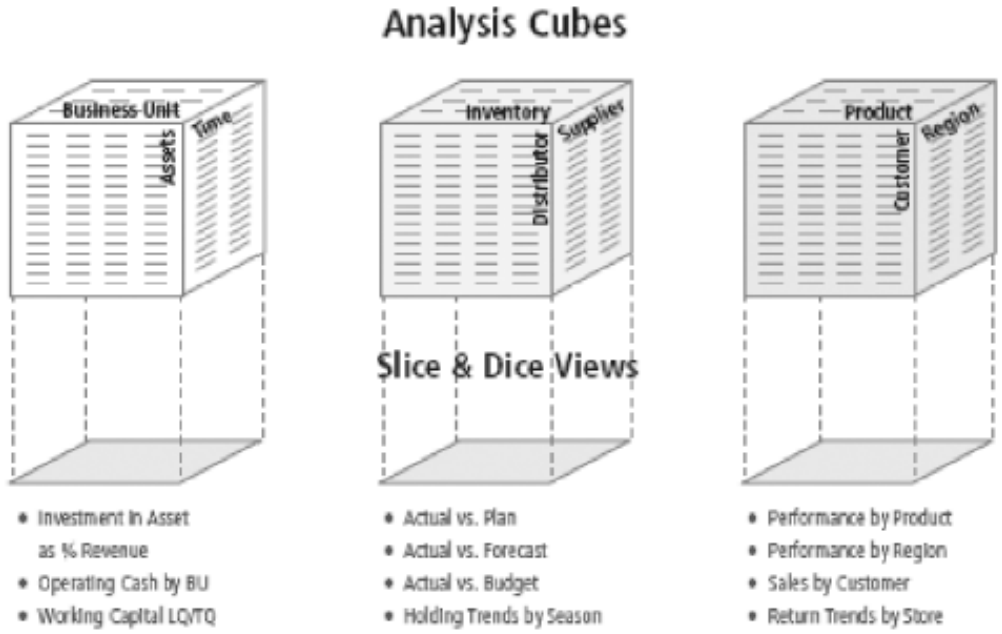


FIGURE 3.4 Slice-and-Dice Cubes

Limitations of Multidimensionality

- 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 Business Analytics

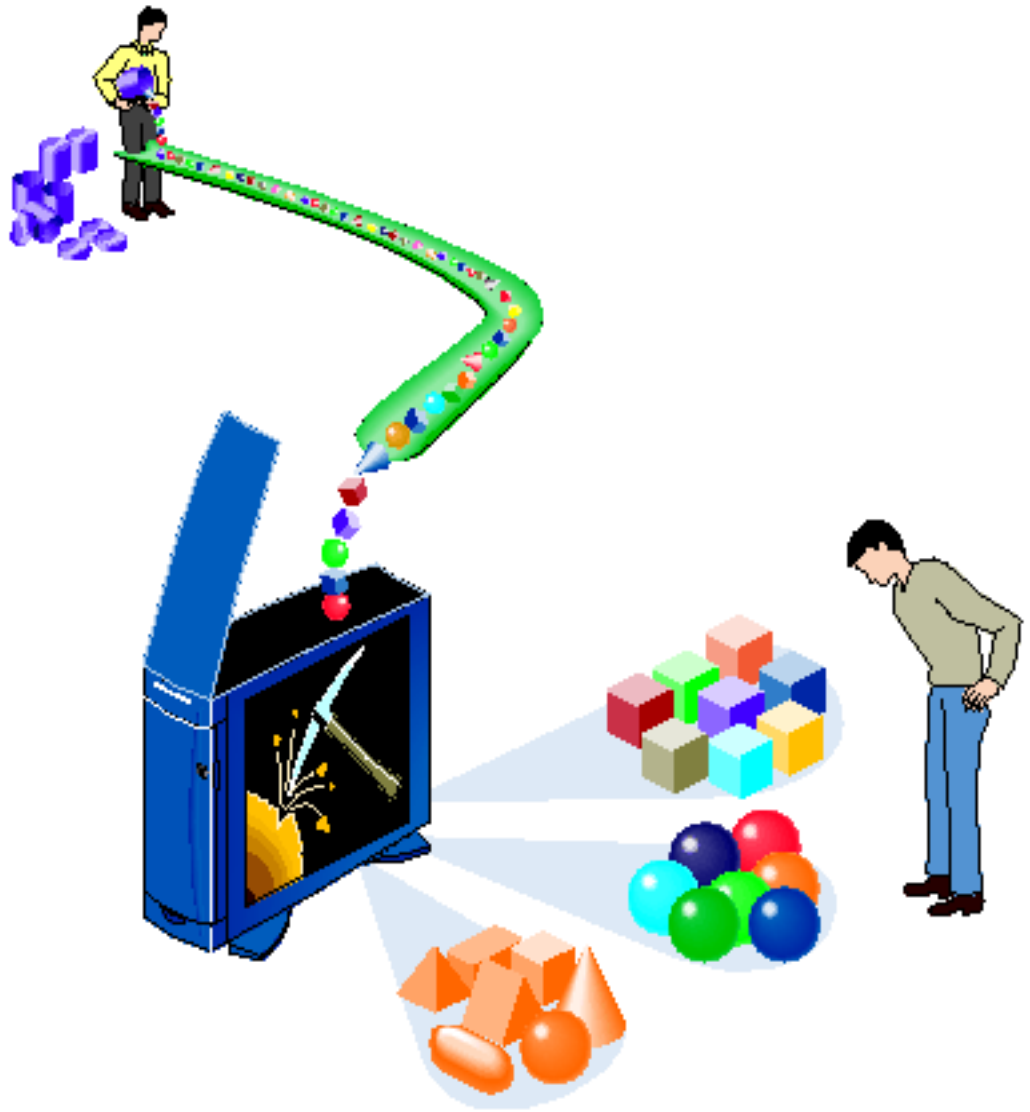
Data mining and predictive analysis

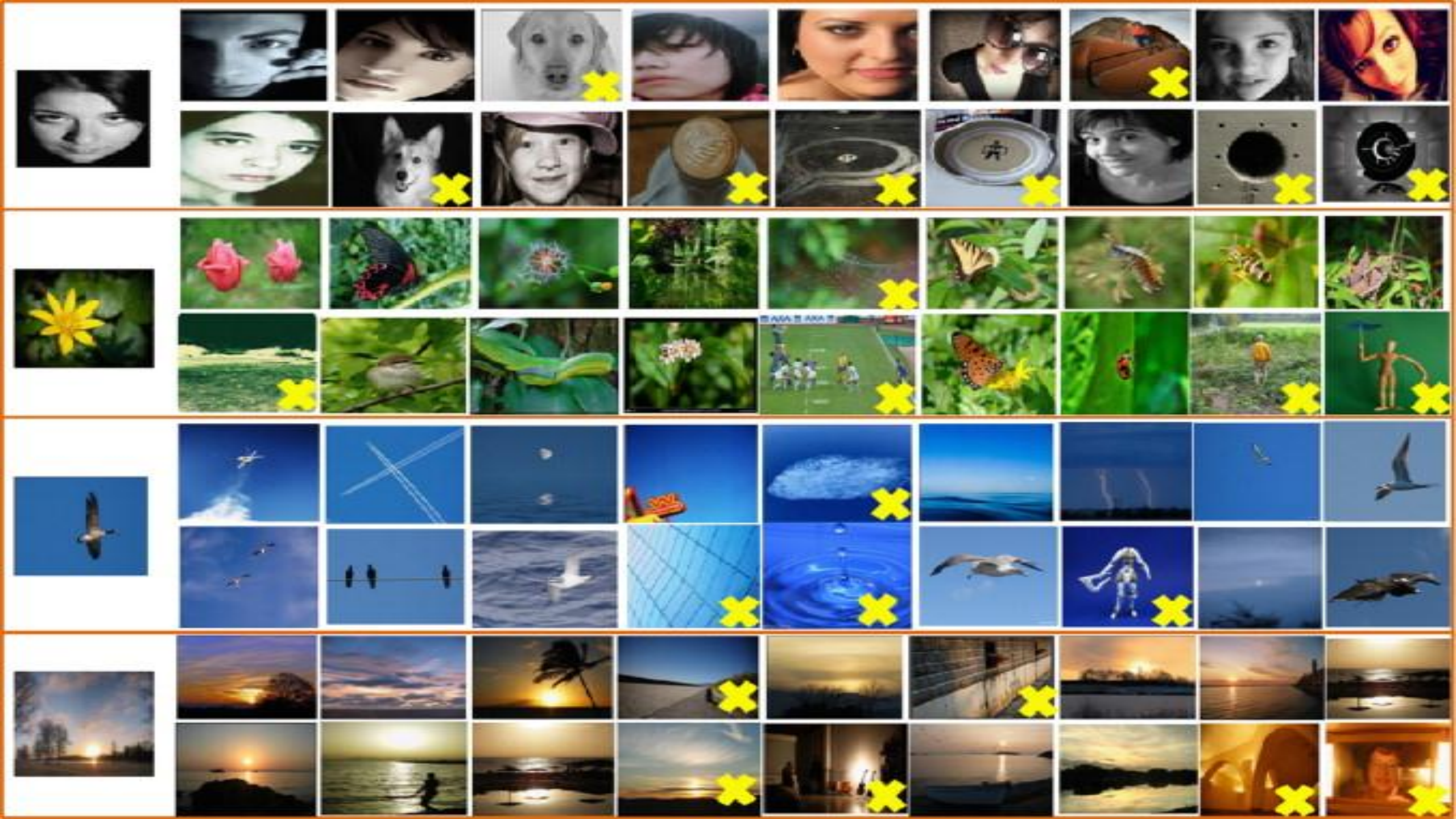
- Data mining
- Predictive analysis

  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 Mining

Data mining, also known as "knowledge discovery," refers to computer-assisted tools and techniques for sifting through and analyzing these vast data stores in order to find trends, patterns, and correlations that can guide decision making and increase understanding.





Visualization & Presentation

Data Visualization is a graphical, animation, or video presentation of data and the results of data analysis.

- Visual technologies can condense 1000 numbers in one picture and make decision support applications more attractive and understandable
- 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

Geographic Information Systems (GIS)

An information system that uses spatial data, such as digitized maps. A GIS is a combination of text, graphics, icons, and symbols on maps.

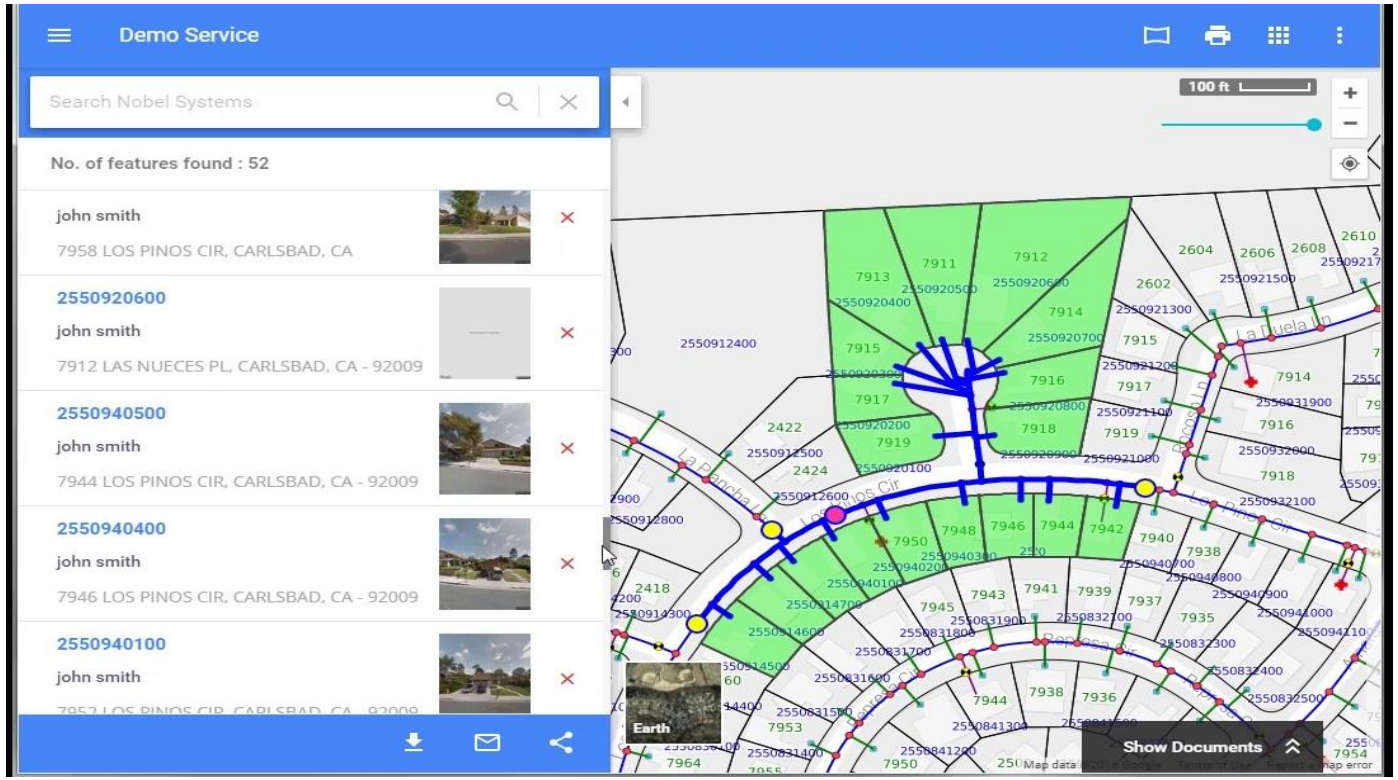


Image source: https://nobelsystemsblog.com/industries-use-gis-business-intelligence-improve-system-workflow-reduce-costs/

Geographic Information Systems (GIS)

GIS and decision making

- GIS applications are used to improve decision making in the public and private sectors including:
  - Dispatch of emergency vehicles
  - Transit management
  - Facility site selection
  - Drought risk management
  - Wildlife management
- Local governments use GIS applications for used mapping and other decision-making applications

Geographic Information Systems (GIS)

GIS combined with GPS

- **Global positioning systems (GPS)**

  Wireless devices that use satellites to enable users to detect the position on earth of items (e.g., cars or people) the devices are attached to, with reasonable precision

GIS and the Internet/intranets

- Most major GIS software vendors provide Web access that hooks directly to their software
- GIS can help the manager of a retail operation determine where to locate retail outlets
- Some firms are deploying GIS on the Internet for internal use or for use by their customers (locate the closest store location)

Real-Time BI, Automated Decision Support, 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

- 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, 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

- 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, 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, 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.

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)

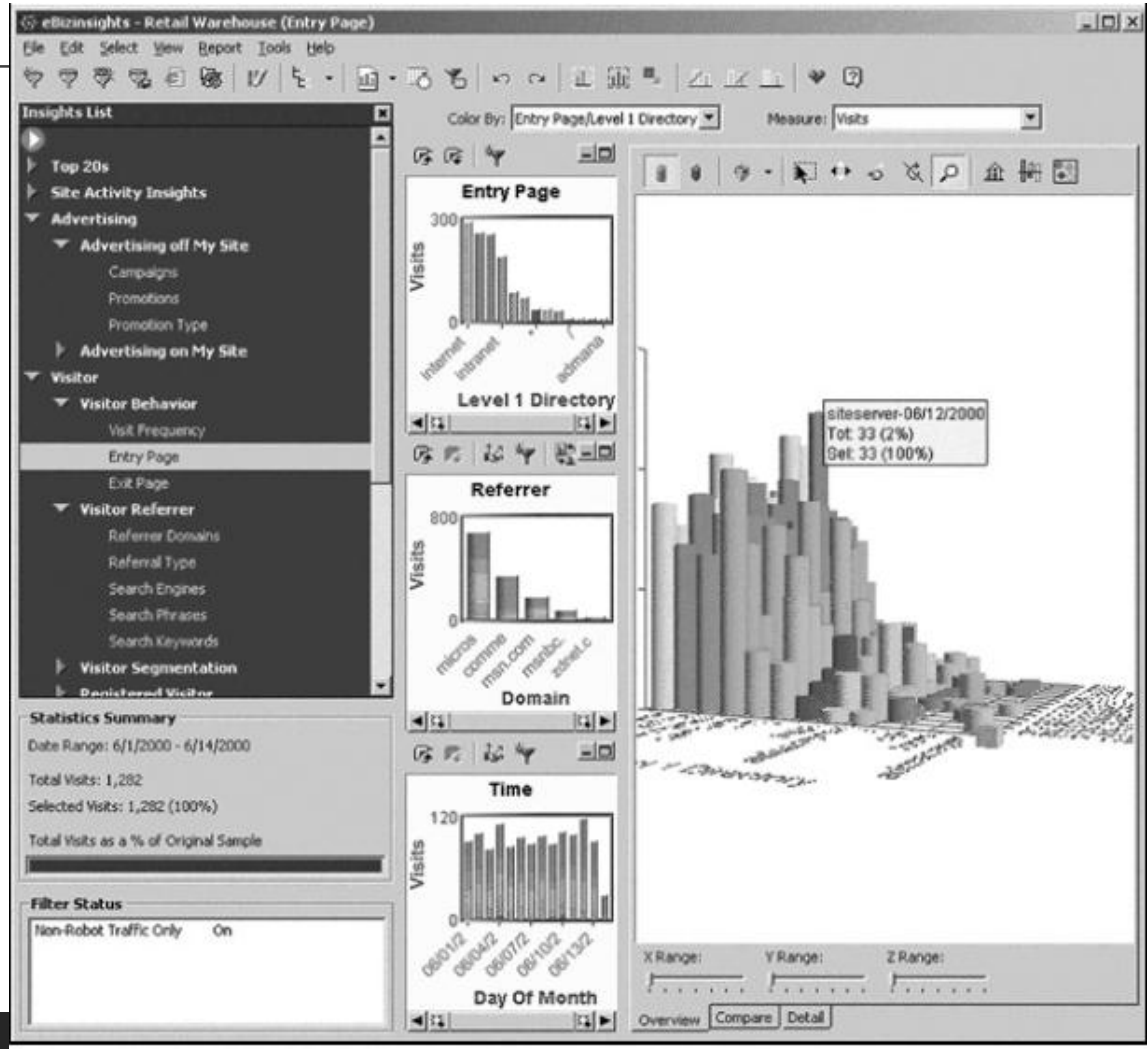


FIGURE 3.7 Screen Shot from the eBizInsights Visual Portal Analysis of Web Performance

Usage, Benefits & Success of BA

Usage of BA

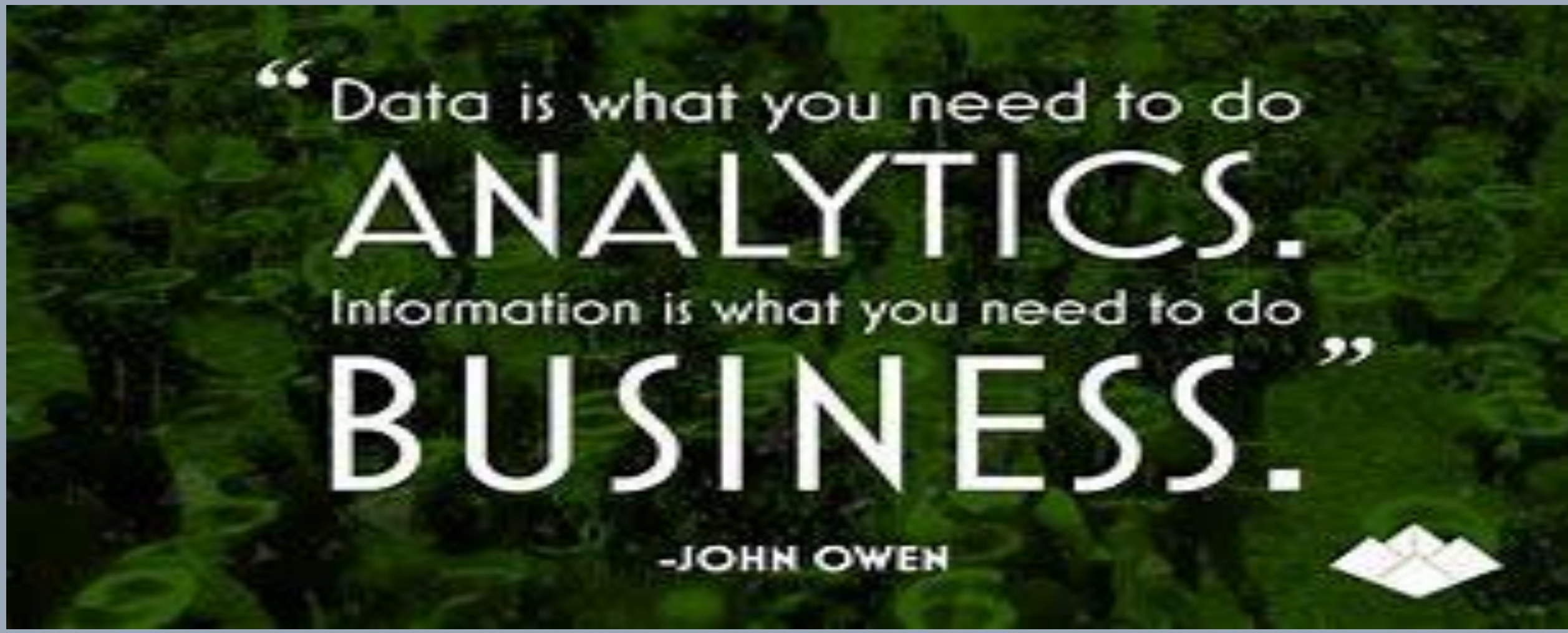
- Almost all managers and executives can use some BA systems, but some find the tools too complicated to use or they are not trained properly.
- Most businesses want a greater percentage of the enterprise to leverage analytics; most of the challenges related to technology adoption involve culture, people,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

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

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
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)
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


“Data is what you need to do
ANALYTICS.
Information is what you need to do
BUSINESS.”
-JOHN OWEN

THANK YOU!!