

Enhancing Business Intelligence Using Big Data and Analytics

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Topics

- Enhancing organizational decision making
- Business intelligence and advances analytics
- Knowledge management and GIS

Organizational decision making

- Implementing Business intelligence (BI) and Analytics

TABLE 6.1 Sample Uses of Business Intelligence and Analytics in Non-Business Contexts

Context	Example
Political parties	Model the influence of social media on election outcomes
Government	Analyze performance of public benefits programs
Defense	Manage maintenance and logistics during overseas deployments
Hospitals	Predict patient volume and resource utilization
Nonprofit organizations	Manage fundraising campaigns and target donors

Organizational decision making

- Data-driven organizations
- Responding to threats and opportunities
- Big data
- Effective planning
- Databases and interactive websites
- Operational and informational systems

Organizational decision making

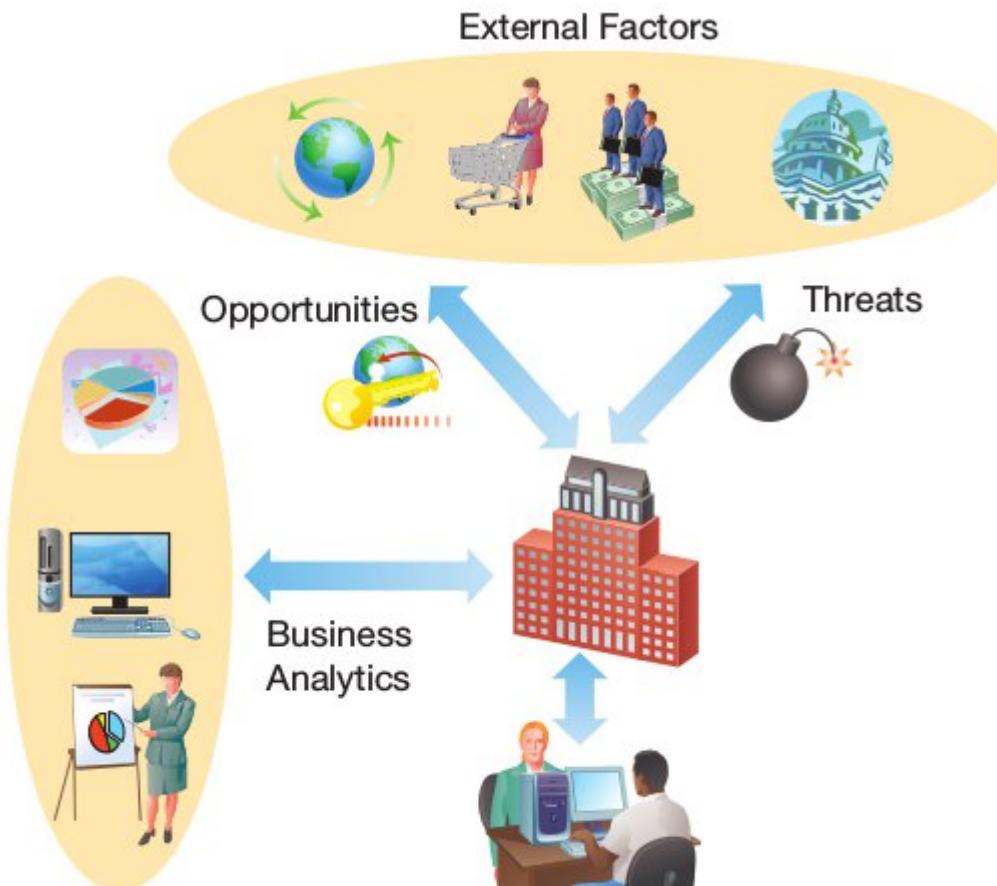


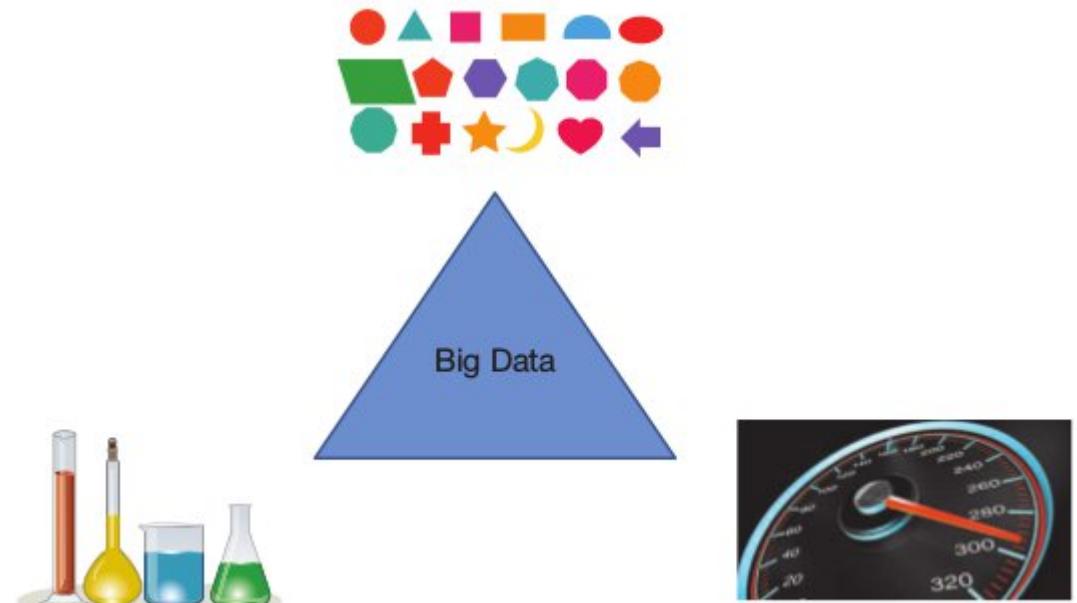
FIGURE 6.2

Business analytics helps organizations swiftly respond to external threats and opportunities.

Organizational decision making

FIGURE 6.3

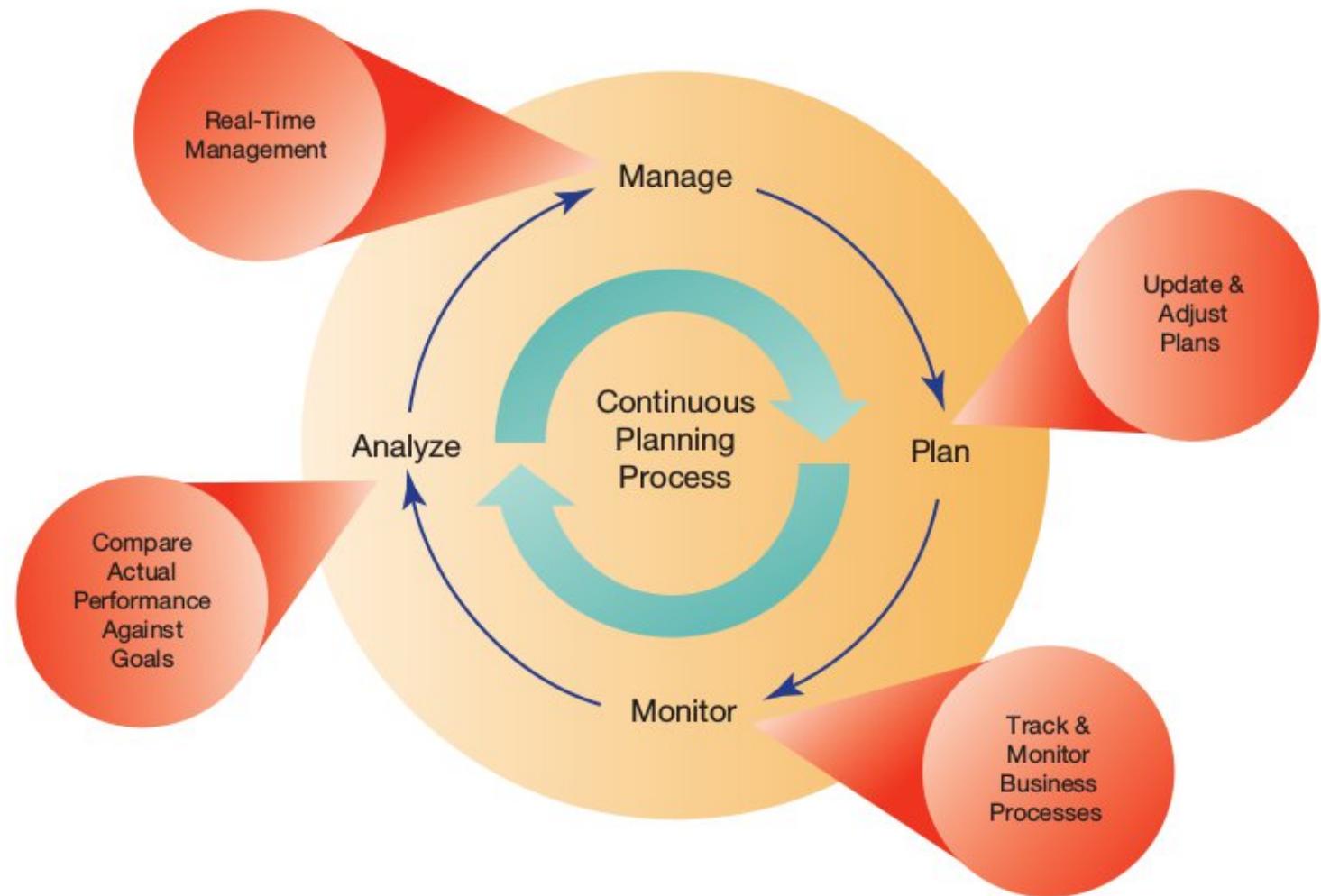
Big Data is characterized by volume, variety, and velocity.
Source: Alswart/Fotolia.



Organizational decision making

FIGURE 6.4

Effective business planning is continuous.



Organizational decision making

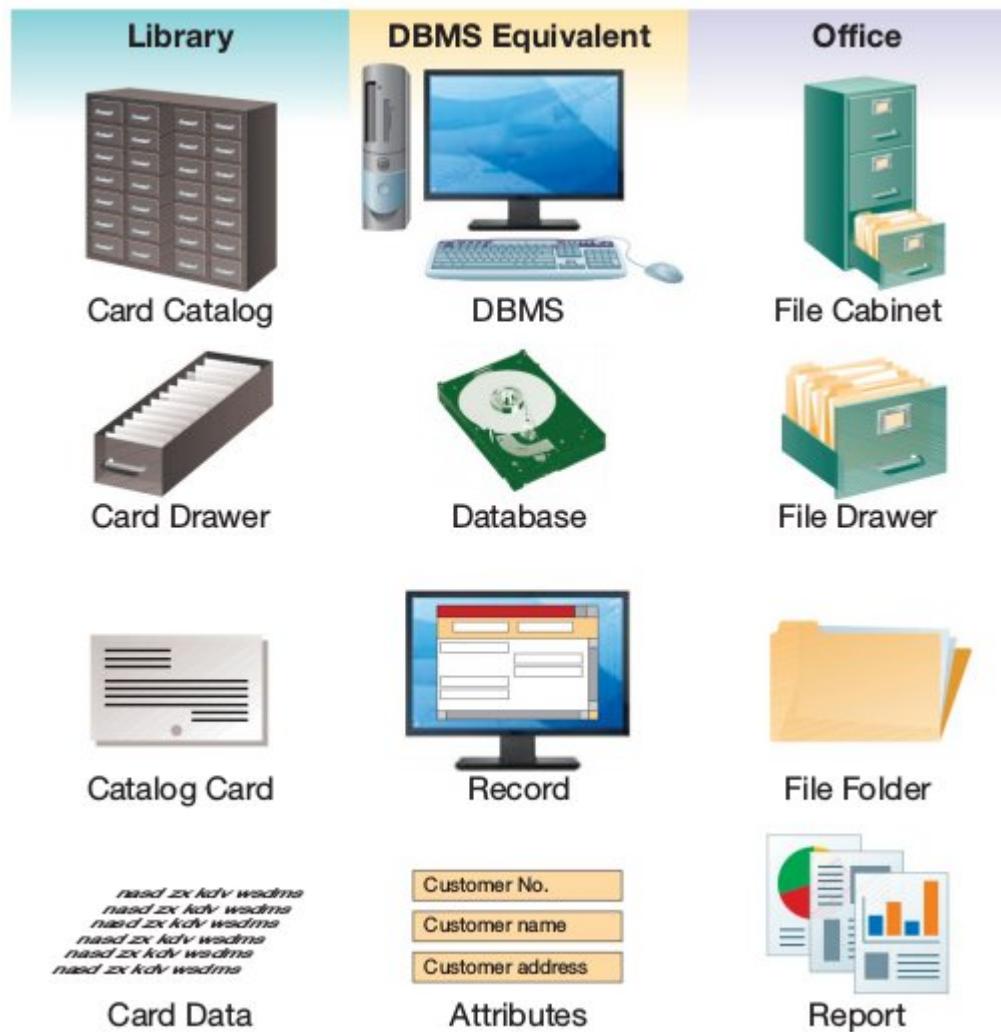


FIGURE 6.5

Computers make the process of storing and managing data much easier.

Organizational decision making

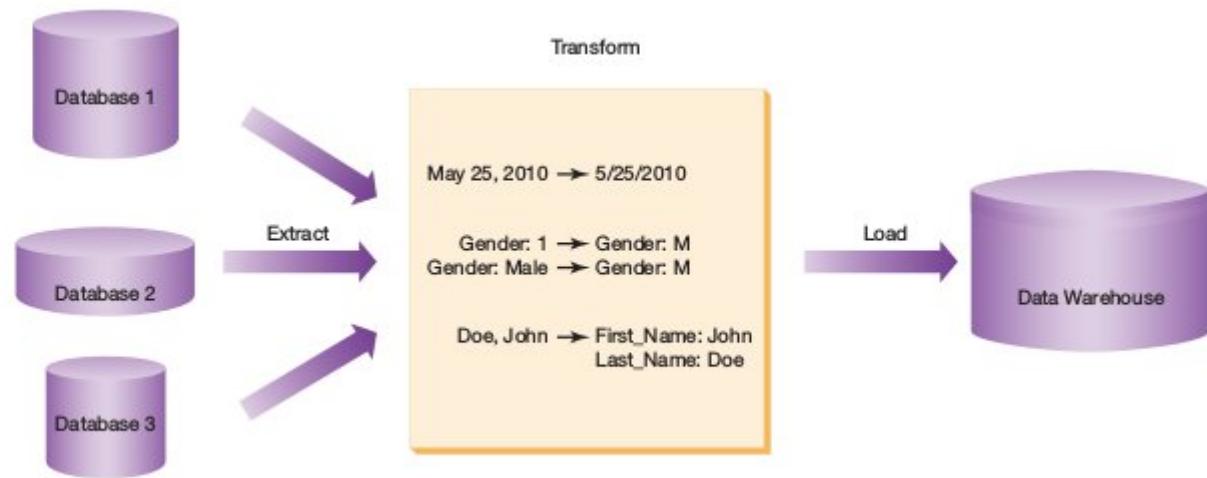
TABLE 6.2 Advantages of the Database Approach

Advantages	Description
Minimal data redundancy	A single copy of data ensures that storage requirements are minimized.
Improved data consistency	Eliminating redundancy greatly reduces the possibilities of inconsistency.
Increased security	A centralized system makes it easier to enforce access restrictions.
Improved data quality	Centralized control, minimized redundancy, and improved data consistency help to enhance the quality of data.
Improved data accessibility and sharing	A centralized system makes it easier to deploy and control access for personnel within or outside organizational boundaries.
Enforcement of standards	A centralized system makes it much easier to enforce standards and rules for data creation, modification, naming, and deletion.
Program–data independence	It is much easier to evolve and alter software to changing business needs when data and programs are independent.
Increased productivity of application development	Data standards make it easier to build and modify applications.
Reduced program maintenance	Data changed in the central database is replicated seamlessly throughout all applications.

Organizational decision making

FIGURE 6.10

Extraction, transformation, and loading are used to consolidate data from operational systems into a data warehouse.



Organizational decision making

TABLE 6.3 Common Reports and Queries

Report/Query	Description
Scheduled reports	Reports produced at predefined intervals—daily, weekly, or monthly—to support routine decisions
Key-indicator reports	Reports that provide a summary of critical metrics on a recurring schedule
Exception reports	Reports that highlight situations that are out of the normal range
Drill-down reports	Reports that provide greater detail, so as to help analyze why a key indicator is not at an appropriate level or why an exception occurred
Ad hoc queries	Queries answering unplanned information requests to support a nonroutine decision; typically not saved to be run again

Organizational decision making

TABLE 6.4 Comparison of Operational and Informational Systems

Characteristic	Operational System	Informational System
Primary purpose	Run the business on a current basis	Support managerial decision making
Type of data	Current representation of state of the business	Historical or point-in-time (snapshot)
Primary users	Online customers, clerks, salespersons, administrators	Managers, business analysts, and customers (checking status and history)
Scope of usage	Narrow and simple updates and queries	Broad and complex queries and analyses
Design goal	Performance	Ease of access and use

Business Intelligence and Analytics

- Decision support systems (DSS)
- Online analytical processing (OLAP)
- Visualisation
- Data mining
- Unstructured data analysis
- Machine learning
- Predictive modeling
- Artificial intelligence (AI)

Business Intelligence and Analytics

TABLE 6.6 Common DSS Uses for Specific Organizational Areas

Area	Common DSS Uses
Corporate level	Corporate planning, venture analysis, mergers and acquisitions
Accounting	Cost analysis, breakeven analysis, auditing, tax computation and analysis, depreciation methods, budgeting
Finance	Discounted cash flow analysis, return on investment, buy or lease, capital budgeting, bond refinancing, stock portfolio management, compound interest, after-tax yield, foreign exchange values
Marketing	Product demand forecast, advertising strategy analysis, pricing strategies, market share analysis, sales growth evaluation, sales performance
Human resources	Employee business expenses, fringe benefit computations, payroll and deductions
Production	Production scheduling, transportation analysis, product mix, inventory levels, quality control, plant location, material allocation, maintenance analysis, machine replacement, job assignment, material requirements planning

Business Intelligence and Analytics

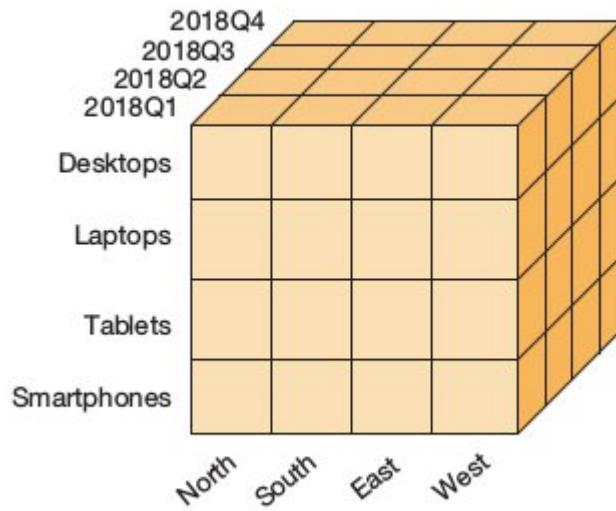


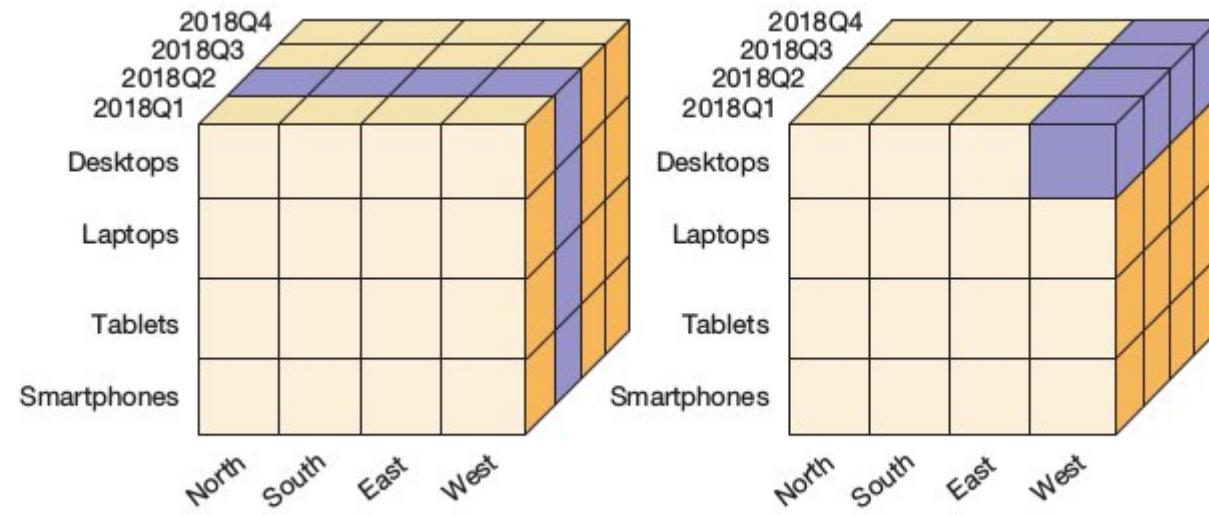
FIGURE 6.11

An OLAP cube allows for analyzing data by multiple dimensions.

Business Intelligence and Analytics

FIGURE 6.12

Slicing and dicing allows for analyzing subsets of the dimensions.



Business Intelligence and Analytics

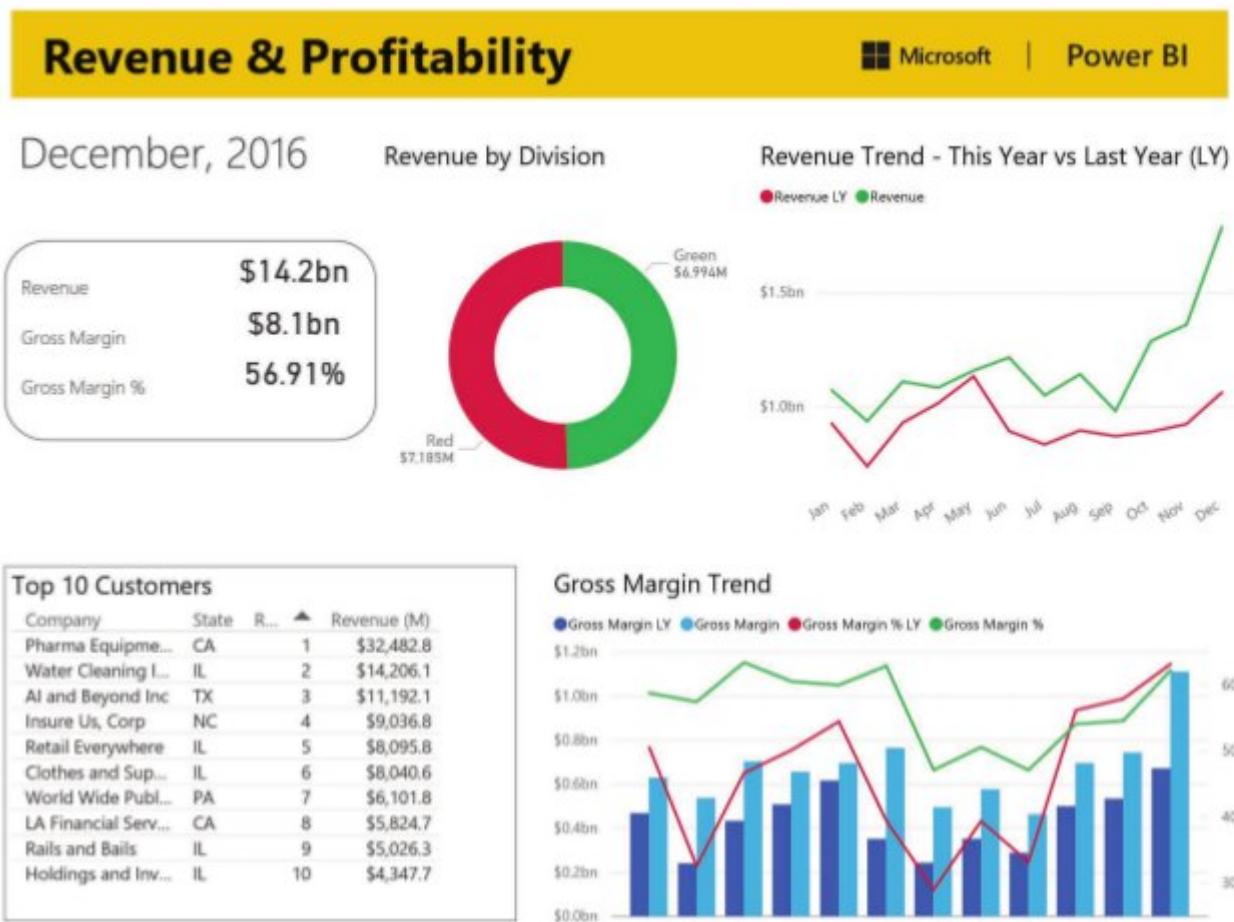


FIGURE 6.13

A digital dashboard presents information in a highly aggregated form, enabling executives to scan information quickly for trends and anomalies.

Source: Power BI 2016, Windows 10, Microsoft Corporation.

Business Intelligence and Analytics

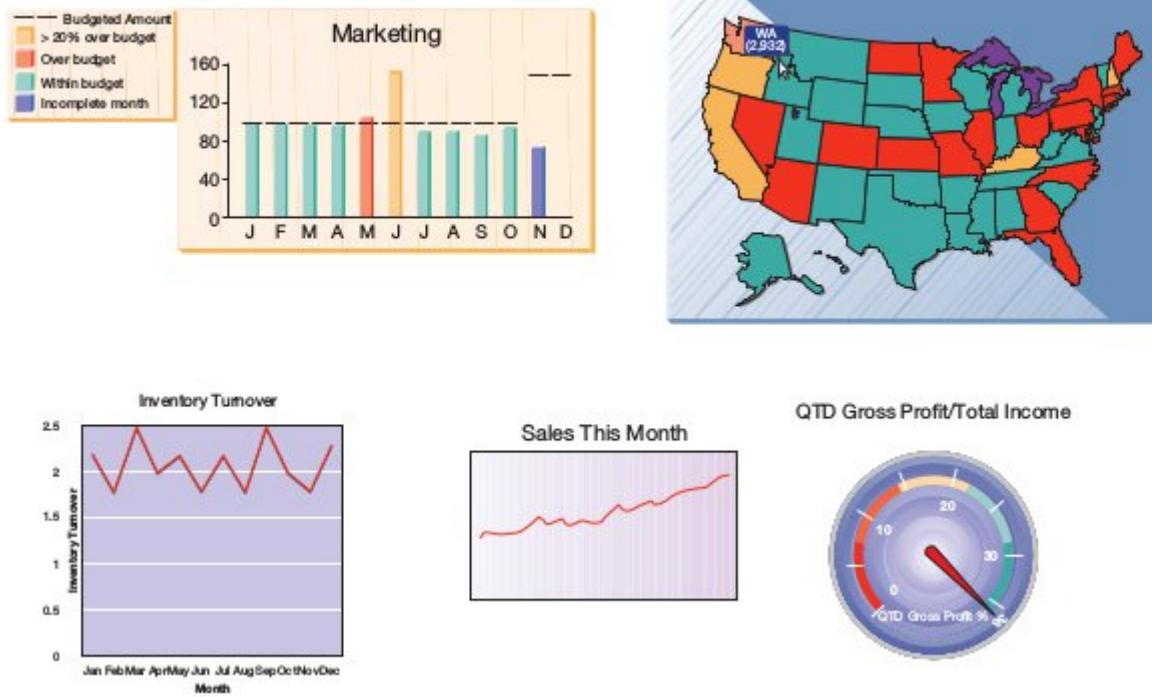


FIGURE 6.14

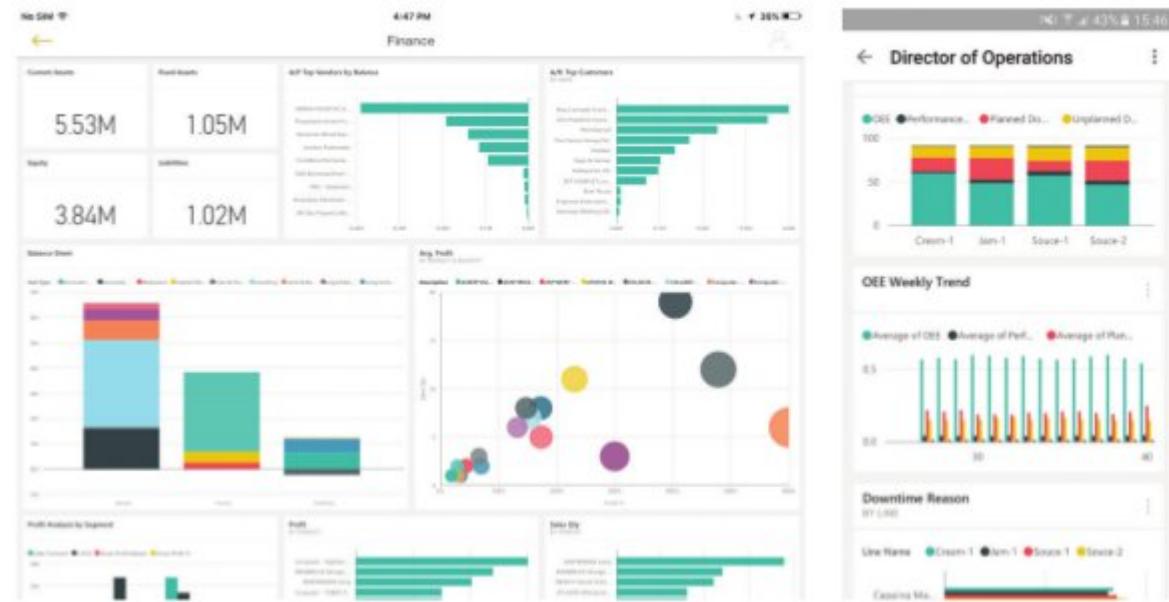
Dashboards use various graphical elements to highlight important information.

Business Intelligence and Analytics

FIGURE 6.15

Mobile business intelligence can provide executives with relevant information regardless of location and device.

Source: Power BI 2016, Windows 10, Microsoft Corporation.

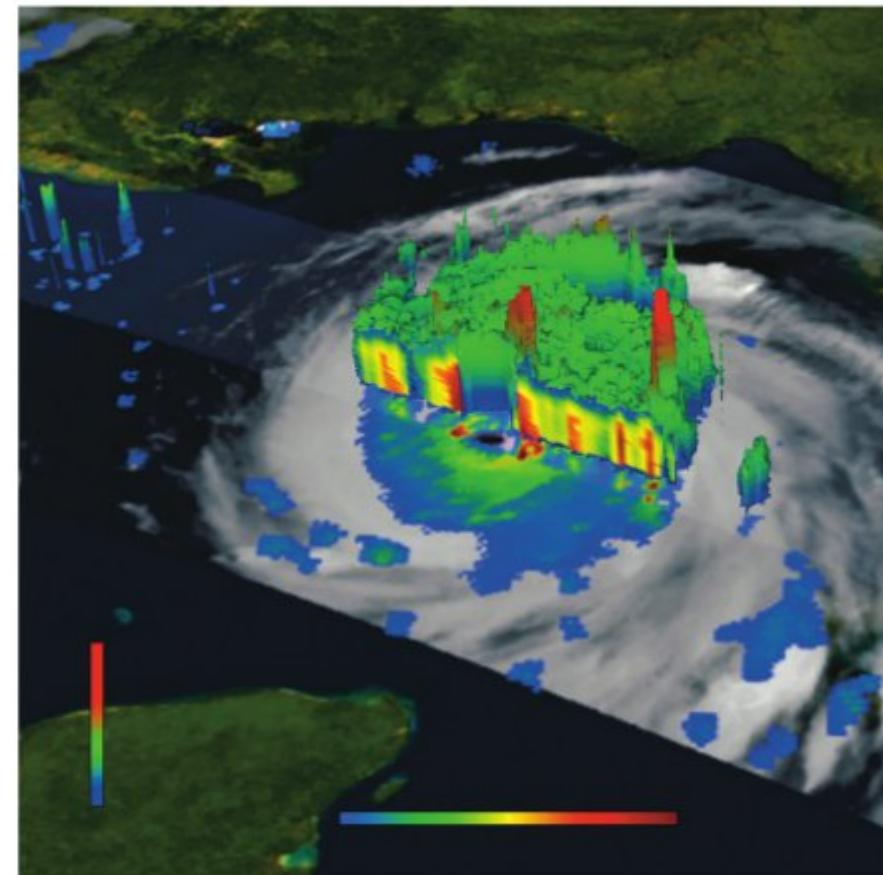


Business Intelligence and Analytics

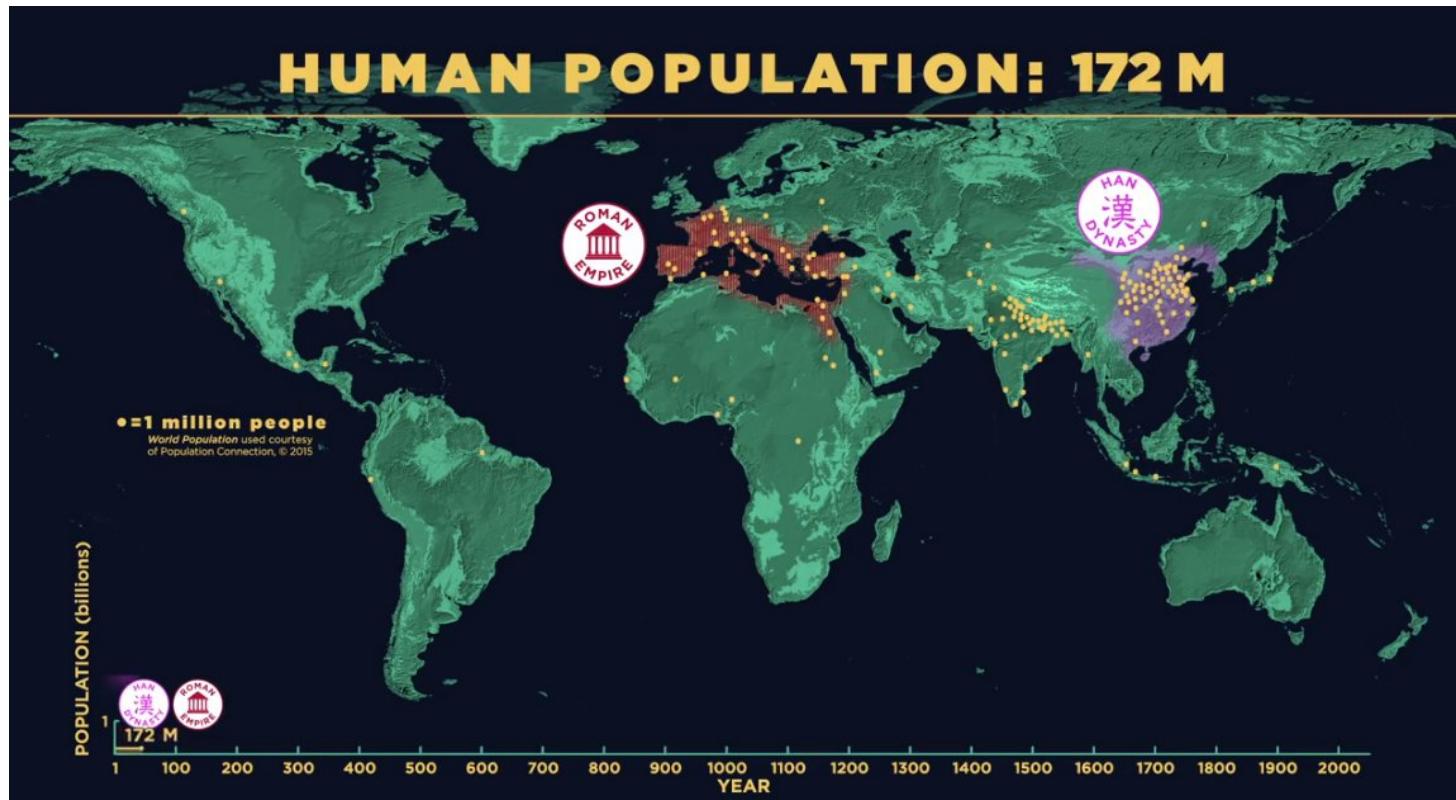
FIGURE 6.16

Visual analytics can help making sense of complex data relationships using a variety of graphical methods.

Source: NASA.



Visualization Example



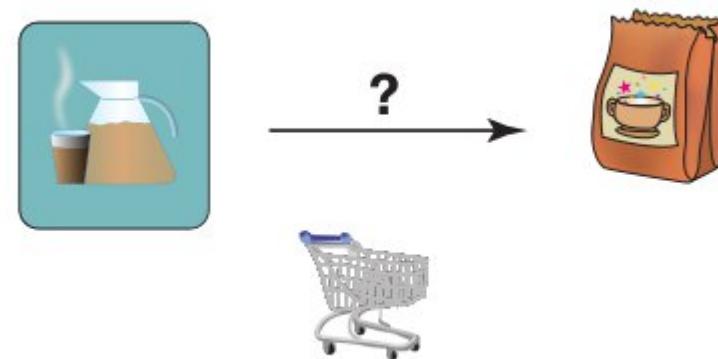
Source: youtube.com

Business Intelligence and Analytics

- Big data and associations

FIGURE 6.17

Association rules symbolize associations among sets of items.



Business Intelligence and Analytics

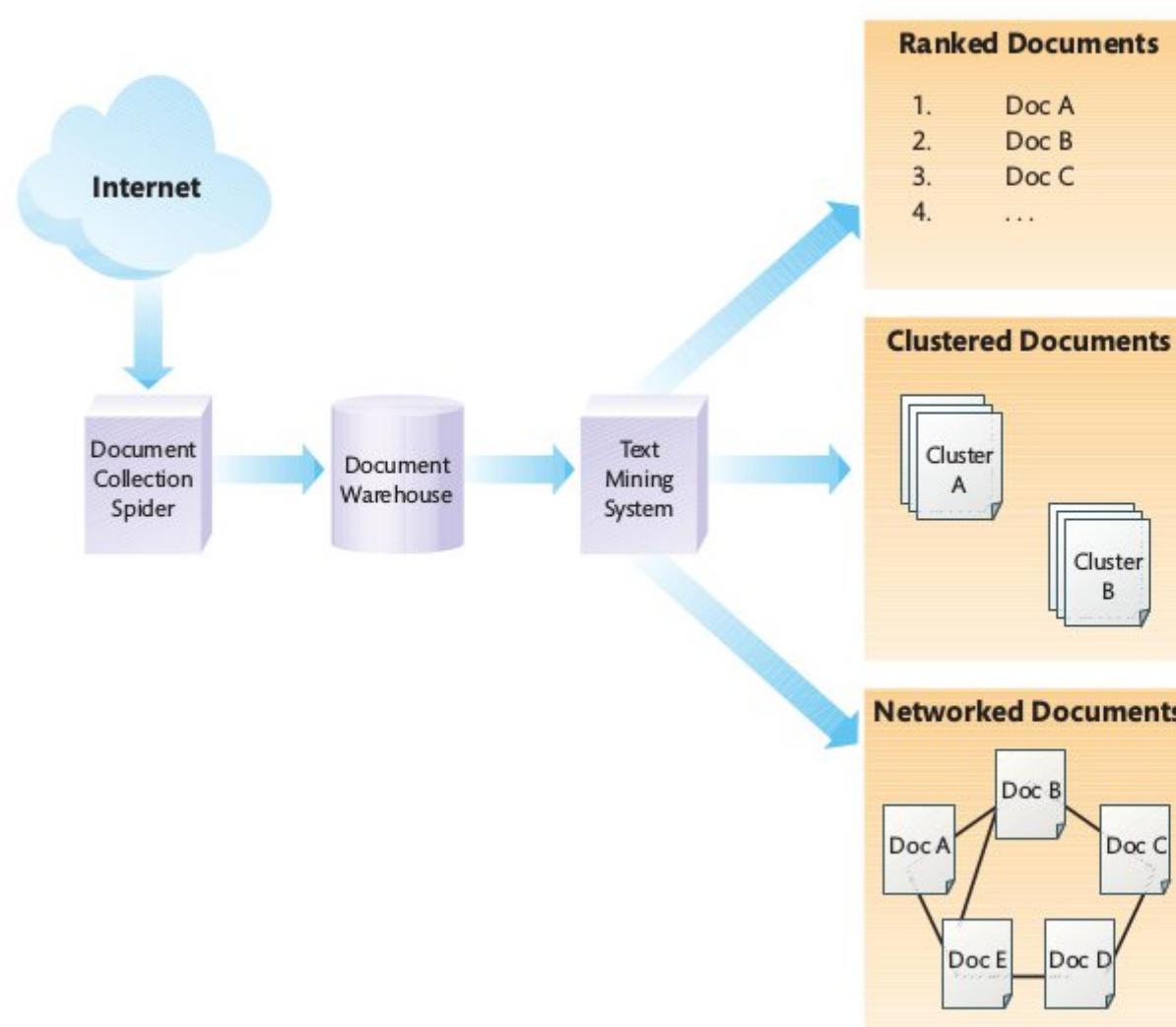


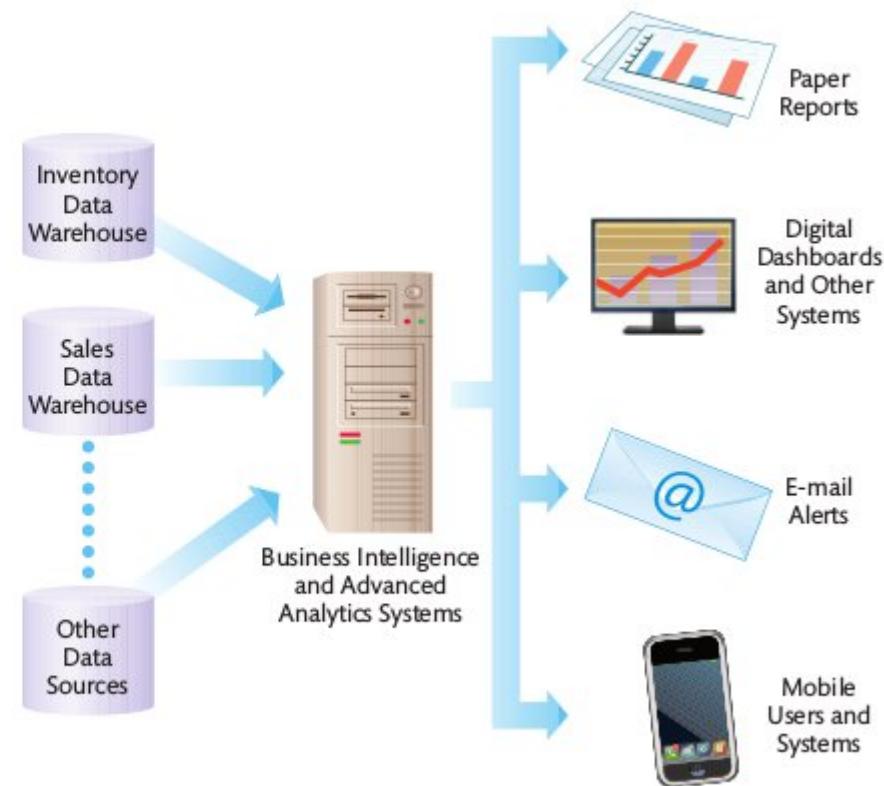
FIGURE 6.18

Text mining the Internet.

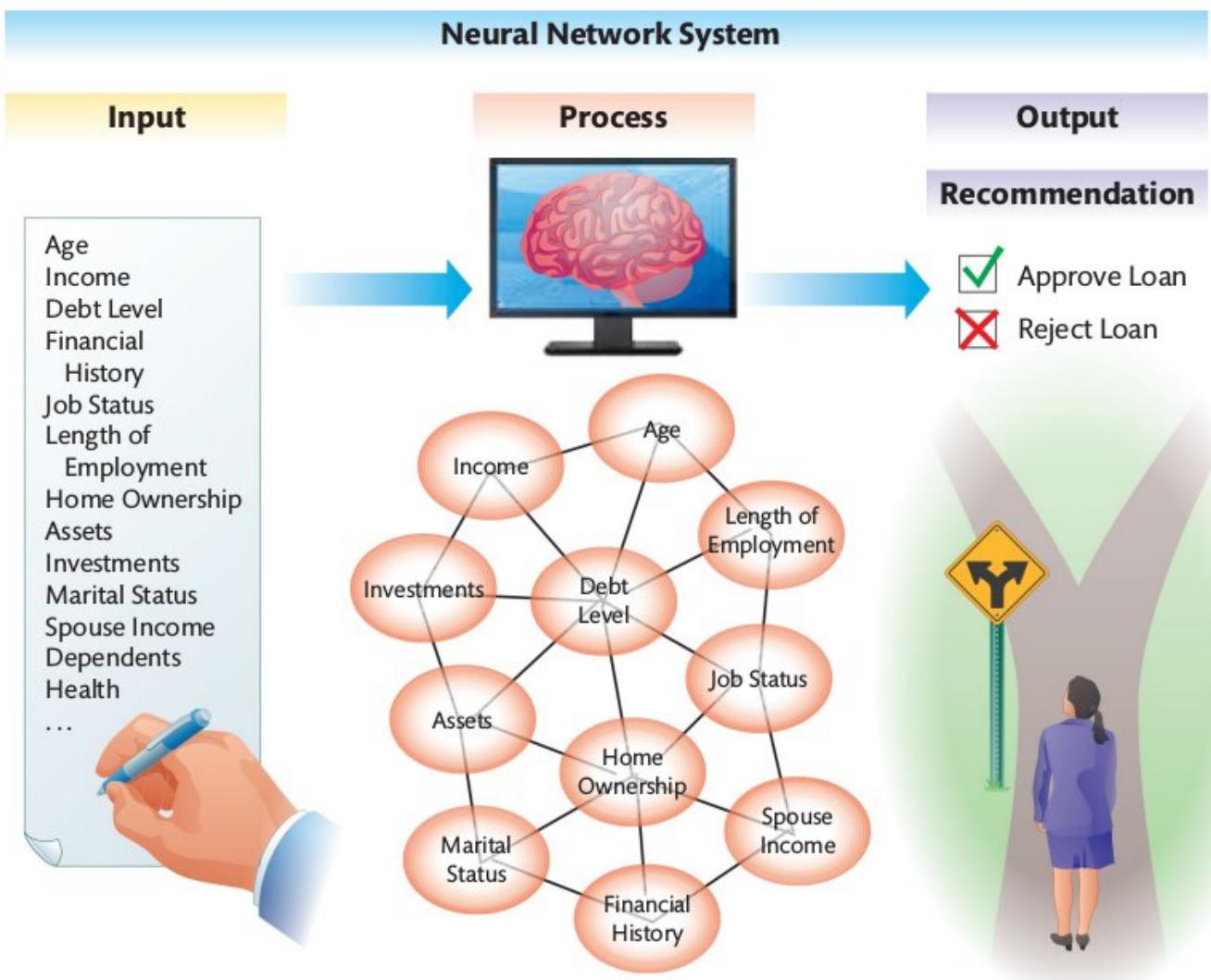
Business Intelligence and Analytics

FIGURE 6.19

Business intelligence can be delivered to users in a variety of ways.



Business Intelligence and Analytics



Business Intelligence and Analytics

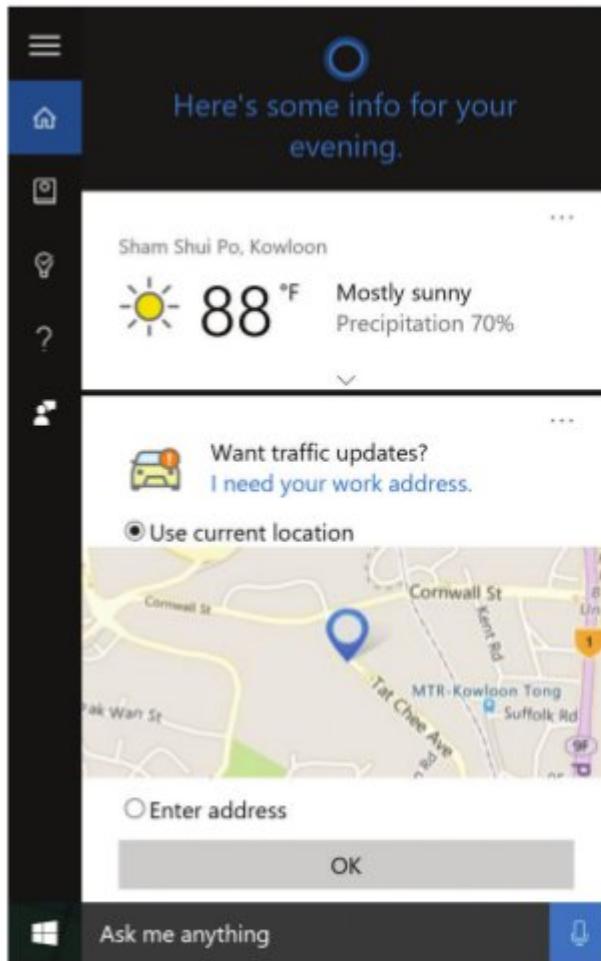


FIGURE 6.21

Cortana, an intelligent agent built into various Microsoft platforms, presents pertinent information based on factors such as the user's habits, location, and time of day.

Source: Cortana, Windows 10, Microsoft Corporation.

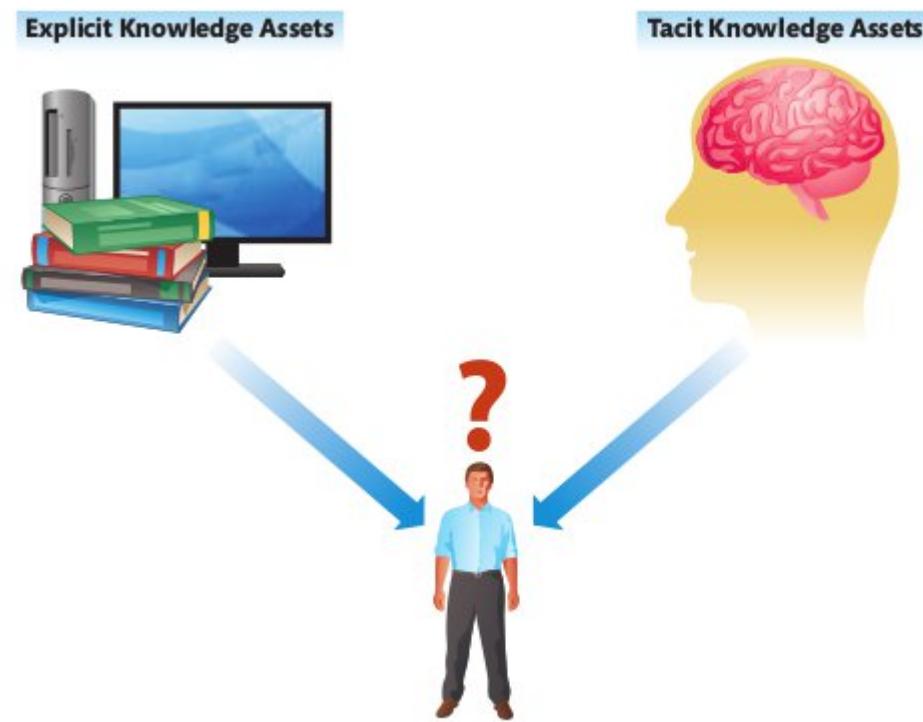
Knowledge Management

- Knowledge management systems
- Geographic information systems

Knowledge Management Systems

FIGURE 6.22

Explicit knowledge assets can easily be documented, archived, and codified, whereas tacit knowledge assets are located in a person's mind.



Knowledge Management Systems

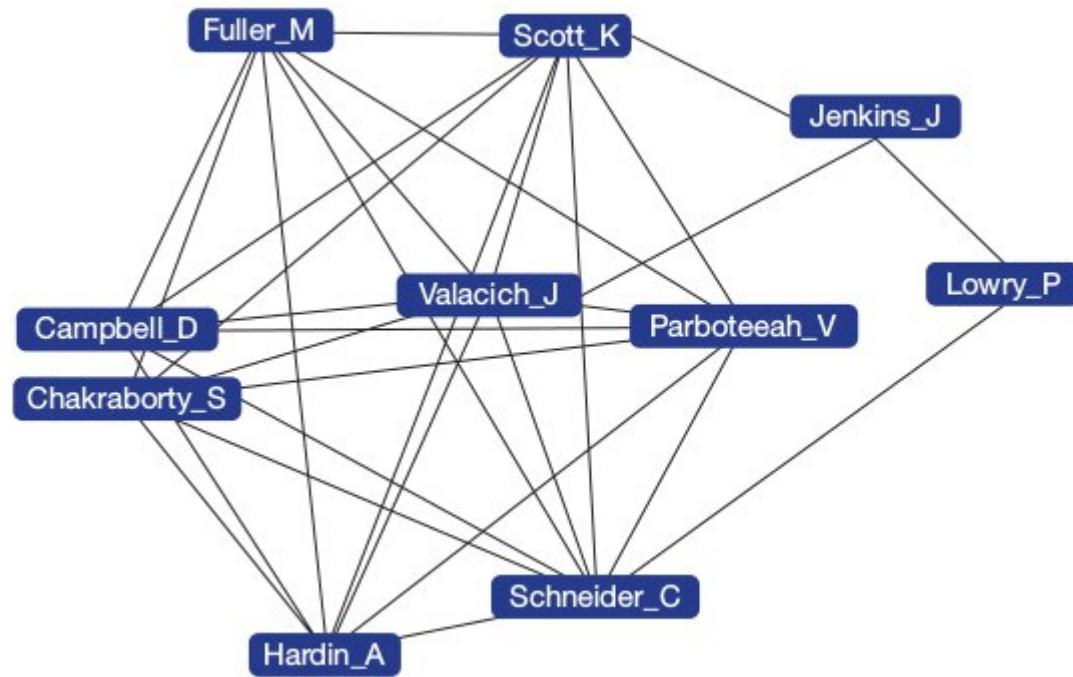
TABLE 6.7 Benefits and Challenges of Knowledge Management Systems

Benefits	Challenges
Enhanced innovation and creativity	Getting employee buy-in
Improved customer service, shorter product development, and streamlined operations	Focusing too much on technology
Enhanced employee retention	Forgetting the goal
Improved organizational performance	Dealing with knowledge overload and obsolescence

Knowledge Management Systems

FIGURE 6.23

Social network analysis can help to analyze collaboration patterns.



Knowledge Management Systems

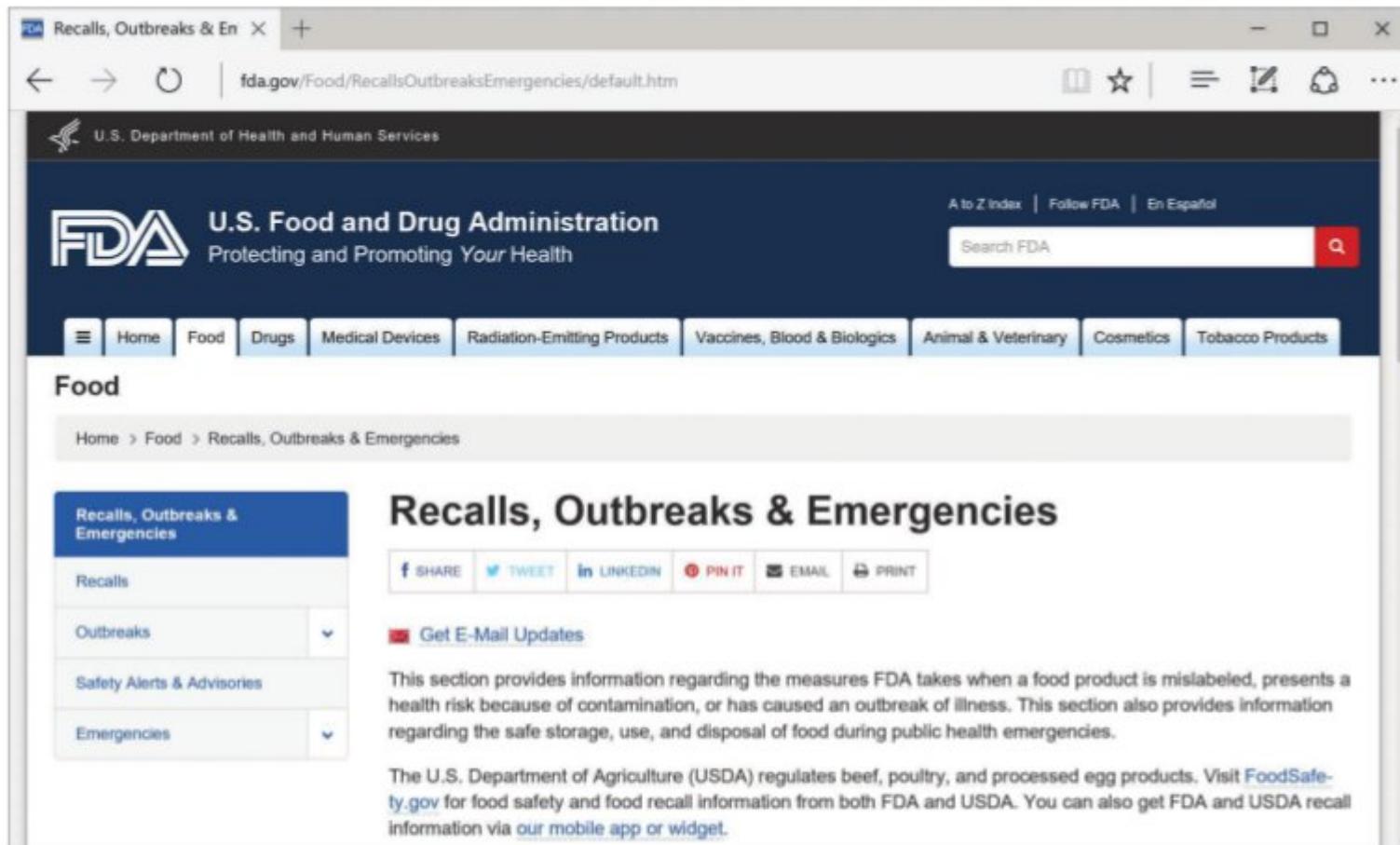


FIGURE 6.24

Countless organizations are using web-based knowledge portals to provide information to employees, customers, and partners.
Source: United States Food and Drug Administration.

Geographical Information Systems

TABLE 6.8 Various Industry Uses of GISs

Industry	Sample Uses
Agriculture	Analyze crop yield by location, soil erosion, or differences in fertilizer needs (precision farming)
Banking	Identify lucrative areas for marketing campaigns
Disaster response	Analyze historical events, set up evacuation plans, and identify areas most likely to be affected by disasters
Environment and conservation	Analyze wildlife behaviors or influences of climate change
Insurance	Risk analysis (e.g., earthquake insurance)
Government	Urban planning, zoning, and census planning
Law enforcement	Analyze high-crime areas
Marine biology	Track movements of fish swarms
Media	Create maps to visualize locations of events and analyze circulation
Mining and drilling	Locate potential areas for extraction of natural resources
Real estate	Create maps to visualize locations of properties
Retail	Analyze sales, inventory, customers, and so on, by location; identify new retail locations; and visualize and present business data
Transportation and logistics	Route planning

Source: Based on ESRI, <http://www.esri.com/what-is-gis/who-uses-gis>.

Geographical Information Systems

TABLE 6.9 Various Ways of Representing Geospatial Data

Mapping	Example
Features and patterns (i.e., distribution of features)	Earthquake epicenters (features) and areas where the hazard may be highest (patterns)
Quantities	The number of young families with a high income in a census district
Densities	Number of high-income families per square mile in a census district
What's inside	Does a luxury real estate development fall within a 15-minute driving radius of a store?
What's nearby	How many Starbucks stores are within 5 miles of my new coffee shop?
Change	How have store sales changed after a large ad campaign?

Source: Based on ESRI, <http://www.esri.com/what-is-gis/overview>.

Geographical Information Systems

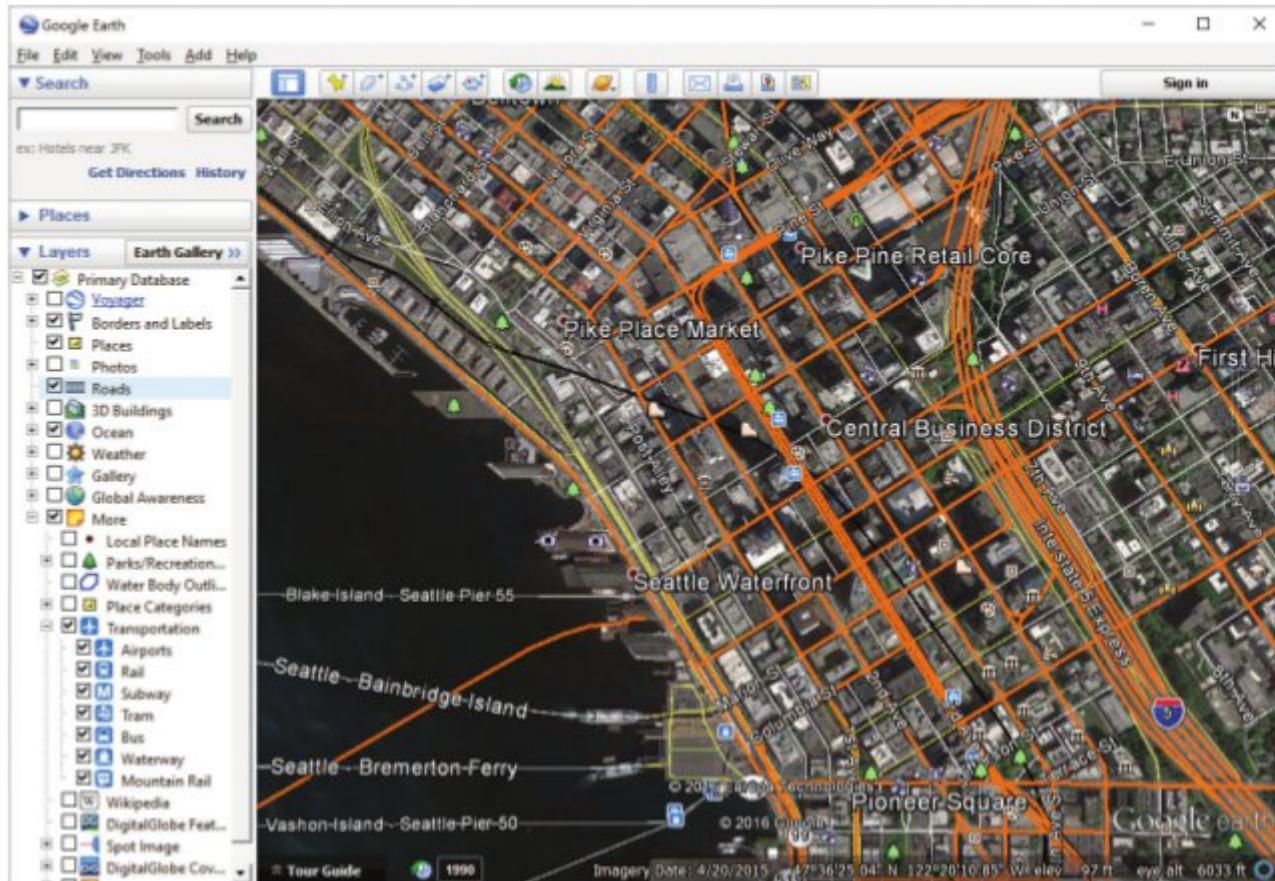


FIGURE 6.25

Google Earth uses layers to display information related to a specific geographical area.

Source: 2016 Google Inc. All rights reserved. Google and the Google Logo are registered trademarks of Google Inc.

Key Points

- Needs for Business Intelligence
- Data collection and advanced analytics
- Knowledge management and GIS
- Enhancing decision making

References/Acknowledgements

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