

Chapter 6 Learning Objectives



Business Intelligence

- Describe the concept of business intelligence and how databases serve as a foundation for gaining business intelligence.



Business Intelligence Components

- Explain the three components of business intelligence: information and knowledge discovery, business analytics, and information visualization.

Business Intelligence



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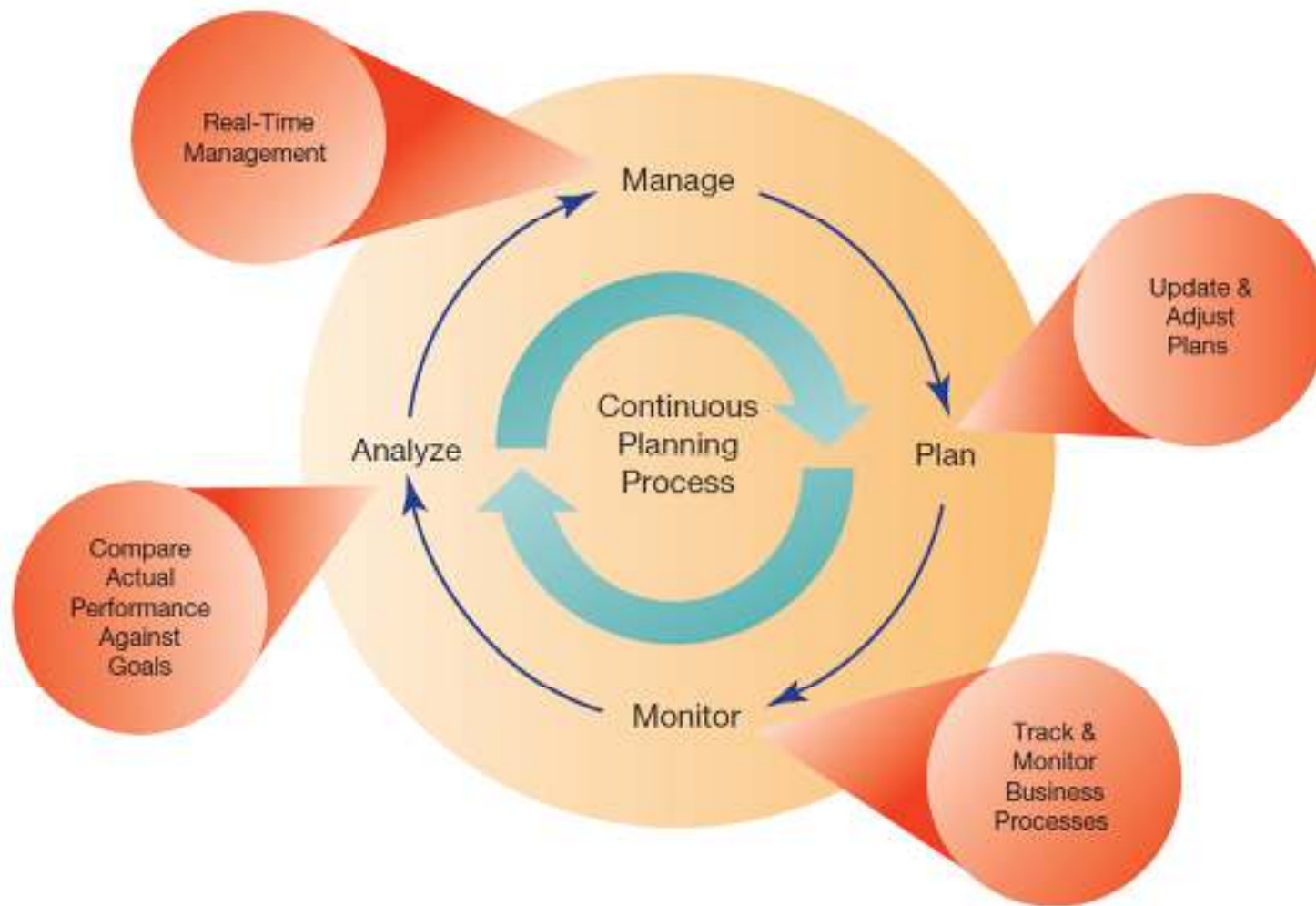
Why Organizations Need Business Intelligence: Threats and Opportunities



Why Organizations Need Business Intelligence: Understanding Big Data

- Businesses are dealing with the challenge of “Big Data”
 - High **Volume**
 - Unprecedented amounts of data
 - High **Variety**
 - Structured data
 - Unstructured data
 - High **Velocity**
 - Rapid processing to maximize value

Why Organizations Need Business Intelligence: Continuous Planning



Databases: Providing Inputs into Business Intelligence Applications

- Data and knowledge are an organization's most valuable resource
- Enabling interactive Web sites using databases:
 - E-commerce makes extensive use of databases
 - Product catalog data are stored in databases and available to users
 - Customer billing and shipping
 - E-commerce applications process millions of transactions per day

Databases: Foundation Concepts



Databases: Tables and Records



The screenshot shows the Microsoft Access interface with the 'Students' table open in Datasheet View. The table contains 10 records. The first record is highlighted in blue. The interface includes a ribbon with 'TABLE TOOLS' and 'FIELDS' tabs, and a 'Navigation Pane' on the left.

ID	LastName	FirstName	StreetAddress	City	State	Zip
209345	Judson	Jackie	216 Main	Pullman	WA	99164
213009	Schirmer	Birgit	233 Webb	Pullman	WA	99163
345987	Valacich	James	1212 Valley View	Pullman	WA	99163
457838	Wright	Elizabeth	426 Main	Pullman	WA	99163
459987	Schmidt	Lisa-Marie	1824 Lamont	Pullman	WA	99164
466711	Ferrelll	Lauren	412 C Street	Pullman	WA	99164
512678	Gatewood	Lael	200 Hill	Pullman	WA	99163
691112	Fuller	Grace	312 Mountain D	Pullman	WA	99164
910234	Hardin	Ethan	200 Sunset	Pullman	WA	99164
983445	Kabbe	Joshua	825 Skylark	Pullman	WA	99163

This sample data table for the entity *Student* includes 7 attributes and 10 records.

Source: Microsoft Access

Databases: Advantages

Advantage	Description
Program-data independence	Programs and data are separated by the DBMS
Minimal data redundancy	There is a single copy of the data
Improved data consistency	Eliminating redundancy improves consistency
Improved data sharing	The DBMS allows sharing between programs
Application development	Data standards simplify program development
Standards enforcement	Centralized data management standardizes rules
Increased security	Simplifies enforcement of access restrictions
Improved data quality	Centralized control, minimized redundancy, and improved data consistency enhance data quality
Improved data accessibility	Centralized, standardized access
Reduced program maintenance	Changes in data replicate seamlessly

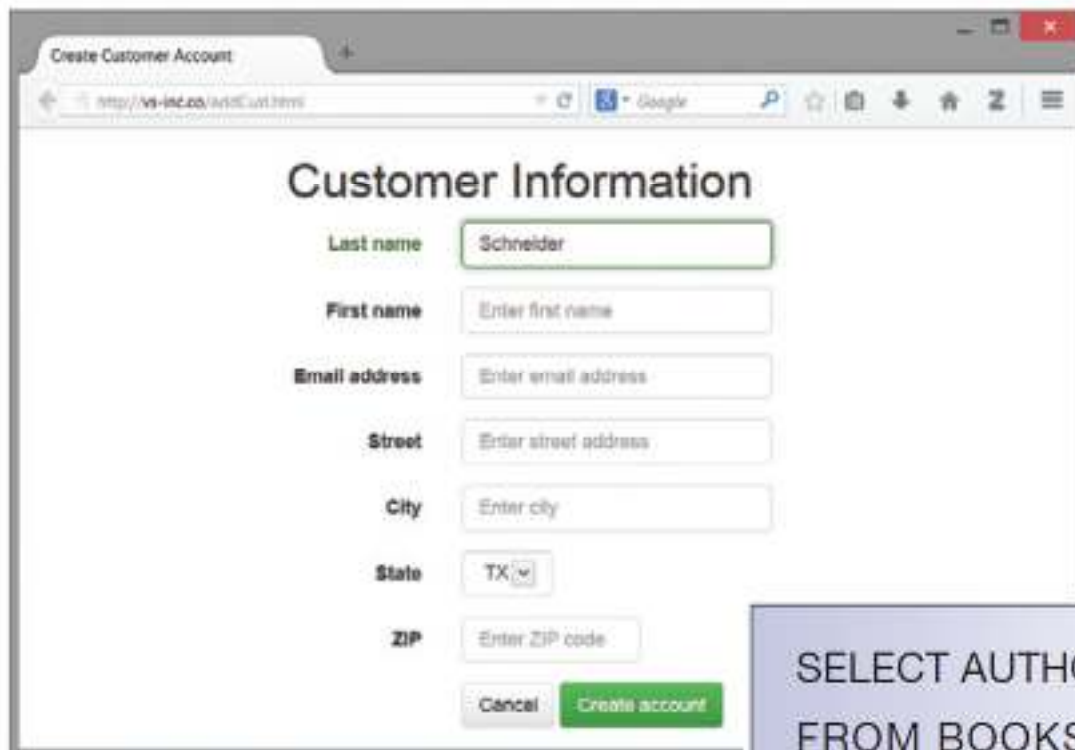
Databases: Costs and Risks

Cost or Risk	Description
Need for new, specialized personnel	Conversion to the database approach may require hiring additional personnel.
Installation and management cost and complexity	The database approach has higher up-front costs and complexity in order to gain long-term benefits.
Conversion costs	Extensive costs are common when converting existing systems, often referred to as <i>legacy systems</i> , to the database approach.
Need for explicit backup and recovery	A shared corporate data resource must be accurate and available at all times.
Organizational conflict	Ownership—creation, naming, modification, and deletion—of data can cause organizational conflict.

Databases: Effective Management

- The Data Model
 - What data will be captured
 - How the data will be represented
- The Data Dictionary
 - Document of database metadata
 - Attribute name
 - Type of data
 - Valid values
 - Business rules

Databases: Entering and Querying Data



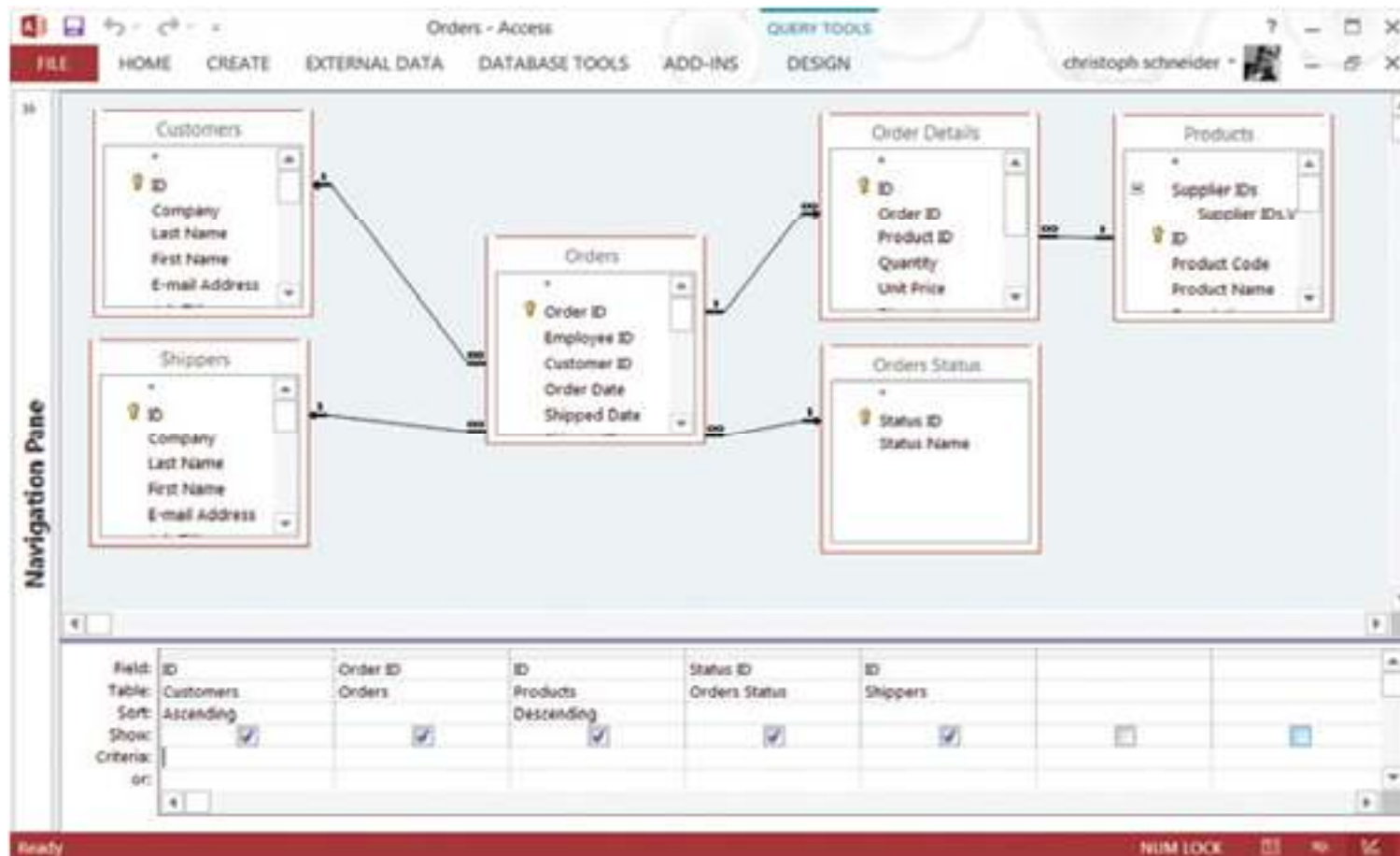
The screenshot shows a web browser window with a single tab titled 'Create Customer Account'. The address bar displays 'http://vs-1nd.co.uk/Cust.html'. The page content is a form titled 'Customer Information' with the following fields:

- Last name:** A text input field containing the value 'Schneider'.
- First name:** A text input field with the placeholder text 'Enter first name'.
- Email address:** A text input field with the placeholder text 'Enter email address'.
- Street:** A text input field with the placeholder text 'Enter street address'.
- City:** A text input field with the placeholder text 'Enter city'.
- State:** A dropdown menu currently showing 'TX'.
- ZIP:** A text input field with the placeholder text 'Enter ZIP code'.

At the bottom of the form are two buttons: a grey 'Cancel' button and a green 'Create account' button.

```
SELECT AUTHOR, TITLE, PUBLICATION_DATE, PRICE
FROM BOOKS
WHERE AUTHOR="VALACICH"
ORDER BY PUBLICATION_DATE;
```

Databases: Query via Graphical User Interface



Source: Courtesy of Microsoft Corporation

Databases:

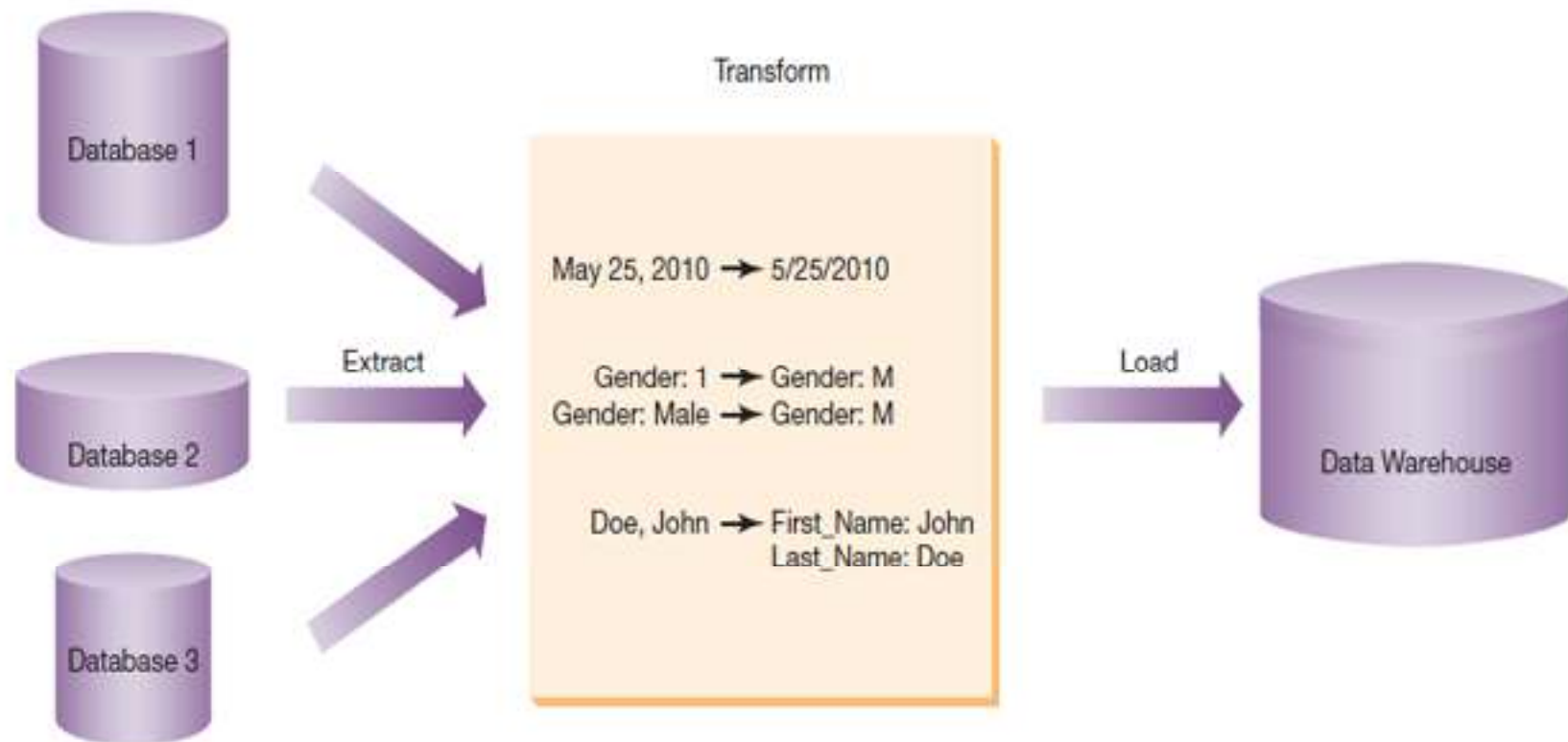
Operational Systems and BI

- Online Transaction Processing (OLTP)
 - Systems that interact with customers and run a business in real time
- Master Data Management
 - Data deemed most important in the operation of a business
 - Shared among multiple organizational units
- Data Warehouses
 - Integrate data from multiple databases and other data sources
 - Contain historic as well as current data
- Data Marts
 - Mini data warehouse, limited in scope to organizational unit

Operational vs. 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

Extract, Transform, and Load



Business Intelligence Components



Business Intelligence

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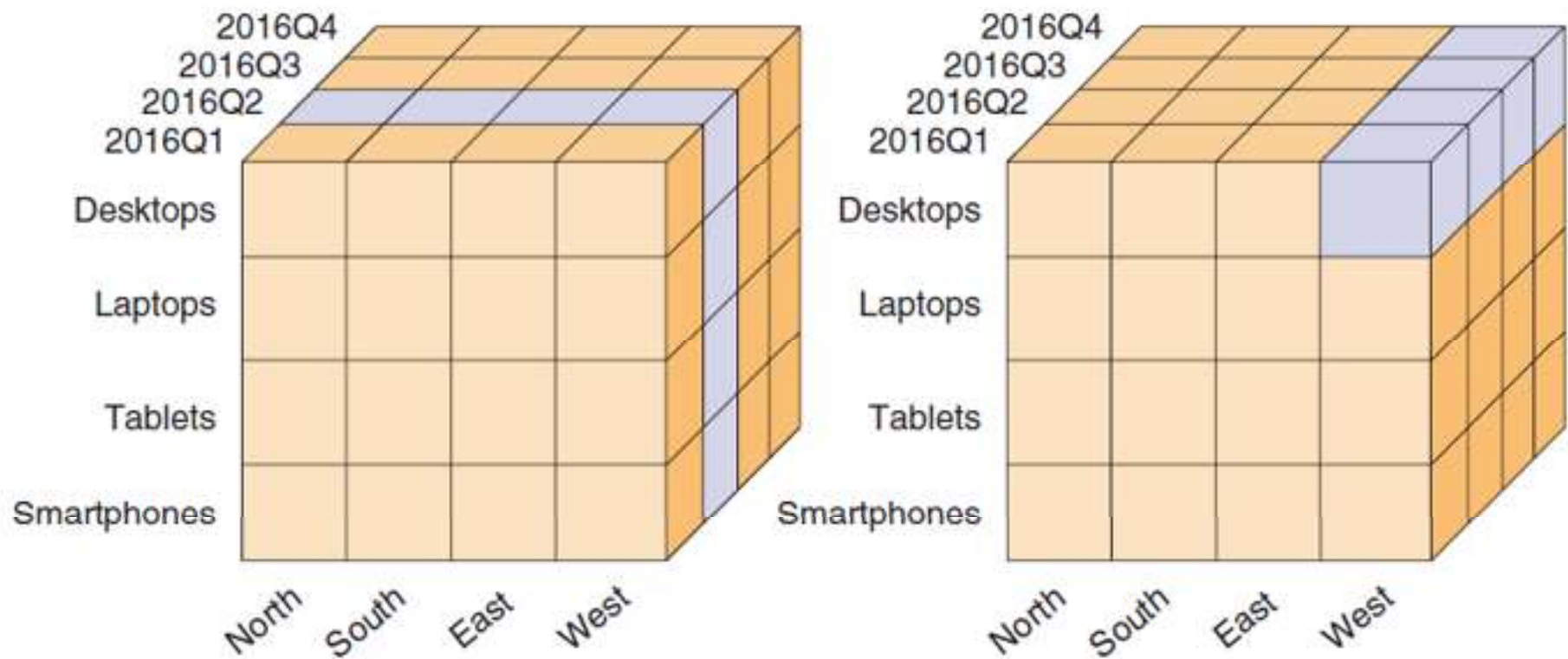
Business Intelligence Components

Explain the three components of business intelligence: information and knowledge discovery, business analytics, and information visualization.

Information and Knowledge Discovery: 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 information 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 non-routine decision; typically not saved to be run again

Information and Knowledge Discovery: Online Analytical Processing (OLAP)



An OLAP cube is a multidimensional database structured to support slicing, dicing, and drill-down

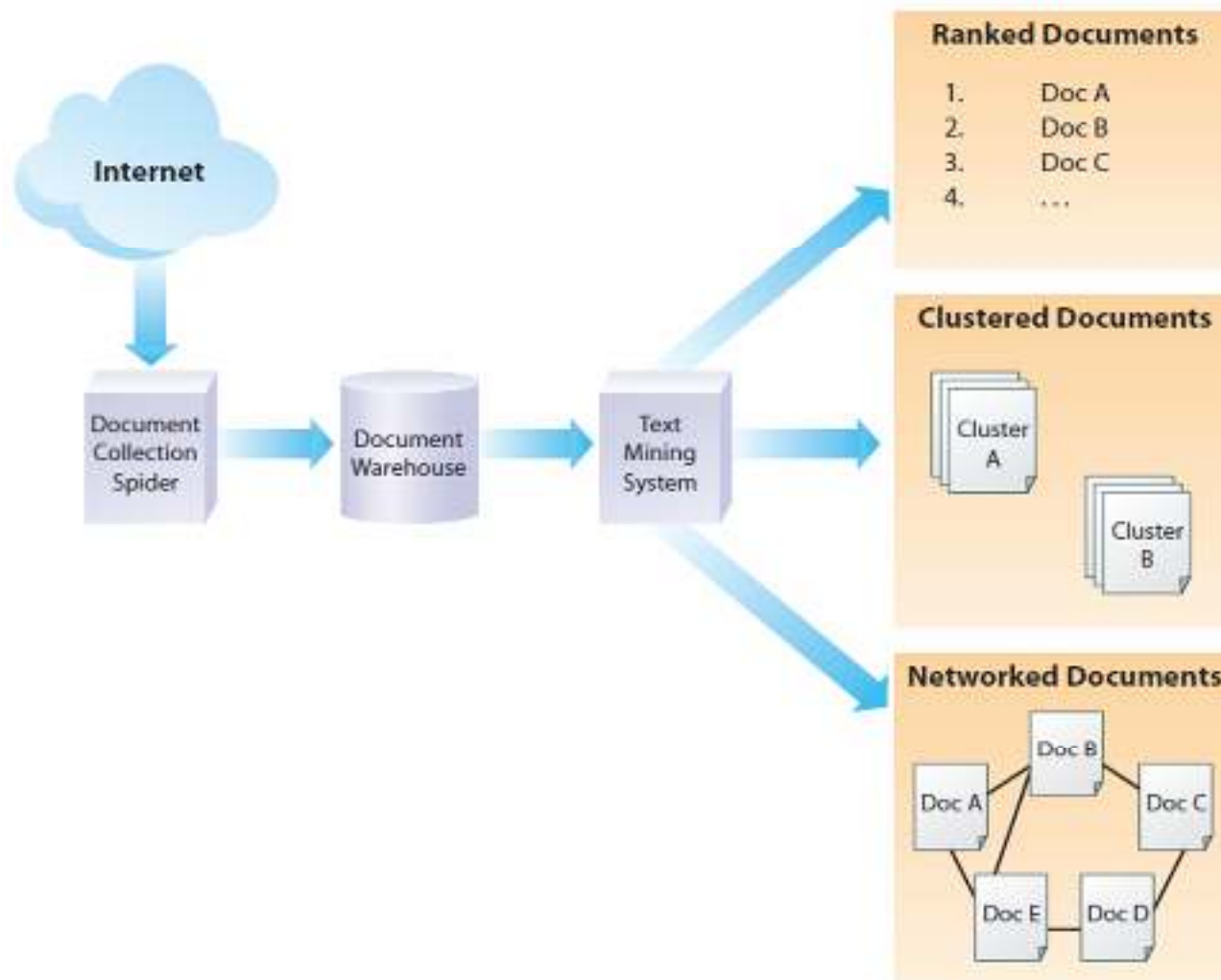
OLAP Terms and Concepts

- Measures
 - Facts, numerical data that can be aggregated
- Dimensions
 - Perspectives on which to view the facts
 - Hierarchically arranged to enable drill-down and roll-up
- Cubes
 - Multidimensional structure of dimensions and measures
- Slicing and Dicing
 - Analyzing data on a subset of dimensions

Data Mining

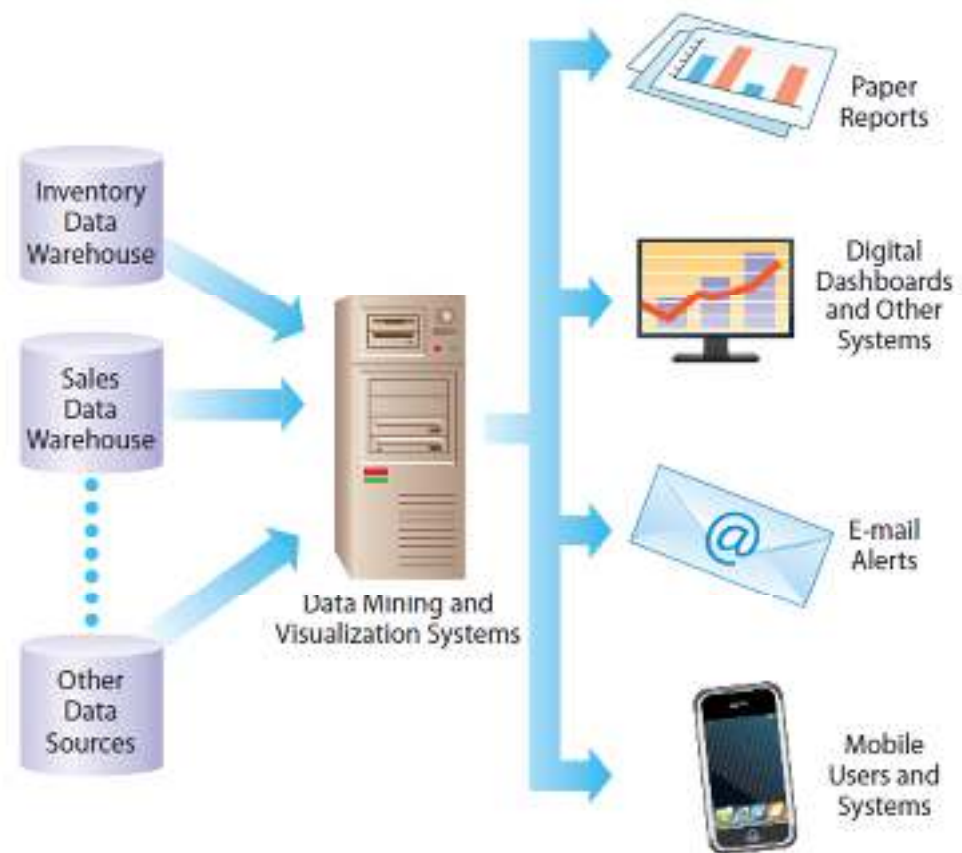
- Discovering “hidden” predictive relationships in the data
- Complicated algorithms run on large data warehouses
- Types of data mining algorithms
 - Association discovery
 - Clustering
 - Classification
 - Text and web content mining

Information and Knowledge Discovery: Unstructured Data Analysis



Presenting the Results of Data Mining

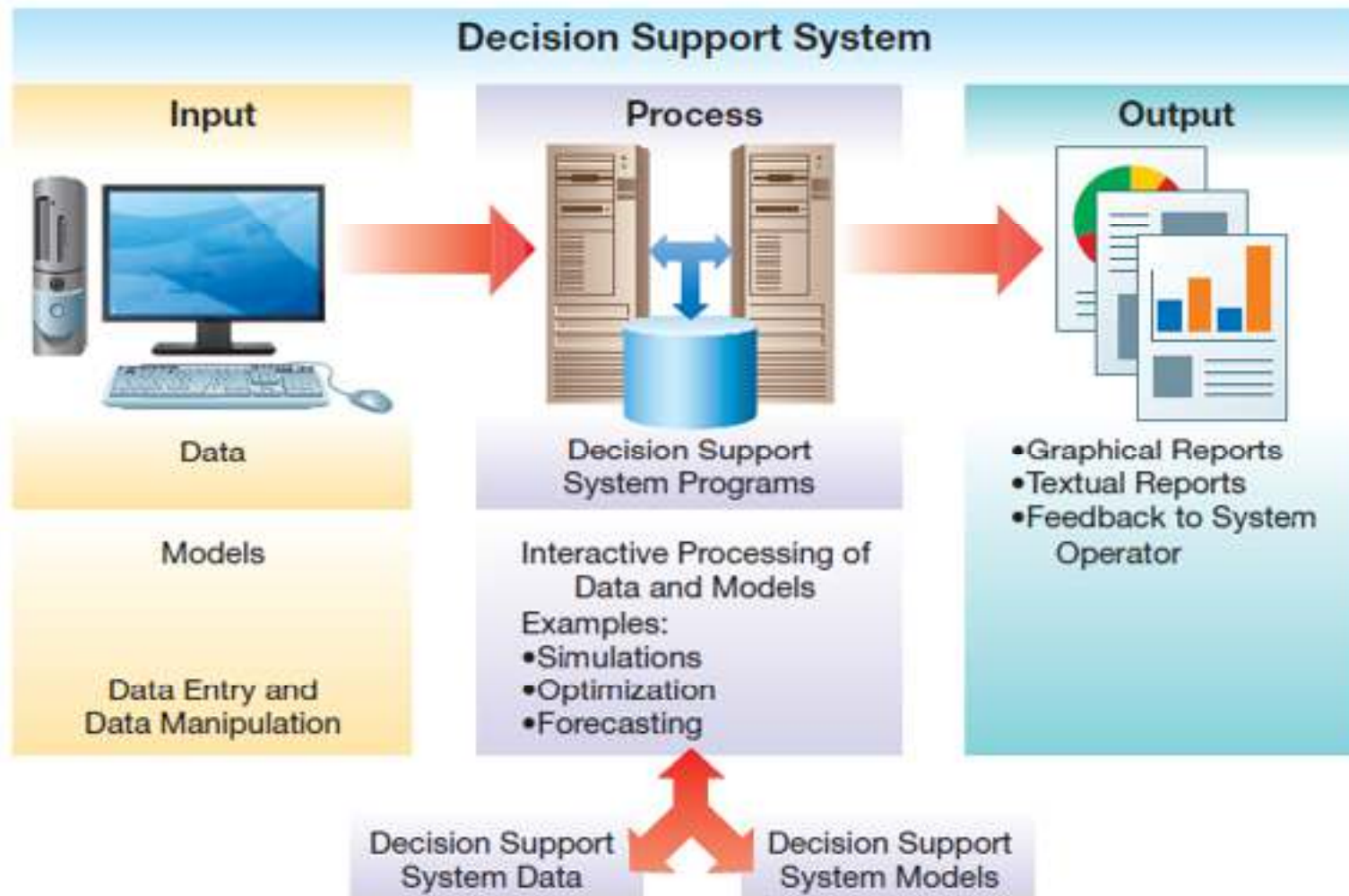
Data mining results can be delivered to users in a variety of ways



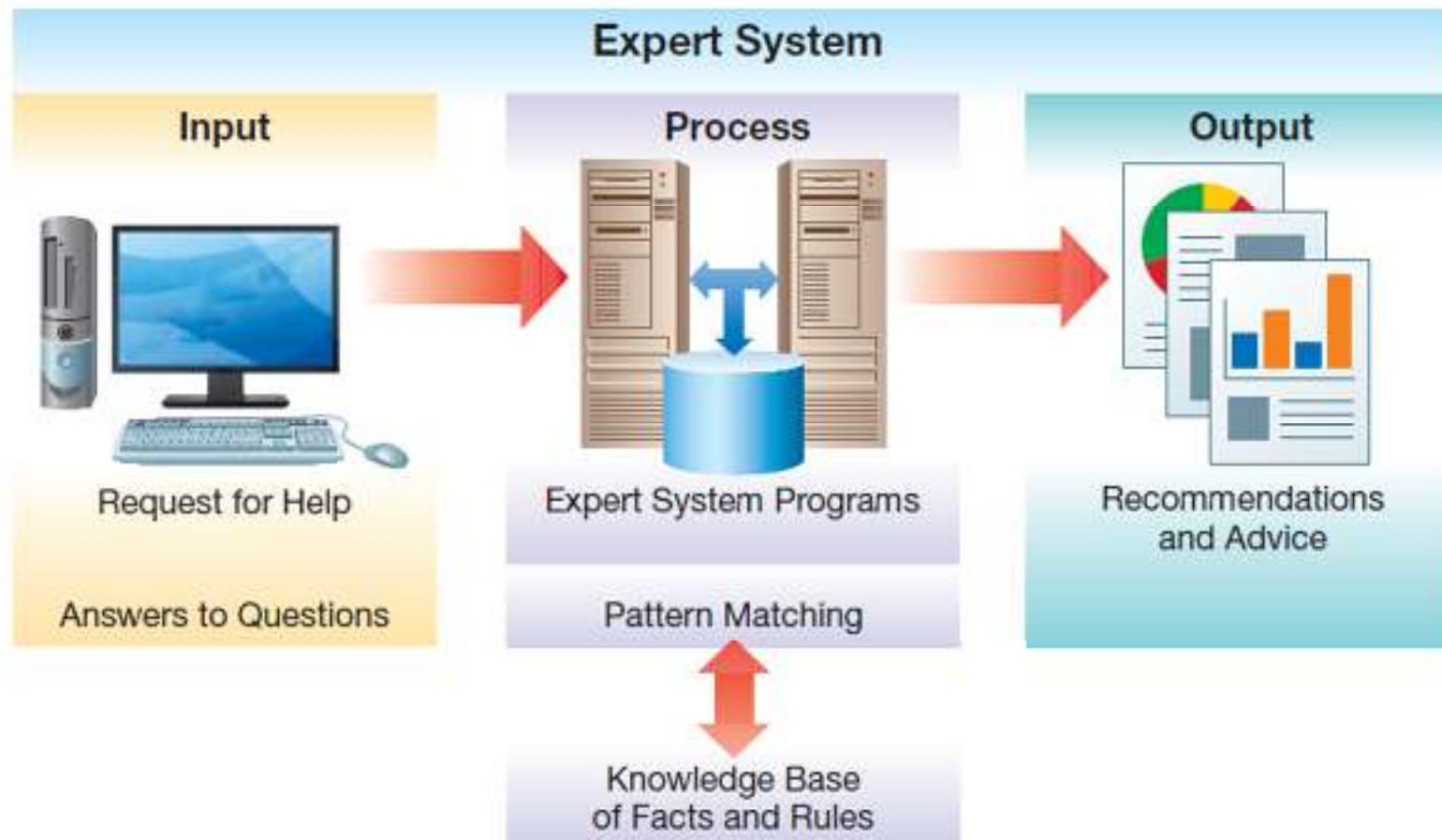
Business Analytics to Support Decision Making

- Business Analytics
- Decision Support Systems
- Intelligent Systems
 - Machine learning (e.g., neural networks)
 - Expert systems
 - Intelligent agents
- Knowledge Management Systems

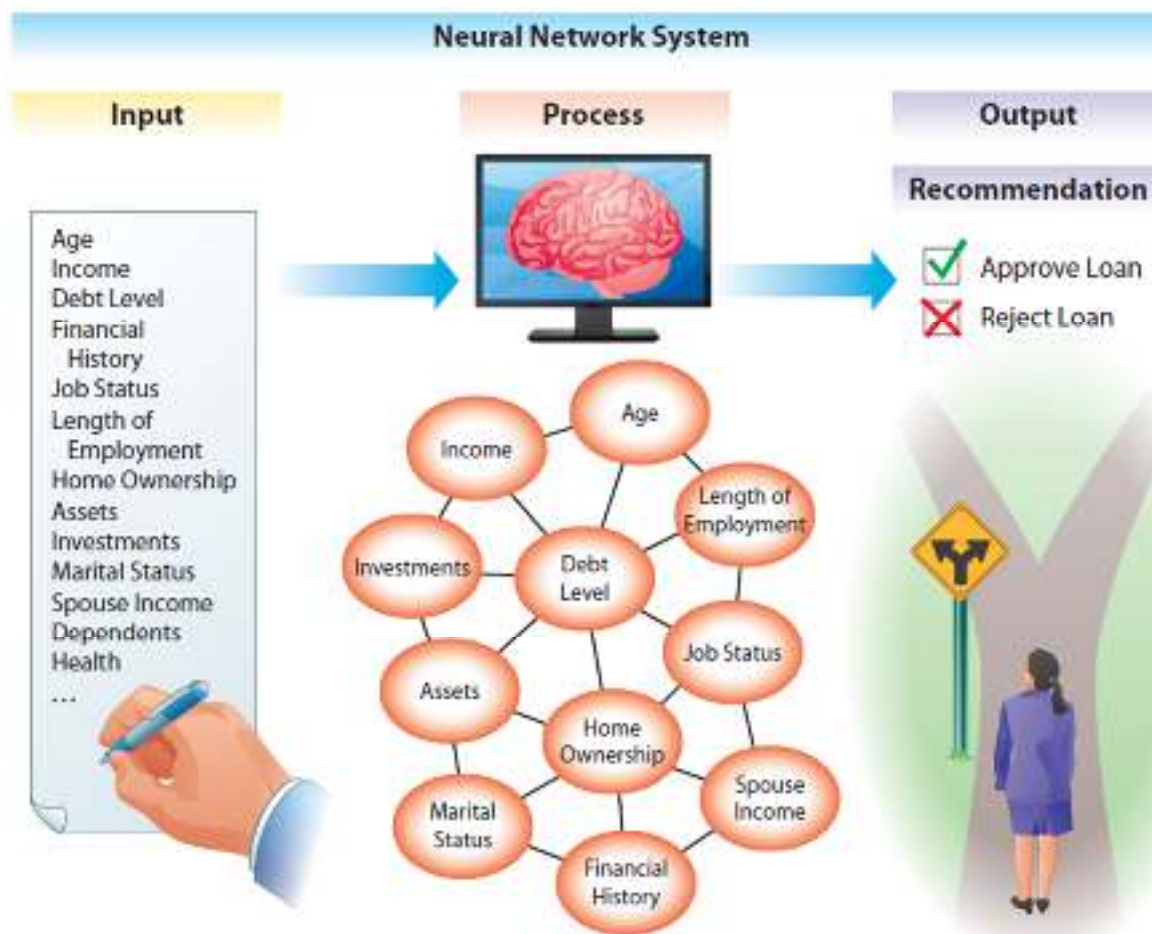
Architecture of a Decision Support System (DSS)



Architecture of an Expert System (ES)



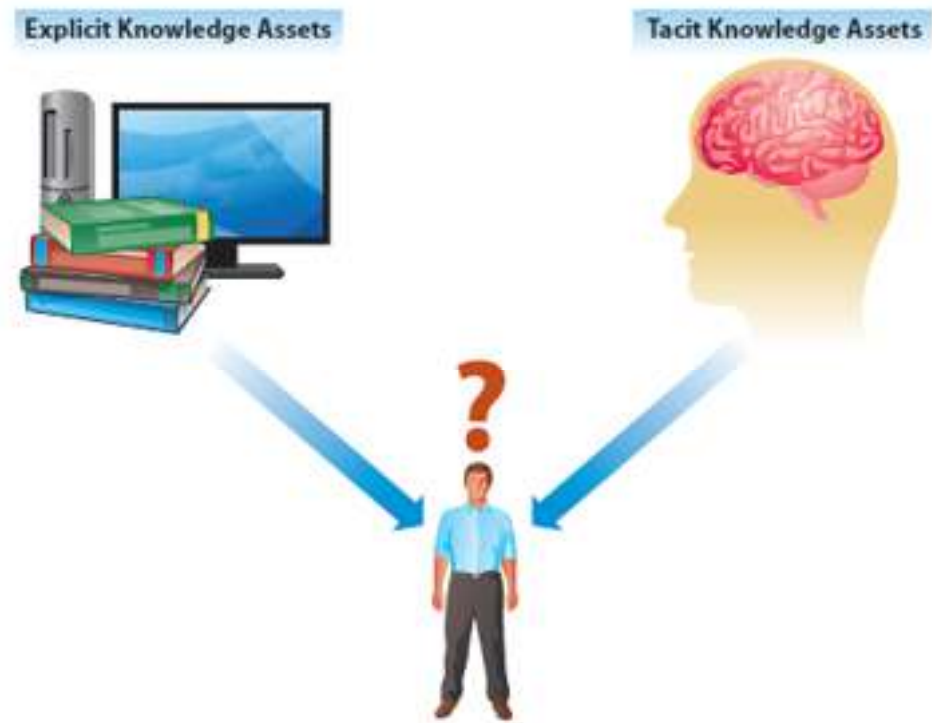
Machine Learning: Neural Networks



Neural networks approximate the functioning of the brain by creating common patterns in data and then comparing new data to learned patterns to make a recommendation

Knowledge Management Systems

- Explicit knowledge
 - Easily codified and documented
- Tacit knowledge
 - Embedded in people's minds
 - Hard to get at
 - Important for best practices

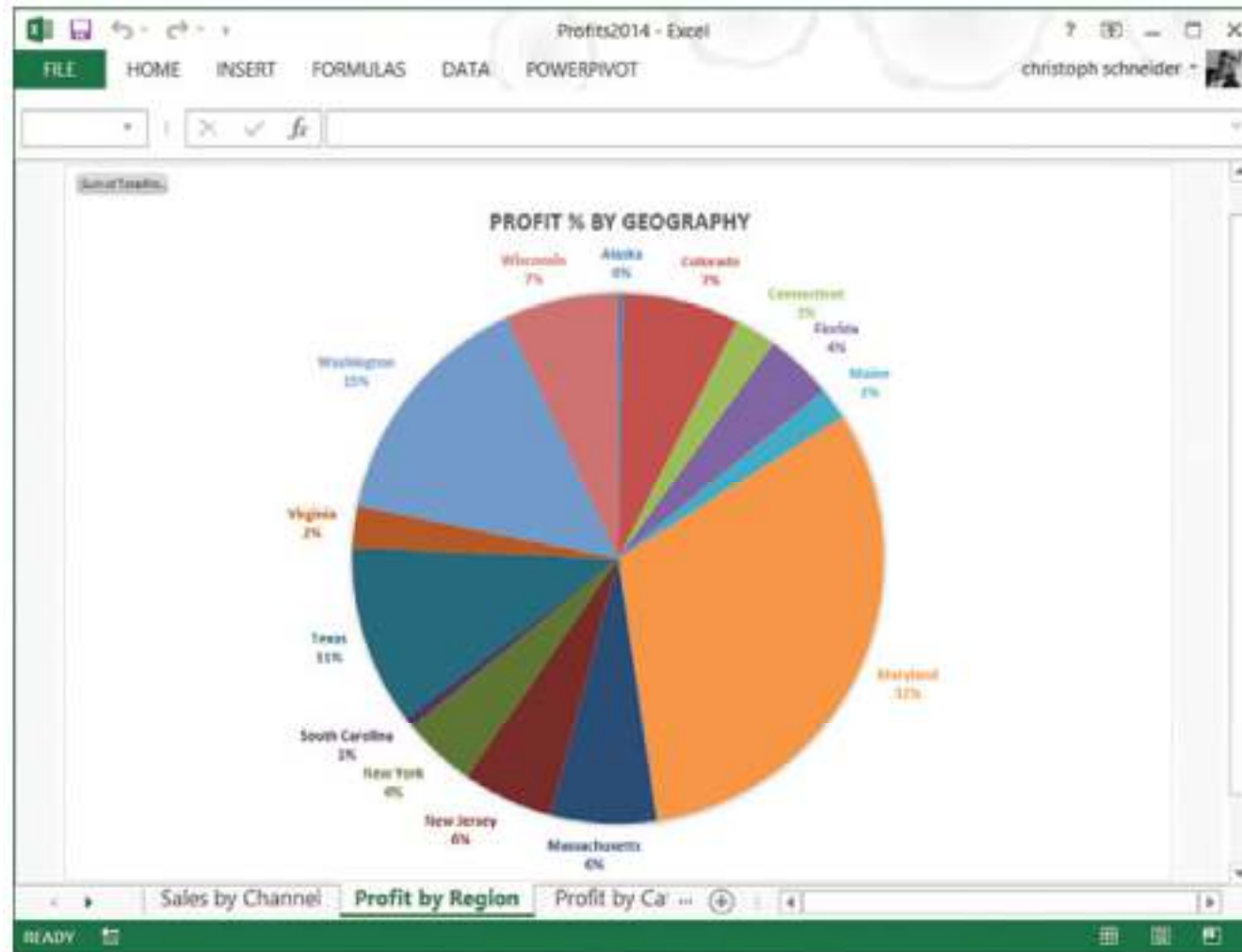


Goal: gain the greatest value from knowledge assets

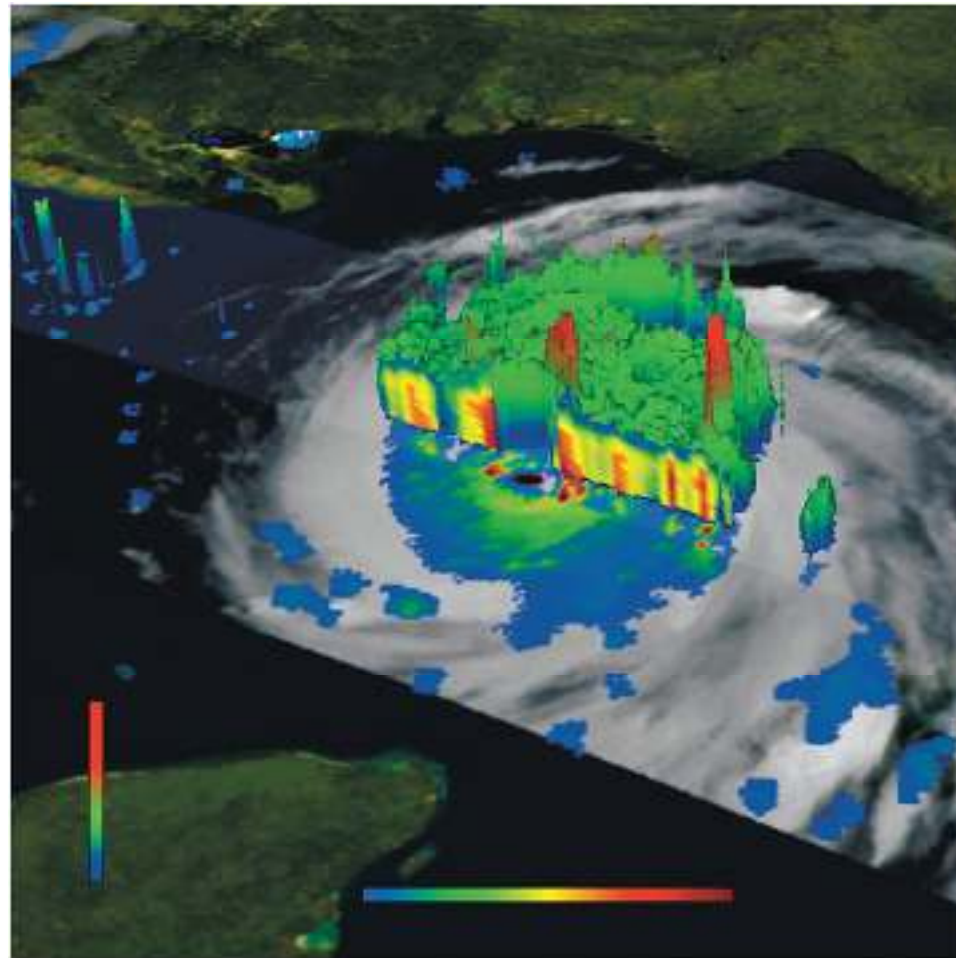
Information Visualization

- Dashboards
 - Comprised of key performance indicators (KPIs)
 - Visual display of summary information
 - Aid in situational awareness and decision making
- Visual Analytics
 - Interactive graphics for complex analysis
- Geographic Information Systems
 - Visualizing geographic information

Information Visualization: Digital Dashboard of Business Data



Information Visualization: Geographical Data



Source: NASA Headquarters

END OF CHAPTER CONTENT

Managing in the Digital World: FBI and CIA— Gathering Intelligence Using Social Media

- Social media is pervasive
 - Changing perspectives on privacy, reshaping relationships, increased information sharing
- Organizations monitor and digest social media information flow
- Police, first responders, NSA, also tap into social media to track crises, forecast social upheavals, and predict economic changes
- Analyzing the huge volume of social media interactions is a Big Data problem

When Things Go Wrong: Twitter Fever—Where Good Conscience Meets Bad Intelligence

- Twitter allows very rapid dissemination and sharing of information
- People often retweet something they find touching without verifying its accuracy first
- The shortness of tweets also limits background and context, so information is easily distorted
- Stories can gain rapid momentum regardless of truth or fact, and have damaging consequences

Coming Attractions: Intelligence Through Drones

- University of Pennsylvania is doing research on autonomous flying robots (quadcopters) that can work together in formation
- Amazon.com announced work on drones that can deliver packages 30 minutes after order
- University of Aberdeen is developing drone technology that gathers geographic data to help farmers find ideal planting locations

Brief Case:

Quality Assurance Through Call Recording

- Different customer personalities relate better to different customer service approaches
- E-loyalty software can classify a customer and direct a customer service representative how to handle the call
 - Personality types: Spock, Princess Diana, Rush Limbaugh, Robin Williams, Donald Trump, Yoda
- Algorithms use past experience and call analysis to infer patterns
- E-loyalty lowers call center operating expenses by 20 percent because of more productive calls

Ethical Dilemma: Are You Being Tracked?

- Mobile phones emit a Temporary Mobile Subscriber Identifier (TMSI)
- Software known as Footpath can triangulate this TMSI and track customers as they walk through malls
- This tracking can shed light on shoppers' individual tastes, tapping into their shopping patterns
- Privacy concerns; what are the legal ramifications?

Key Players: SAS, MicroStrategy, and other Business Intelligence Leaders

- Business intelligence is becoming big business
 - Independent Pure Play analytic companies
 - SAS
 - MicroStrategy
 - Larger integrated companies
 - IBM
 - SAP
 - Oracle
 - Microsoft
 - Specialized companies also exist that focus on very specific aspects of business intelligence

Who's Going Mobile: AroundMe

- Mobile devices and location are a perfect match for each other
- Search engines (Google, Bing) provide users with information on nearby restaurants
- AroundMe—a popular location-based service
 - Uses phones GPS to find user's location, and finds list of interesting places nearby
 - Makes use of ad platform Google Dynamic Mobile Advertisement

Industry Analysis: Health Care

- Health care providers and insurance companies are turning to information systems
 - Electronic medical records and prescriptions
 - Digital imaging systems
 - Telemedicine
 - Robotic surgery
- Consumers are turning to Web sites for health information
 - Dedicated sites such as WebMD
 - Social media postings related to a condition or symptoms