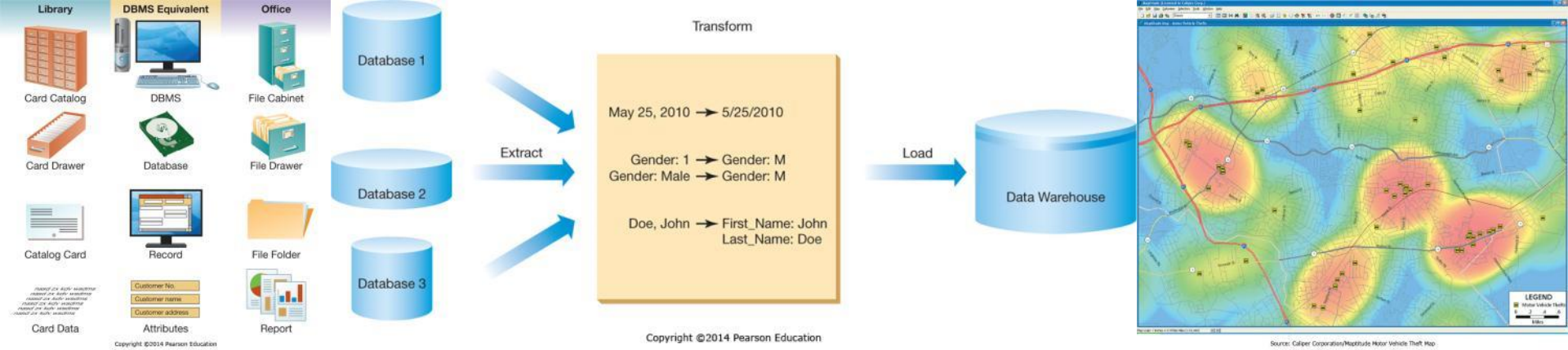


Chapter 6 - Enhancing Business Intelligence Using Information Systems

Managers need high-quality and timely information to support decision making

Chapter 6 Learning Objectives

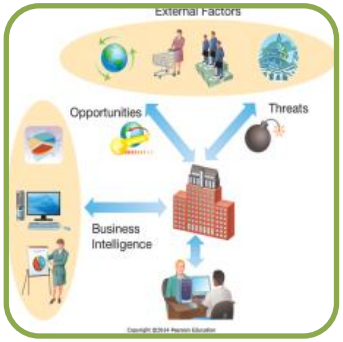
Business Intelligence

- 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



Business Intelligence

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

Business Intelligence Components

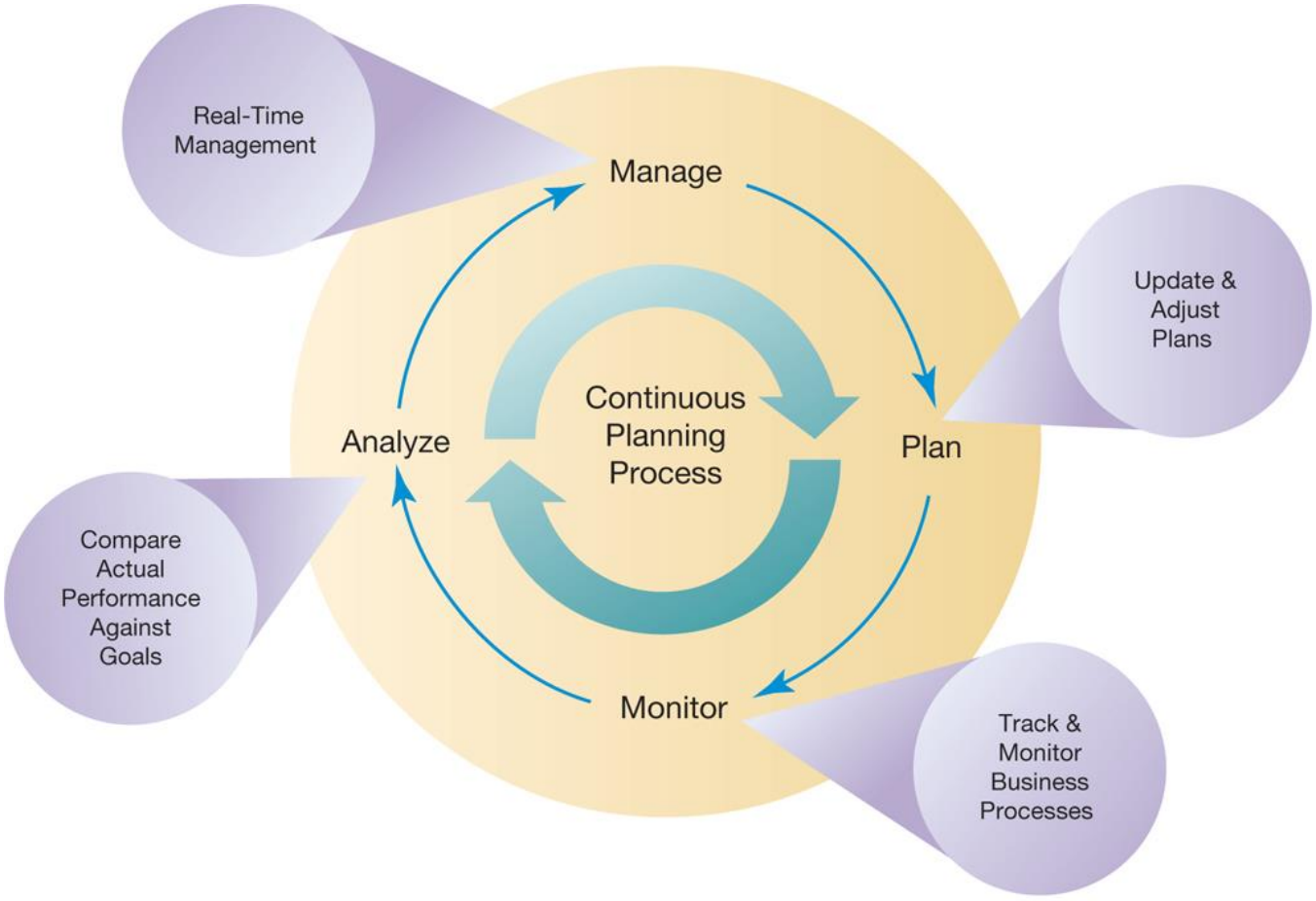
Explain the three components of business intelligence: information and knowledge discovery, business analytics, and information visualization.

Why Organizations Need Business Intelligence: Threats and Opportunities

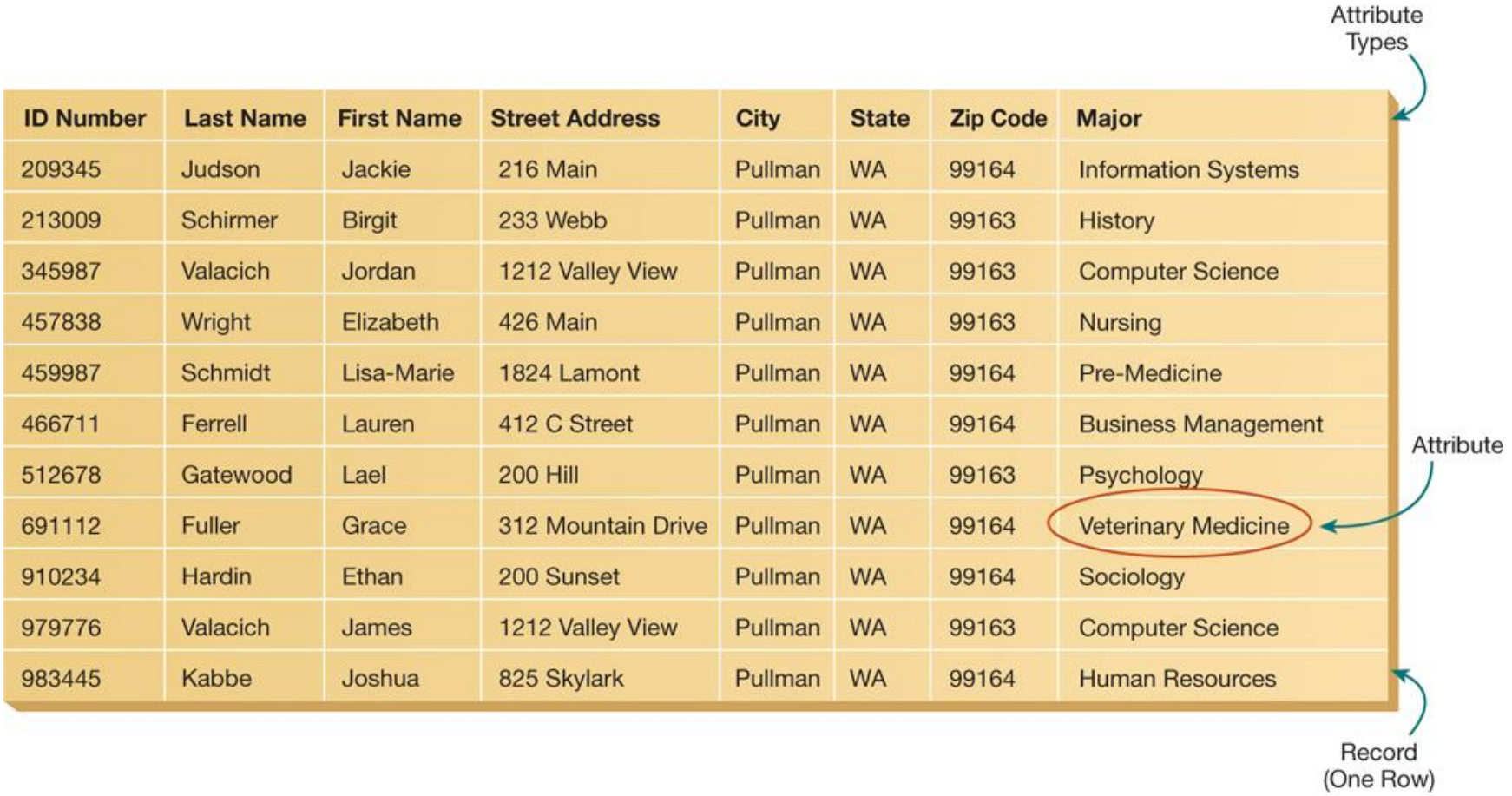
Why Organizations Need Business Intelligence: Understanding Big Data

- 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

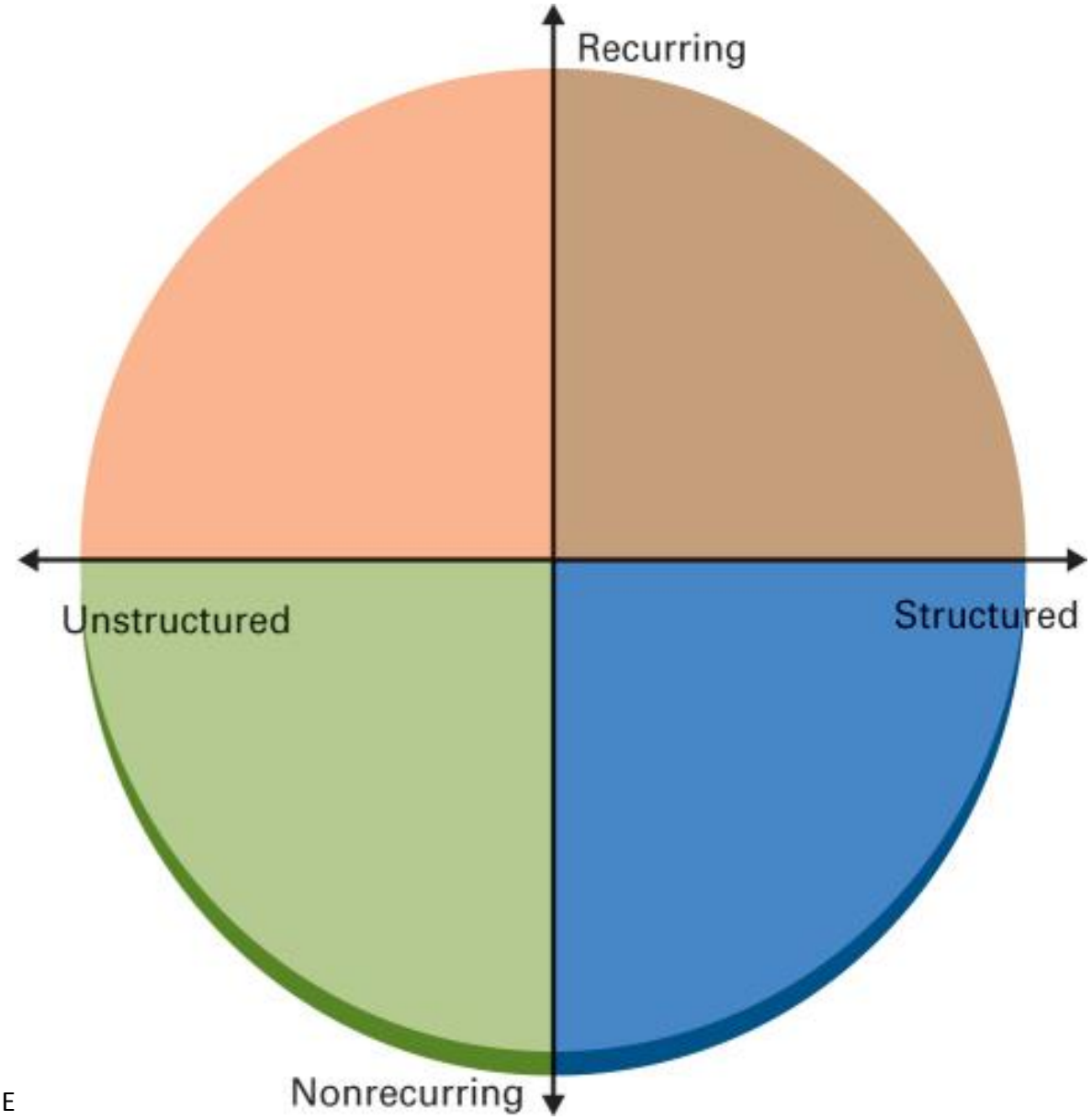


Databases: Tables and Records



ID Number	Last Name	First Name	Street Address	City	State	Zip Code	Major
209345	Judson	Jackie	216 Main	Pullman	WA	99164	Information Systems
213009	Schirmer	Birgit	233 Webb	Pullman	WA	99163	History
345987	Valacich	Jordan	1212 Valley View	Pullman	WA	99163	Computer Science
457838	Wright	Elizabeth	426 Main	Pullman	WA	99163	Nursing
459987	Schmidt	Lisa-Marie	1824 Lamont	Pullman	WA	99164	Pre-Medicine
466711	Ferrell	Lauren	412 C Street	Pullman	WA	99164	Business Management
512678	Gatewood	Lael	200 Hill	Pullman	WA	99163	Psychology
691112	Fuller	Grace	312 Mountain Drive	Pullman	WA	99164	Veterinary Medicine
910234	Hardin	Ethan	200 Sunset	Pullman	WA	99164	Sociology
979776	Valacich	James	1212 Valley View	Pullman	WA	99163	Computer Science
983445	Kabbe	Joshua	825 Skylark	Pullman	WA	99164	Human Resources

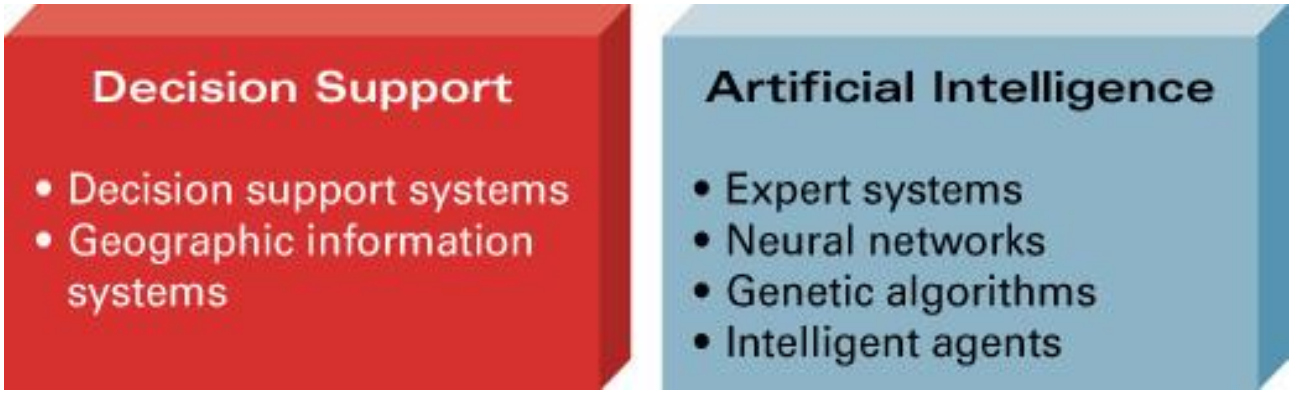
Types of Decisions You Face



Scenario – Warehouse Manager

- You know you have too much cash tied up in inventory. You want to reduce inventory levels.
- You get a lot of heat when orders are placed and you can't fill the order from inventory.
- What information do you need, how would you like to see it and how do you make decisions about adjusting inventory levels?
- Are these structured or unstructured decisions?

Decision Support vs. Artificial Intelligence



Helps you analyze information

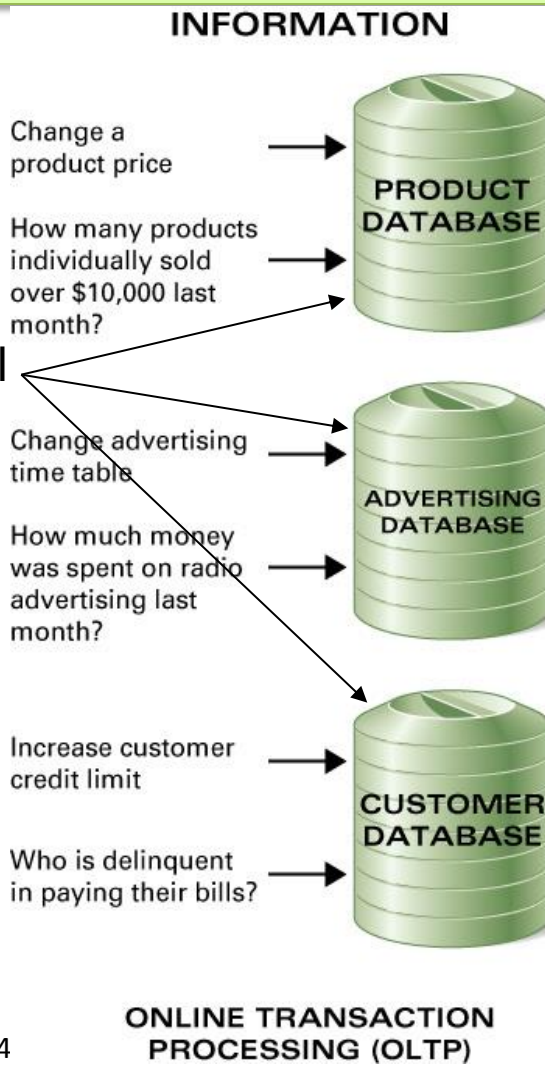
Makes or recommends a decision for you

Business Intelligence (BI)

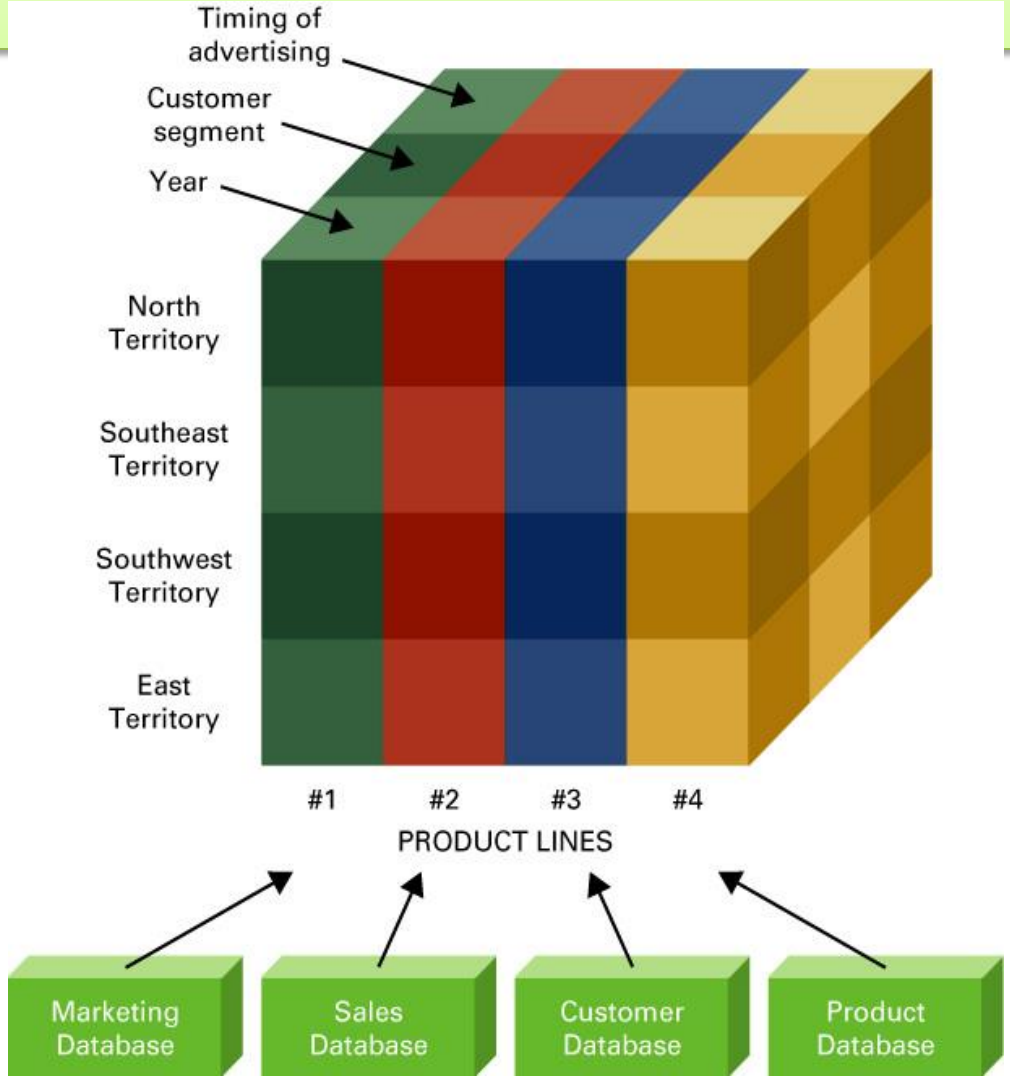
- Business Intelligence (BI) is the use of information systems to gather and analyze information from internal and external sources in order to make better business decisions.
- BI is used to integrate data from disconnected:
  - Reports
  - Databases
  - Spreadsheets
- Integrated data helps to monitor and fine-tune business processes.

Databases & Data Warehouses

Operational Databases



What Is a Hypercube?

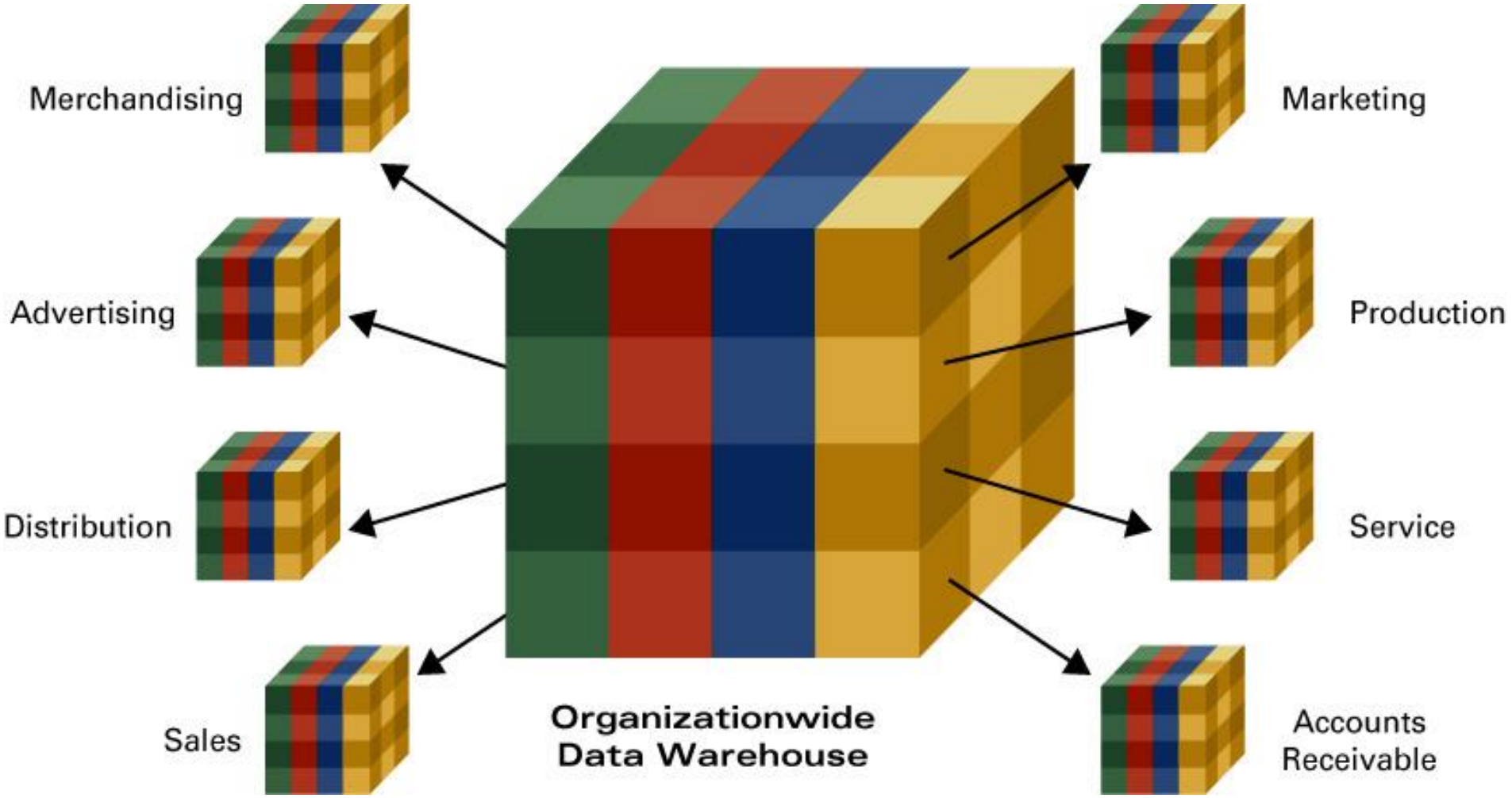


Create multi-dimensional "cubes" of information that summarize transactional data across a variety of dimensions.

OLAP vs. OLTP

Envisioned by smart businesspeople, built by the IT pros

Data Marts



Business Intelligence Components

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 Components

- Three types of tools
  - Information and knowledge discovery
  - Business analytics
  - Information visualization

- Information and Knowledge Discovery
  - Search for hidden relationships.
  - Hypotheses are tested against existing data.
    - For example: Customers with a household income over $150,000 are twice as likely to respond to our marketing campaign as customers with an income of $60,000 or less.

Ad Hoc 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 an exception occurred
Ad hoc queries	Queries answering unplanned information requests to support a nonroutine decision; typically not saved to be run again

Online Analytical Processing (OLAP)

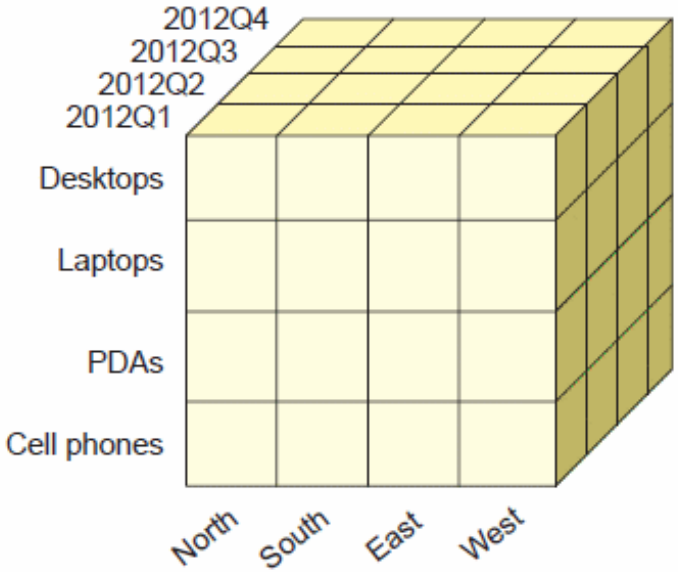
- Complex, multidimensional analyses of data beyond simple queries
- OLAP server —main OLAP component
- Key OLAP concepts:
  - Measures and dimensions
  - Cubes, slicing, and dicing
  - Data mining
  - Association discovery
  - Clustering and classification
  - Text mining and Web content mining
  - Web usage mining

One application of OLAP…

Cubes

- Cube—an OLAP data structure organizing data via multiple dimensions

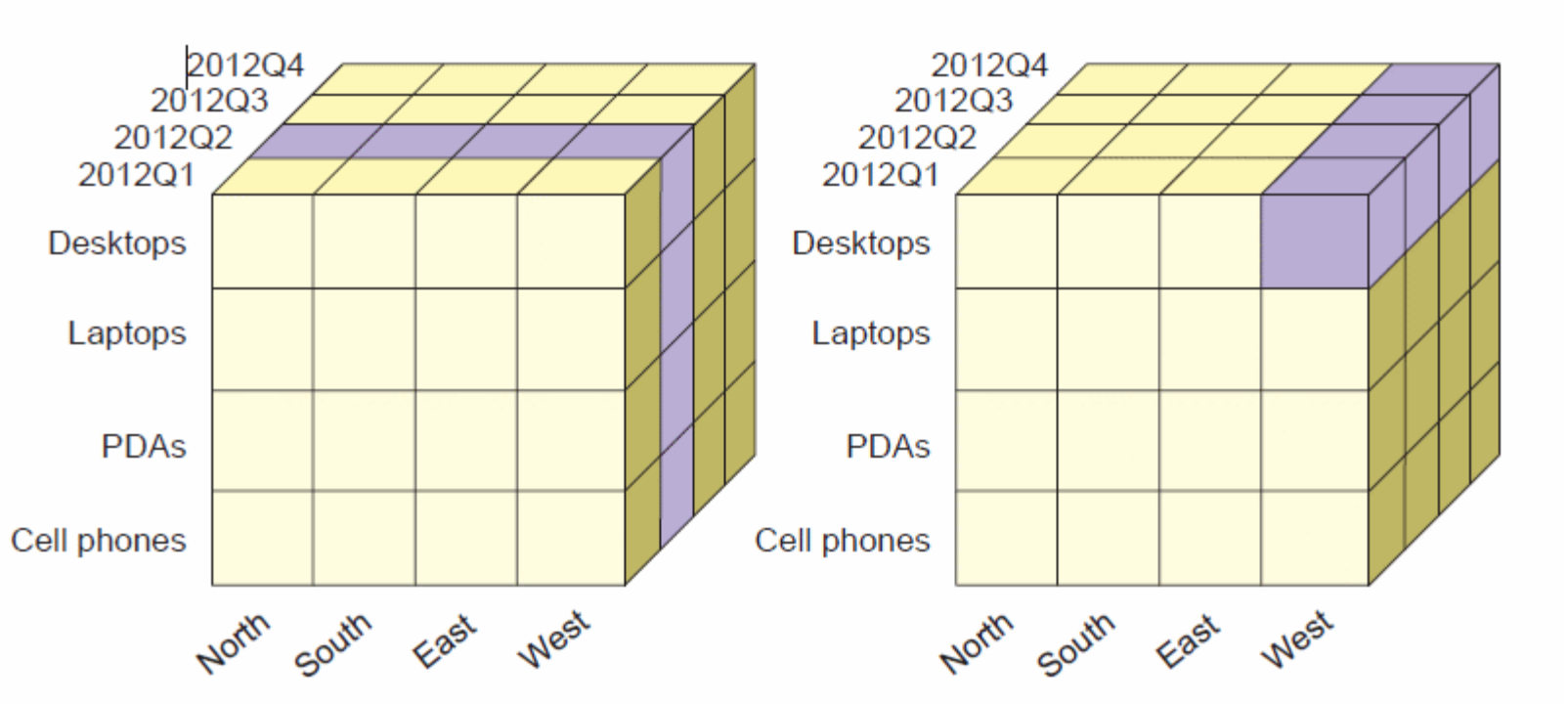
- Cubes can have any number of dimensions
  - Be careful, most people can't comprehend after 3 dimensions!



A cube with three dimensions

Slicing and Dicing

- Slicing and dicing—analyzing the data on subsets of the dimensions

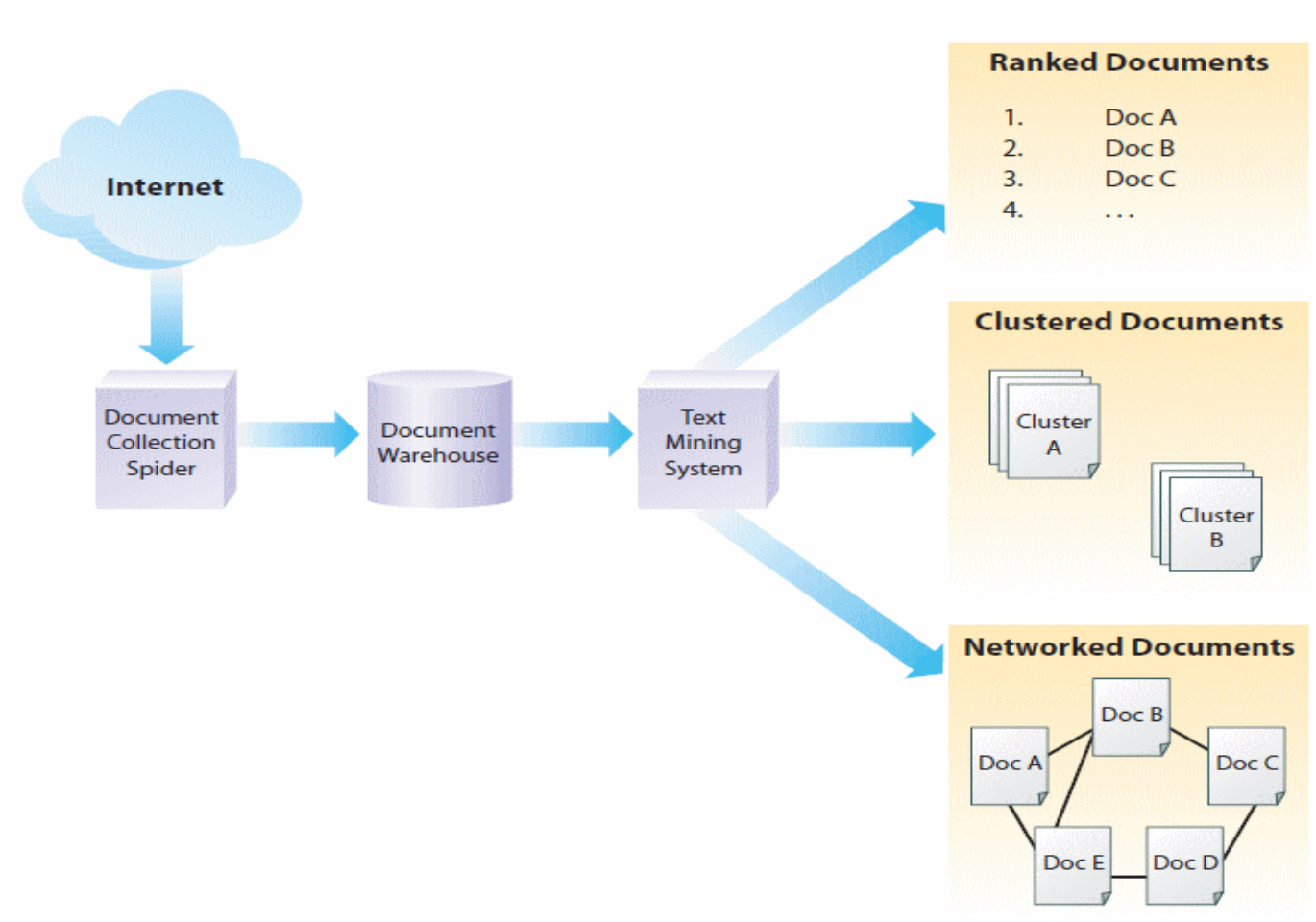


Data Mining

- Used for discovering “hidden” predictive relationships in the data
  - Patterns, trends, or rules
  - Example: identification of profitable customer segments or fraud detection
  - Any predictive models should be tested against “fresh” data.

- Data-mining algorithms are run against large data warehouses.
  - Data reduction helps to reduce the complexity 0f data and speed up analysis.

Text mining the Internet



Textual Analysis Benefits

- Marketing—learn about customers' thoughts, feelings, and emotions.
- Operations—learn about product performance by analyzing service records or customer calls.
- Strategic decisions—gather competitive intelligence.
- Sales—learn about major accounts by analyzing news coverage.
- Human resources—monitor employee satisfaction or compliance to company policies (important for compliance with regulations such as the Sarbanes-Oxley Act).

Web Usage Mining

- Used by organizations such as Amazon.com
- Used to determine patterns in customers' usage data.
  - How users navigate through the site
  - How much time they spend on different pages
- Clickstream data—recording of the users' path through a Web site.
- Stickiness—a Web page's ability to attract and keep visitors.

Web Usage Mining

- Project 3
  - Create an e-Portfolio
  - Enable Google Analytics
  - Analyze the traffic to your site

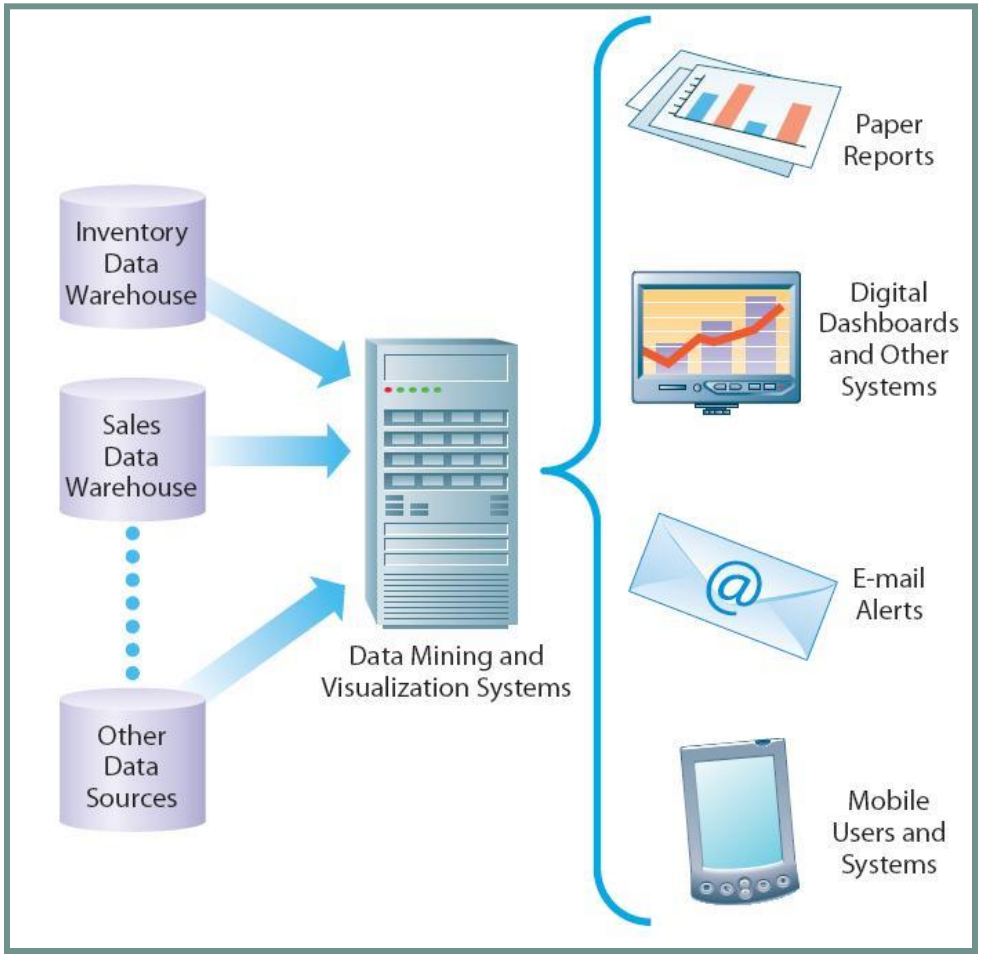
- What will you be doing with Google Analytics?

Twitter Feeds

- Have you ever heard of anyone mining Twitter feeds?

- As a business person, what kind of information could you learn about your customers if you subscribed to every Twitter feed imaginable and mined the data?

Presenting Results



Any Danger?

- Is there any danger in a business student becoming too “tech savvy”?
- Is there an danger in a business student not becoming “tech savvy” enough?
- What is a “program” and is there anything that is more nerdy that being a “programmer”?

Should you be a little more of a nerd?

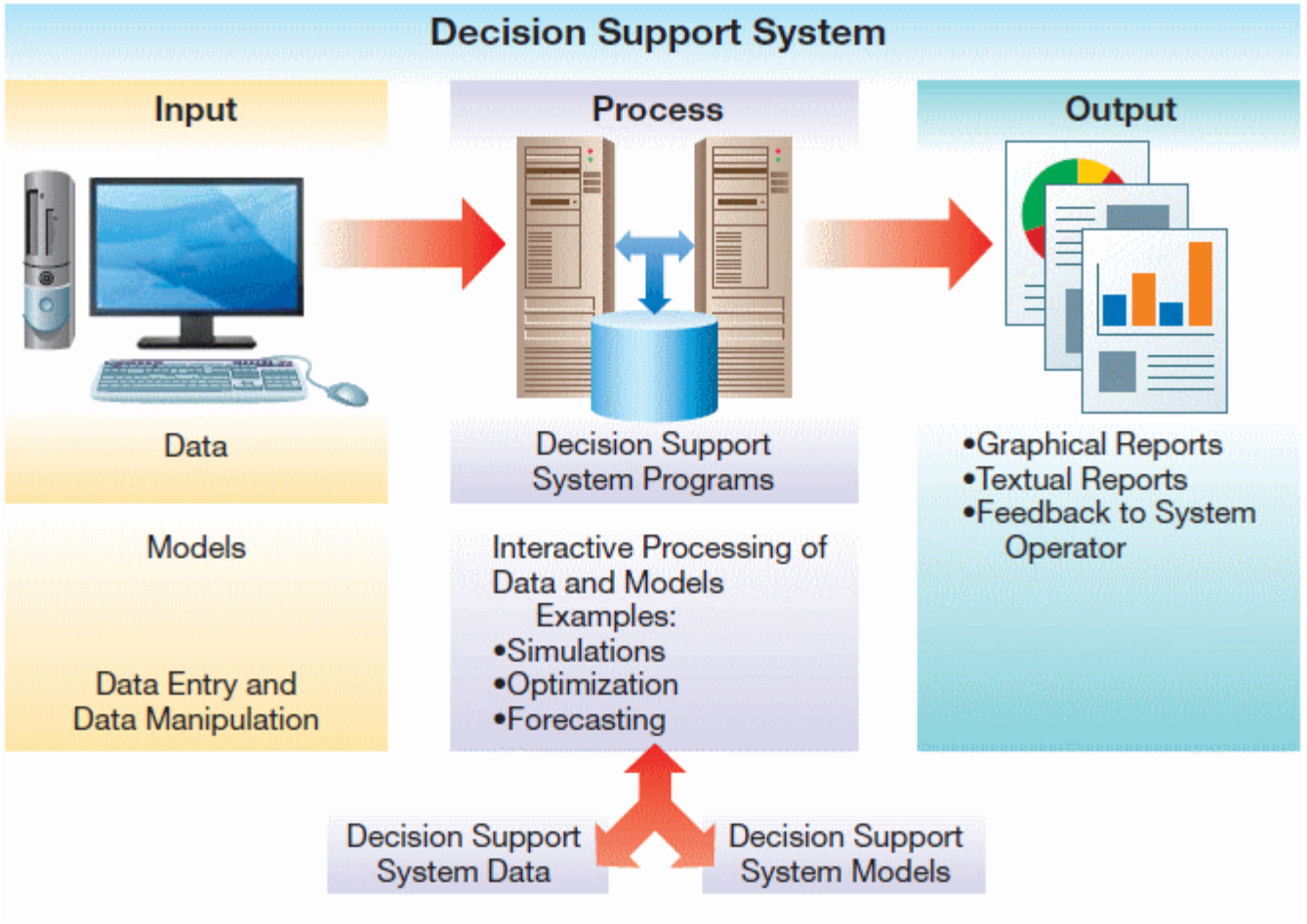
Business Analytics

- BI applications to support human and automated decision making
  - Business Analytics—predict future outcomes
  - Decision Support Systems (DSS)—support human unstructured decision making
  - Intelligent systems
  - Enhancing organizational collaboration

Decision Support Systems (DSS)

- Decision-making support for recurring problems
- Used mostly by managerial level employees (can be used at any level)
- Interactive decision aid
- What-if analyses
  - Analyze results for hypothetical changes
  - Example: Microsoft Excel

Architecture of a DSS

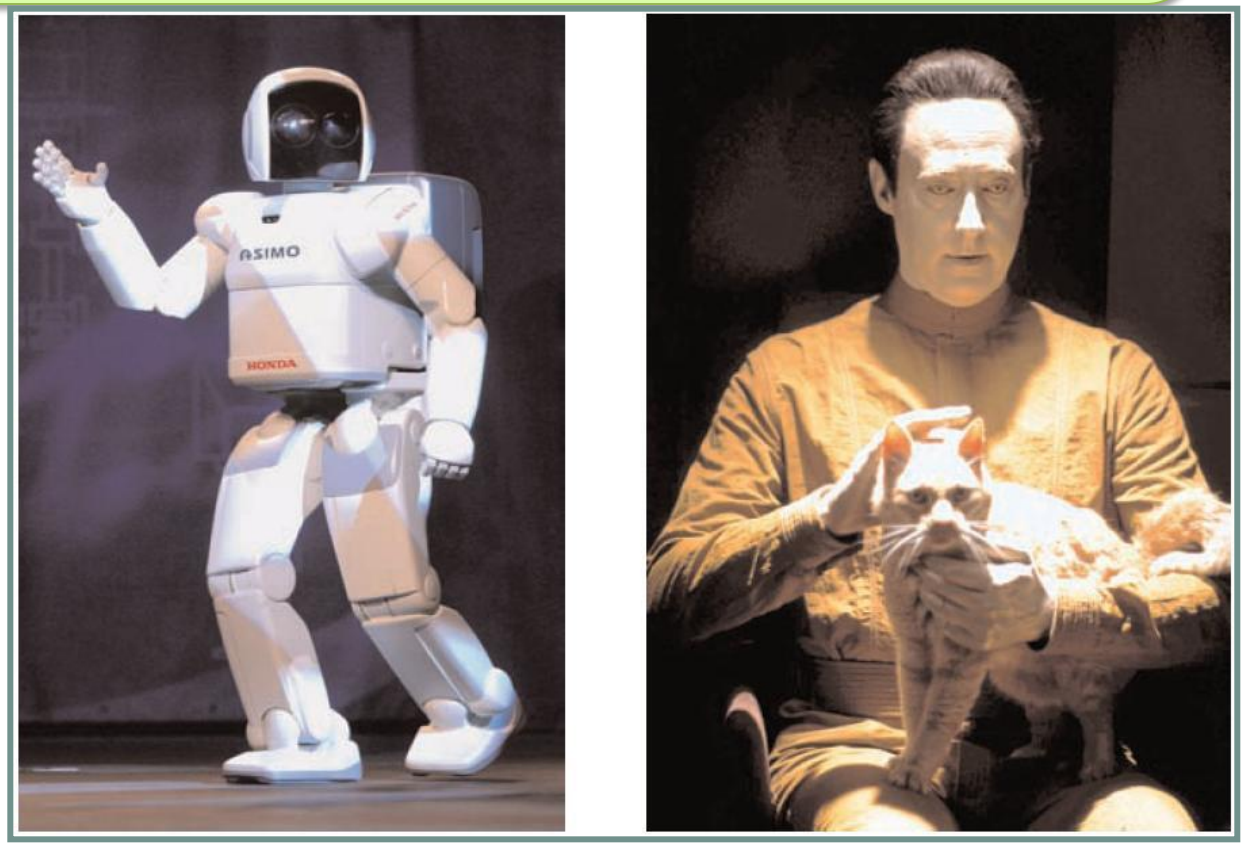


Common DSS Models

Area	Common DSS Models
Corporate level	Corporate planning, venture analysis, mergers and acquisitions
Accounting	Cost analysis, discriminant 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	Labor negotiations, labor market analysis, personnel skills assessment, employee business expenses, fringe benefit computations, payroll and deductions
Production	Product design, production scheduling, transportation analysis, product mix, inventory levels, quality control, plant location, material allocation, maintenance analysis, machine replacement, job assignment, material requirements planning
Management science	Linear programming, decision trees, simulation, project evaluation and planning, queuing, dynamic programming, network analysis
Statistics	Regression and correlation analysis, exponential smoothing, sampling, time-series analysis, hypothesis testing

Artificial Intelligence

- Is Nicholas' robot "intelligent"? Will it become "intelligent" over the summer?
- Be wary of "Artificial" anything?



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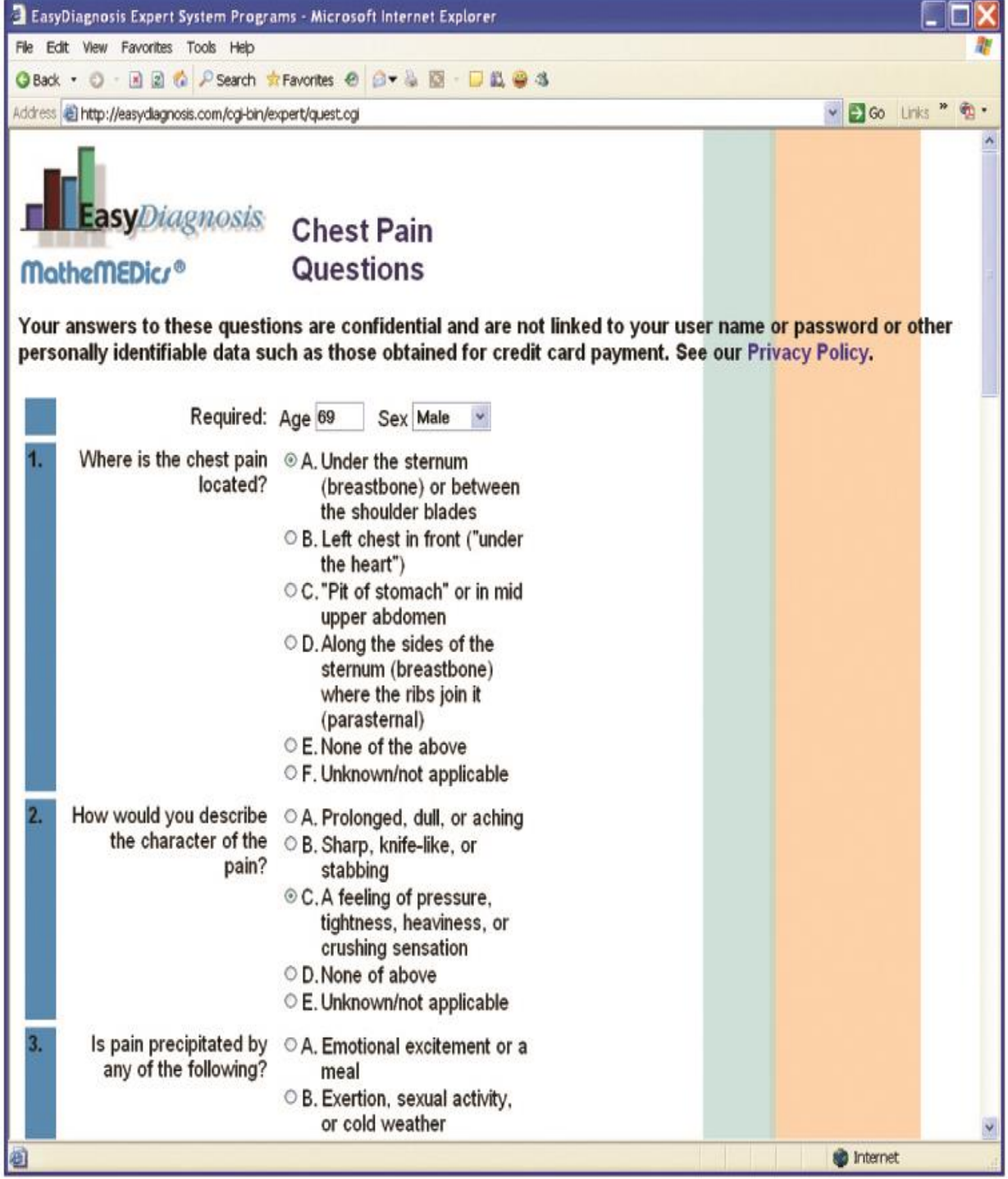
Expert Systems



Could You Use an Expert System?

- Talk to the person next to you about the various jobs that you have had.
- Discuss situations where a decision tree could be used to lead an employee who wasn't really an expert through a series of questions and eventually to the answer they are looking for.
- Where is the intelligence…in the employee or the decision tree?

Can you recognize patterns and be trained?

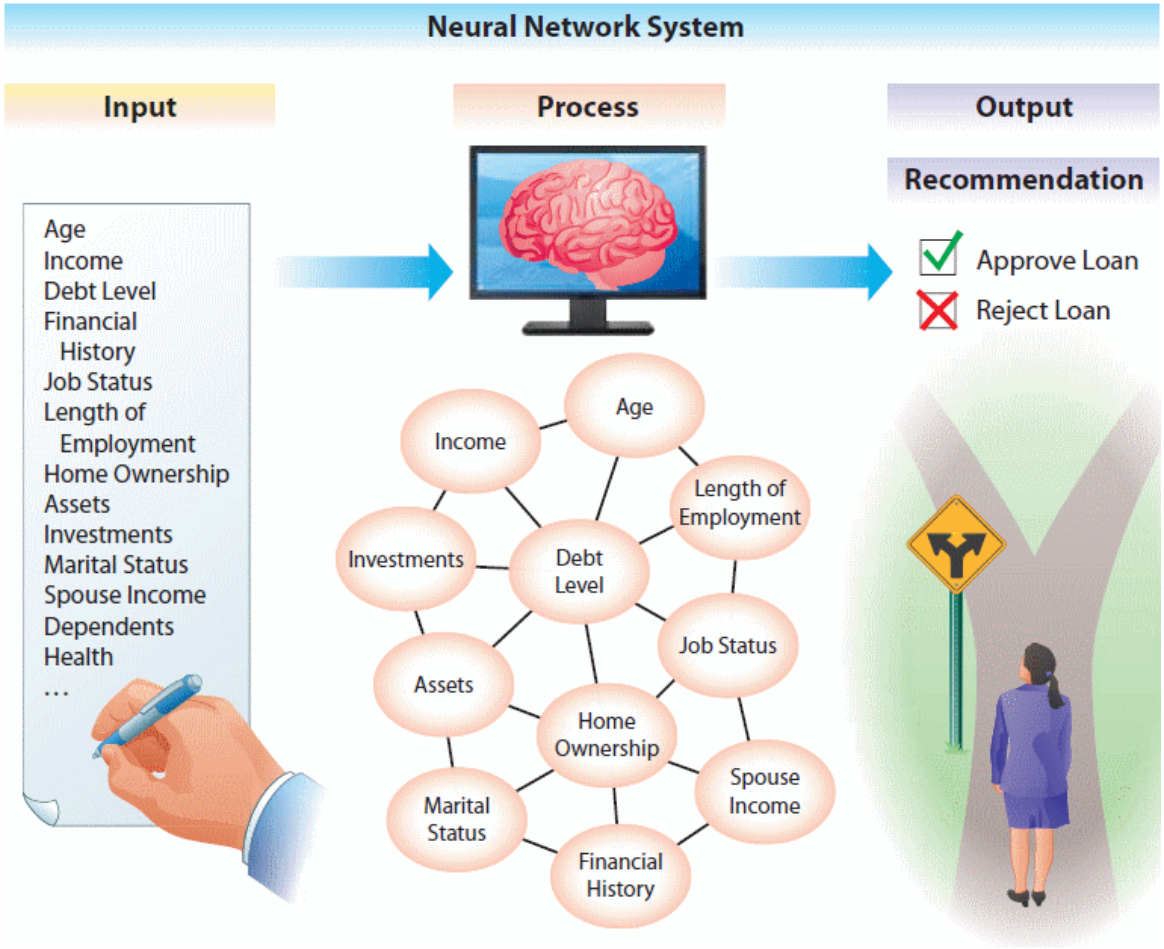
- You see a new breed of dog
- How do you know it is a dog?
- How do you know it is even an animal?

- How do you know if an animal is a mammal?
- How about a whale?
- How about a platypus?

Scenario – Loan Officer

- You need to make approval/rejection decisions on loan applications?
- What information do you look at to make your decisions?
- Do you make decisions based on individual pieces of information or combinations of information?
- What combinations correlate with good/bad loans?

Example: Neural Network System



Intelligent Agent Systems

- Program working in the background
- Bot (software robot)
- Provides service when a specific event occurs

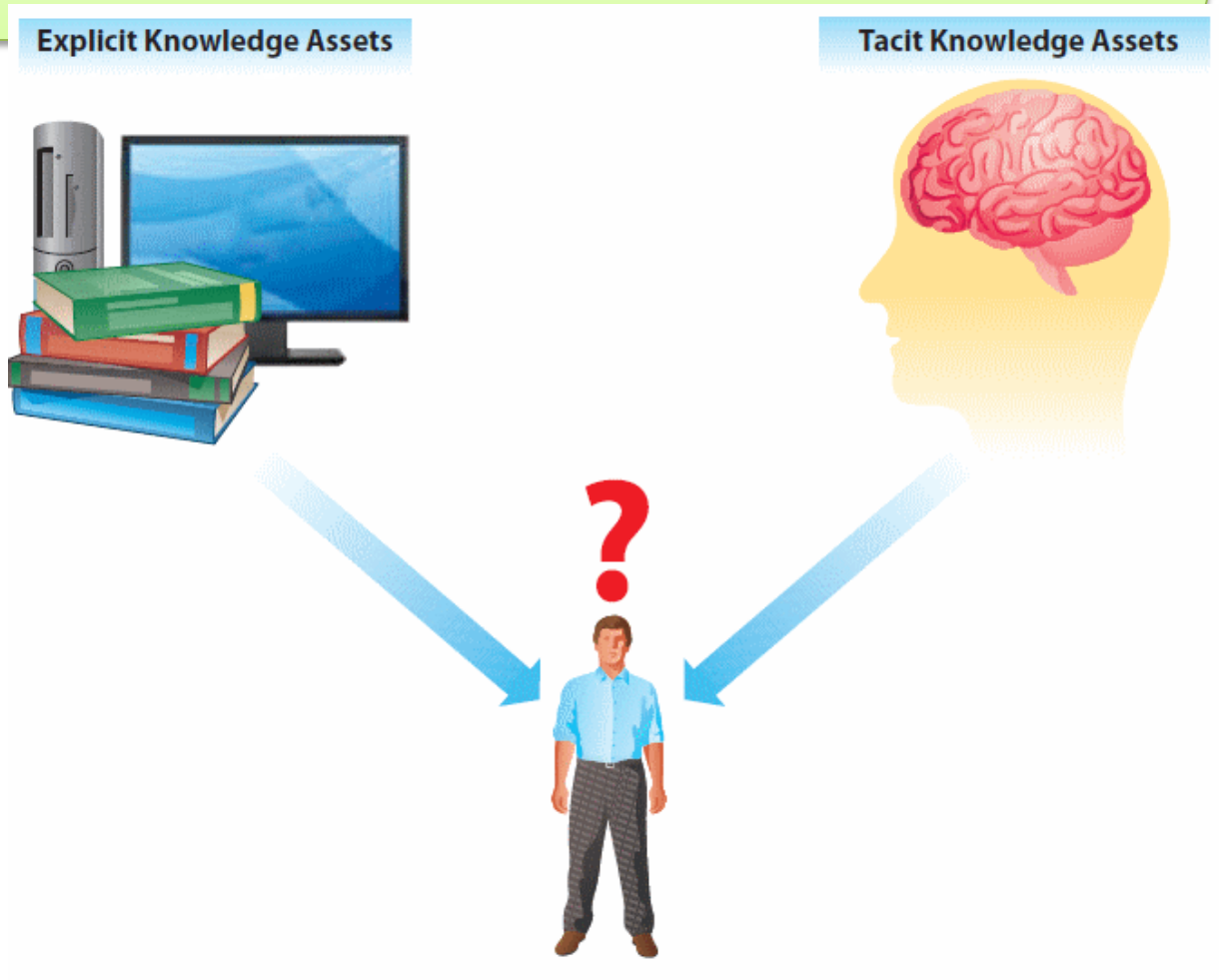
Types of Intelligent Agent Systems

- User agents
  - Performs a task for the user
- Buyer agents (shopping bots)
  - Search for the best price
- Monitoring and sensing agents
  - Keep track of information and notifies users when it changes
- Data-mining agents
  - Continuously browse data warehouses to detect changes
- Web crawlers (aka Web spiders)
  - Continuously browses the Web
- Destructive agents
  - Designed to farm e-mail addresses or deposit spyware

Question

- What is a “Baby Boomer” and how many of them are in the workforce today?
- How many will be in the workforce 10 years from now?
- What is “Tacit Knowledge”?
- Why is this keeping CEOs awake at night?
- Is there technology that we can use to help with this?

Knowledge Management

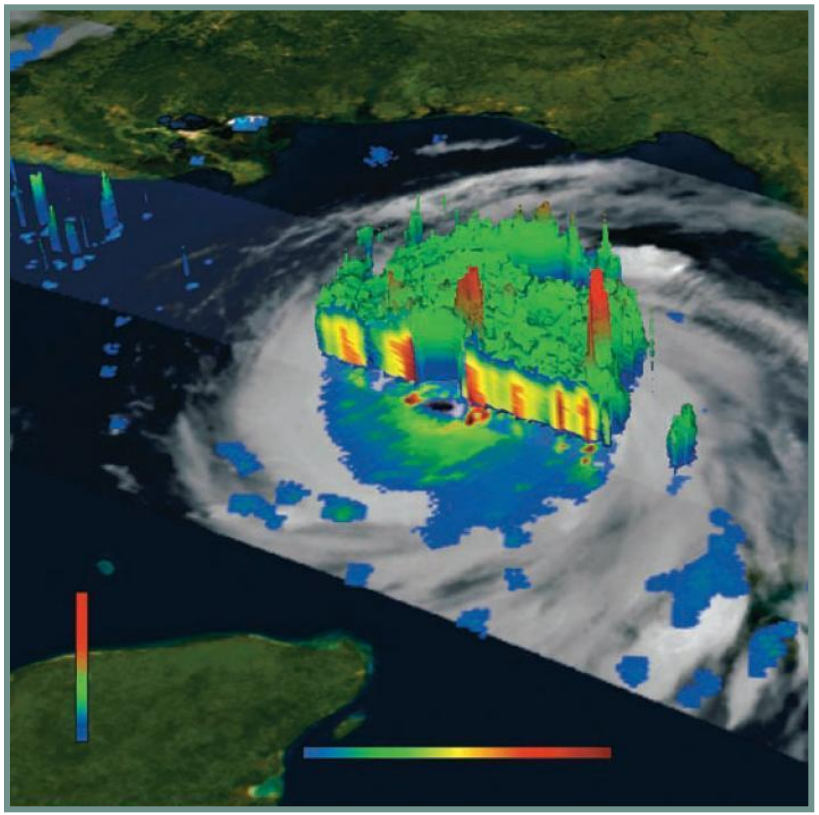


Benefits and Challenges of Knowledge-Based Systems

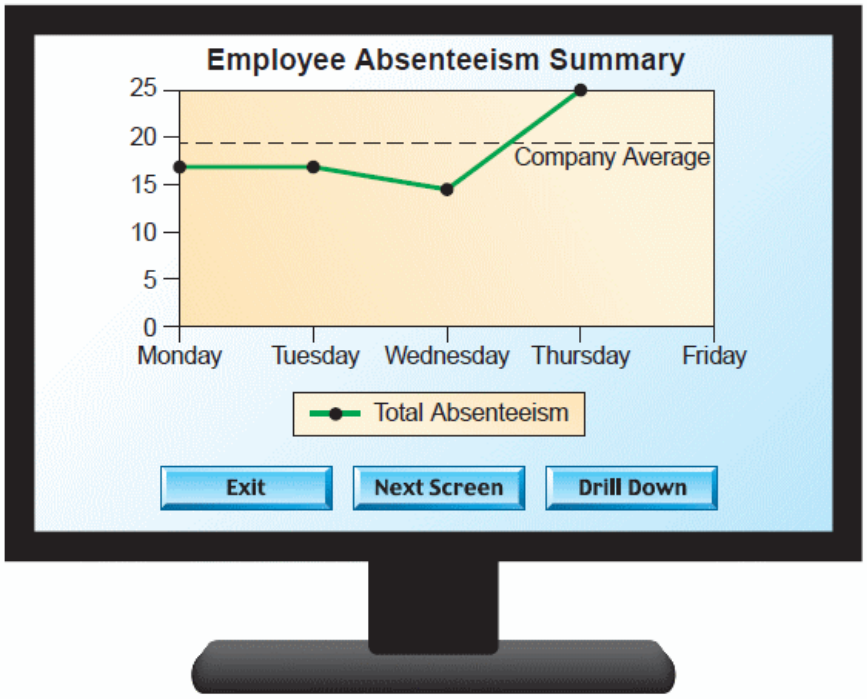
Benefits	Challenges
Enhanced innovation and creativity	Getting employee buy-in
Improved customer service, shorter product development, and streamlined operations	Focusing too much on technology
Enhanced employee retention	Forgetting the goal
Improved organizational performance	Dealing with knowledge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

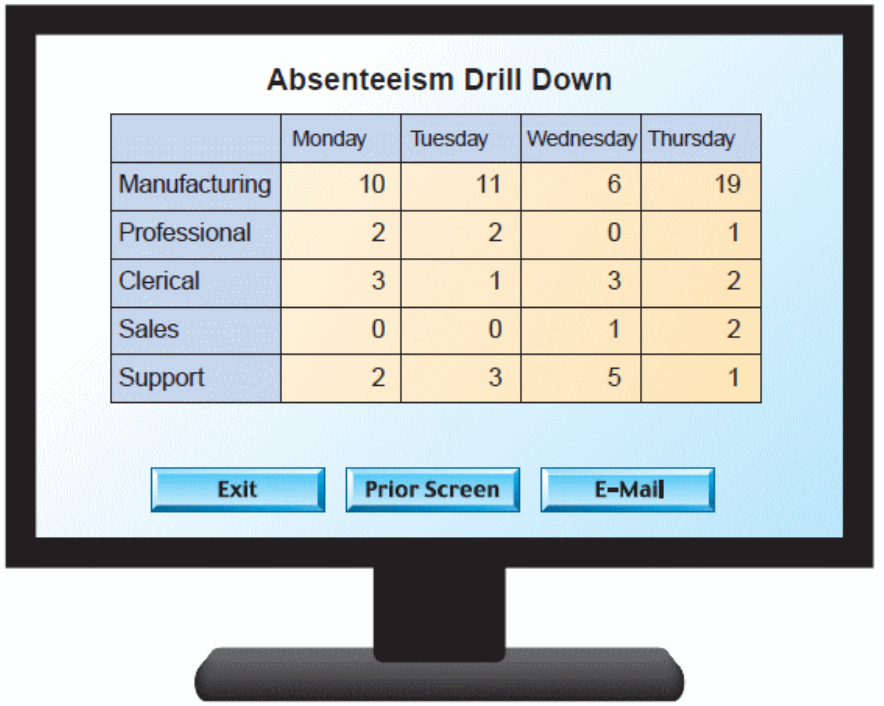
Information Visualization

- Display of complex data relationships using graphical methods
  - Enables managers to quickly grasp results of analyses
  - Visual analytics
  - Dashboards
  - Geographic information systems



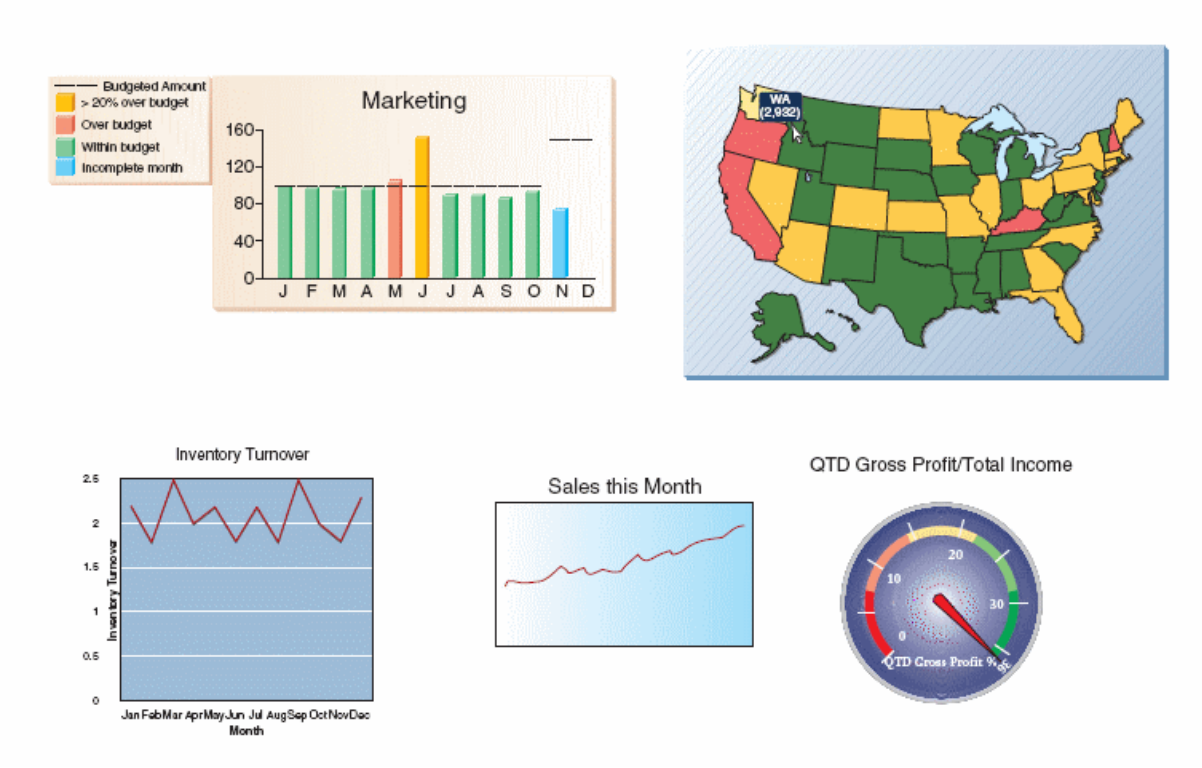
Digital Dashboards





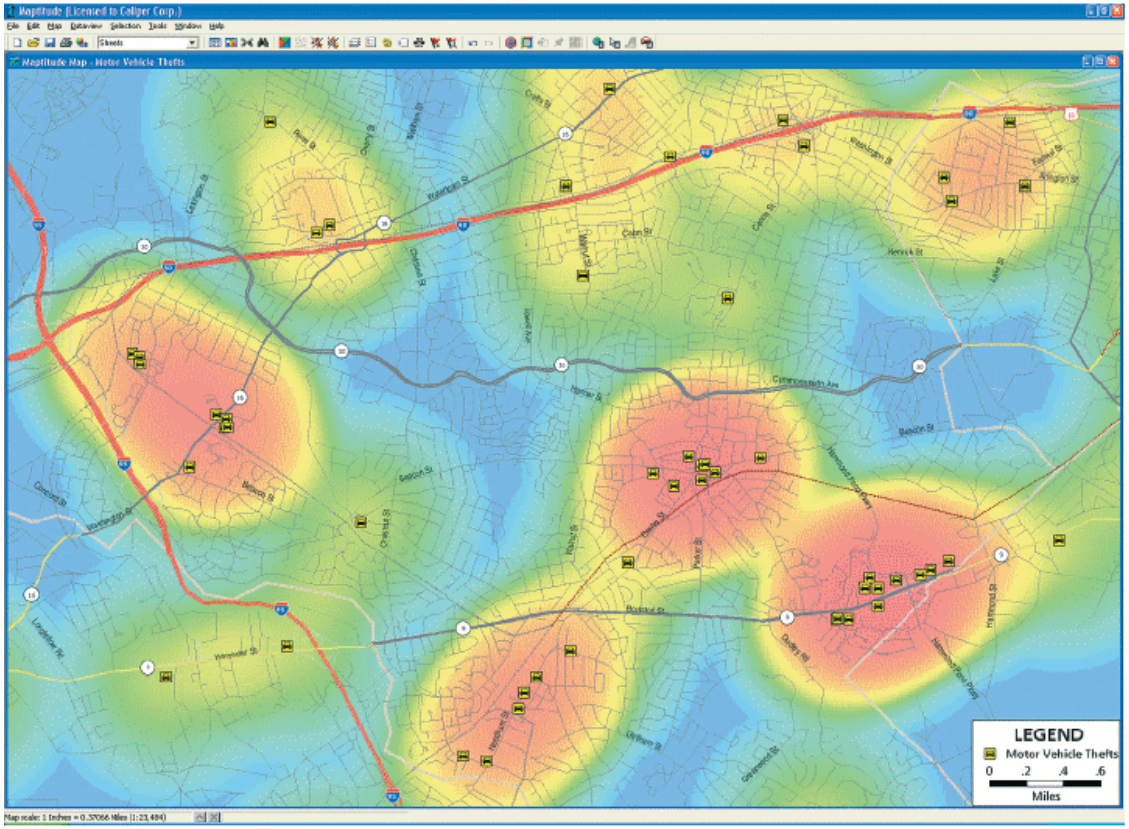
Dashboards

- Dashboards use various graphical elements to highlight important information.



Thematic Maps

- A thematic map showing car thefts in a town



Geographic Information System (GIS)