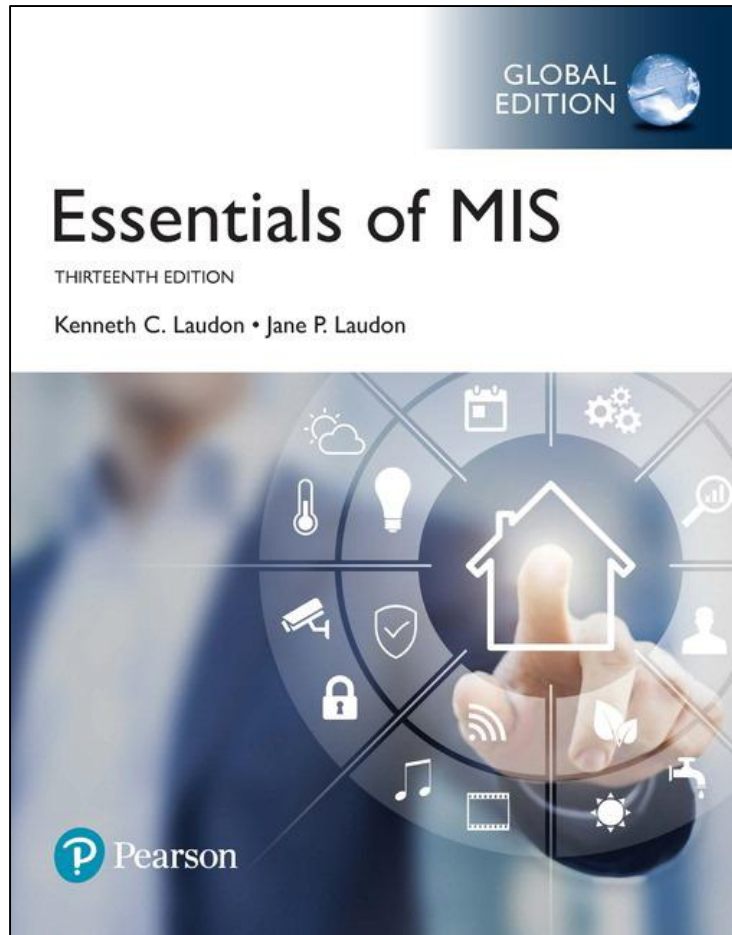


Essentials of Management Information Systems



Chapter 11

Improving Decision Making
and Managing Knowledge

Learning Objectives

11.1 What are the different types of decisions, and how does the decision-making process work?

11.2 How do business intelligence and business analytics support decision making?

11.3 What are the business benefits of using intelligent techniques in decision making and knowledge management?

11.4 What types of systems are used for enterprise-wide knowledge management, and how do they provide value for businesses?

Business Value of Improved Decision Making

- Possible to measure value of improved decision making
- Decisions made at all levels of the firm
 - Some are common, routine, and numerous
 - Although value of improving any single decision may be small, improving hundreds of thousands of “small” decisions adds up to large annual value for the business



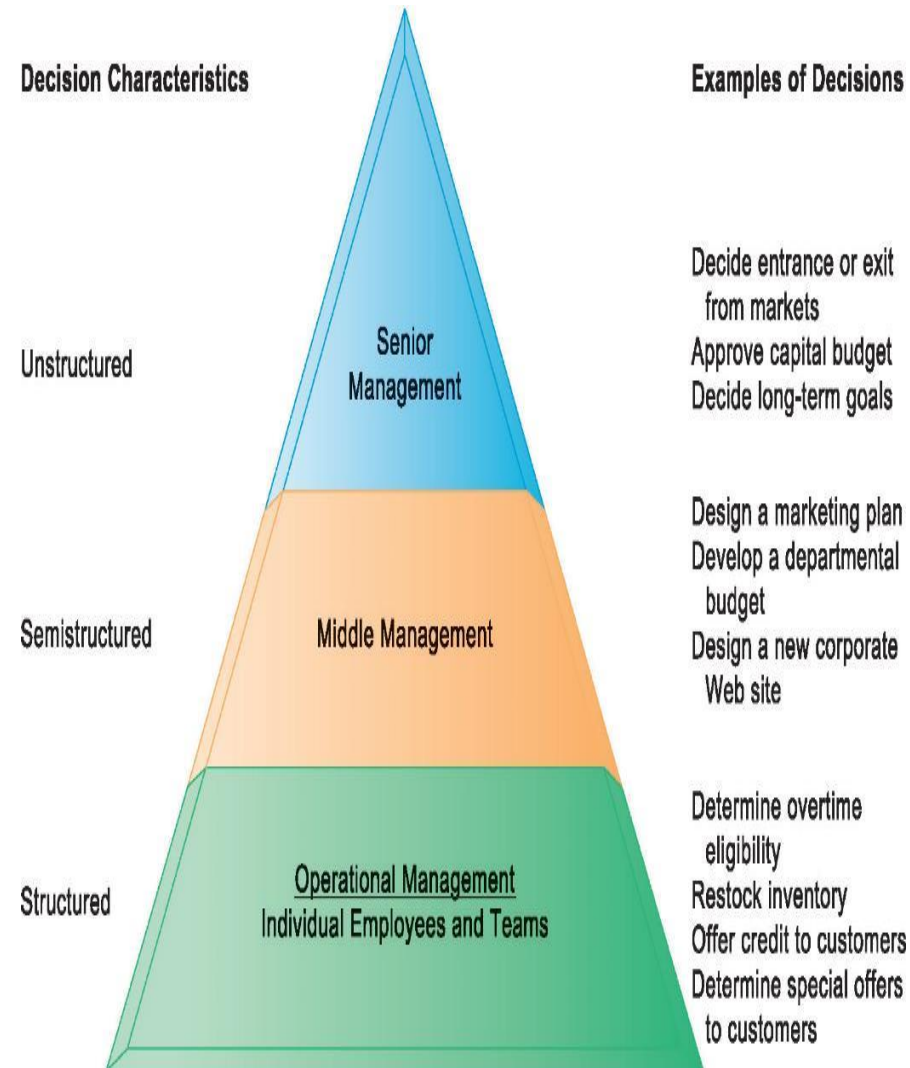
Table 11.1 Business Value of Enhanced Decision Making

Example Decision Value	Decision Maker	# of Annual Decisions	Estimated Value to Firm	Annual
Allocate support to most valuable customers	Accounts manager	12	\$100,000	\$1,200,000
Predict call center daily demand	Call Center management	4	150,000	600,000
Decide parts inventory level daily	Inventory manager	365	5,000	1,825,000
Identify competitive bids from major suppliers	Senior management	1	2,000,000	2,000,000
Schedule production to fill orders	Manufacturing manager	150	10,000	1,500,000

Types of Decisions

Information Requirements of Key Decision-Making Groups in a Firm

- **Unstructured**
 - Decision maker must provide judgment to solve problem
 - Novel, important, nonroutine
 - No well-understood or agreed-upon procedure for making them
- **Structured**
 - Repetitive and routine
 - Involve definite procedure for handling them so do not have to be treated as new
- **Semi-structured**
 - Only part of problem has clear-cut answer provided by accepted procedure



The Decision-Making Process

1. Intelligence

Discovering, identifying, and understanding the problems occurring in the organization

2. Design

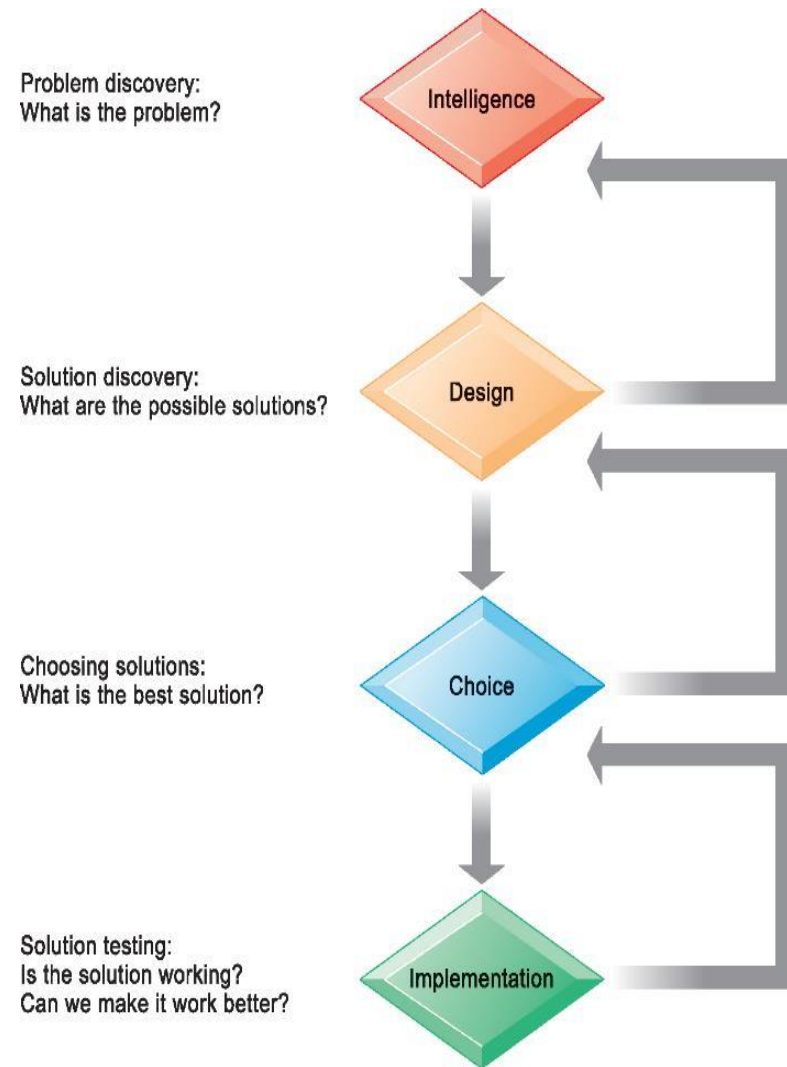
Identifying and exploring various solutions

3. Choice

Choosing among solution alternatives

4. Implementation

Making chosen alternative work and monitoring how well solution is working



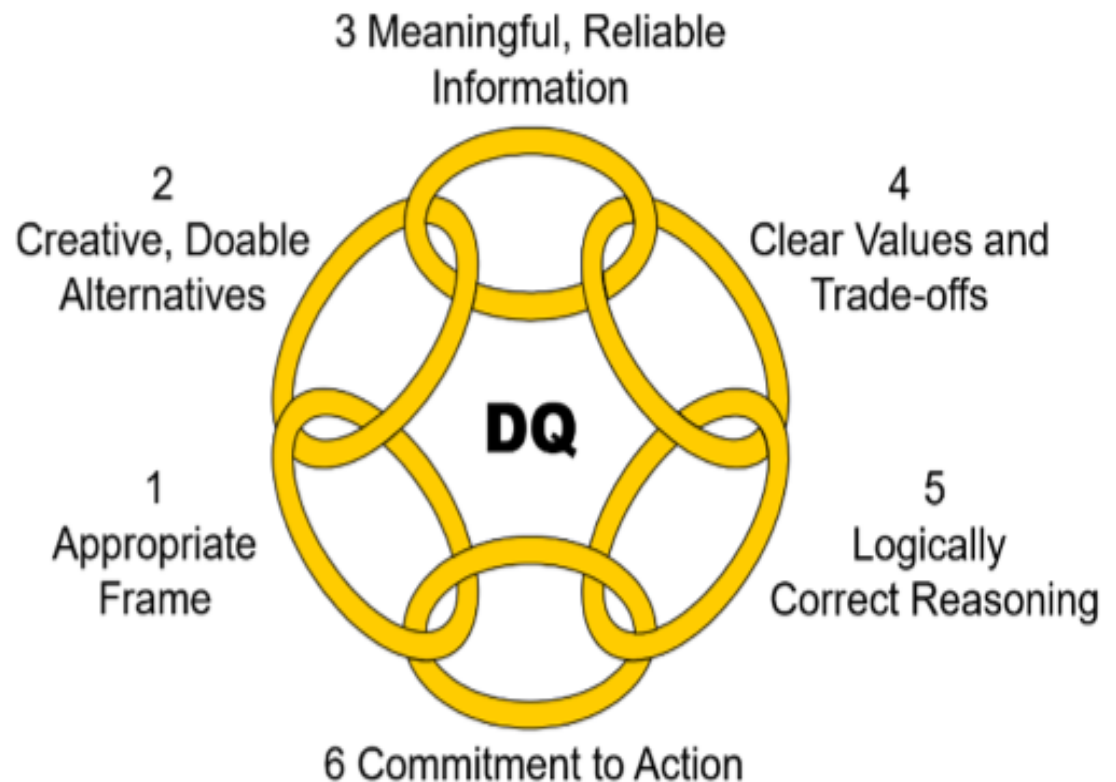
High-Velocity(Speed) Automated Decision Making

- High-velocity Decisions involve quickly acting on reversible decisions; making decisions with partial information; being okay to disagree and commit anyway; and rapidly escalating misalignment.
- Humans eliminated
- Decision-making process capture by computer algorithms
- Predefined range of acceptable solutions
- Decisions made faster than managers can monitor and control
- E.g. Trading programs at electronic stock exchanges

Quality of Decisions and Decision Making

- Accuracy
- Comprehensiveness
- Fairness
- Speed (efficiency)
- Coherence
- Due process

Elements of Decision Quality

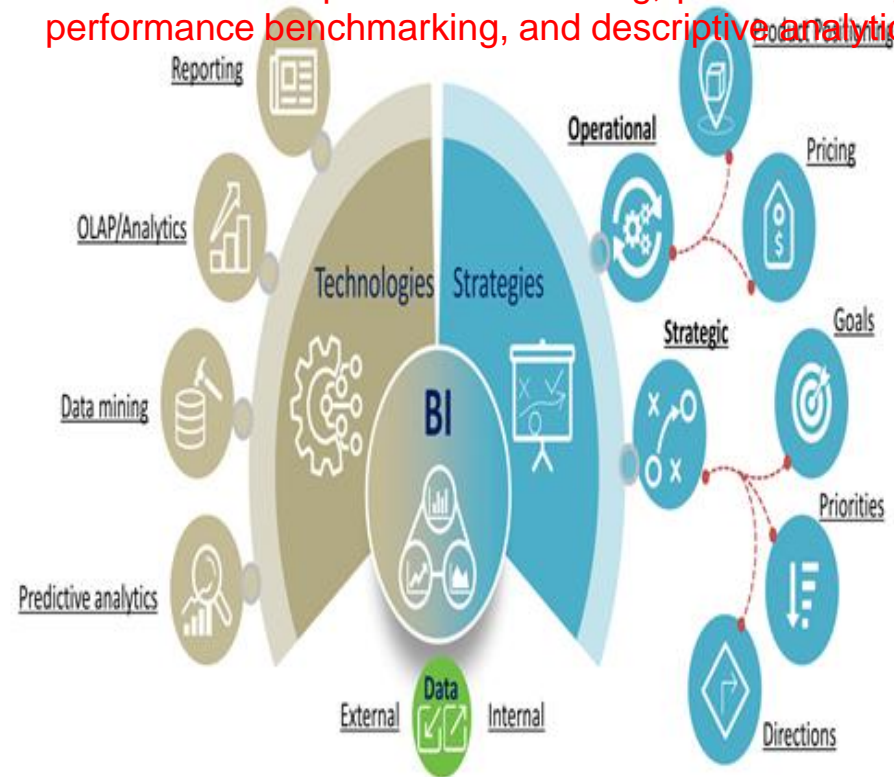


Business Intelligence

- Infrastructure for managing data from business environment
 - Warehousing
 - Integrating
 - Reporting
 - Analyzing
- Hadoop, OLAP, analytics
- Products defined by technology vendors and consulting firms

What is Business intelligence?

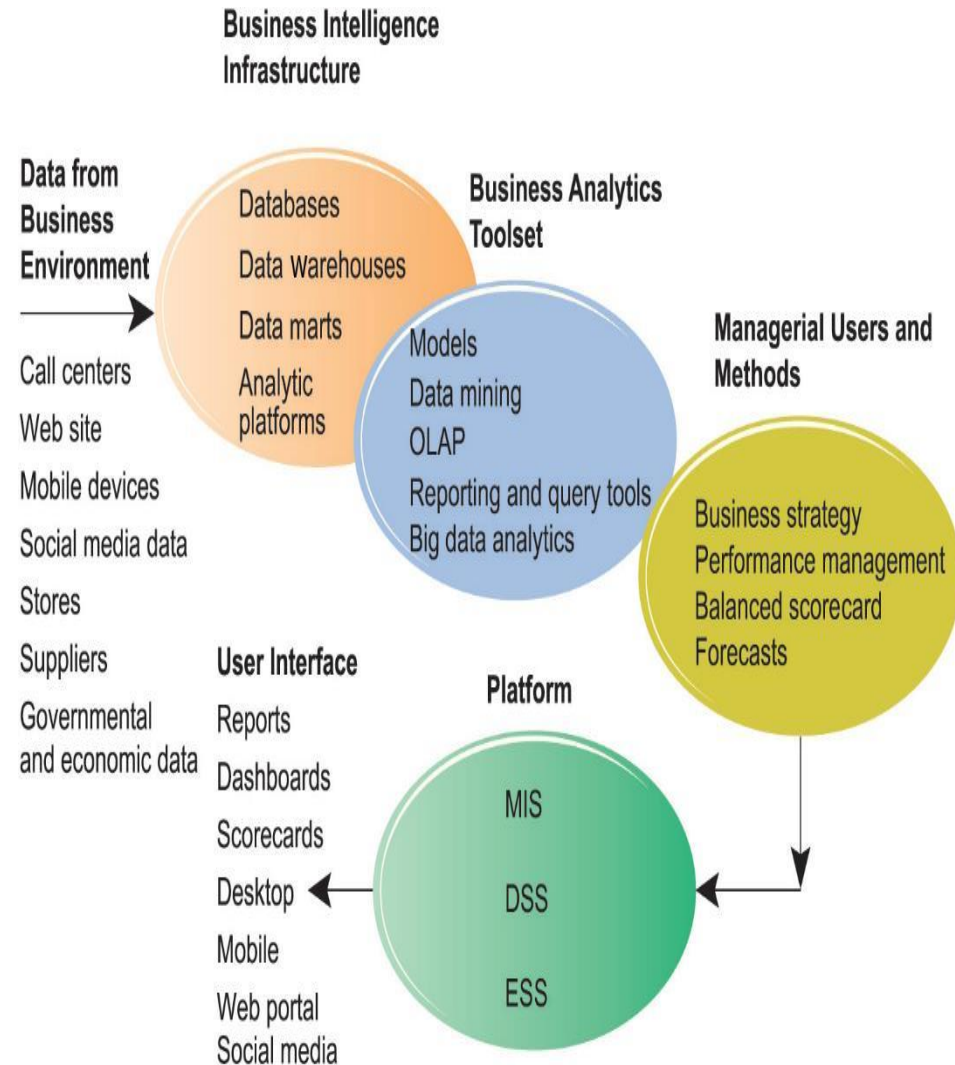
Refers to **the procedural and technical infrastructure that collects, stores, and analyzes the data produced by a company's activities**. BI is a broad term that encompasses data mining, process analysis, performance benchmarking, and descriptive analytics.



The Business Intelligence Environment

Six elements in the BI environment

1. Data from business environment
2. Business intelligence infrastructure
3. Business analytics toolset
4. Managerial users and methods
5. Delivery platform
MIS, DSS, ESS
6. User interface



Business Intelligence and Analytics Capabilities

- Production reports
- Parameterized reports
- Dashboards/scorecards
- Ad-hoc query/search/report creation
- Drill-down
- Forecasts, scenarios, models
 - Linear forecasting, what-if scenario analysis, data analysis

Business Functional Area	Production Reports
Sales	Sales forecasts, sales team performance, cross selling, sales cycle times
Service/Call Center	Customer satisfaction, service cost, resolution rates, churn rates
Marketing	Campaign effectiveness, loyalty and attrition, market basket analysis
Procurement and Support	Direct and indirect spending, off-contract purchases, supplier performance
Supply Chain	Backlog, fulfillment status, order cycle time, bill of materials analysis
Financials	General ledger, accounts receivable and payable, cash flow, profitability
Human Resources	Employee productivity, compensation, workforce demographics, retention

Predictive Analytics

- Uses statistical analytics, data mining, historical data; assumptions of future conditions
- Extracts information from data to predict future trends and behavior patterns
 - Responses to direct marketing campaigns
 - Best potential customers for credit cards
 - At-risk customers
 - Customer response to price changes and new services
- Accuracies range from 65 to 90 percent

Big Data Analytics

- Predictive analytics can use the big data generated from social media, consumer transactions, sensor and machine output, etc.
- Combining with customer data
- Big data analytics driving move toward “smart cities”
 - Utility management
 - Transportation operation
 - Healthcare delivery
 - Public safety

Operational Intelligence and Analytics

- Operational intelligence
 - Day-to-day monitoring of business decisions and activity
- Real-time monitoring
- Schneider National truckload logistics services provider
 - Data developed from sensors in trucks, trains, industrial systems
- The Internet of Things (IoT) providing huge streams of data from connected sensors and devices

Location Analytics and GIS

- Location analytics
 - Big data analytics that uses location data from mobile phones, sensors, and maps
 - E.g. Helping a utility company view customer costs as related to location
- GIS – Geographic information systems
 - Help decision makers visualize problems with mapping
 - Tie location data about resources to map

Business Intelligence Users

Power Users: Producers (20% of employees)

IT developers

Super users

Business analysts

Analytical modelers

Capabilities

Production reports

Parameterized reports

Dashboards/scorecards

Ad hoc queries; drill-down
search/OLAP

Forecasts; what-if
analysis; statistical models

Casual Users: Consumers (80% of employees)

Customers/suppliers
Operational employees

Senior managers

Managers/staff

Business analysts

Support for Semi-Structured Decisions

- Decision-support systems (DSS)
 - BI delivery platform for “super-users” who want to create own reports, use more sophisticated analytics and models
 - What-if analysis
 - Sensitivity analysis
 - Backward sensitivity analysis
 - Pivot tables: Spreadsheet function for multidimensional analysis
 - Intensive modeling techniques

Figure 11.5 Sensitivity Analysis

Total fixed costs	19000					
Variable cost per unit	3					
Average sales price	17					
Contribution margin	14					
Break-even point	1357					
		Variable Cost per Unit				
Sales	1357	2	3	4	5	6
Price	14	1583	1727	1900	2111	2375
	15	1462	1583	1727	1900	2111
	16	1357	1462	1583	1727	1900
	17	1267	1357	1462	1583	1727
	18	1188	1267	1357	1462	1583

Sensitivity analysis is a financial model that determines how target variables are affected based on changes in other variables known as input variables. This model is also referred to as a what-if or simulation analysis.

Sensitivity analysis is essentially the exploration of the multidimensional input space, which grows exponentially in size with the number of inputs.

A Pivot Table That Examines Customer Regional Distribution and Advertising Source

The screenshot displays the Microsoft Excel interface with a PivotTable and the PivotTable Field List task pane. The PivotTable is located in the range M5:M10 and is titled "Count of Cust ID". It shows the distribution of customers by Region and Source. The PivotTable Field List task pane is open, showing the fields available for the PivotTable.

PivotTable Data:

Row Labels	Web	Grand Total
East	24	77
North	28	92
South	33	106
West	57	211
Grand Total	142	510

PivotTable Field List:

- Choose fields to add to report:
 - ☒ Cust ID
 - ☒ Region
 - ☐ Payment
 - ☒ Source
 - ☐ Amount
 - ☐ Product
- Drag fields between areas below:
 - Report Filter: (Empty)
 - Column Labels: Source
 - Row Labels: Region
 - Values: Count of Cust ID
- ☐ Defer Layout Update
- Update

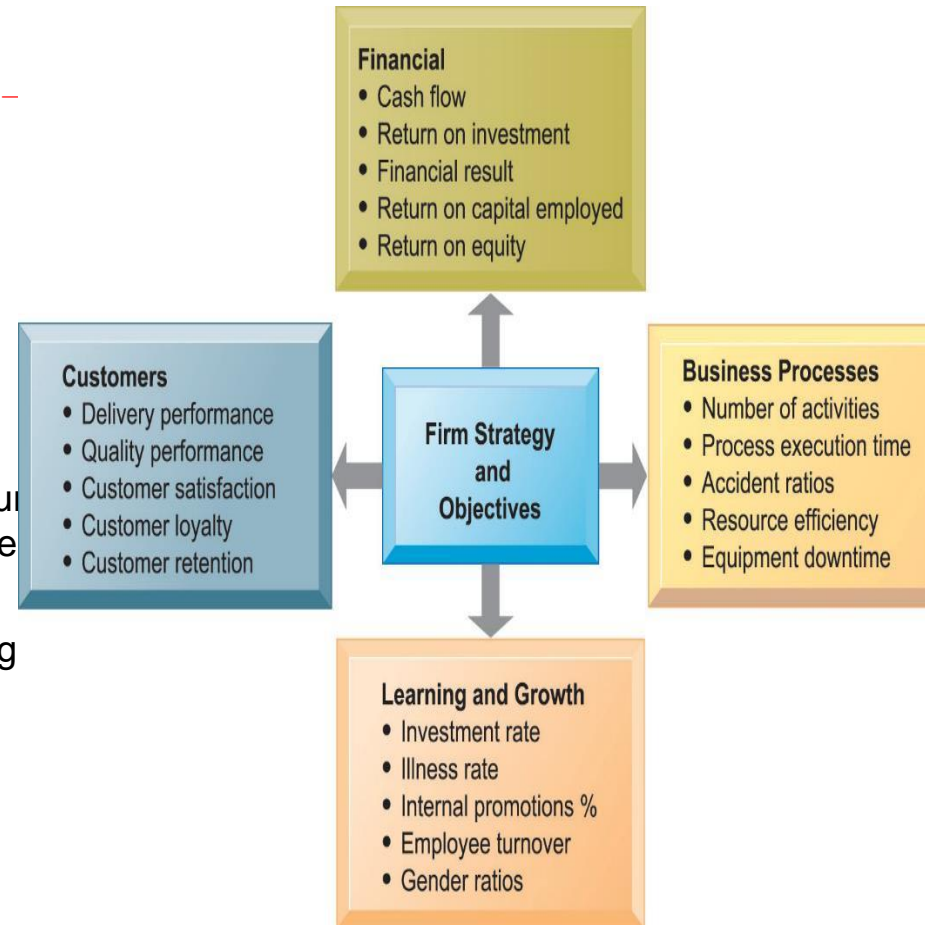
Decision Support for Senior Management

- Executive support systems

- Balanced scorecard method : **A tool for monitoring the strategic decisions taken by the company based on indicators previously established and that should permeate through at least four aspects – financial, customer, internal processes and learning & growth**

- Measures four dimensions of firm performance
 - Financial
 - Business process
 - Customer
 - Learning and growth
- Key performance indicators (K P I) used to measure each dimensionBusiness performance management (B P M)
- Management methodology based on firm's strategy
- Translates strategies into operational targets
- Uses set of K P Is to measure progress toward targets
- E S S combine internal data with external
- Financial data, news, etc.

The Balanced Scorecard Framework



Group Decision-Support Systems (GDSS)

- **Is an interactive computer-based system used to facilitate the solution of unstructured problems by a set of decision makers working together as a group**
- Facilitate solving of unstructured problems by set of decision makers
- Software collects, ranks, stores ideas and decisions
- Conference rooms or virtual collaboration
- Support increased meeting sizes with increased productivity

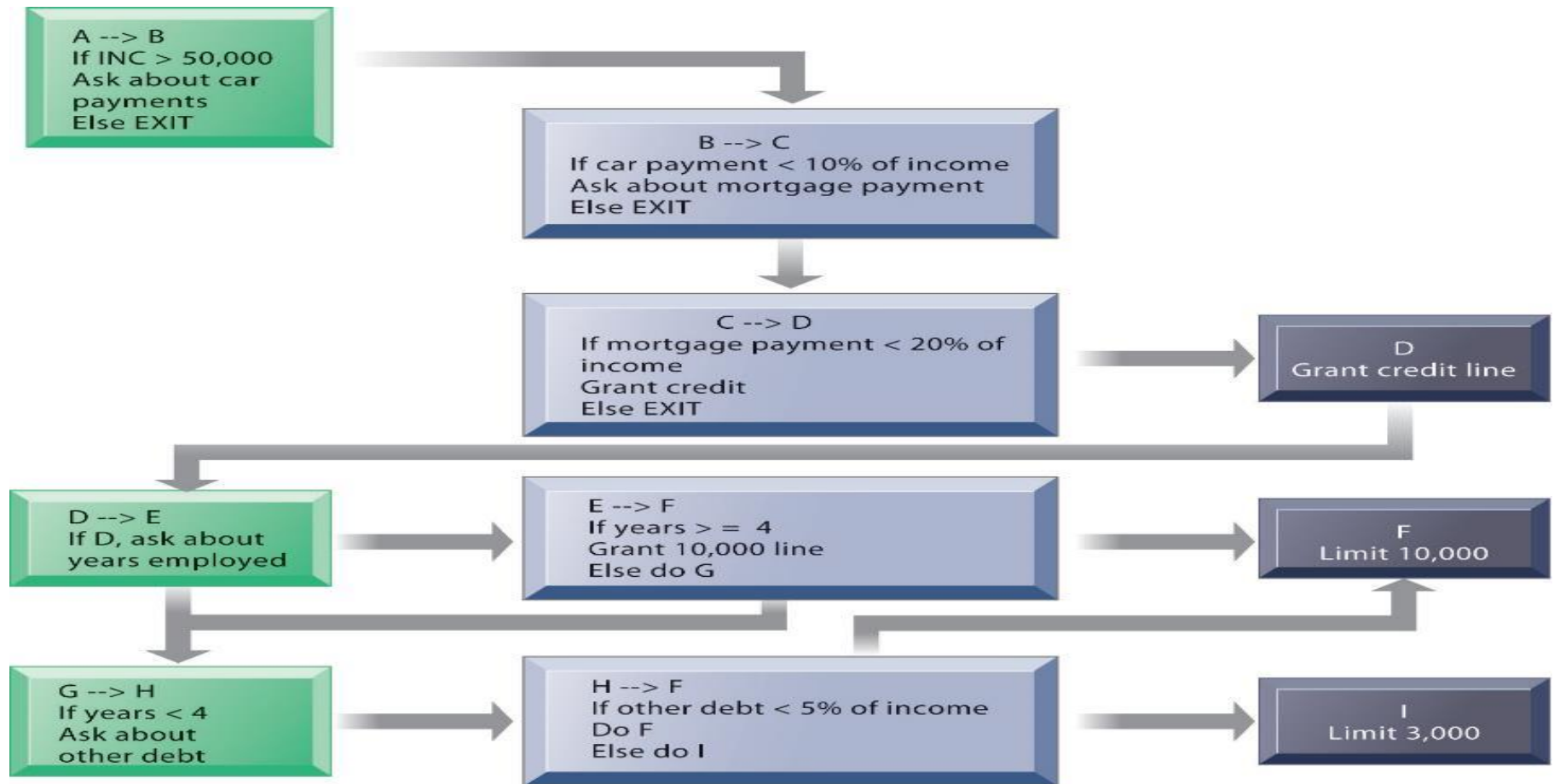
Artificial Intelligent Techniques (1 of 2)

- **Artificial intelligence is the simulation of human intelligence processes by machines, especially computer systems.** Specific applications of AI include expert systems, natural language processing, speech recognition and machine vision
- Intelligent techniques
 - Capture knowledge
 - Discover patterns and behaviors in large amounts of data
 - Perform some human-like action
 - Generate solutions to problems too complex for humans to solve alone
 - Used in decision making and knowledge management
- Machine learning
 - Computers improving performance by using algorithms to learn patterns from data and examples
- Neural networks
 - Find patterns and relationships in very large amounts of data
 - Sensing and processing nodes (Netflix develop a personalized selection of videos for customers? **use multiple layers of neural networks to detect patterns in input data.**
- Genetic algorithms
 - Examine large number of solutions for a problem
 - Based on machine learning techniques inspired by evolutionary biology

Artificial Intelligent Techniques (2 of 2)

- Intelligent agents
 - Software programs that work in the background to carry out specific repetitive tasks
- Natural language processing
 - Software that can process voice or text commands using natural human language
- Computer vision systems
 - Emulate human visual system to view and extract information from real-world images
- Robotics
 - Design and use of movable machines that can substitute for humans
- Expert systems
 - Capture human expertise in a limited domain of knowledge
 - Express expertise as a set of rules in a software system
 - Knowledge base
 - Inference engine

Rules in an Expert System



Knowledge Management

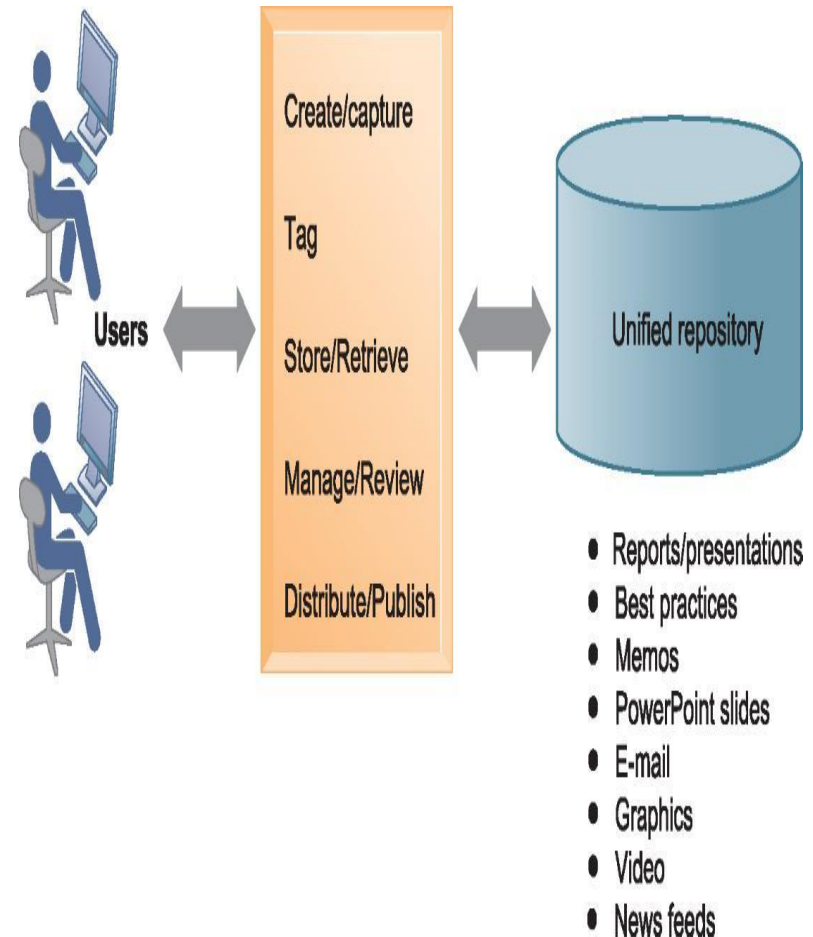
- KM is the process by which an enterprise gathers, organizes, shares and analyzes its knowledge in a way that is easily accessible to employees.
 - Business processes developed for creating, storing, transferring, and applying knowledge
 - Increases the ability of organization to learn from environment and to incorporate knowledge into business processes and decision making
 - Knowing how to do things effectively and efficiently in ways that other organizations cannot duplicate is major source of profit and competitive advantage

Enterprise-wide Knowledge Management Systems

- knowledge management also includes three types of knowledge—**explicit, implicit, and tacit, knowledge**.
 - Explicit knowledge is the structured set of information which can be recognized, recorded, stored and shared.
 - Semi-structured (Implicit) Implicit Knowledge is knowledge that is gained through incidental activities, or without awareness that learning is occurring.
 - Tacit knowledge (unstructured) refers to the knowledge, skills, and abilities an individual gains through experience that is often difficult to put into words or otherwise communicate
- Enterprise-wide knowledge management systems
 - Deal with all three types of knowledge
 - General-purpose, firm-wide systems that collect, store, distribute, and apply digital content and knowledge

Enterprise Content Management Systems

- Capabilities for knowledge capture, storage
 - Collecting and organizing semi-structured knowledge such as email
- Repositories for documents and best practices
- Classification schemes
 - Key problem in managing knowledge
 - Each knowledge object must be tagged for retrieval
- Tools for locating and sharing expertise
 - Search tools and directories of experts and profiles

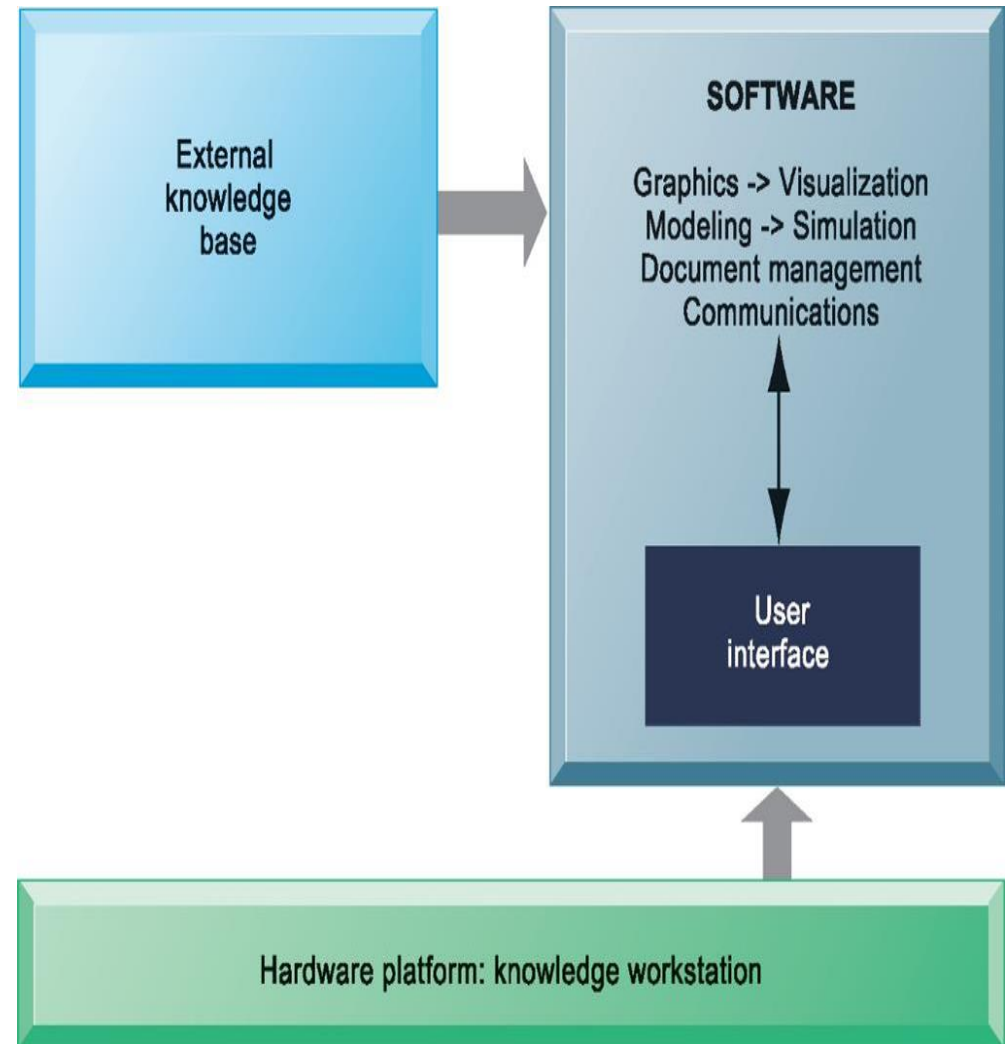


Learning Management Systems

- is an online integrated software used for creating, delivering, tracking, and reporting educational courses and outcomes. It can be used to support traditional face-to-face instruction, as well as blended/hybrid and distance learning environments.
- Provide tools for management, delivery, tracking, and assessment of employee learning and training
- Multiple modes of learning
 - Videos
 - Web-based classes
 - Live instruction
 - Group learning in online forums
- Massive open online courses (MOOCs) are free online courses available for anyone to enroll. **MOOCs** provide an affordable and flexible way to learn new skills, ...

Knowledge Work Systems

- Specialized systems for knowledge workers
- Requirements of knowledge work systems:
 - Specialized tools
 - Powerful graphics, analytical tools, and communications and document management
 - Computing power to handle sophisticated graphics or complex calculations
 - Access to external databases
 - User-friendly interfaces



Examples of Knowledge Work Systems

- Computer-aided design (CAD) systems
- Virtual reality (VR) systems (is a simulated experience that employs pose tracking and 3D near-eye displays to give the user an immersive feel of a virtual world.
 - Virtual Reality Modeling Language (VRML) is a standard file format for representing 3-dimensional interactive vector graphics, designed particularly with the World Wide Web in mind.
- Augmented reality (AR) systems is an interactive experience that combines the real world and computer-generated content. The content can cover multiple sensory
 - E.g. image-guided surgery