ACS-1803
Introduction to Information Systems

Instructor: Kerry Augustine

Management Information Systems Frameworks

Lecture Outline 3

Learning Objectives

1. Describe the characteristics that differentiate the operational, managerial, and executive levels of an organization
2. Explain the characteristics of the three information systems designed to support each unique level of an organization: Operational/Transaction Processing Systems (TPS), Tactical/ Management Information Systems (MIS), and Strategic/ Executive Information Systems (EIS)
3. Understand the nature of Functional Area systems as a system that spans organizational boundaries

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The Nature of Managerial Work

- Management
  - the process of directing tasks and directing resources to achieve organizational goals
  - management functions: planning, organizing, directing, motivating, controlling...
- Planning: done at different Levels
  - Long-term mission and vision
  - Strategic goals
  - Tactical objectives

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Decision-Making Levels

- Three main levels of decision-making in an organization:
  - Operational
  - Tactical
  - Executive (strategic)
- Each level processes information differently
  - Different types of decisions are made
  - Different information needs
    - Format, presentation, medium, frequency, amount, output

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The Organizational Pyramid

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The Organizational Pyramid – Management

- Senior (Executive) Managers:
  - Make long-term decisions about products / services to produce
- Middle Managers:
  - Carry out programs and plans of senior managers budgeting, monthly scheduling, personnel plans
- Operational Managers:
  - Monitor firm's daily activities daily scheduling, inventory handling.

Control Direction

Control Activity

Control Resources

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Decisions at different levels

- **Strategic Decisions:** Decisions that consider the entire organization and represent major changes for it. The goal of making strategic decisions is to implement policy that aims to move the organization toward its long-term goals.
- **Tactical Decisions:** They relate to the implementation of strategic decisions. Risk level of these decisions is still low but larger then operational decisions. They are directed towards developing divisional plans, structuring workflows, establishing distribution channels, acquisition of resources.
- **Operational Decisions:** Occur on a daily basis. Often these decisions are repetitive in nature and can be implemented quickly and tend to carry little risk.

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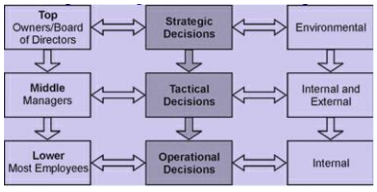
Considerations about managerial work

- To make decisions, each level of management has different information needs.



How much information detail does a Senior/ Middle / Operational manager Need?

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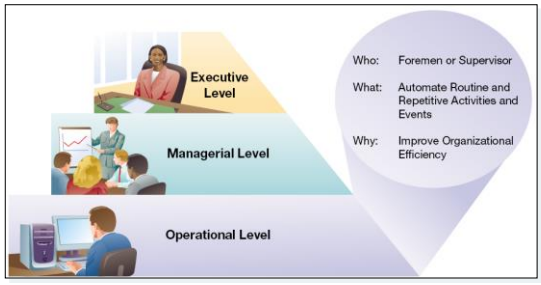
Transaction Processing Systems

Systems at the Operational level

Who, What, Why: Organizational Level



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Transaction Processing Systems

- Transaction processing systems (TPSs):
  - Capture and process detailed data necessary to update the organization's records about fundamental business operations
  - Include order entry, inventory control, payroll, accounts payable, accounts receivable, general ledger, etc.
- A TPS provides valuable input to:
  - Management information systems
  - Decision support systems
  - Knowledge management systems

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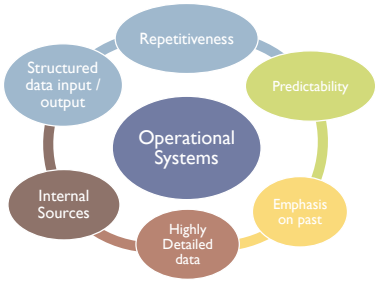
A Framework for Information Systems



- Operational systems are often used by clerical workers and low level management

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Transactions

- An economic event that initiates the accounting process of recording it in a **company's** accounting system.
- Financial transaction: an agreement, communication, or movement carried out between a buyer and a seller to exchange a payment
- Computer Transaction: a sequence of information exchange and related work (such as database updating)
- Accounting: Event that effects a change in the asset, liability, or net worth account. Transactions are recorded first in journal and then posted to a ledger.
- Generic Definition: A single event that Changes something

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Transactions

- Transactions include:
  - Customer Orders
  - Receipts
  - Invoices
  - Payments
- Transaction Processing Activities include:
  - Collection
  - Editing
  - Manipulation
  - Storage
- Consider: Many transaction that can occur in a retail business setting.

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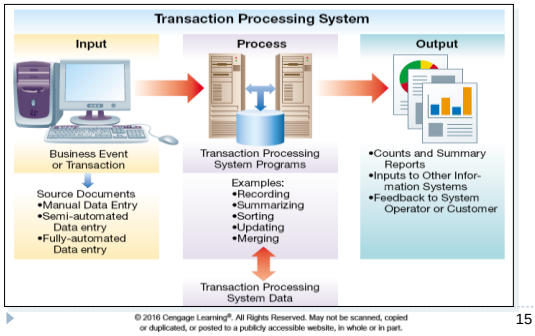
System Architecture: Transaction Processing System



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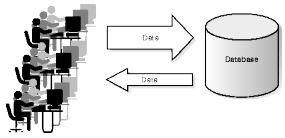
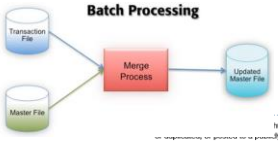
Traditional Transaction Processing Methods

- Online (Real time):
  - Transactions input into the system as they occur.
- Batch:
  - Transactions are accumulated over time, and prepared for entry or processing as a single unit or a batch





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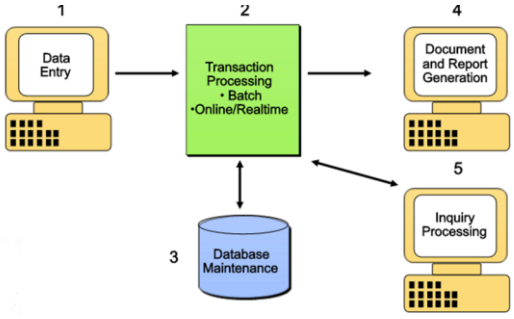
TPS



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Transaction Processing Methods and Objectives

- Organizations expect their TPSs to:
  - Capture, process, and update databases
  - Ensure that the data is processed accurately and completely
  - Avoid processing fraudulent transactions
  - Produce timely user responses and reports
  - Reduce clerical and other labor requirements
  - Help improve customer service
  - Achieve competitive advantage

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Transaction Processing Methods and Objectives

- A TPS includes:
  - Order processing systems
    - Processing flow begins with receipt of customer order, then finished product inventory is checked to see if sufficient inventory is on hand to fill the order
    - Product pick list is printed at the warehouse and inventory is adjusted
    - Customer invoice is created and copy included in the customer shipment
  - Accounting systems
    - Must track the flow of data related to all the cash follows that affect the organization
  - Purchasing systems
    - Systems that support the purchasing business function
    - Inventory control, purchase order processing, receiving, and accounts payable

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Transaction Processing Activities

- The transaction processing cycle
  - Data collection
  - Data editing
  - Data correction
  - Data manipulation
  - Data storage
  - Document production

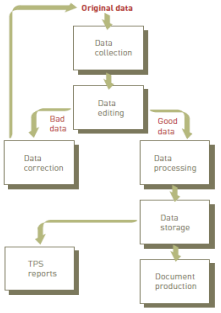

FIGURE 5.9
Transaction processing activities
A transaction processing cycle includes data collection, data editing, data correction, data processing, data storage, and document production.

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Data Collection

- Capturing and gathering all data necessary to complete the processing of transactions
- Data collection can be:
  - **Manual**: typed-in by hand
  - **Semi-automated**: Use of special Data entry devices
  - **Fully-automated**: computer of the buyer "talks" directly to computer of the seller Involves capturing data at its source and recording it accurately in a timely fashion with minimal manual effort and in an electronic or digital form so that it is directly entered into the computer

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Data Editing

- Data editing
  - Checking data for validity and completeness to detect any problems
- Examples
  - Quantity and cost data must be numeric
  - Names must be alphabetic
  - Codes associated with an individual transaction are edited against a database containing valid codes

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Data Correction

- Systems should provide error messages that alert those responsible for editing the data
  - Error messages should specify the problem so proper corrections can be made
- Data correction involves reentering data that was not typed or scanned properly

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Data Processing

- Performing calculations and other data transformations related to business transactions including:
  - Classifying data
  - Sorting data into categories
  - Performing calculations
  - Summarizing results
  - Storing data in the organization's database for further processing

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Data Storage

- Data Storage
  - Involves updating one or more databases with new transactions
- After being updated, this data can be further processed and manipulated by other systems

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Document Production

- Document Production involves generating output records, documents, and reports
  - Hard-copy paper reports
  - Displays on computer screens (soft copy)
- Results from one TPS can be input to another system
- Most TPSs provide other useful management information, such as:
  - Printed or on-screen reports that help managers and employees perform various activities
  - Reports showing current inventory
  - Reports required by local, state, and federal agencies

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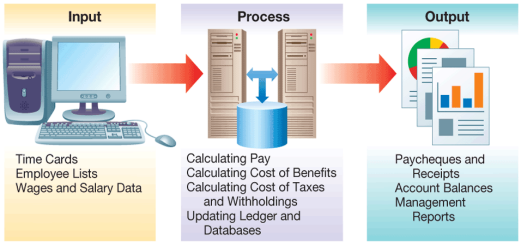
TPS Example: Payroll System



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TPS Example: POS System

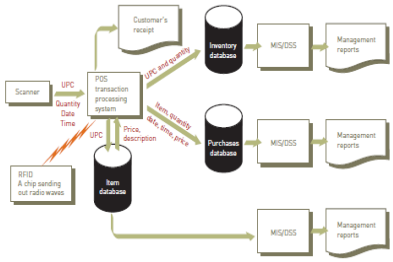

FIGURE 5.10
Point-of-sale transaction processing system
The purchase of items at the check-out stand updates a store's inventory database and its database of purchases.

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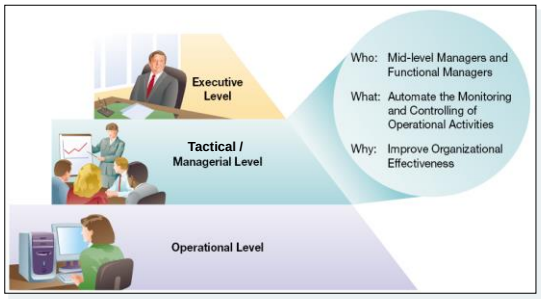
Management Information Systems

Systems at the Tactical / Managerial Level

Who, What, Why: Managerial Level



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Management Information System (MIS)

- Computerized database of information organized and programmed in such a way that it produces regular reports on operations for management in a company.
- The main purpose is to give managers feedback about performance
- Information displayed by the MIS typically shows "actual" data, and it allows comparison against "planned" results thus it measures progress against goals.
- The MIS receives data from company units and functions.

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Management Information System (MIS)

- MISs perform the following functions:
  - Provide reports with fixed and standard formats
  - Produce hard-copy and soft-copy reports
  - Allow users to develop custom reports
  - Require user requests for reports developed by systems personnel

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Management Information Systems (MIS)

- Purpose of an MIS:
  - To help an organization achieve its goals by providing managers with insight into the regular operations of the organization
  - Provide the right information to the right person in the right format at the right time
- *Tactical information systems differ from operational do not to support the execution of operational tasks, but help the manager control operations*

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Tactical Systems (MIS)

- In Operational Systems, transaction data is captured and stored (in a database)
- In Tactical/ Managerial Information Systems transaction data is **summarized, aggregated, and analyzed** for additional insight for **middle** managers.
  - (Remember the Characteristics of Information at the Tactical level)
  - Generate a variety of reports:
  - Summary reports: totals, averages, key data
  - Total regular and overtime hours worked for each plant for the week, by job classification {*What resource will this information help to control?*}

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Transaction Processing vs. Management Information Systems

- TPS
  - Capture and process the detailed data necessary to update current records about operations
  - E.g. Order Entry, inventory Control, payroll, accounts payable, accounts receivable, etc…
- MIS
  - Provide insight for managers into regular operations of the organization so they can control, organize, and plan more effectively.
  - Right info to the right person at the right time
  - Information typically provided in reports

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Tactical vs Operational Info. Systems

- Tactical information systems differ from operational information systems in the:
  - the amount of detail produced as output
  - the comparative nature of the information
  - the rigidity of the structure of the information
  - regularity with which information is produced (e.g. ad hoc)

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MIS Output

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System Description: Management Information Systems (MIS)

Tactical Information Systems or Management Information Systems (MISs) are used by **managerial employees** to support recurring decision making in managing a function or the entire business

Supported Activities

- **Scheduled Reporting** - the system produces automatically based on a **predetermined schedule**. Some include:
  - **Key Indicator** – High-level summaries to monitor performance (e.g. Monthly Sales Report)
  - **Exception** – Highlights situations where data is out of normal range (e.g. Monthly Late Shipments)
  - **Drill Down** – Provides lower-level detail aggregated in a summary report
- ***Ad Hoc* Reporting** – **unscheduled** reports that are usually custom built to answer a specific question (e.g. sales data by person report to identify issues)

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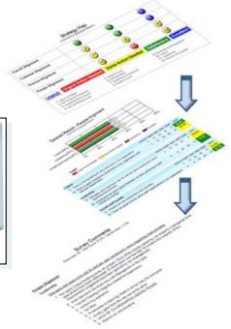
Reporting Activity: Drill-down (MIS)

First Level
Graphical Summary



Second Level
Data Drill Down

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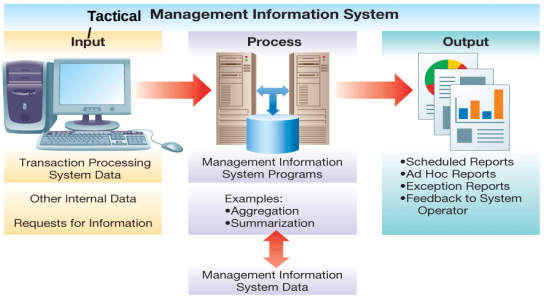
System Architecture: Management Information System



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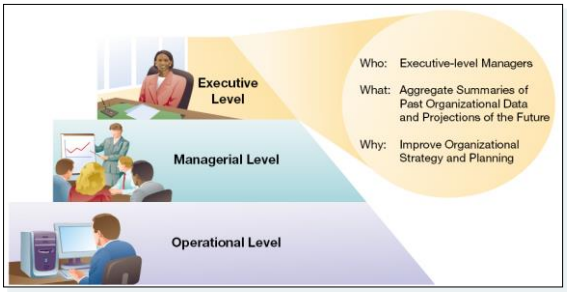
Executive Support Systems

Systems at the Strategic Level

Who, What, Why: Executive Level



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Strategic / Executive Information Systems

- Strategic Systems/ Executive Information Systems
- provide top managers with information that assist them in making long-range planning decisions for the organization
- Produced regularly, but more often on ad hoc basis
- Executive-level reports provide **Summarized** data

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Executive Support Systems

- Executive support system (ESS):
  - Includes hardware, software, data, procedures, and people used to assist senior-level executives
  - Also called an executive information system (EIS)
  - ESS provide an overview of an entire organization's performance
    - Or any aspects of the organization that executives consider important
- ESS provides support for:
  - Defining overall vision
  - Strategic planning
  - Strategic organizing and staffing
  - Strategic control
  - Crisis management

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Strategic/ Executive Information Systems

- These systems use graphical user interfaces to display consolidated information and can deliver both:
  - Soft Data - textual news stories or non-analytical data
  - Hard Data – facts, numbers, calculations, etc.
- The activities supported by these kinds of systems include:
  - Executive Decision Making
  - Long-range Strategic Planning
  - Monitoring of Internal and External Events
  - Crisis Management
  - Staffing and Labour Relations

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Executive Information Systems (EIS)

Questions:

What kind of tactical information would be useful to a branch manager of a Coca-Cola or Pepsi distributorship?

What kind of *strategic* information would be useful to the president of a four-year liberal arts college?

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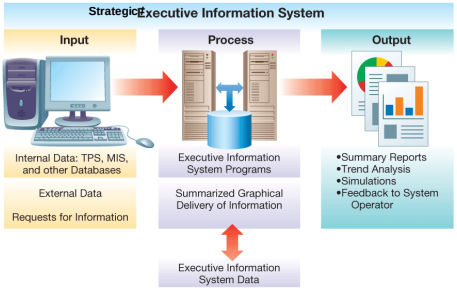
System Architecture: Executive Information Systems



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Inputs to MIS and ESS Information Systems

- Internal data sources:
  - TPS and related databases
  - Data warehouses and data marts
  - Specific functional areas throughout the firm
- External data sources:
  - Customers, suppliers, competitors, and stockholders whose data is not already captured by the TPS and ERP systems
  - Internet

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MIS/ ESS Outputs

- Reports:
  - Formatted result of database queries and contains useful data for decision-making and analysis.
  - Scheduled reports:
    - Produced periodically, such as daily, weekly, or monthly
  - Demand reports:
    - Developed to provide certain information upon request

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MIS / ESS Outputs (continued)

- Exception reports:
  - Automatically produced when a situation is unusual or requires management action
  - Trigger points should be set carefully
  - *E.g. list of all plants that have logged more overtime hours than expected for the week*
  - *E.g. list of all sales personnel whose sales fall in the top and bottom 10% of the organization*

Daily Sales Exception Report – ORDERS OVER 10,000
Prepared: 08/10/xx

Order #	Customer ID	Sales Rep ID	Ship Date	Quantity	Item #	Amount
P12453	C89321	CAR	08/12/06	144	P1234	13,214
P12453	C89321	CAR	08/12/06	288	P3214	15,660
P12453	C03214	GWA	08/13/06	12	P4902	11,224
...	...	...	...	...	...	...
...	...	...	...	...	...	...

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MIS / ESS outputs - Ad-Hoc Reports

- Ad hoc reports: "spur-of-the-moment"; unplanned
  - needed by manager to solve a unique problem
  - E.g. a list of the total number of employees absent during the week, arranged by plant and by job title, along with the hours or days missed
- If an exception report has shown high overtime earnings at some plants, then a manager might ask for a report showing the production record of each plant for the week; to help investigate why there was an overtime problem.

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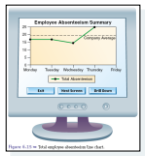
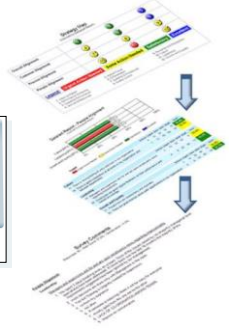
Reporting Activity: Drill-down (EIS)



First Level
Graphical Summary

Second Level
Data Drill Down



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Key Performance Indicators

- Metrics that track progress in executing strategies to attain organizational objectives and goals
  - These metrics are also called key performance indicators (KPIs) and consist of a direction, measure, target, and time frame
- Examples of well-defined KPIs:
  - For a university. Increase (direction) the five-year graduation rate for incoming freshman (measure) to at least 80 percent (target) starting with the graduating class of 2022 (time frame)
  - For a customer service department. Increase (direction) the number of customer phone calls answered within the first four rings (measure) to at least 90 percent (target) within the next three months (time frame)
  - For an HR organization. Reduce (direction) the number of voluntary resignations and terminations for performance (measure) to 6 percent or less (target) for the 2018 fiscal year and subsequent years (time frame)

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Key Indicator Report

- Key Indicator: Also Known as Performance indicator or key performance indicator (KPI).
- A type of performance measurement to evaluate the success of an organization or of a particular activity in which it engages.

Daily Sales - Key Indicator Report			
	This Month	Last Month	Last Year
Total Orders Month to Date	1,808	1,694	1,014
Forecasted Sales for the Month	2,406	2,224	2,608

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Dashboards

- Dashboard – Mostly for ESS
  - Presents a set of KPIs about the state of a process at a specific point in time
  - Provide rapid access to information in an easy-to-interpret and concise manner
  - Provide users at every level of the organization the information they need to make improved decisions
- Operational dashboards can be designed to draw data in real time from various sources
  - Including corporate databases and spreadsheets
- Widely used BI software comes from many different vendors, including:
  - Hewlett Packard, IBM, Information Builders, Microsoft, Oracle, and SAP

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Dashboard Reporting

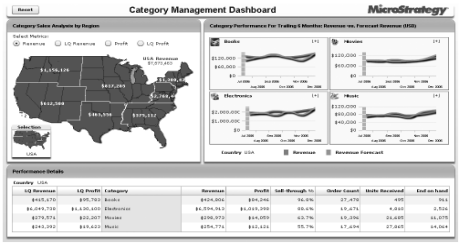

FIGURE 6.8
Category management dashboard for total U.S. region
This dashboard summarizes a number of sales measures.
Source: *www.microstrategy.com/us/analytics/technology.*

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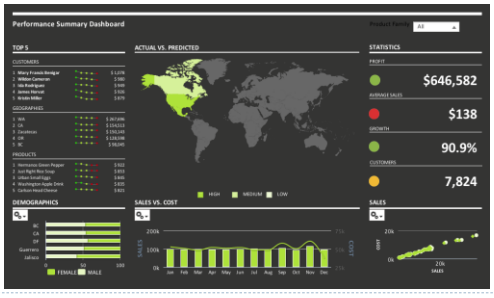
Dashboard Reporting

Results are aggregated for the organization and presented in a graphical format or "executive dashboard" for quick viewing and timely decision making



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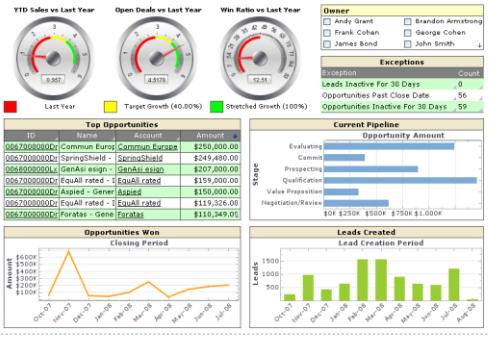
Dashboard Reporting



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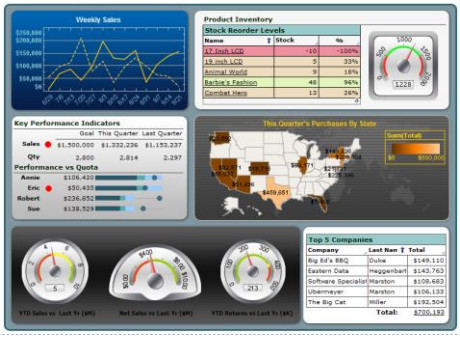
Strategic Level Report Example



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Review 1: Categorize Each Decision as Strategic, Tactical, or Operational

a. Rejecting credit for a company with an overdue account
(Operational)

b. Analyzing sales by product line within each geographic region, this year to date vs. last year to date
(Tactical)

c. Using a simulation model to forecast profitability of a new product, using projected sales data, competitive industry statistics, and economic trends
(Strategic)

d. Comparing planned vs. actual expenses for department staff
(Tactical)

e. Allocating salespeople's time to the highest potential market prospects
(Tactical)

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Review 2: Categorize Each Decision as Strategic, Tactical, or Operational

a. Rejecting credit for a company with an overdue account
(Operational)

b. Closing down a business unit to stop production of a particular line of clothing after analysing sales by product line within each geographic region, this year to date vs. last year to date
(Tactical)

c. Deciding to begin production of a new product after using a simulation model to forecast profitability of it, using projected sales data, competitive industry statistics, and economic trends
(Strategic)

d. Reducing the number of sales people after comparing planned vs. actual sales for department staff
(Tactical)

e. Opening a new plant in a new market with great potential.
(Strategic)

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The Organizational Pyramid - Summary

Executive Level
Strategic planning and responses to **strategic issues** occur here. Executive **decisions** are usually **unstructured** and are made using **consolidated internal** and **external** information

Managerial Level
Monitoring and **controlling** of operational activities and **executive information support** occur here. Managerial **decisions** are usually **semistructured** and are made using **procedures** and ***ad hoc*** tools

Operational Level
Day-to-day business processes and interactions with customers occur here. Operational **decisions** are usually **structured** and are made using established **policies and procedures**

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