

CHAPTER 12

Business Intelligence and Analytics

CHAPTER OVERVIEW

- 12.1 Managers and Decision Making
- 12.2 What Is Business Intelligence?
- 12.3 Business Intelligence Applications for Data Analysis
- 12.4 Business Intelligence Applications for Presenting Results

LEARNING OBJECTIVES

1. Identify the phases in the decision-making process, and use a decision-support framework to demonstrate how technology supports managerial decision making.
2. Describe and provide examples of the three different ways in which organizations use business intelligence (BI).
3. Specify the BI applications available to users for data analysis, and provide examples of how each can be used to solve a business problem at your university.
4. Describe three BI applications that present the results of data analyses to users, and offer examples of how businesses and government agencies can use each of these applications.

CASE 12.1 CHAPTER OPENING CASE TORONTO RAPTORS USES BI ...

The Problem

- It is difficult to hire the right player for an athletic team such as the Raptors and the wrong decision can result in both playing losses and revenue losses
- Paper and Excel-based player data was difficult to share and use by both on-site and off-site managers



CASE 12.1 CHAPTER OPENING CASE TORONTO RAPTORS USES BI ...

The IT Solution

- IBM's Sports Insights Central with Watson Tradeoff Analytics using artificial intelligence were adopted
- Data mining software Alchemy API was used to query the player data
- An associated phone app was used so management could access player data remotely

CASE 12.1 CHAPTER OPENING CASE TORONTO RAPTORS USES BI ...

The Results

- ▣ Reduction of paperwork
- ▣ Ready access to updated data
- ▣ Better access to data for decision-making about player hires and trades

CASE 12.1 CHAPTER OPENING CASE TORONTO RAPTORS USES BI ...

Questions

1. Discuss the importance of data analysis in the process of hiring a new basketball player. What relationship can you infer between the quality and quantity of data and the quality of analysis performed on that data?
2. Discuss the impact of data quantity and quality on the Toronto Raptors' War Room.
3. Discuss the relationship between software tools for data analytics and data presentation and explain why they would be implemented together as part of the same technology solution.

12.1 Managers and Decision Making

- **BI Intelligence (BI)** is a broad category of applications, technologies and processes for gathering, storing, accessing and analyzing data to help business users make better decisions
- Management is a process by which an organization achieves its goals through the use of resources (people, money, materials, and information).
 - These resources are considered to be *inputs*. Achieving the organization's goals is the *output* of the process. The ratio between the input & outputs is an indication of the organization's **productivity**.

THE MANAGER'S JOB AND DECISION MAKING

Managers perform three basic roles (Mintzberg 1973) :

- Interpersonal: figurehead, leader, liaison
- Informational: monitor, disseminator, spokesperson, analyzer
- Decisional: entrepreneur, disturbance handler, resource allocator, negotiator

THE MANAGER'S JOB & DECISION MAKING (CONTINUED)

- A **Decision** is a choice among two or more alternatives that individuals and groups make.
- **Decision making** is a systematic process. Economist Herbert Simon (1977) described decision making as composed of three major phases: intelligence, design, and choice, followed by implementation and evaluation.

WHY MANAGERS NEED IT SUPPORT

- The number of alternatives is constantly increasing.
- Most decisions must be made under time pressure.
- Decisions are becoming more complex.
- Decision makers, as well as the information, can be situated in different locations.
- **THE AMOUNT OF DATA IS ASTRONOMICAL!**
- **The potential for failure is high**

FIGURE 12.2 A FRAMEWORK FOR COMPUTERIZED DECISION ANALYSIS

| | | Nature of Decision | | | Support Needed |
|------------------|-----------------|---|---|--|---|
| | | Operational Control | Management Control | Strategic Planning | |
| Type of Decision | Structured | Accounts receivable, order entry 1 | Budget analysis, short-term forecasting, personnel reports, make-or-buy analysis 2 | Financial management (investment), warehouse location, distribution systems 3 | Management science |
| | Semi-structured | Production scheduling, inventory control 4 | Credit evaluation, budget preparation, plant layout, project scheduling, reward systems design 5 | Building new plant, mergers and acquisitions, new product planning, compensation planning, quality assurance planning 6 | Decision support systems (DSS) |
| | Unstructured | Selecting a cover for a magazine, buying software, approving loans 7 | Negotiating, recruiting an executive, buying hardware, lobbying 8 | R & D planning, new technology development, social responsibility planning 9 | BI, DSS Expert systems (ES) neural networks |
| Support Needed | | Management science | Management science, DSS, Business intelligence (BI), ES | Business intelligence (BI), ES, neural networks | |

PROBLEM STRUCTURE

The first dimension deals with the problem structure, where the decision making processes fall along the continuum ranging from highly structured to highly unstructured decisions.



Structured

**Example:
Inventory Control**

Semi-structured

**Example:
Evaluating Employees**

Unstructured

**Example:
New Services**

THE NATURE OF DECISIONS

- The second dimension of decision support deals with the nature of decisions.
- Three categories of managerial decision making:
 - Operational control: involves executing specific tasks efficiently and effectively.
 - Management control: involves decisions concerning acquiring and using resources efficiently in accomplishing organizational goals
 - Strategic planning: involves decisions concerning the long range goals and policies for growth and resource allocation

IT's About Business 12.1 Predicting Airplane Arrivals More Accurately, p. 335 illustrates how crowdsourcing (with a \$100,000 prize) helped better predict Alaska Airlines' flight arrival times

12.2 WHAT IS BUSINESS INTELLIGENCE?

Clicking on the links will take you to each company's home page

- ▣ [SAS](#): analytics software
- ▣ [IMB](#): IBM's SPSS Software
- ▣ [SAP](#): BI as part of SAP ERP software

THE SCOPE OF BUSINESS INTELLIGENCE

- Smaller Organizations
 - ▣ Excel spreadsheets
- Larger Organizations
 - ▣ Data mining, predictive analytics, dashboards and data visualization
 - ▣ May be used enterprise-wide
 - ▣ Use of BI may be a requirement for competing in the marketplace

THE SCOPE OF BI (CONTINUED)

Three specific BI targets that represent different levels of change:

- development of one or a few related BI applications (Example: campaign management in marketing)
- development of infrastructure to support enterprise-wide BI (Example: enterprise data warehouse)
- support for organizational transformation (Example: support for new business model)
- These targets differ in terms of their focus; scope; level of sponsorship, commitment, and required resources; technical architecture; impact on personnel and business processes; and benefits.

1 2.3 BUSINESS INTELLIGENCE APPLICATIONS FOR DATA ANALYSIS

- Online Analytical Processing (OLAP) or Multidimensional analysis
- Data Mining
- Decision Support Systems

MULTIDIMENSIONAL ANALYSIS OR ONLINE ANALYTICAL PROCESSING (OLAP)

- OLAP:
 - ▣ “slices & dices” data stored in a dimensional format,
 - ▣ drills down in the data to greater detail, and,
 - ▣ aggregates the data.

DATA MINING

- Data mining can perform two basic operations:
 - ▣ predicting trends and behaviours e.g. for targeted marketing and predicting bankruptcy
 - ▣ identifying previously unknown patterns e.g. for detecting fraudulent credit card transactions

IT's About Business 2.2 Cardlytics Analyzes Customer Buying Behaviours describes how credit card transactions processed by Cardlytics have become an important marketing tool

DECISION SUPPORT SYSTEMS (DSSS)

- DSS capabilities
 - ▣ Sensitivity analysis: is the study of the impact that changes in one or more parts of a decision-making model have on other parts
 - ▣ What-if analysis: attempts to predict the impact of a change in the assumptions (input data) on the proposed solution
 - ▣ Goal-seeking analysis: represents a “backward” solution approach. It attempts to find the value of the inputs necessary to achieve a desired level of output

1 2.4 BUSINESS INTELLIGENCE

APPLICATIONS FOR PRESENTING RESULTS

- A **dashboard** provides easy access to timely information and direct access to management reports
- Capabilities of Dashboards from Information Builders:
 - Drill-down
 - Critical success factors (CSFs)
 - Key performance indicators (KPIs)
 - Status access
 - Trend analysis
 - Exception reporting

FIGURE 12.3 SAMPLE PERFORMANCE DASHBOARD



Image courtesy of Dundas Data Visualization, Inc., 2014 (www.dundas.com).

FIGURE 12.4 SUPPORT CENTRE OPERATIONS DASHBOARD

Support Center Operations Dashboard

Overview | Product Adoption | Regional Performance | High Priority Customers

Key Performance Indicators

Current Monthly (Dec 2007) Year to Date (2007)

| | TM | LM | %TM-LM | Trend |
|----------------------|-------|-------|---------|-------|
| Open Cases EOM | 6,688 | 6,507 | 2.8% | ▲ |
| New Cases | 2,755 | 2,761 | (0.2%) | ▼ |
| Closed Cases | 2,338 | 2,344 | (0.3%) | ▼ |
| Avg. Resolution Time | 3.65 | 4.13 | (11.7%) | ▲ |

TM - This Month; LM - Last Month
Trend: light blue is positive, dark blue is negative



Worldwide Summary

Closed Cases New Cases New Critical Cases Open Cases EOM

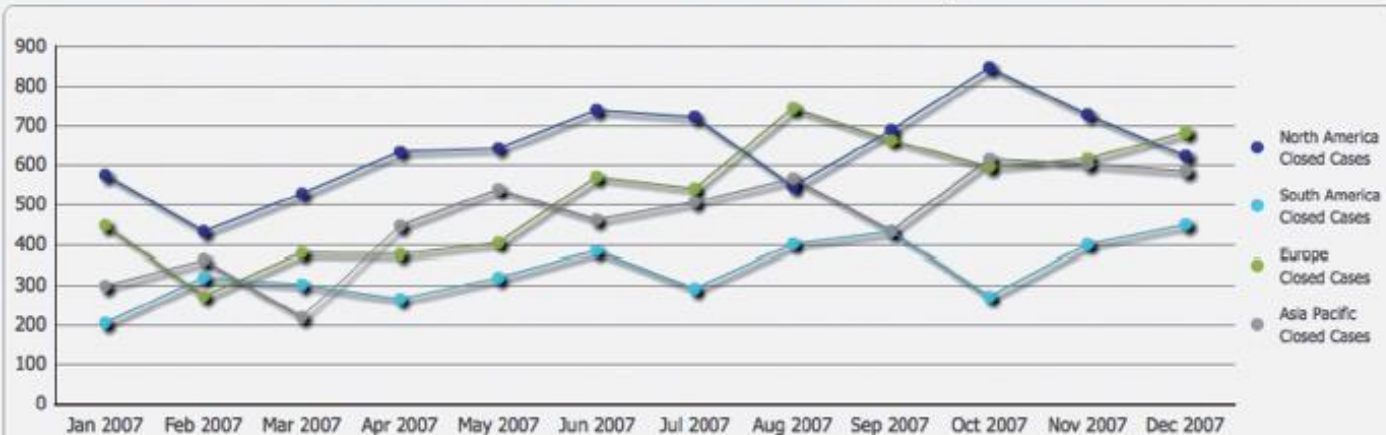


FIGURE 12.5 BLOOMBERG TERMINAL



Source: Carlos Osario/Zuma Press

FIGURE 1 2.6 MANAGEMENT COCKPIT



Source: The Management Cockpit is a registered trademark of SAP, created by Professor Patrick M. Georges.

Sample TPS - DSS

□ Fitbit, Nike, Jawbone trackers



FITBIT FLEX



FITBIT ONE



FITBIT ZIP



FITBIT ULTRA



UP²⁴

Always connected via Bluetooth.



UP

Plug in to sync instantly.



Sample DSS Dashboard

< | > Friday SEPTEMBER 12



2.5 lbs
to go



2,799 calories
Champ!



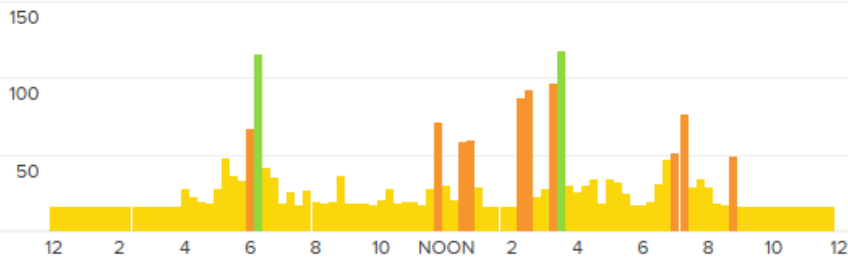
under

0 vs 2799



15,725 steps
Champ!

Activity



6 hrs 4 min



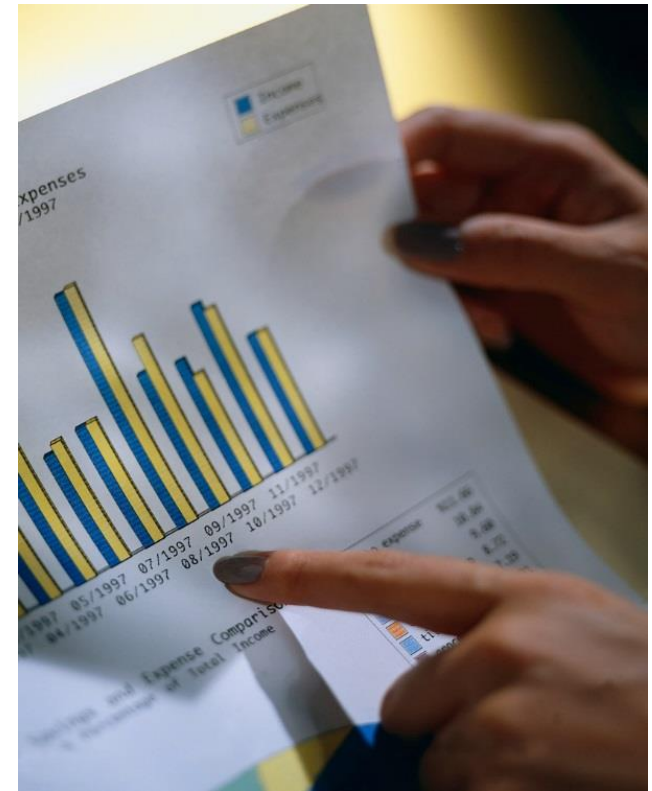
7.29 miles
Champ!

Executive Information Systems

Learning Outcome

2.2

- ❑ Specialized DSS for senior managers & executives
- ❑ Uses external as well as internal data
- ❑ Essential results at a glance
- ❑ **Visualization** tools display key results



Executive Information Systems

2.2

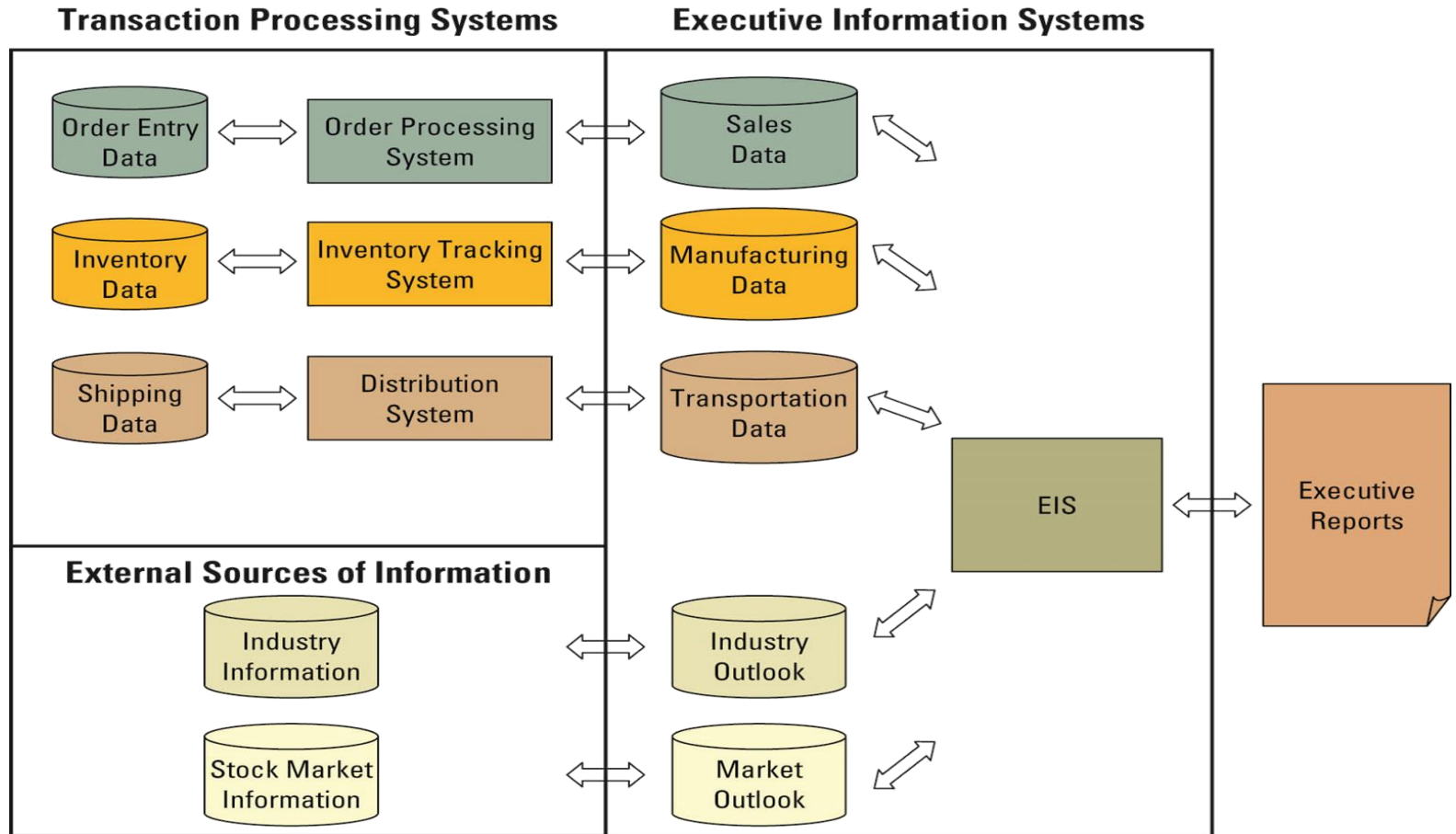


FIGURE 2.10

DATA VISUALIZATION TECHNOLOGIES

- Geographic Information Systems (shown here is ESRI Canada) are a computer-based system for capturing, integrating, manipulating, and displaying data using digitized maps
- GIS allows analysts to extract information from the usage patterns of mobile phones and other wireless devices.
 - ▣ Example: integration of GIS and GPS

IT's About Business 1 2.3 Geographic Information Systems Have Many Uses provides details of some real uses of GIS

CHAPTER CLOSING

- The decision-making process includes: intelligence, design, and choice, followed by implementation and evaluation of the solution.
- There are three major ways levels of change for the organizations that use BI:
 - development of one or a few related BI applications
 - development of infrastructure to support enterprise-wide BI
 - support for organizational transformation

CHAPTER CLOSING (CONTINUED)

- BI applications available to analyze data include multidimensional analysis, data mining, and decision support systems.
- BI applications that present the results of data analyses to users include dashboards and geographic information systems

