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الجامعة السورية الخاصة
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1. Introduction to Business Intelligence

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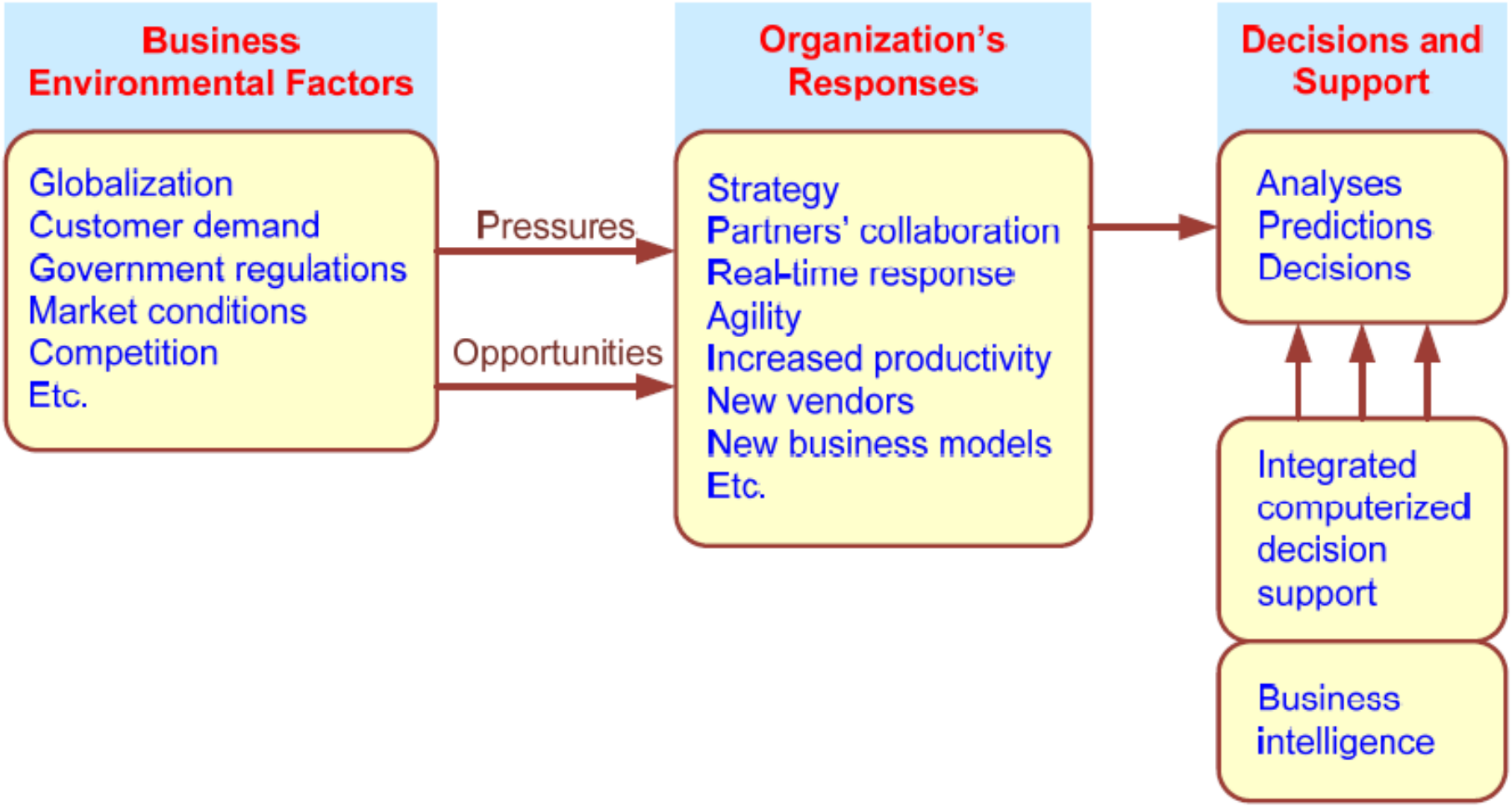
Learning Objectives

- Understand today's turbulent business environment and describe how organizations survive and even excel in such an environment (solving problems and exploiting opportunities)
- Understand the need for computerized support of managerial decision making
- Describe the business intelligence (BI) methodology and concepts and relate them to decision support systems (DSS)
- Understand the issues in implementing BI

Changing Business Environment & Computerized Decision Support

- Companies are moving aggressively to computerized support of their operations => Business Intelligence
- Business Pressures–Responses–Support Model
  - Business pressures result of today's competitive business climate
  - Responses to counter the pressures
  - Support to better facilitate the process

Business Pressures–Responses–Support Model



The Business Environment

- The environment in which organizations operate today is becoming more and more complex, creating:
  - opportunities, and
  - problems.
  - Example: globalization.
- Business environment factors:
  - markets, consumer demands, technology, and societal.

Business Environment Factors

FACTOR	DESCRIPTION
Markets	Strong competition
	Expanding global markets
	Blooming electronic markets on the Internet
	Innovative marketing methods
	Opportunities for outsourcing with IT support
	Need for real-time, on-demand transactions
Consumer demand	Desire for customization
	Desire for quality, diversity of products, and speed of delivery
	Customers getting powerful and less loyal
Technology	More innovations, new products, and new services
	Increasing obsolescence rate
	Increasing information overload
	Social networking, Web 2.0 and beyond
Societal	Growing government regulations and deregulation
	Workforce more diversified, older, and composed of more women
	Prime concerns of homeland security and terrorist attacks
	Necessity of Sarbanes-Oxley Act and other reporting-related legislation
	Increasing social responsibility of companies
	Greater emphasis on sustainability

Organizational Responses

- Be Reactive, Anticipative, Adaptive, and Proactive
- Managers may take actions, such as:
  - Employing strategic planning.
  - Using new and innovative business models.
  - Restructuring business processes.
  - Participating in business alliances.
  - Improving corporate information systems.
  - Improving partnership relationships.
  - Encouraging innovation and creativity. …cont…>

Organizational Responses, continued

- Improving customer service and relationships.
- Moving to electronic commerce (e-commerce).
- Moving to make-to-order production and on-demand manufacturing and services.
- Using new IT to improve communication, data access (discovery of information), and collaboration.
- Responding quickly to competitors' actions (e.g., in pricing, promotions, new products and services).
- Automating many tasks of white-collar employees.
- Automating certain decision processes.
- Improving decision making by employing analytics.

Closing the Strategy Gap

- One of the major objectives of computerized decision support is to facilitate closing the gap between the current performance of an organization and its desired performance, as expressed in its mission, objectives, and goals, and the strategy to achieve them.

Business Intelligence (BI)

- BI is an evolution of decision support concepts over time.
  - Meaning of EIS/DSS…
    - Then: Executive Information System
    - Now: Everybody's Information System (BI)
- BI systems are enhanced with additional visualizations, alerts, and performance measurement capabilities.
- The term BI emerged from industry apps.

Definition of BI

- BI is an umbrella term that combines architectures, tools, databases, analytical tools, applications, and methodologies.
- BI a content-free expression, so it means different things to different people.
- BI's major objective is to enable easy access to data (and models) to provide business managers with the ability to conduct analysis.
- BI helps *transform* data, to information (and knowledge), to decisions and finally to action.

A Brief History of BI

- The term BI was coined by the Gartner Group in the mid-1990s
- However, the concept is much older
  - 1970s — MIS reporting — static/periodic reports
  - 1980s — Executive Information Systems (EIS)
  - 1990s — OLAP, dynamic, multidimensional, ad-hoc reporting -> coining of the term "BI"
  - 2005+ — Inclusion of AI and Data/Text Mining capabilities; Web-based Portals/Dashboards
  - 2010s — Yet to be seen

The Evolution of BI Capabilities

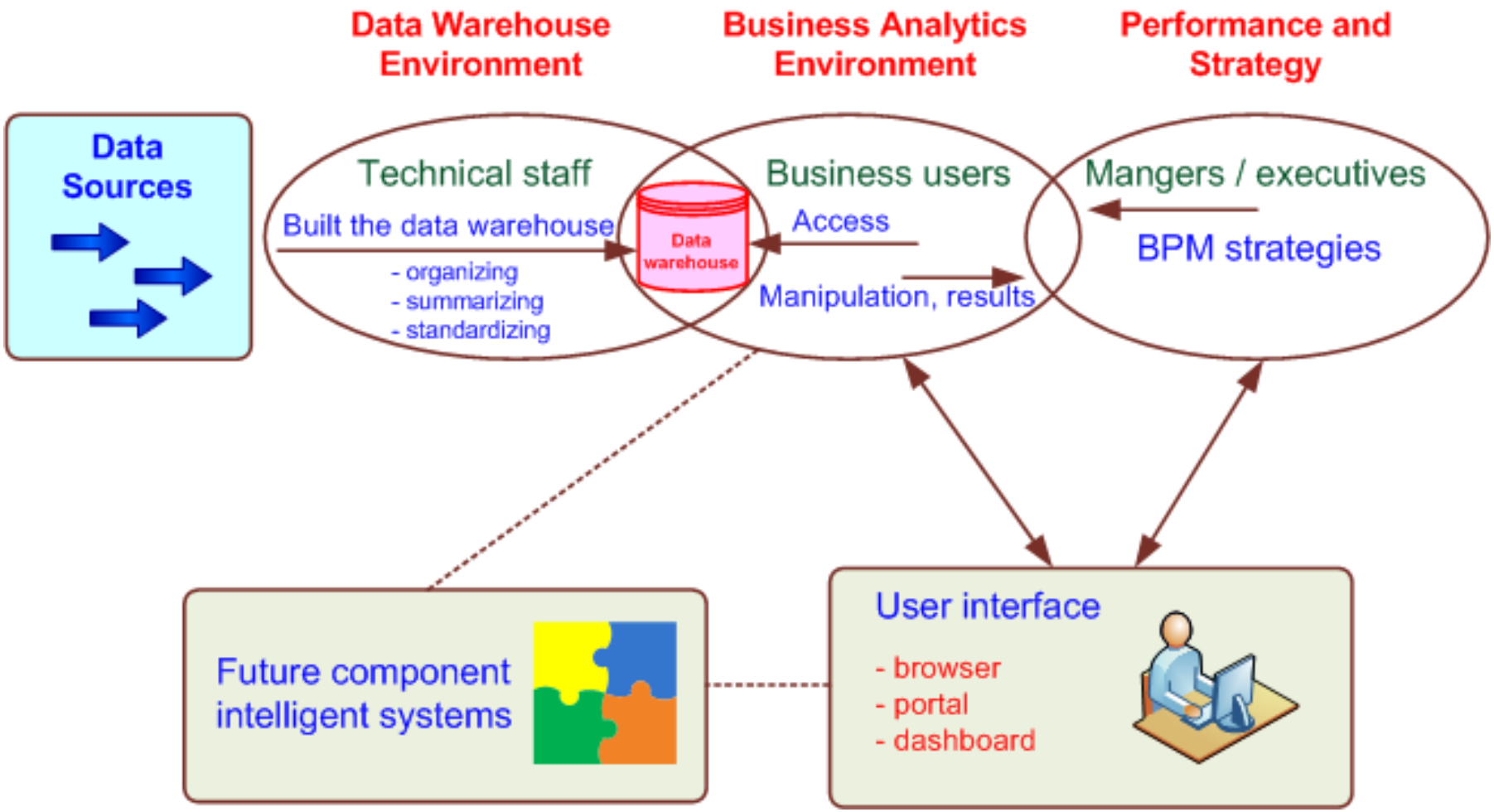
The 5 Stages of Business Intelligence

- BI development typically follows the 5 stages listed below:
  - 1. The Data: defining which data will be loaded into the system and analyzed.
  - 2. The ETL (Extract, Transform, and Load) Engine: moving the source data to the Data Warehouse. This can be a complex step involving modifications and calculations on the data itself. If this step doesn't work properly, the BI solution simply cannot be effective.
  - 3. Data Warehousing: connects electronic data from different operational systems so that the data can be queried and analyzed over time for business decision making.
  - 4. Analytic Engine: analyzes multidimensional data sets found in a data warehouse to identify trends, outliers, and patterns.
  - 5. Presentation Layer: the dashboards, reports and alerts that present findings from the analysis.

The Architecture of BI

- A BI system has four major components:
  - a data warehouse, with its source data
  - business analytics, a collection of tools for manipulating, mining, and analyzing the data in the data warehouse;
  - business performance management (BPM) for monitoring and analyzing performance
  - a user interface (e.g., dashboard)

A High-level Architecture of BI



Components in a BI Architecture

- The data warehouse is the cornerstone of any medium-to-large BI system.
  - Originally, the data warehouse included only historical data that was organized and summarized, so end users could easily view or manipulate it.
  - Today, some data warehouses include access to current data as well, so they can provide real-time decision support (for details see Chapter 2).
- Business analytics are the tools that help users transform data into knowledge (e.g., queries, data/text mining tools, etc.).

BI vs. Business Analytics

- Used often interchangeably in the present business environment
- Analytics is more tools oriented, so it mainly refers to the technology for BI
- BI is more of the umbrella term that also includes the business side of the equation
- BI is more of a planning level concept and BA is more of an implementation level concept
- If you think of KPI (Key Performance Indicators), BI defines them while BA measures them (roughly speaking)
- *Google Analytics: BI or BA?*

Components in a BI Architecture

- Business Performance Management (BPM), which is also referred to as corporate performance management (CPM), is an emerging portfolio of applications within the BI framework that provides enterprises tools they need to better manage their operations
- User Interface (i.e., dashboards) provides a comprehensive graphical/pictorial view of corporate performance measures, trends, and exceptions.

Styles of BI

- MicroStrategy, Corp. distinguishes five styles of BI and offers tools for each:
  1. report delivery and alerting
  2. enterprise reporting (using dashboards and scorecards)
  3. cube analysis (also known as slice-and-dice analysis)
  4. ad-hoc queries
  5. statistics and data mining

The Benefits of BI

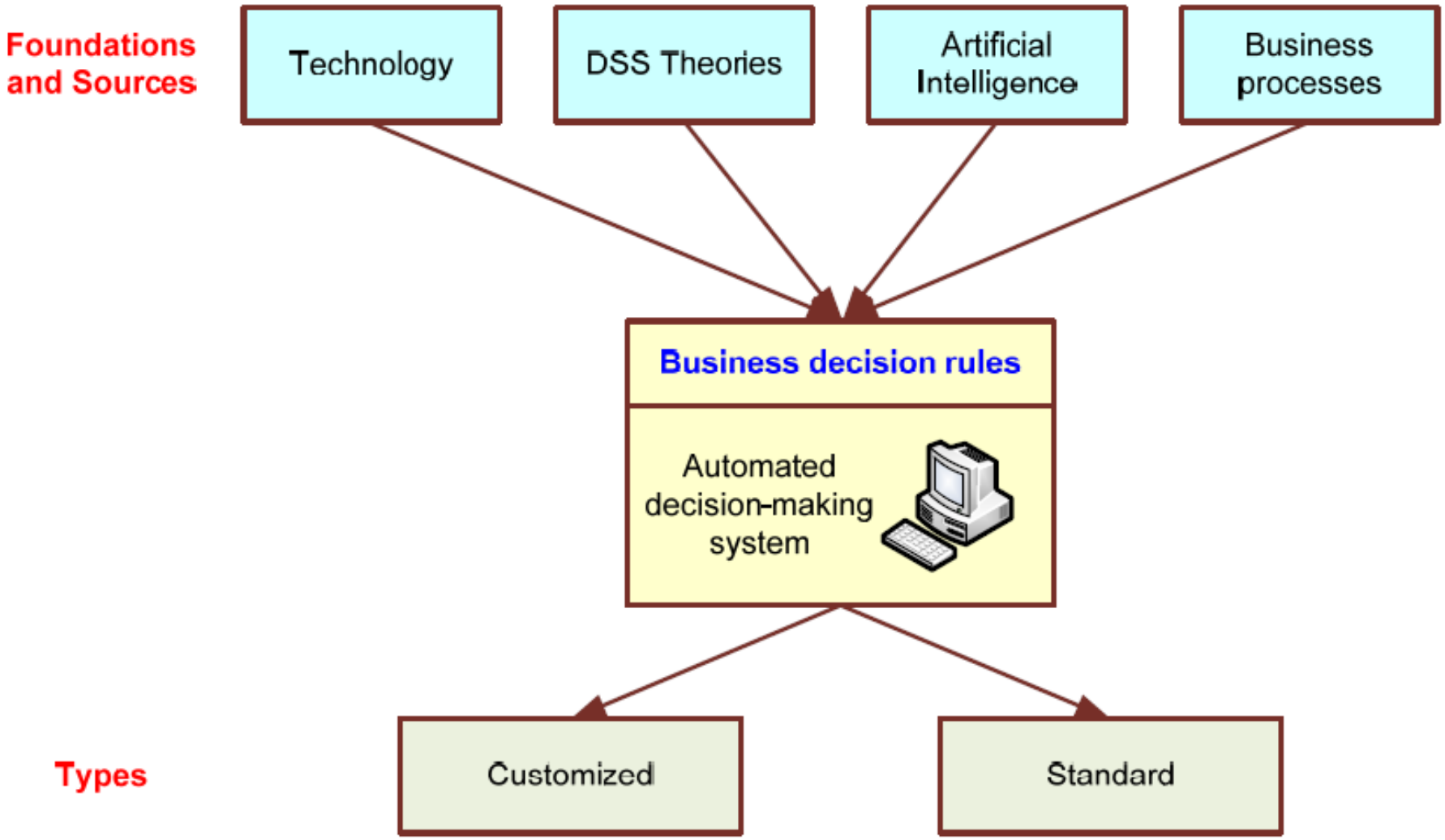
- The ability to provide accurate information when needed, including a real-time view of the corporate performance and its parts
- A survey by Thompson (2004)
  - Faster, more accurate reporting (81%)
  - Improved decision making (78%)
  - Improved customer service (56%)
  - Increased revenue (49%)

Automated Decision Making

- A relatively new approach to supporting decision making
- Applies to highly structured decisions
- Automated decision systems (ADS)

  (or decision automation systems)
- An ADS is a rule-based system that provides a solution to a repetitive managerial problem in a specific area.
  - e.g., simple-loan approval system

Automated Decision-Making Framework



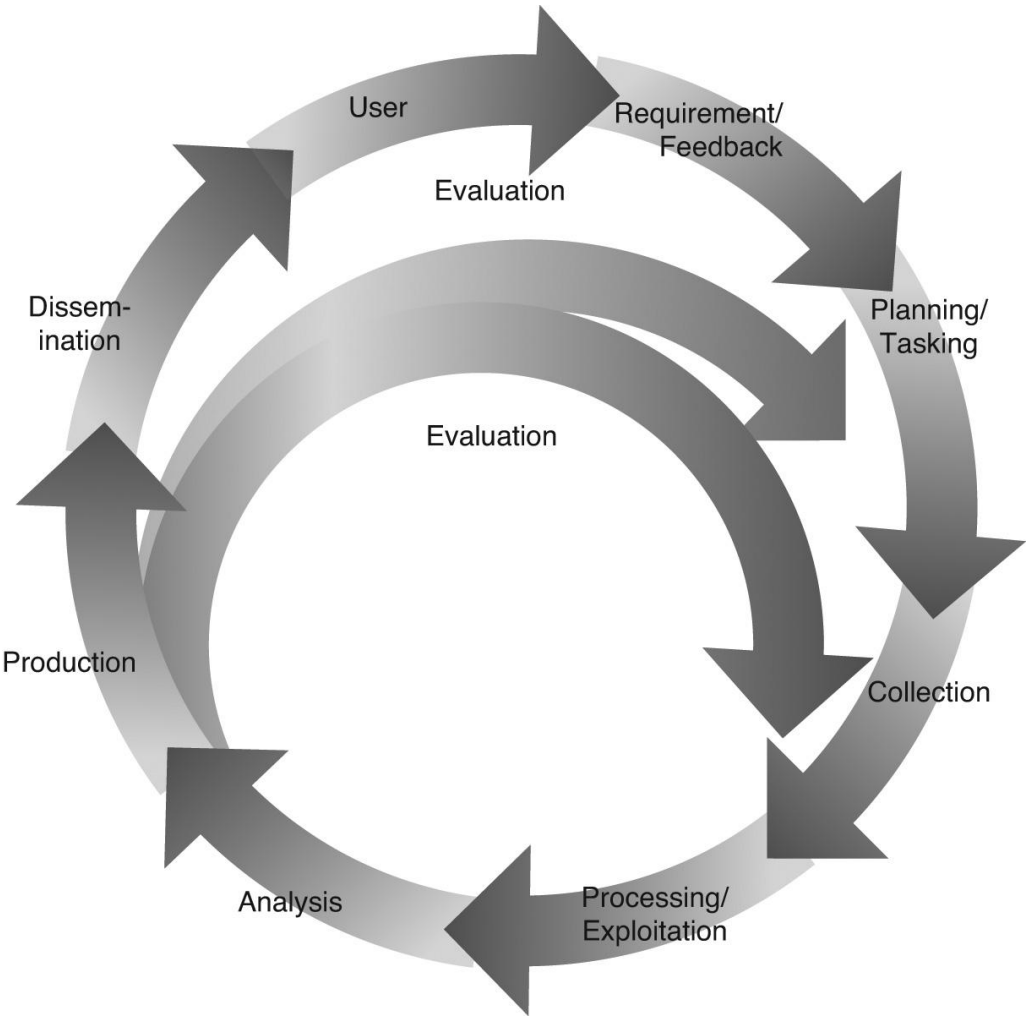
Automated Decision Making

- ADS initially appeared in the airline industry called revenue (or yield) management (or revenue optimization) systems.
  - dynamically price tickets based on actual demand
- Today, many service industries use similar pricing models.
- ADS are driven by business rules!

Intelligence Creation and Use

A Cyclical Process of Intelligence Creation And Use

- ✓ BI practitioners often follow the national security model depicted in this figure.



Intelligence and Espionage

- Stealing corporate secrets, CIA, …
  - Intelligence vs. Espionage
- Intelligence

  The way that modern companies ethically and legally organize themselves to glean as much as they can from their customers, their business environment, their stakeholders, their business processes, their competitors, and other such sources of potentially valuable information
- Problem – too much data, very little value
  - Use of data/text/Web mining (see Chapter 4, 5)

Transaction Processing Versus Analytic Processing

- Transaction processing systems are constantly involved in handling updates (add/edit/delete) to what we might call operational databases.
  - ATM withdrawal transaction, sales order entry via an ecommerce site – updates DBs
  - Online analytic processing (OLTP) handles routine on-going business
  - ERP, SCM, CRM systems generate and store data in OLTP systems
  - The main goal is to have high efficiency

Transaction Processing Versus Analytic Processing

- Online analytic processing (OLAP) systems are involved in extracting information from data stored by OLTP systems
  - Routine sales reports by product, by region, by sales person, etc.
  - Often built on top of a data warehouse where the data is not transactional
  - Main goal is effectiveness (and then, efficiency) – provide correct information in a timely manner
  - More on OLAP will be covered in Chapter 2

Successful BI Implementation

- Implementing and deploying a BI initiative is a lengthy, expensive and risky endeavor!
- Success of a BI system is measured by its widespread usage for better decision making.
- The typical BI user community includes
  - All levels of the management hierarchy (*not* just the top executives, as was for EIS)
    - Provide what is needed to whom he/she needs it
- A successful BI system must be of benefit to the enterprise as a whole.

Real-time, On-demand BI

- The demand for "real-time" BI is growing!
- Is "real-time" BI attainable?
- Technology is getting there…
  - Automated, faster data collection (RFID, sensors,…)
  - Database and other software technologies (agent, SOA, …) are advancing
  - Telecommunication infrastructure is improving
  - Computational power is increasing while the cost for these technologies is decreasing
- Trent -> Business Activity Management

Major BI Tools and Techniques

- Tool categories
  - Data management
  - Reporting, status tracking
  - Visualization
  - Strategy and performance management
  - Business analytics
  - Social networking & Web 2.0
  - New/advanced tools/techniques to handle massive data sets for knowledge discovery

BI Resources

- Teradata University Network
  - A great and free academic resource for BI (the available resources include cases, articles, tools including Microstrategy, datasets, exercises, etc.
- The Data Warehousing Institute (tdwi.org)
- The OLAP Report (olapreport.com)
- DSS Resources (dssresources.com)
- Business Intelligence Network (b-eye-network.com)
- AIS World (isworld.org)
- Microsoft Enterprise Consortium (enterprise.waltoncollege.uark.edu/mec)