Fatimah AL-Shaikh

Chapter 1:

An Overview of Business Intelligence, Analytics, and Decision Support

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...

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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
  - Employ strategic planning.
  - Use new and innovative business models.
  - Restructure business processes.
  - Participate in business alliances.
  - Improve corporate information systems.
  - ... more [in your book]

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.

Managerial Decision Making

- Management is a process by which organizational goals are achieved by using resources.
  - Inputs: resources
  - Output: attainment of goals
  - Measure of success: outputs / inputs
- Management ≅ Decision Making
- Decision making: selecting the best solution from two or more alternatives

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The Nature of Managers' Work

Mintzberg's 10 Managerial Roles

Interpersonal

1. Figurehead
2. Leader
3. Liaison

Informational

4. Monitor
5. Disseminator
6. Spokesperson

Decisional

7. Entrepreneur
8. Disturbance handler
9. Resource allocator
10. Negotiator

Decision-Making Process

- Managers usually make decisions by following a four-step process (a.k.a. the scientific approach)
    1. Define the problem (or opportunity)
    2. Construct a model that describes the real-world problem.
    3. Identify possible solutions to the modeled problem and evaluate the solutions.
    4. Compare, choose, and recommend a potential solution to the problem.

Information Systems Support for Decision Making

- Group communication and collaboration
- Improved data management
- Managing data warehouses and Big Data
- Analytical support
- Overcoming cognitive limits in processing and storing information
- Knowledge management
- Anywhere, anytime support

An Early Decision Support Framework (by Gory and Scott-Morten, 1971)

	Type of Control		
Type of Decision	**Operational Control**	**Managerial Control**	**Strategic Planning**
Structured	1 Accounts receivable Accounts payable Order entry	2 Budget analysis Short-term forecasting Personnel reports Make-or-buy	3 Financial management Investment portfolio Warehouse location Distribution systems
Semistructured	4 Production scheduling Inventory control	5 Credit evaluation Budget preparation Plant layout Project scheduling Reward system design Inventory categorization	6 Building a new plant Mergers & acquisitions New product planning Compensation planning Quality assurance HR policies Inventory planning
Unstructured	7 Buying software Approving loans Operating a help desk Selecting a cover for a magazine	8 Negotiating Recruiting an executive Buying hardware Lobbying	9 R & D planning New tech. development Social responsibility planning

An Early Decision Support Framework

- Degree of Structuredness (Simon, 1977)
  - Decisions are classified as
    - Highly structured (a.k.a. programmed)
    - Semi-structured
    - Highly unstructured (i.e., nonprogrammed)
- Types of Control (Anthony, 1965)
  - Strategic planning (top-level, long-range)
  - Management control (tactical planning)
  - Operational control

The Concept of DSS

- DSS - interactive computer-based systems, which help decision makers utilize data and models to solve unstructured problems

(Gorry and Scott-Morton, 1971)

- Decision support systems couple the intellectual resources of individuals with the capabilities of the computer to improve the quality of decisions.
- DS as an Umbrella Term
- Evolution of DS into Business Intelligence

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A Framework for Business Intelligence (BI)

- BI is an evolution of decision support concepts over time
  - 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

Definition of BI

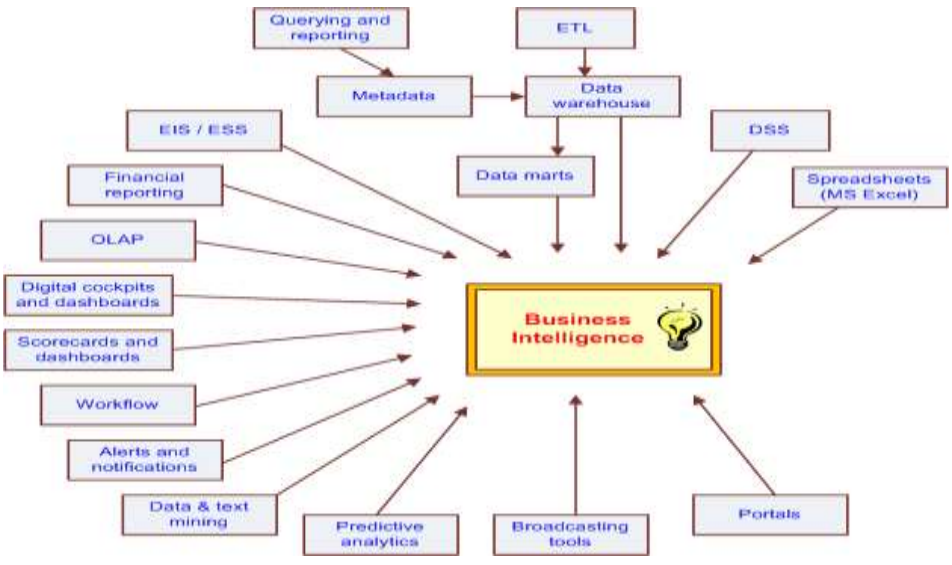
- BI is an umbrella term that combines architectures, tools, databases, analytical tools, applications, and methodologies
- BI is a content-free expression, so it means different things to different people
- BI's major objective is to enable easy access to data (and models) to provide business managers 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"
  - 2010s - Inclusion of AI and Data/Text Mining capabilities; Web-based Portals/Dashboards, Big Data, Social Media, Analytics
  - 2020s - yet to be seen

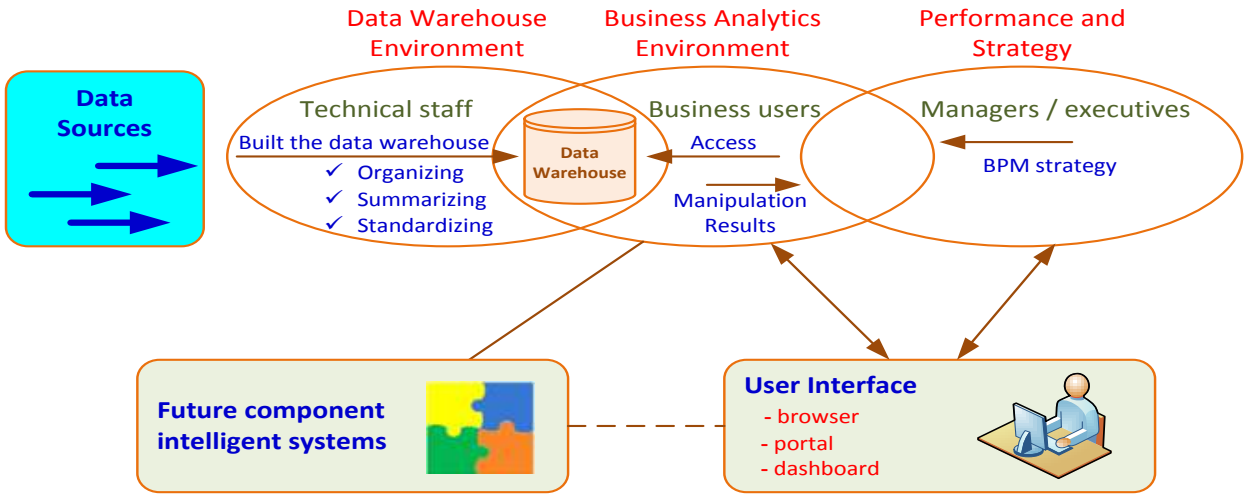
The Evolution of BI Capabilities



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



Business Value of BI Analytical Applications

- Customer segmentation
- Propensity to buy
- Customer profitability
- Fraud detection
- Customer attrition
- Channel optimization

DSS-BI Connections

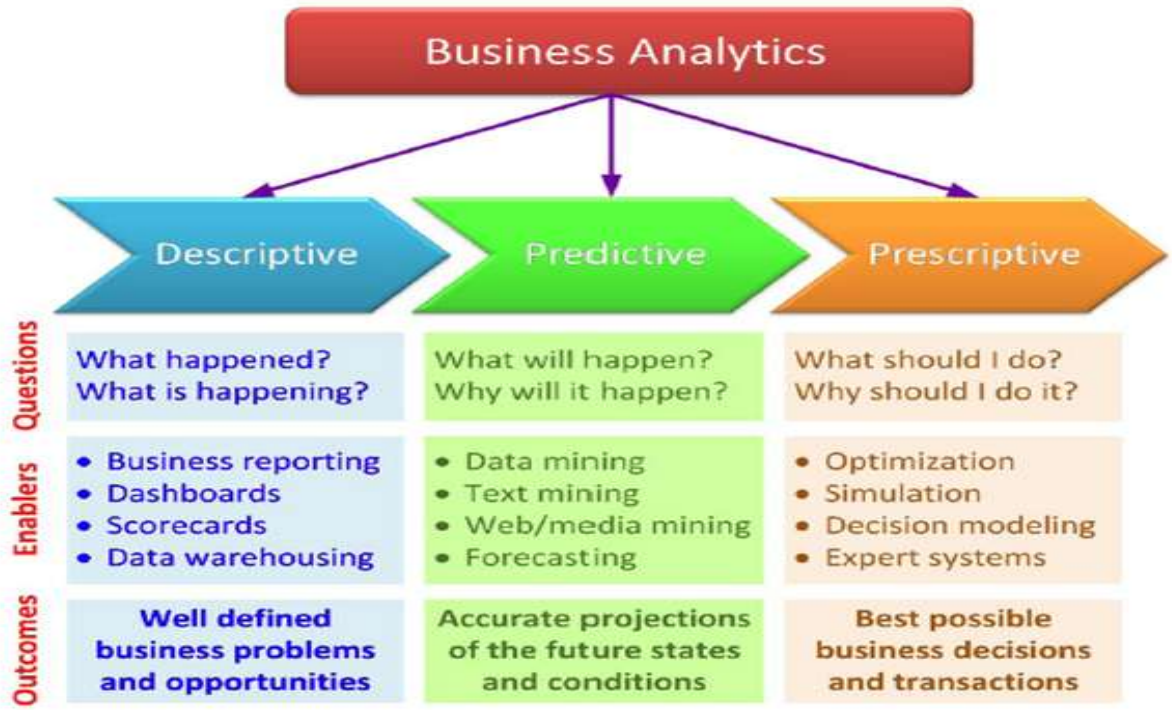
- Similarities and differences?
  - Similar architectures, data focus, ...
- Direct vs. indirect support
- Different target audiences
- Commercially available systems versus in-house development of solutions
- Origination – Industry vs. Academia
- So, is DSS = BI ?

Analytics Overview

- Analytics?
  - Something new or just a new name for ...
- A Simple Taxonomy of Analytics (proposed by INFORMS)
  - Descriptive Analytics
  - Predictive Analytics
  - Prescriptive Analytics

Analytics or Data Science?

Analytics Overview



Introduction to Big Data Analytics

- Big Data?
  - Not just big!
  - Volume
  - Variety
  - Velocity
- More of Big Data and related analytics tools and techniques are covered in Chapter 13.