UNIT- 2
BUSINESS INTELLIGENCE AND ANALYTICS

Dr. K. Dhanasekaran

WHAT IS A DECISION-MAKING PROCESS?

- A **decision-making process** is a series of **steps** taken by an individual to determine the best option or course of action to meet their needs.

- In a business context, it is a set of steps taken by managers in an enterprise to determine the planned path for business initiatives and to set specific actions in motion.
  - Ideally, business decisions are based on an analysis of objective facts, aided by the use of business intelligence and analytics tools.

- There are many different decision-making methodologies, but most share at least five steps in common:
  - Identify a business problem.
  - Seek information about different possible decisions and their likely effect.
  - Evaluate the alternatives and choose one of them.
  - Implement the decision in business operations.
  - Monitor the situation, gather data about the decision's impact and make changes if necessary.

- The most obviously troubling situations found in an organization can usually be identified as symptoms of underlying problems.
- These symptoms indicate that something is wrong with an organization.
- A successful manager doesn't just attack symptoms.
  - he works to uncover the factors that cause these symptoms.

TABLE 1 Symptoms and Their Real Causes

Symptoms	Underlying Problem
Low profits and/or declining sales	Poor market research
High costs	Poor design process; poorly trained employees
Low morale	Lack of communication between management and subordinates
High employee turnover	Rate of pay too low; job design not suitable
High rate of absenteeism	Employees believe that they are not valued

WHAT ARE THE PHASES OF DECISION-MAKING PROCESS SYSTEM IN BUSINESS INTELLIGENCE?

- In this mode, there are 3 phases:
  - intelligence, design and choice.

- The DSS basically helps the information system in the intelligence phase where the objective is to identify the problem and then go to the design phase for solution.
- The choice of selection criterion varies from problem to problem.

- As against these phases, Rubenstein and Haberstroh have proposed five phases-
  - recognition of problem or need for a decision
  - analysis and statement of alternatives
  - choice among the alternatives
  - communication and implementation of decision
  - follow-up and feedback results of decision.

WHAT IS THE CONCEPT OF DECISION-MAKING AND THE PROCESS OF DECISION-MAKING?

- Decision making is the process of making choices by identifying a decision, gathering information, and assessing alternative resolutions.
- Using a step-by-step decision-making process can help you make more deliberate, thoughtful decisions by organizing relevant information and defining alternatives.

7 STEPS IN THE PROCESS OF DECISION-MAKING

- Robert Frost wrote,
  - “Two roads diverged in a wood, and I—I took the one less traveled by, and that has made all the difference.”
  - But unfortunately, not every decision is as simple as “Let’s just take this path and see where it goes,” especially when you’re making a decision related to your business.
- Whether you manage a small team or are at the head of a large corporation, your success and the success of your company depend on you
  - making the right decisions—and
  - learning from the wrong decisions.

1. Identify the decision

- To make a decision, you must first identify the problem you need to solve or the question you need to answer.
  - Clearly define your decision.
  - If you misidentify the problem to solve, or if the problem you've chosen is too broad, you'll knock the decision train off the track before it even leaves the station.
- If you need to achieve a specific goal from your decision, make it measurable and timely.

2. Gather relevant information

- Once you have identified your decision, it's time to gather the information relevant to that choice.
- Do an internal assessment, seeing where your organization has succeeded and failed in areas related to your decision.
- Also, seek information from external sources, including studies, market research, and, in some cases, evaluation from paid consultants.
- Keep in mind, you can become bogged down by too much information and that might only complicate the process.

3. Identify the alternatives

- With relevant information now at your fingertips, identify possible solutions to your problem.
- There is usually more than one option to consider when trying to meet a goal.
- For example, if your company is trying to gain more engagement on social media,
  - your alternatives could include paid social advertisements,
  - a change in your organic social media strategy,
  - or a combination of the two.

4. Weigh the evidence

- Once you have identified multiple alternatives, weigh the evidence for or against said alternatives.
- See what companies have done in the past to succeed in these areas, and take a good look at your organization's own wins and losses.
- Identify potential pitfalls for each of your alternatives, and weigh those against the possible rewards.

5.Choose among alternatives

- Here is the part of the decision-making process where you actually make the decision.
- Hopefully, you've identified and clarified what decision needs to be made, gathered all relevant information, and developed and considered the potential paths to take.
- You should be prepared to choose.

6. Take action

- Once you've made your decision, act on it!
- Develop a plan to make your decision tangible and achievable.
- Develop a project plan related to your decision, and then assign tasks to your team.

7. Review your decision

- After a predetermined amount of time—which you defined in step one of the decision-making process—take an honest look back at your decision.
- Did you solve the problem?
- Did you answer the question?
- Did you meet your goals?
- If so, take note of what worked for future reference.
- If not, learn from your mistakes as you begin the decision-making process again.

BUSINESS INTELLIGENCE AND ANALYSTICS

UNIT -II

Decision Making Process

Decision-making is the process of choosing between different alternatives

The decision-making process can be broken down into three steps:

- Analysis of the current situation.
- Presentation of the data to the manager, who can take the data and make a decision.
- Applying the final decision.

What Are The Effective Steps In The Decision-making Process That Uses Bi?

- Gathering information
- Design and analyze
- Select and implement using ad hoc query, what-if, and forecasting.
- Do evaluations using the vital tools.

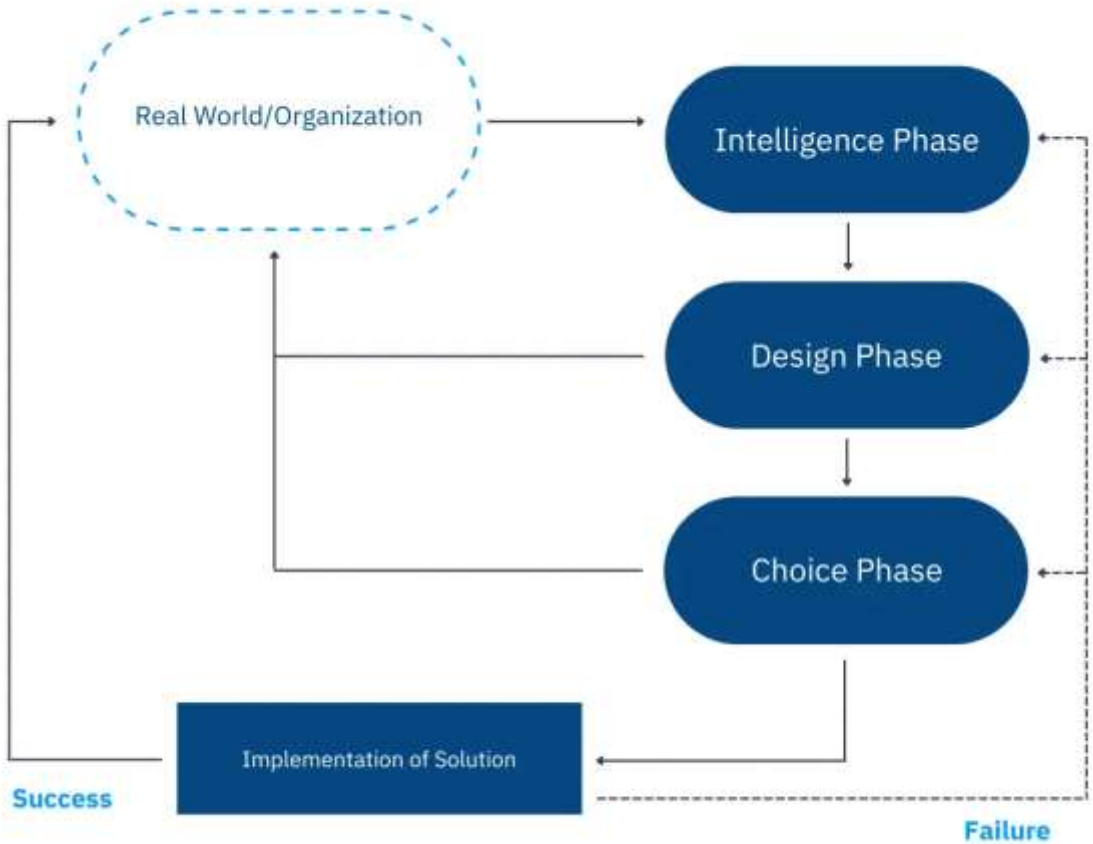
Cont..


DASHBOARD Energy consumption BETA
Electr. 1kWh: $ 0,21
Gas 1w3: $ 0,12
Date Choice: 27 November
MENU
WEEK
MONTH
YEAR
Year budget $ 700
2019
Dashboard
Costs
Equipment
Rooms
Emissions
ELECTRO / GAS
72%
Total:
$ 798,83
28%
Electro
Gas
CHANGES TO COSTS
$ 798,83
$ 593,27
2018
2019
34,65%
+/- IN PERCENTAGES
EVALUATION OF COSTS
$900
$800
$700
$600
$500
$400
$300
$200
$100
$-
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Statistics
Date Choice
EQUIPMENT ACTIVITY
Ovens and stoves
$ 282
Heating Air conditioning
$ 223
Ventilation
$ 89
Dough mixers
$ 87
Refrigeration
$ 69
Other
$ 50
BUDGET LOAD
100
114,29 %
BUDGET: $ 700
year
CO2 EMISSIONS / ENERGY CONSUMPTION
CO2 EMISSIONS
FACT
NORM
3674kg
5000kg
ENERGY CONSUMPTION In
ELECTRIC POWER
GAS
2729kW
1883kWh

Process of Decision Making (or) Steps Involved In Decision Making

Figure 4.3 Process of Decision Making

Phases of the Decision-Making Process



Phases of the Decision-Making Process

- Simon's model defines four phases of decision-making process:
  - Intelligence Phase
    - decision makers examine reality and
    - try to identify problems or opportunities correctly.
    - Defining organizational objectives
    - Data collection
    - Problem identification and classification
  - Design Phase
    - to define and construct a model which represent a system, by defining relationships between collected variables.
    - Once validate the model and define the criteria of choice
    - search for several possible solutions for the defined problem (opportunity).
    - wrap up the design phase by predicting the future outcomes for each alternative.

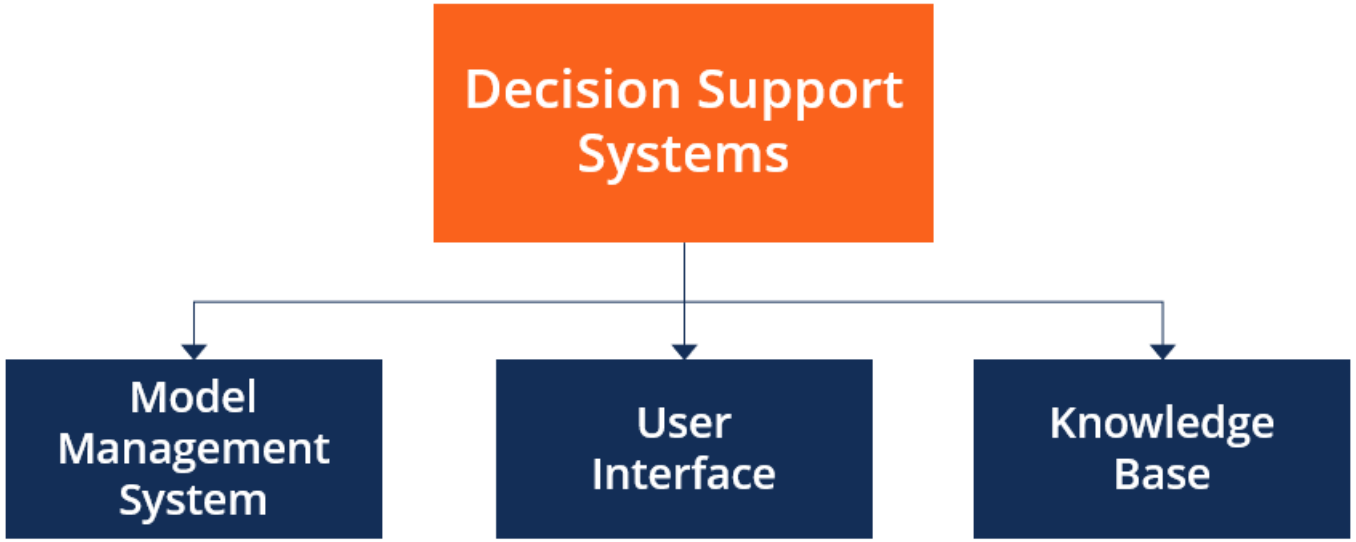
Contd.,

- Choice Phase
  - The end product of this phase is a decision.
  - Decision is made by selecting and evaluating alternatives defined in previous step.
- Implementation Phase
  - Implementation can be either successful or not.
  - Successful implementation results with a solution to the defined problem.
  - On the other hand, failure brings us back to the earlier phase.

Decision support system

- Decision support system (DSS) - activities that require judgment, determination, and a sequence of actions
- **Purpose of a Decision Support System**
  - Gathering and analyzing data
  - sales projection, for inventory and operations-related data, and to present information to customers in an easy-to-understand manner.

Components of DSS



Components of DSS

- **1. Model Management System**

  used S=stores models

  financial health of the organization and forecasting demand

2. User Interface

tools that help the end-user

3. Knowledge Base

internal sources and External source

What are the capabilities of decision support system?

- **Decision-making, timely problem-solving, and improved efficiency**

- **What are three features or capabilities of a DSS?**

  Support for individuals and groups. Less structured problems often requires the involvement of several individuals from different departments and organization level. Support for interdependent or sequential decisions. Support for intelligence, design, choice, and implementation.

Decision Support System - Classification

- Holsapple and Whinston classify DSS into the following six frameworks: Text-oriented DSS, Database-oriented DSS, Spreadsheet-oriented DSS, Solver-oriented DSS, Rule-oriented DSS, and Compound DSS.
- A compound DSS is the most popular classification for a DSS. It is a hybrid system that includes two or more of the five basic structures described by Holsapple and Whinston.

CHAPTER 3

Decision Support Systems:
An Overview

Decision Support Systems

- **Decision Support Methodology**
- **Technology Components**
- **Development**

Decision Support Systems: An Overview

- **Capabilities**
- **Structure**
- **Classifications**

DSS Configurations

- Supports individuals and teams
- Used repeatedly and constantly
- Two major components: data and models
- Web-based
- Uses subjective, personal, and objective data
- Has a simulation model
- Used in public and private sectors
- Has what-if capabilities
- Uses quantitative and qualitative models

DSS Definitions

- **Little (1970)**
  "model-based set of procedures for processing data and judgments to assist a manager in his decision making"
  <u>Assumption</u>: that the system is computer-based and extends the user's capabilities.

- **Alter (1980)**
  Contrasts DSS with traditional EDP systems (Table 3.1)

TABLE 3.1 DSS versus EDP.

Dimension	*DSS*	*EDP*
Use	Active	Passive
User	Line and staff management	Clerical
Goal	Effectiveness	Mechanical efficiency
Time Horizon	Present and future	Past
Objective	Flexibility	Consistency

Source: Alter [1980].

- **Moore and Chang (1980)**

1. Extendible systems
2. Capable of supporting ad hoc data analysis and decision modeling
3. Oriented toward future planning
4. Used at irregular, unplanned intervals

- **Bonczek et al. (1980)**

A computer-based system consisting of

1. A language system -- communication between the user and DSS components
2. A knowledge system
3. A problem-processing system--the link between the other two components

- **Keen (1980)**

  DSS apply "to situations where a 'final' system can be developed only through an adaptive process of learning and evolution"

- **Central Issue in DSS**

  support and improvement of decision making

TABLE 3.2 Concepts Underlying DSS Definitions.

Source	DSS Defined in Terms of
Gorry and Scott Morton [1971]	Problem type, system function (support)
Little [1970]	System function, interface characteristics
Alter [1980]	Usage pattern, system objectives
Moore and Chang [1980]	Usage pattern, system capabilities
Bonczek, et al. [1996]	System components
Keen [1980]	Development process

Working Definition of DSS

- **A DSS is an interactive, flexible, and adaptable CBIS, specially developed for supporting the solution of a non-structured management problem for improved decision making. It utilizes data, it provides easy user interface, and it allows for the decision maker's own insights**

- **DSS may utilize models, is built by an interactive process (frequently by end-users), supports all the phases of the decision making, and may include a knowledge component**

Characteristics and Capabilities of DSS (Figure 3.1)

1. Provide support in semi-structured and unstructured situations, includes human judgment and computerized information
2. Support for various managerial levels
3. Support to individuals and groups
4. Support to interdependent and/or sequential decisions
5. Support all phases of the decision-making process
6. Support a variety of decision-making processes and styles

(more)

7. Are adaptive
8. Have user friendly interfaces
9. Goal: improve effectiveness of decision making
10. The decision maker controls the decision-making process
11. End-users can build simple systems
12. Utilizes models for analysis
13. Provides access to a variety of data sources, formats, and types

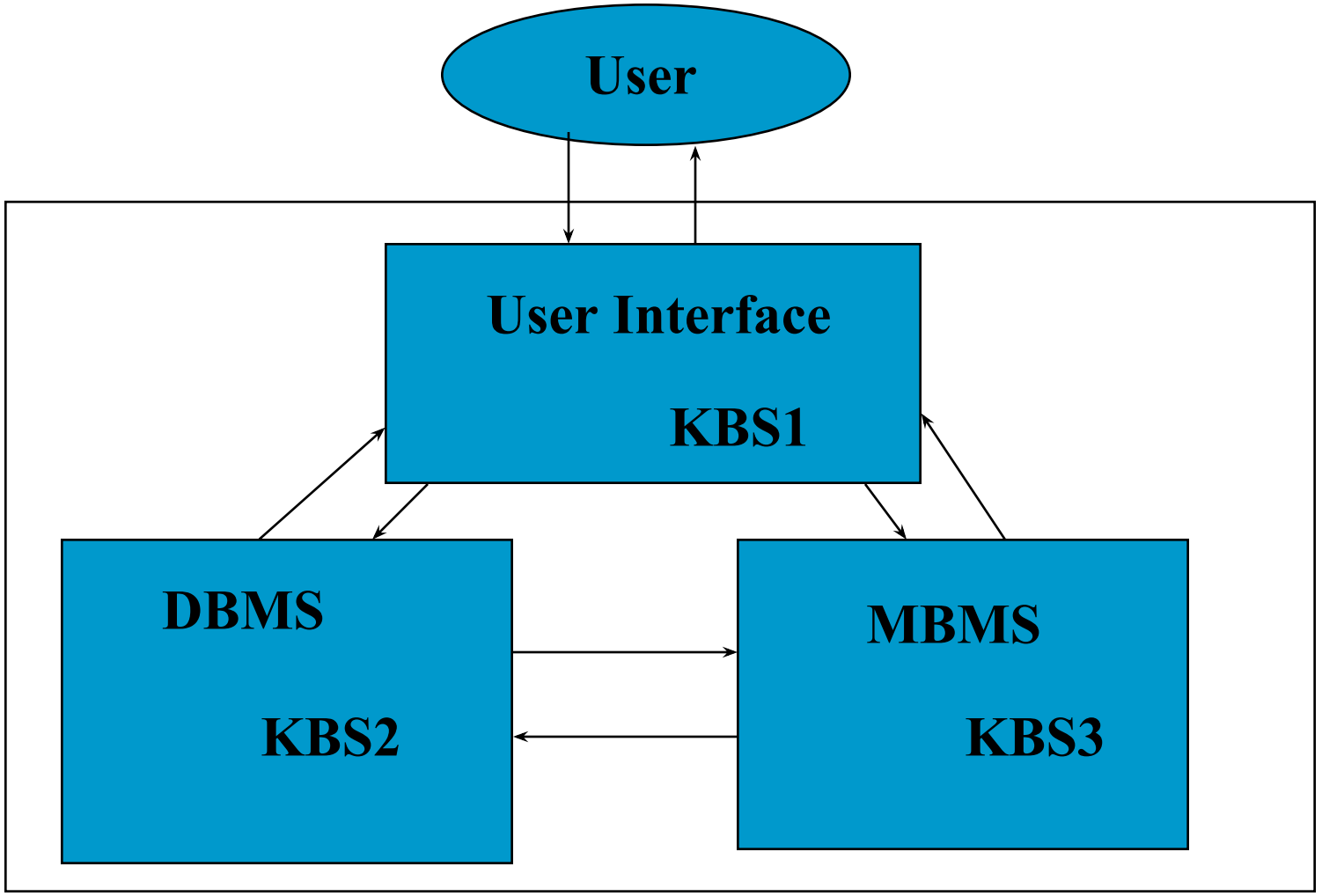
Decision makers can make better, more consistent decisions in a timely manner

DSS Components

1. Data Management Subsystem
2. Model Management Subsystem
3. Knowledge-based (Management) Subsystem
4. User Interface Subsystem
5. The User

(Figure 3.2)

DSS Components



The Data Management Subsystem

- **DSS database**
- **Database management system**
- **Data directory**
- **Query facility**
  (Figure 3.3)

DSS In Focus 3.2: The Capabilities of DBMS in a DSS

- Captures/extracts data for inclusion in a DSS database
- Updates (adds, deletes, edits, changes) data records and files
- Interrelates data from different sources
- Retrieves data from the database for queries and reports
- Provides comprehensive data security (protection from unauthorized access, recovery capabilities, etc.)
- Handles personal and unofficial data so that users can experiment with alternative solutions based on their own judgment
- Performs complex data manipulation tasks based on queries
- Tracks data use within the DSS
- Manages data through a data dictionary

DSS Database Issues

- Data warehouse
- Data mining
- Special independent DSS databases
- Extraction of data from internal, external, and private sources
- Web browser data access
- Web database servers
- Multimedia databases
- Special GSS databases (like Lotus Notes / Domino Server)
- Online Analytical Processing (OLAP)
- Object-oriented databases
- Commercial database management systems (DBMS)

The Model Management Subsystem

- **Analog of the database management subsystem (Figure 3.4)**

- **Model base**
- **Model base management system**
- **Modeling language**
- **Model directory**
- **Model execution, integration, and command processor**

Model Management Issues

- **Model level: Strategic, managerial (tactical), and operational**
- **Modeling languages**
- **Lack of standard MBMS activities. WHY?**
- **Use of AI and fuzzy logic in MBMS**

The Knowledge Based (Management) Subsystem

- **Provides expertise in solving complex unstructured and semi-structured problems**
- **Expertise provided by an expert system or other intelligent system**
- **Advanced DSS have a *knowledge* based (*management)* component**
- **Leads to intelligent DSS**
- **Example: Data mining**

The User Interface (Dialog) Subsystem

- **Includes all communication between a user and the MSS**
- **Graphical user interfaces (GUI)**
- **Voice recognition and speech synthesis possible**

- **To most users, the user interface *is* the system**

The User

Different usage patterns for the *user*, the *manager*, or the *decision maker*

- **Managers**
- **Staff specialists**
- **Intermediaries**
  1. ***Staff assistant***
  2. ***Expert tool user***
  3. ***Business (system) analyst***
  4. ***GSS Facilitator***

DSS Hardware

Evolved with computer hardware and software technologies

Major Hardware Options

- **Mainframe**
- **Workstation**
- **Personal computer**
- **Web server system**
  - **Internet**
  - **Intranets**
  - **Extranets**

Distinguishing DSS from Management Science and MIS

- DSS is a problem-solving tool and is frequently used to address ad hoc and unexpected problems
- Different than MIS
- DSS evolve as they develop

DSS Classifications

Alter's Output Classification (1980)

- **Degree of action implication of system outputs (supporting decision) (Table 3.3)**

- **Holsapple and Whinston's Classification**
  1. **Text-oriented DSS**
  2. **Database-oriented DSS**
  3. **Spreadsheet-oriented DSS**
  4. **Solver-oriented DSS**
  5. **Rule-oriented DSS**
  6. **Compound DSS**

Intelligent DSS Categories

- **Descriptive**
- **Procedural**
- **Reasoning**
- **Linguistic**
- **Presentation**
- **Assimilative**

Alternate Categories of Intelligent DSS

- Symbiotic
- Expert-system based
- Adaptive
- Holistic

Other Classifications

Institutional DSS vs. Ad Hoc DSS

- **Institutional DSS deals with decisions of a recurring nature**
- **Ad Hoc DSS deals with specific problems that are usually neither anticipated nor recurring**

Other Classifications (cont'd.)

- **Degree of nonprocedurality (Bonczek et al., 1980)**
- **Personal, group, and organizational support (Hackathorn and Keen, 1981)**
- **Individual versus group support systems (GSS)**
- **Custom-made versus ready-made systems**

Summary

- **Fundamentals of DSS**
- **Components of DSS**
- **Major capabilities of the DSS components**
- **Major DSS categories**

Unit – II

Phases of the Decision in Business Intelligence Systems

Topics Covered

- Introduction and Definitions
- Phases of the Decision Making Process
  - Intelligence Phase
  - Design Phase
  - Choice Phase
  - Implementation Phase
- Decision Support Systems Capabilities
- Decision Support Systems Classification
- Decision Support Systems Components

What Is Decision Making Process?

- This process is a way of thinking, a way of seeing the world, and a method of arriving at what you believe are the best possible decisions.
- **The decision-making process can be broken down into three steps:**
  - Analysis of the current situation.
  - Presentation of the data to the manager, who can take the data and make a decision.
  - Applying the final decision.

Contd.,


Adapt it to your needs and capture your audience's attention
Benefits
Defined Project
Adapt it to your needs and capture your audience's attention
Adapt it to your needs and capture your audience's attention
Stages
Predictive Analytics Steps
1.2 Data Collection
Adapt it to your needs and capture your audience's attention
Statistics
Data Analysis
Adapt it to your needs and capture your audience's attention
Adapt it to your needs and capture your audience's attention

What Are The Effective Steps In The Decision-making Process That Uses Bi?

- **Gathering information**
- **Design and analyze**
- **Select and implement using ad hoc query, what-if, and forecasting.**
- **Do evaluations using the vital tools.**

Contd.,


DASHBOARD Energy consumption BETA
Electr. 1kWh: $ 0,21
Gas 1м3: $ 0,12
Date Choice: 27 November
MENU
WEEK
MONTH
YEAR
Year budget $ 700
2019
Dashboard
Costs
Equipment
Rooms
Emissions
ELECTRO / GAS
72%
Total:
$ 798,83
28%
Electro
Gas
CHANGES TO COSTS
$ 798,83
$ 593,27
2018
2019
34,65%
+/- IN PERCENTAGES
EVALUATION OF COSTS
$900
$800
$700
$600
$500
$400
$300
$200
$100
$-
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Statistics
Date Choice
EQUIPMENT ACTIVITY
Ovens and stoves
$ 282
Heating Air conditioning
$ 223
Ventilation
$ 89
Dough mixers
$ 87
Refrigeration
$ 69
Other
$ 50
BUDGET LOAD
100
114,29 %
BUDGET: $ 700
year
CO2 EMISSIONS / ENERGY CONSUMPTION
CO2 EMISSIONS
FACT
NORM
3674kg
5000kg
ENERGY CONSUMPTION in
ELECTRIC POWER
GAS
2729kW
1883kWh

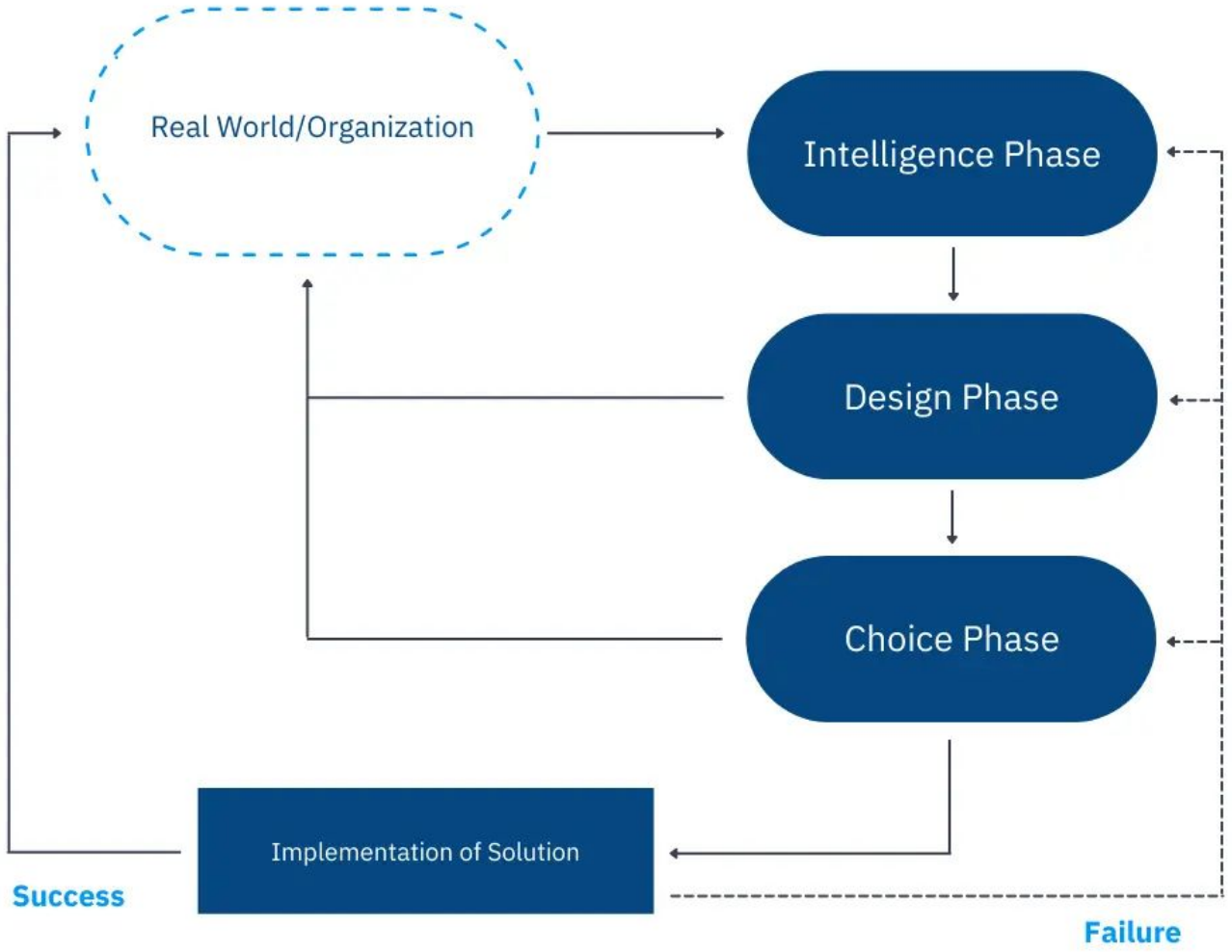
Phases of the Decision-Making Process

- Simon's model defines four phases of decision-making process:
  - Intelligence Phase
    - decision makers examine reality and
    - try to identify problems or opportunities correctly.
    - Defining organizational objectives
    - Data collection
    - Problem identification and classification
  - Design Phase
    - to define and construct a model which represent a system, by defining relationships between collected variables.
    - Once validate the model and define the criteria of choice
    - search for several possible solutions for the defined problem (opportunity).
    - wrap up the design phase by predicting the future outcomes for each alternative.

Contd.,

- Choice Phase
  - The end product of this phase is a decision.
  - Decision is made by selecting and evaluating alternatives defined in previous step.
- Implementation Phase
  - Implementation can be either successful or not.
  - Successful implementation results with a solution to the defined problem.
  - On the other hand, failure brings us back to the earlier phase.

Contd.,


Real World/Organization
Intelligence Phase
Design Phase
Choice Phase
Implementation of Solution
Success
Failure

References

- https://www.epcgroup.net/steps-involved-in-decision-making-process-using-bi/
- https://unitfly.com/decision-making-process/
- https://www.filehorse.com/download-microsoft-power-bi-desktop-64/ (tool)