DECISION MAKING

INTRODUCTION

Decision making is a key managerial responsibility

Decision making is a choice amongst alternatives

Steps involved:

- Defining the problem
- Setting the objectives
- Collecting data
- Analyzing data/Generating alternatives
- Evaluate and select the best alternative

TYPES OF DECISIONS

Based on Simon's idea decisions can be:

Structured decisions which are for routine and typically repetitive problems for which standard solution method exists

Unstructured decisions which are for fuzzy, complex problems for which there are no cut-and-dried solution methods

Semi structured decisions which are for problems having some structured elements and some unstructured elements

DECISION TABLE

Possible for only structured/programmed decisions

It is a non-graphical way of representing the steps involved in making a decision

It is usually easier to construct a decision tree first from the description of how a decision is made and then create the decision table

It consists of some conditions, rules and actions

Conditions – these are created from each decision question. Only one possible answer from each question is selected for use in the table. Each answer corresponds to one of each pair of branches in the tree.

Actions – these are the final outcomes of the decision process and are the branch ends or outcomes of the decision tree

Rules – these give the combinations of conditions that lead to the final actions. Y (for Yes) and N (for No) characters in the table normally indicate which combinations of conditions are allowed

DISCOUNTING POLICY OF A PHONE CARD COMPANY

CONDITIONS AND ACTIONS	RULES			
	1	2	3	4
Paid within 2 weeks	Y	Y	Y	N
Order > $35	Y	N	N	–
$20 <= Order <= $35	N	Y	N	–
Order < $20	N	N	Y	–
5% discount	X			
4% discount		X		
No discount			X	X

DECISION TREES

A decision tree is a graphical way of representing the steps involved in making a decision.

A user can look at a decision tree that describes a decision process they use and identify any errors in the diagram.

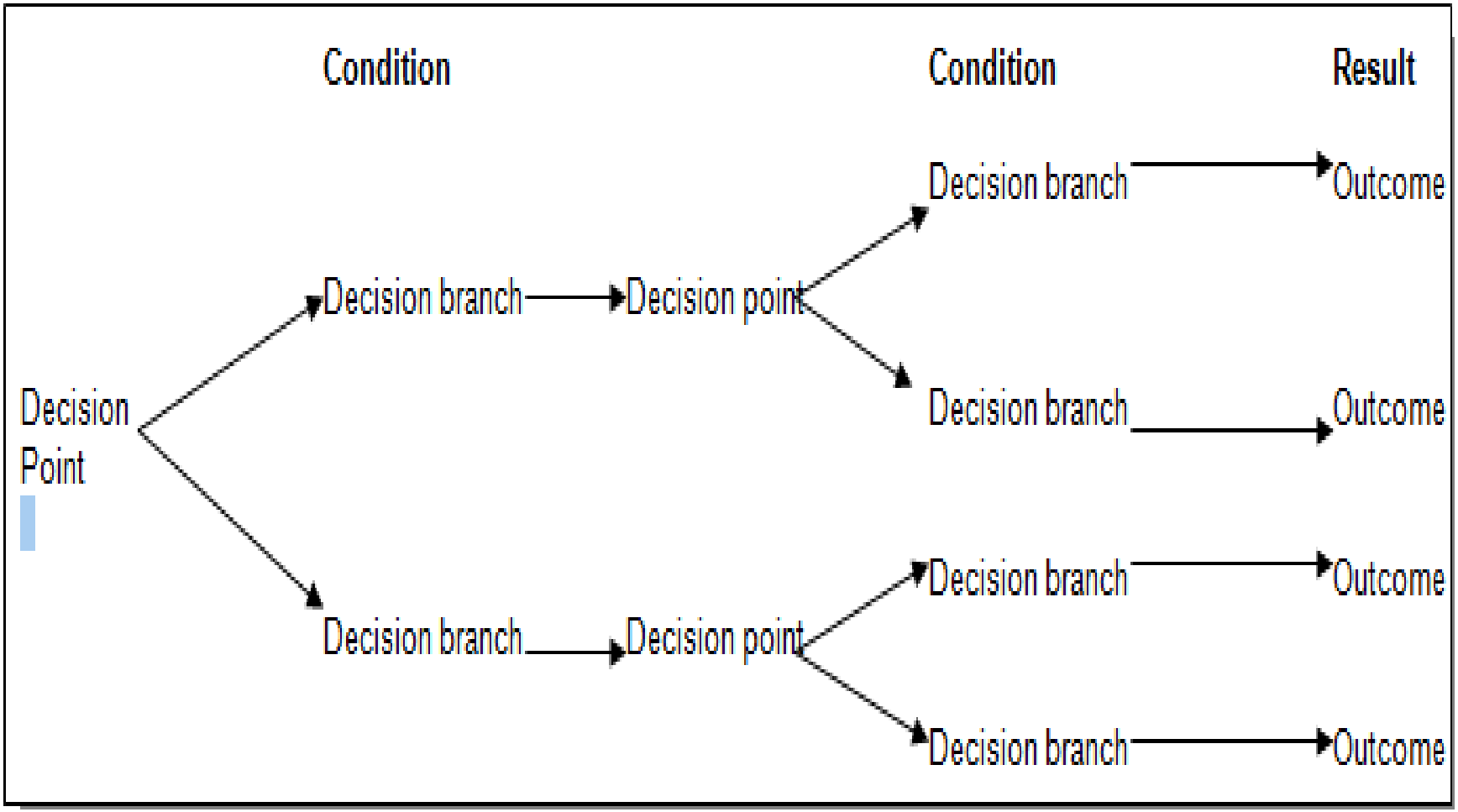
Each horizontal 'branch' of the tree represents the result of a decision or a series of decisions.

The 'roots' where the branches join are the decision points – each point represents a separate decision, a question that much be answered.

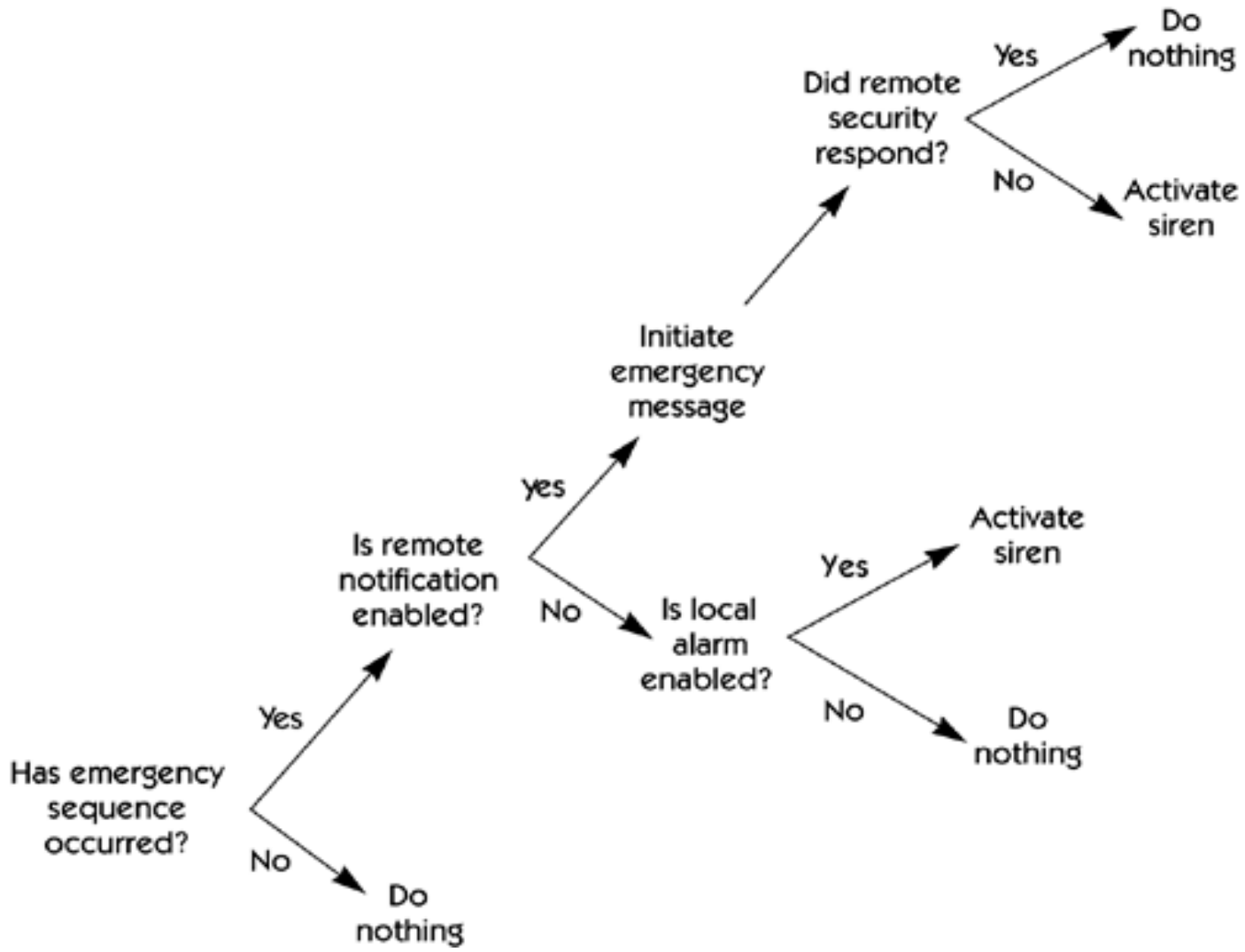
Decision points typically have two or three branches.

At the ends of the branches are the outcomes of the decision process

THE GENERAL ARRANGEMENT OF A DECISION TREE IS AS SHOWN BELOW

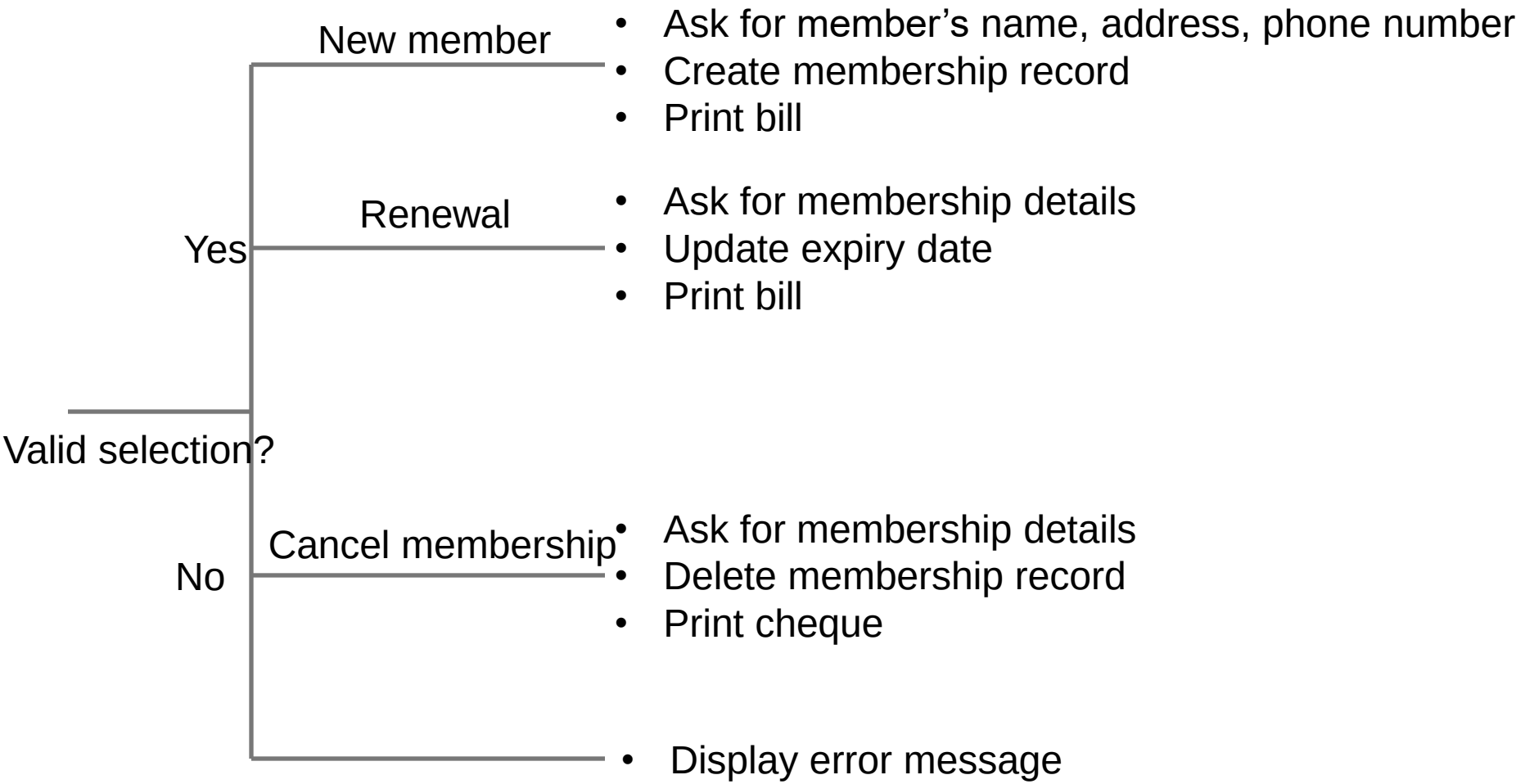


DECISION TREE TO DESCRIBES THE EMERGENCY SEQUENCE



A Library Membership Software(LMS) should support the following three options: new member, renewal, and cancel membership. When the new member option is selected, the software should ask for the member's name, address, and phone number. If proper information is entered, the software should create a membership record for the new member and print a bill for the annual membership charge and the security deposit payable. If the renewal option is chosen, the LMS should ask for the member's name and the membership number. If the member details entered are valid, then the membership expiry date in the membership record should be updated and the annual membership charge payable by the member should be printed. If the cancel membership option is selected

DECISION TREE FOR LMS



DECISION TABLE FOR LMS

Conditions				
Valid selection	NO	YES	YES	YES
New member	-	YES	NO	NO
Renewal	-	NO	YES	NO
Cancellataion	-	NO	NO	YES
Actions				
Display error message	×			
Ask for member's details		×		
Build customer record		×		
Generate bill		×	×	
Ask for membership details			×	×
Update expiry date			×	
Print cheque				×
Delete record				×

SIMON'S DECISION MAKING PROCESS

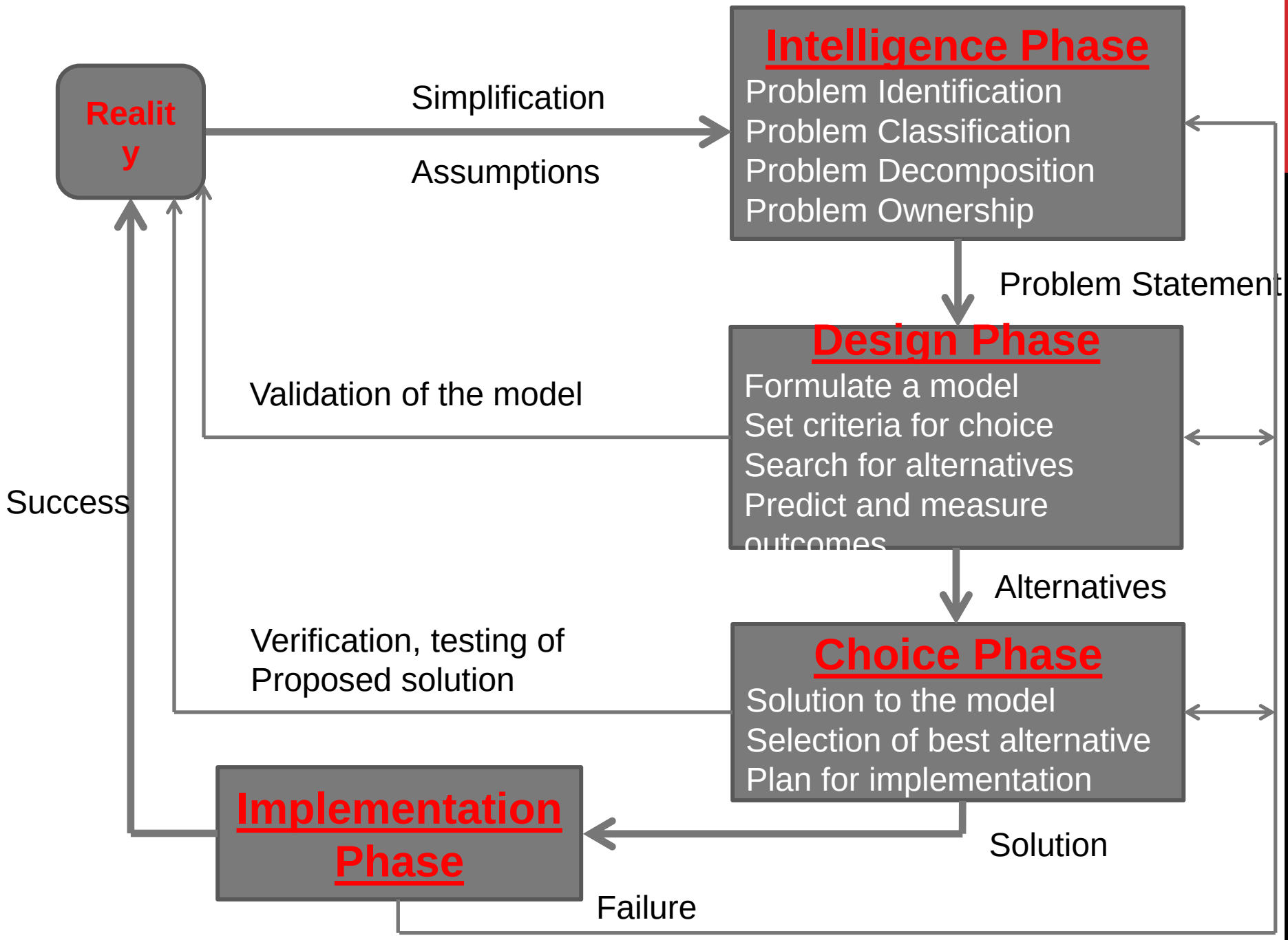
Simon describes the decision making process with a four phase process of:

Intelligence phase: searching for conditions that call for decisions

Design phase: inventing, developing and analyzing possible course of action

Choice phase: selecting a course of action from those available

Implementation phase: once a proposed solution seems reasonable execution starts and result is either a success or failure


Realit
y
Simplification
Assumptions
Intelligence Phase
Problem Identification
Problem Classification
Problem Decomposition
Problem Ownership
Problem Statement
Design Phase
Formulate a model
Set criteria for choice
Search for alternatives
Predict and measure
outcomes
Validation of the model
Success
Alternatives
Verification, testing of
Proposed solution
Choice Phase
Solution to the model
Selection of best alternative
Plan for implementation
Implementation
Phase
Solution
Failure

THE INTELLIGENCE PHASE

Problem (or opportunity) identification

- Begins with the identification of organization goals and objectives related to an issue of concern and determination of whether they are being met
- Determine whether a problem exists, identify its symptoms, determine its magnitude and explicitly define it

Problem classification

- It is the conceptualization of a problem in an attempt to place it in a definable category
- It helps in leading to a standard solution approach
- Ex.

Classifying according to the degree of structuredness evident in the problem

Problem decomposition

- Many complex problems can be divided into sub-problems
- Solving these simpler sub-problems helps in solving the complex problem

Problem ownership

- It is important to understand whether the problem is a controllable or uncontrollable factor and if organization has the ability to solve it

THE DESIGN PHASE

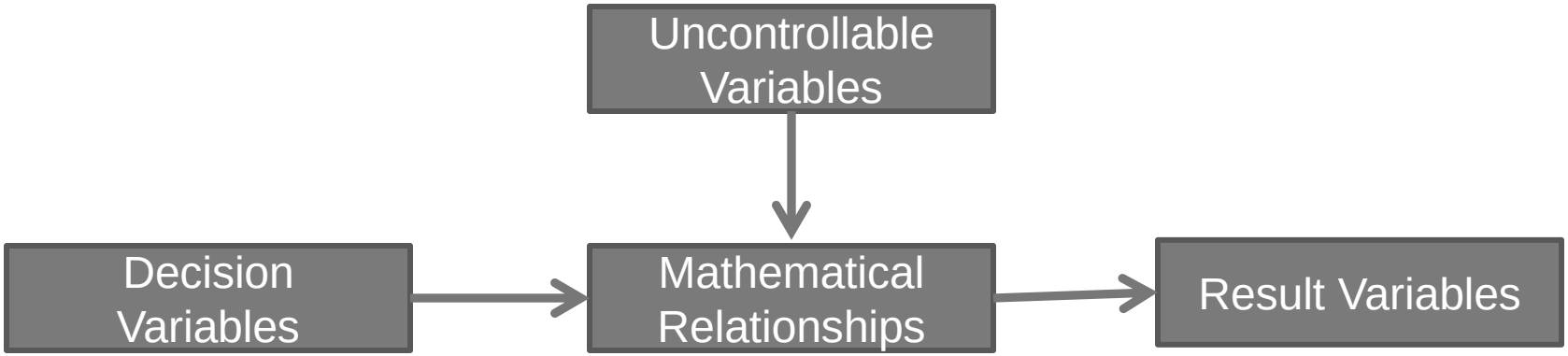
The design phase involves finding and analyzing possible course of action

These include understanding the problem and testing solutions for feasibility

A model of the decision making problem is constructed, tested and validated

Formulate a model

- Modeling involves conceptualization of the problem and its abstraction to quantitative and/or qualitative forms



GENERAL STRUCTURE OF A QUANTITATIVE MODEL

Set criteria for choice

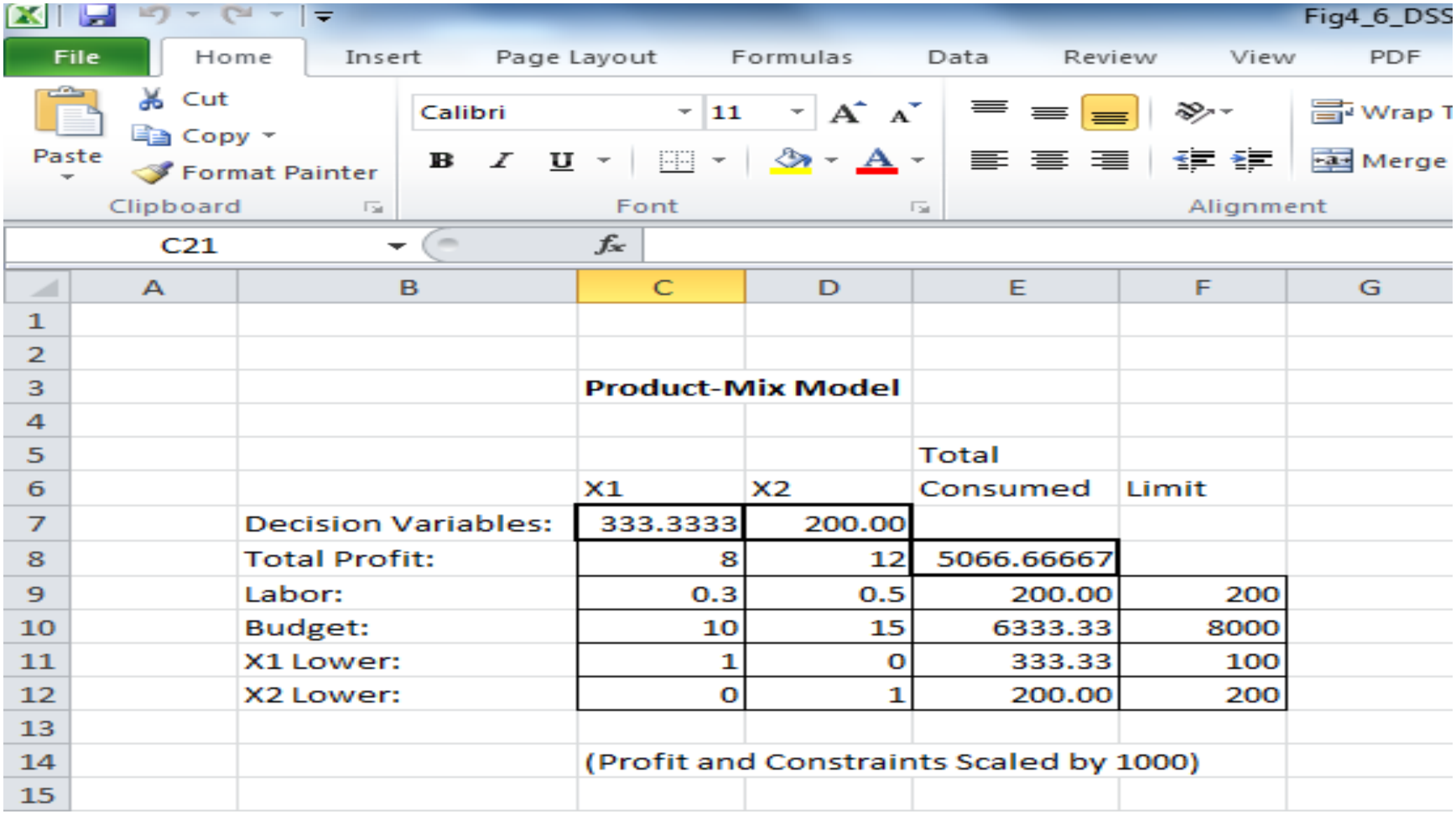
- Selection of a principle of choice describes the acceptability of a solution approach

Search for alternatives

- Generating alternatives is a lengthy process that involves searching and creativity
- It takes time and costs money
- It is important to decide when to stop generating alternatives

Predict and measure outcomes

- To evaluate and compare alternatives, it is necessary to predict the future outcome f each proposed alternative
- It is done under three broad categories:
    - Decision making under certainty
    - Decision making under risk
    - Decision making under uncertainty



	A	B	C	D	E	F	G
1							
2							
3			**Product-Mix Model**				
4							
5					Total		
6			X1	X2	Consumed	Limit	
7		Decision Variables:	333.3333	200.00			
8		Total Profit:	8	12	5066.66667		
9		Labor:	0.3	0.5	200.00	200	
10		Budget:	10	15	6333.33	8000	
11		X1 Lower:	1	0	333.33	100	
12		X2 Lower:	0	1	200.00	200	
13							
14			(Profit and Constraints Scaled by 1000)				
15							

THE CHOICE PHASE

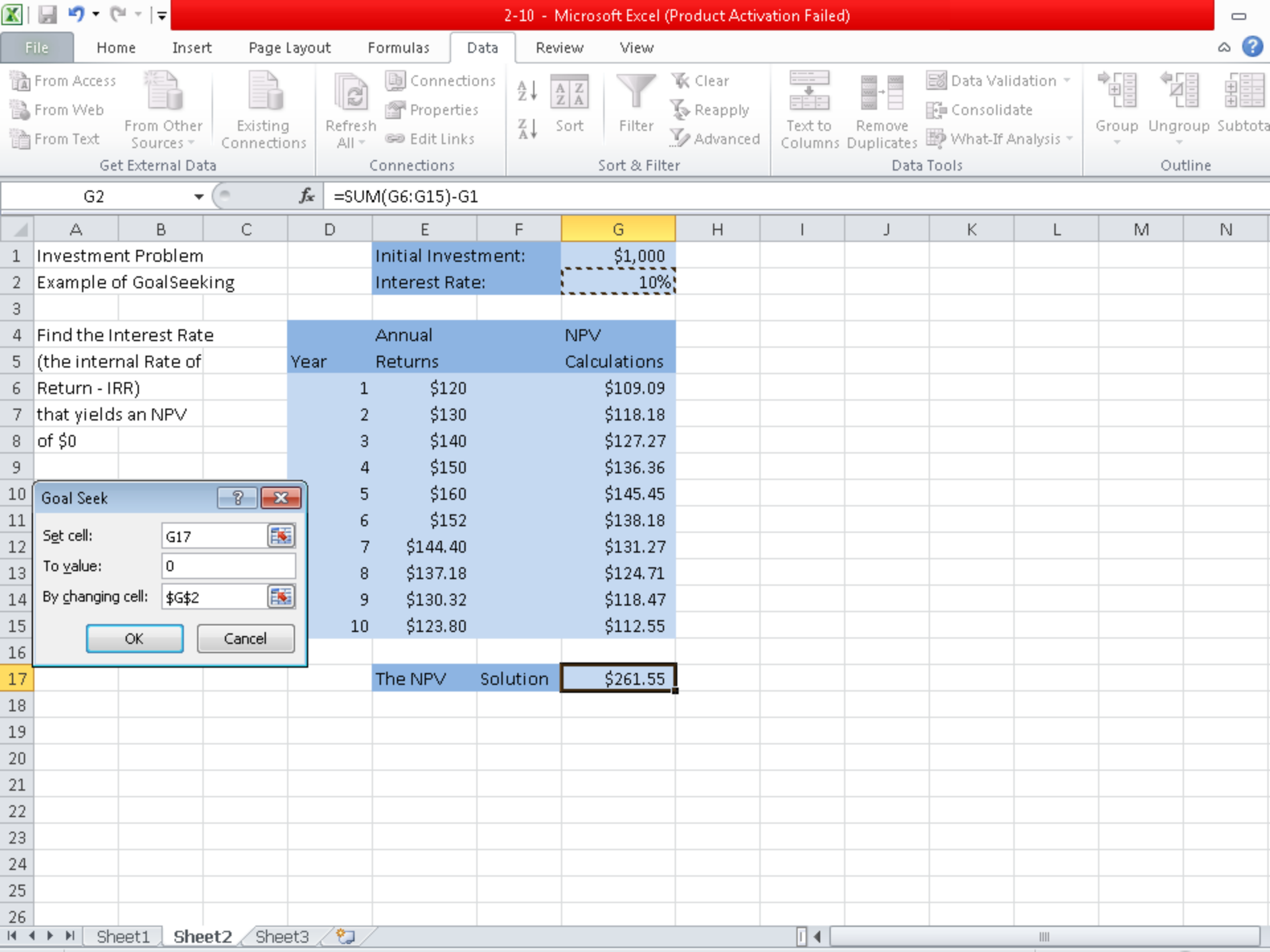
The choice phase is the one in which the actual decision is made, i.e., the commitment to follow a certain course of action is made. The boundary between the design and choice phase is unclear as one can jump frequently between this two phases. It includes,

Solution to the model

Selection of best alternative(s)

Plan for implementation

	A	B	C	D	E	F	G
1							
2							
3							
4							
5							
6							
7	Unit revenue	$ 1.20					
8	Unit cost	$ 0.60					
9							
10	Initial sales	120					
11	Sales growth rate	0.04					
12							
13	Annual net profit	$ 182					
14							
15							
16							
17			Cash Flow Model for 1996				
18						Annual	
19		Qtr1	Qtr2	Qtr3	Qtr4	Total	
20	Sales	120	125	130	135	510	
21	Revenue	$ 144	$ 150	$ 156	$ 162	$ 611	
22	Variable cost	$ 72	$ 75	$ 78	$ 81	$ 306	
23	Fixed cost	$ 30	$ 31	$ 31	$ 32	$ 124	
24	Net profit	$ 42	$ 44	$ 47	$ 49	$ 182	
25							


2-10 - Microsoft Excel (Product Activation Failed)
File
Home
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Review
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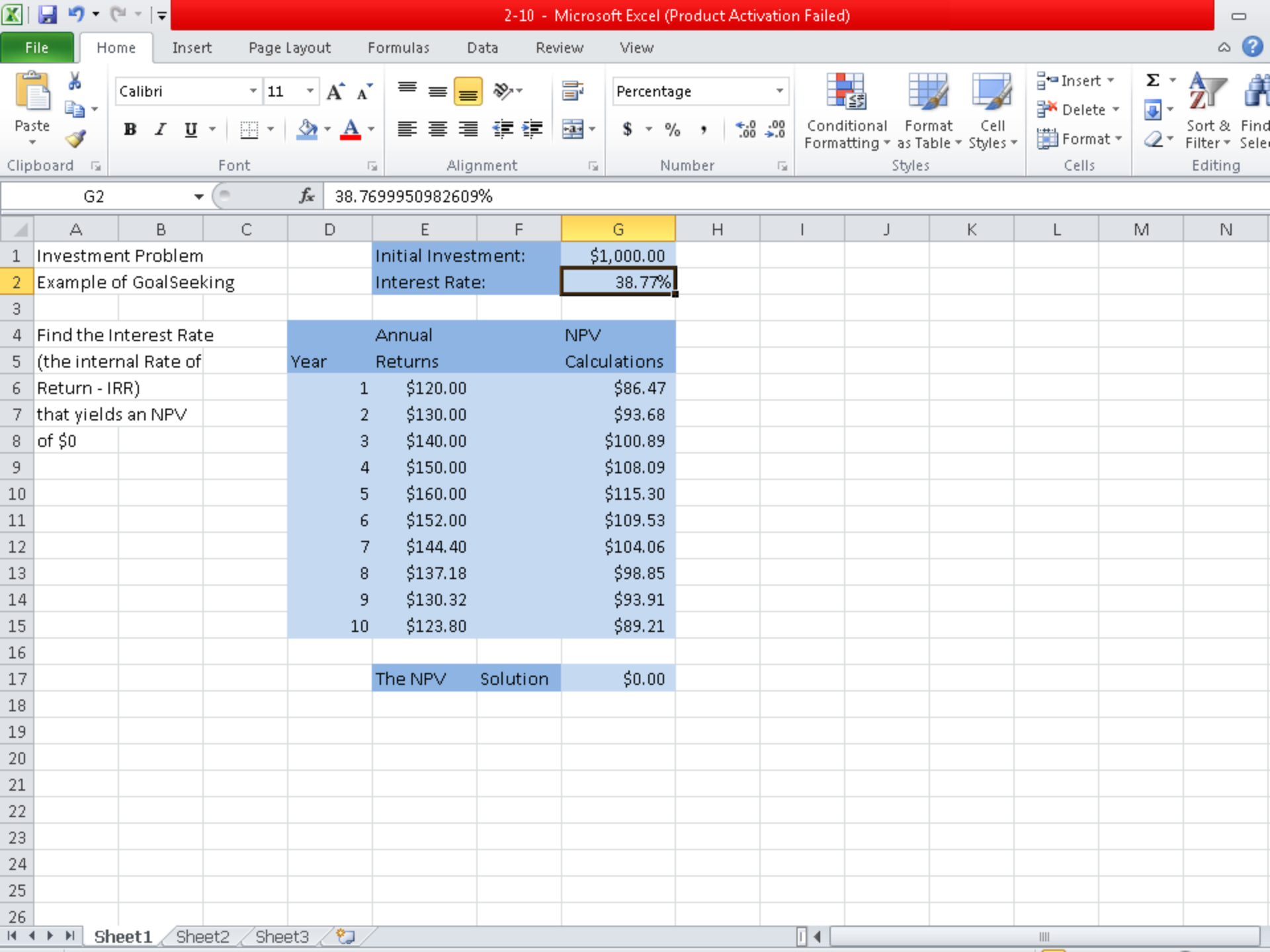
From Access
From Web
From Text
From Other Sources
Existing Connections
Get External Data
Refresh All
Connections
Properties
Edit Links
Connections
Sort
Filter
Clear
Reapply
Advanced
Sort & Filter
Text to Columns
Remove Duplicates
Data Validation
Consolidate
What-If Analysis
Data Tools
Group
Ungroup
Subtota
Outline
G2
=SUM(G6:G15)-G1
Investment Problem
Example of GoalSeeking
Initial Investment:
$1,000
Interest Rate:
10%
Find the Interest Rate
(the internal Rate of
Return - IRR)
that yields an NPV
of $0
Year
Annual Returns
NPV Calculations
1 $120 $109.09
2 $130 $118.18
3 $140 $127.27
4 $150 $136.36
5 $160 $145.45
6 $152 $138.18
7 $144.40 $131.27
8 $137.18 $124.71
9 $130.32 $118.47
10 $123.80 $112.55
The NPV Solution
$261.55
Goal Seek
Set cell:
G17
To value:
0
By changing cell:
G2
OK
Cancel
Sheet1
Sheet2
Sheet3


2-10 - Microsoft Excel (Product Activation Failed)
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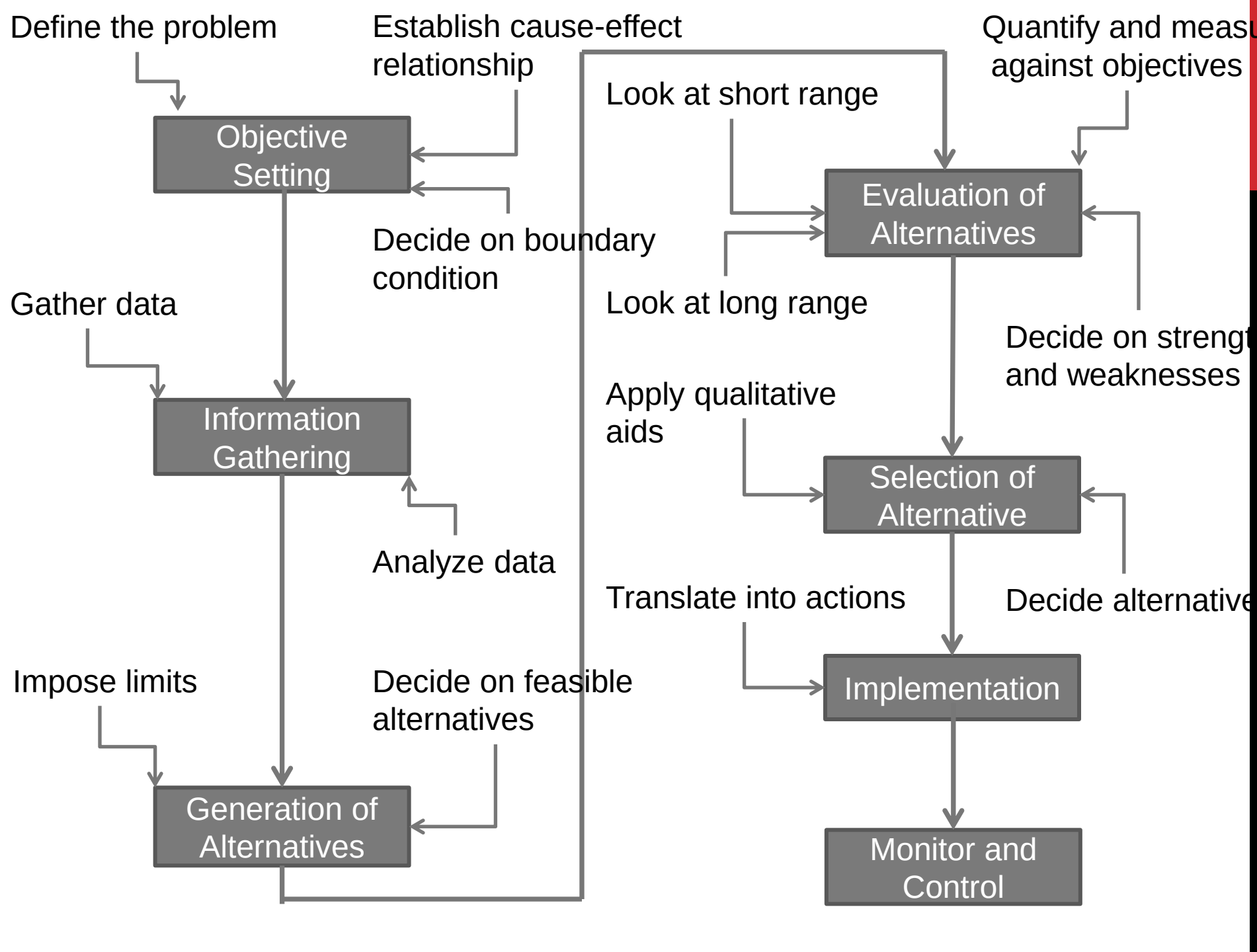
11
Percentage
Conditional Formatting
Format as Table
Cell Styles
Insert
Delete
Format
Sort & Filter
Clipboard
Font
Alignment
Number
Styles
Cells
Editing
G2
38.7699950982609%
Investment Problem
Example of GoalSeeking
Initial Investment:
$1,000.00
Interest Rate:
38.77%
Find the Interest Rate
(the internal Rate of
Return - IRR)
that yields an NPV
of $0
Year
Annual Returns
NPV Calculations
1 $120.00 $86.47
2 $130.00 $93.68
3 $140.00 $100.89
4 $150.00 $108.09
5 $160.00 $115.30
6 $152.00 $109.53
7 $144.40 $104.06
8 $137.18 $98.85
9 $130.32 $93.91
10 $123.80 $89.21
The NPV Solution
$0.00
Sheet1
Sheet2
Sheet3

THE IMPLEMENTATION PHASE

The implementation phase is the final stage of the decision making process

It is concerned with implementing and monitoring

The role of the system is feedback and assessment


Define the problem
Establish cause-effect relationship
Quantify and measu against objectives
Look at short range
Objective Setting
Evaluation of Alternatives
Decide on boundary condition
Look at long range
Gather data
Decide on strengt and weaknesses
Apply qualitative aids
Information Gathering
Selection of Alternative
Analyze data
Translate into actions
Decide alternative
Impose limits
Decide on feasible alternatives
Implementation
Generation of Alternatives
Monitor and Control

MASSIE'S DECISION MAKING MODEL

It is a five stage procedure as follows:

1. **Understand situation**
2. **Diagnose and define problem**
3. **Find alternatives**
4. **Select action**
5. **Secure acceptance of decision**

DSS

DSS is a computer based support system for processing data to aid the management in decision making.

CAPABILITIES OF DSS

Semi structured programs

For managers at different levels

For groups and individuals

Interdependent/Sequential decisions

Supports intelligence, design, choice phase

Adaptability and flexibility

Interactive ease of use

Ease of construction

Modelling and analysis

COMPONENTS OF DSS

Data management subsystem

- DSS database, DBMS, data directory

Model management subsystem

- Model base, MBMS, model directory

Knowledge-based management subsystem

- Intelligent system, KBES

User interface subsystem

- Dialog, UIMS, GUI

DSS CLASSIFICATIONS

Text oriented DSS

Database oriented DSS

Spreadsheet oriented DSS

Solver oriented DSS

Rule oriented DSS

Compound DSS

Intelligent DSS

DSS APPLICATIONS

Market planning and research

- DSS applications include pricing decisions for each customer, forecasting, termination or expansion and customer satisfaction

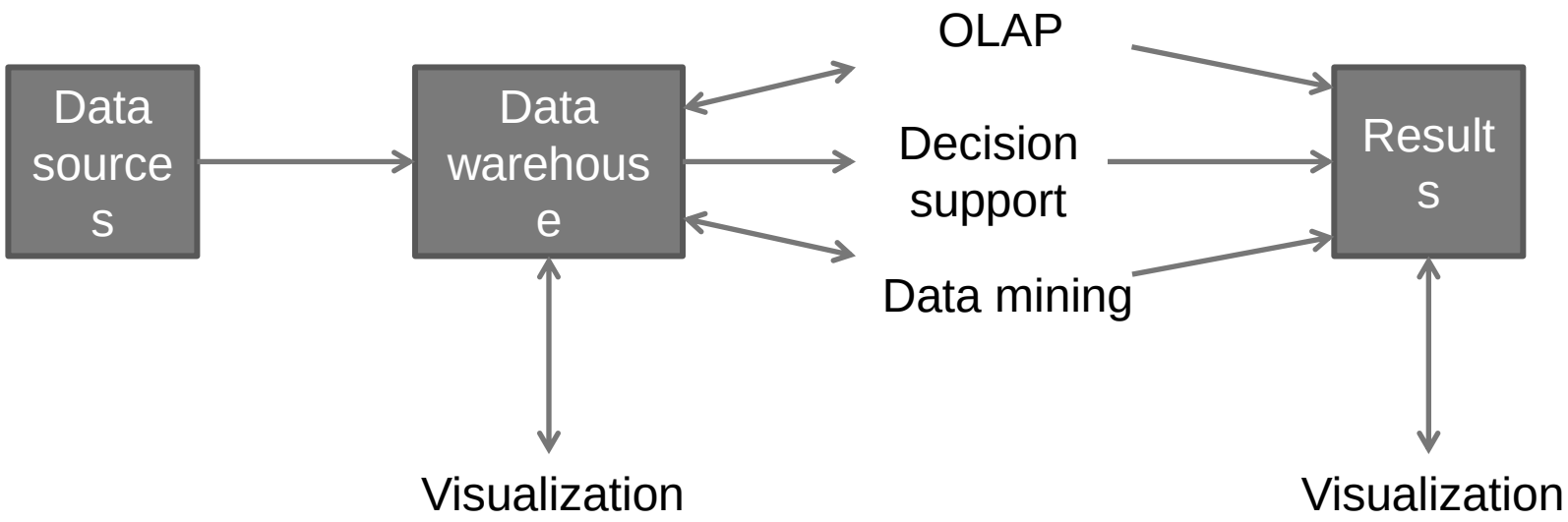
Operation and strategic planning

- DSS is used to support both short-term and strategic planning for monitoring, analyzing and reporting on the market trends

Sales support

- DSS helps by generating daily sales summaries

ACTIVITIES OF BUSINESS INTELLIGENCE



CHARACTERISTICS OF GROUP WORK

A group performs a task, sometimes decision making, sometimes not

Group members may be located in different places

Group members may work at different times

Group members may work for the same or for different organizations

The group can be permanent or temporary

The group can be at any managerial level or span levels

There can be synergy or conflict in group work

There can be gains/losses in productivity from group work

The task might have to be accomplished very quickly

It may be impossible for all members to meet in one place

Some of the data needed may be located in sources external to the organization

The expertise of non-team members may be needed

COMMUNICATION SUPPORT

Communication is a vital element for decision support

Without communication there is no collaboration

Groups of decision makers must communicate, collaborate and negotiate in their work

Effective e-commerce is possible only via modern communication technologies

Modern information technologies provide inexpensive, fast, capable and reliable means of supporting communication

Collaborative technologies like EMS(electronic meeting systems) and electronic conferencing systems and services helps in connecting decision makers

TIME/PLACE COMMUNICATION FRAMEWORK

	Same Time	Different Time
Same Place	• GSS in a decision room • Web-based GSS • Multimedia presentation systems • Whiteboard • Document sharing	• GSS in a decision room • web=-based GSS • Workflow management systems • Document sharing • E-mail, V-mail
Different Place	• Web-based GSS • Whiteboard • Document sharing • Video conferencing • Audio conferencing • Computer conferencing • E-mail, V-mail	• Web-based GSS • Whiteboard • E-mail, V-mail • Workflow management systems • Document sharing • Computer conferencing with memory

KNOWLEDGE MANAGEMENT

It is a process that helps organizations identify, select, organize, disseminate and transfer important information and expertise that are part of the organizational memory that typically resides within the organization in an unstructured manner

This enables effective and efficient problem solving, dynamic learning, strategic planning and decision making

It thus focuses on identifying knowledge, explicating it in a way so that it can be shared in a formal manner and thus reusing it

IMPORTANCE OF MANAGING KNOWLEDGE

Intellectual capital is a firm's only appreciable asset. Most assets depreciate with time.

Knowledge work is increasing

Employees with the most intellectual capital have become volunteers

Many managers ignore intellectual capital and lose out on the benefits of its capture and use

Employees with the most intellectual capital are often the least appreciated

Many current investment in intellectual capital are misfocussed

FEATURES OF KNOWLEDGE MANAGEMENT SYSTEM

Creating a knowledge culture

Capturing knowledge

Knowledge generation

Knowledge explication(and digitization)

Knowledge sharing and reuse

Knowledge renewal

Knowledge management system processes are designed to manage

Knowledge creation through learning

Knowledge capture and explication

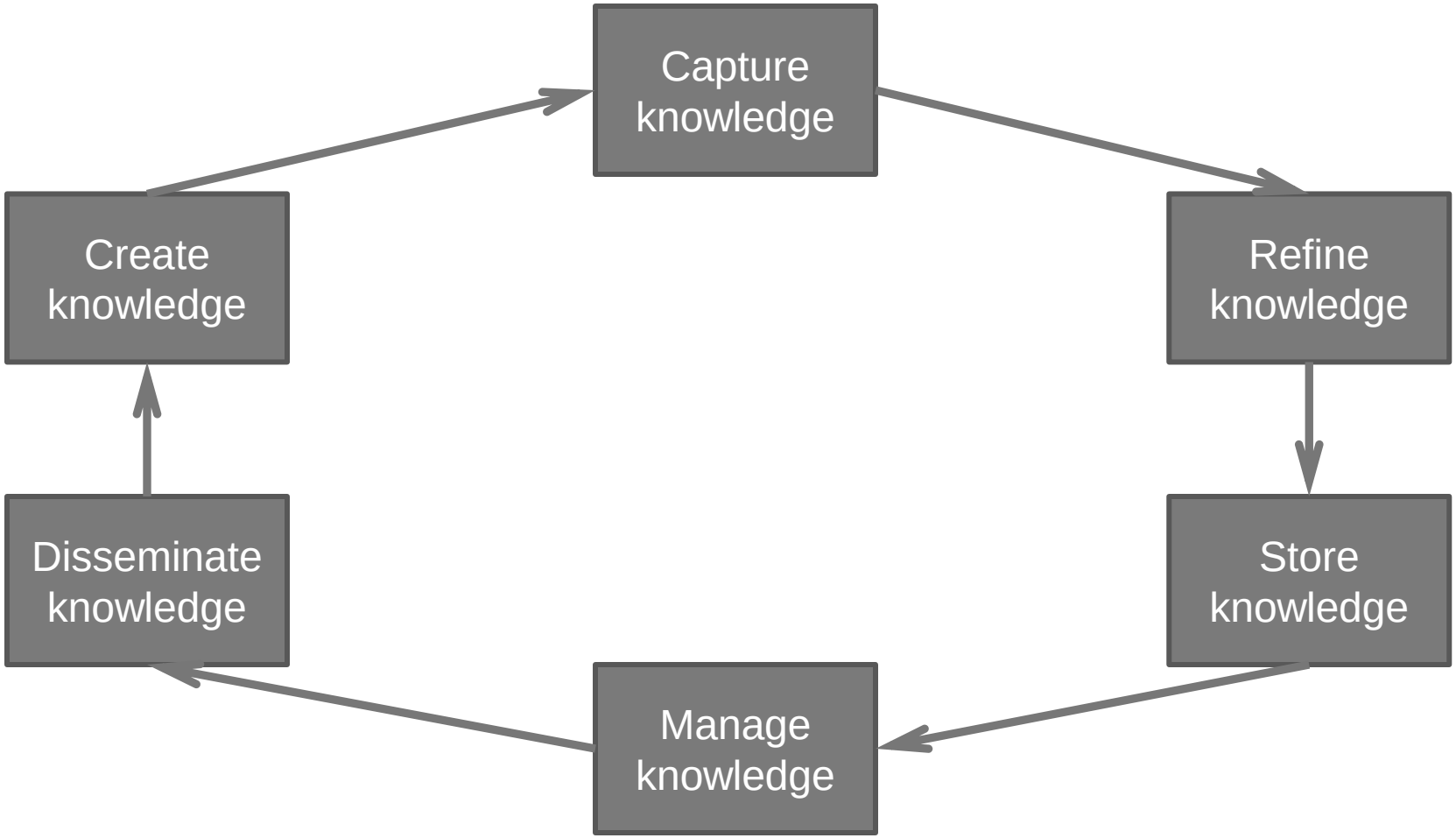
Knowledge sharing and communication

Knowledge access

Knowledge use and reuse

Knowledge archiving

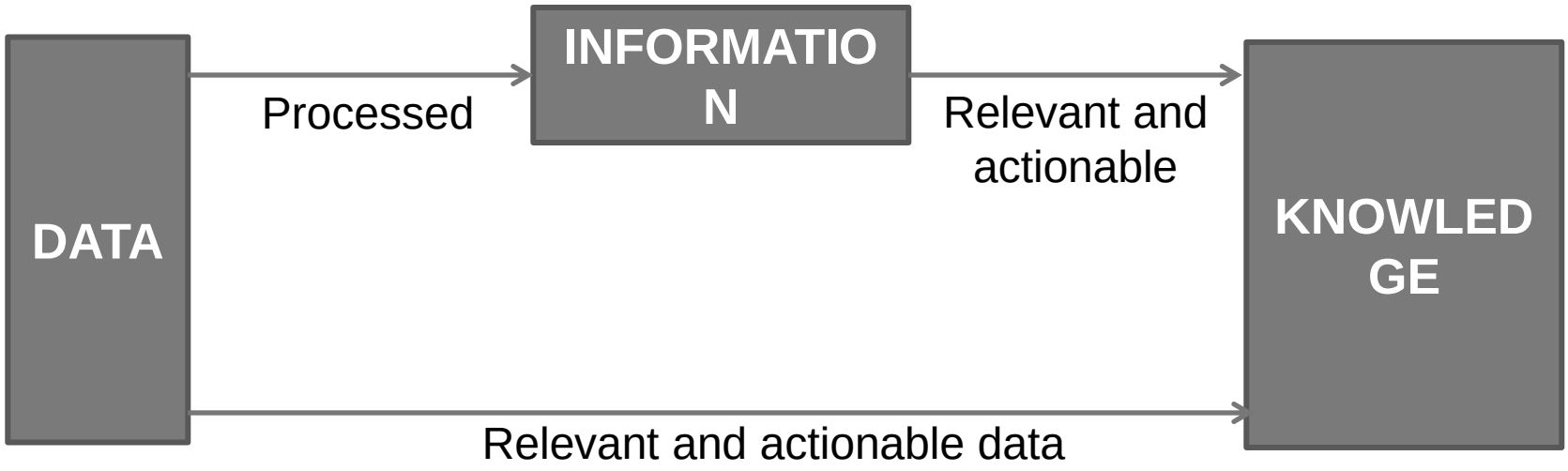
THE KNOWLEDGE MANAGEMENT CYCLE



IMPLEMENTING KNOWLEDGE MANAGEMENT

1. Identify the problem by identifying knowledge segments
2. Prepare for change in terms of business efforts and operation
3. Create the team responsible for implementing a pilot project
4. Map out the knowledge by identifying what it is, where it is, who has it and who needs it
5. Create a feedback mechanism indicating how the system is used and report any difficulties
6. Define the building blocks for a knowledge management system
7. Integrate existing information systems to contribute and capture knowledge in an appropriate format

DATA, INFORMATION AND KNOWLEDGE



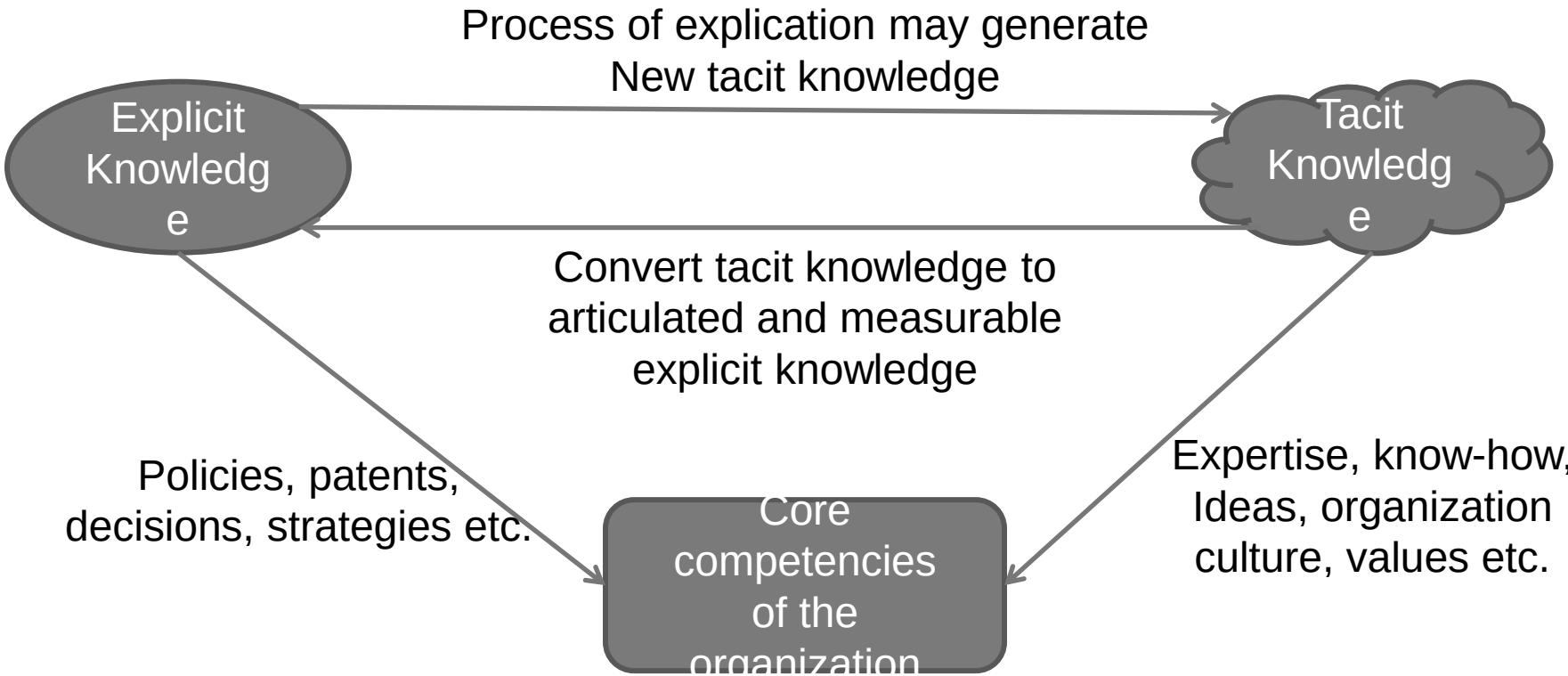
Knowledge management transforms data and/or information into actionable knowledge in a format that when it is made available can be utilized effectively and efficiently throughout an organization

TACIT AND EXPLICIT KNOWLEDGE

Tacit knowledge is in the domain of subjective, cognitive and experiential learning

Explicit knowledge deals more with objective, rational and technical knowledge(data, policies, procedures, software, documents)

Knowledge management transfers the tacit knowledge in individuals to value processes that lead to innovation, knowledge creation and replenishment of the organization'


Process of explication may generate
New tacit knowledge
Explicit Knowledge
Tacit Knowledge
Convert tacit knowledge to articulated and measurable explicit knowledge
Policies, patents, decisions, strategies etc.
Expertise, know-how, Ideas, organization culture, values etc.
Core competencies of the organization

MSS

Modeling is a key element in most DSS and a necessity in a model-based DSS

Management support systems(MSS) are collections of computerized technologies used to support managerial tasks in general and decision making in particular

MSS refers to application of any technology, either as an independent tool or in combination with other information technologies

IMPLEMENTING MSS

MSS technology implementation is complex because these systems are not merely information systems that collect, manipulate and distribute information; rather they are linked to tasks that may significantly change the manner in which organizations operate

MSS implementation is an ongoing process that occurs during the entire development of the system, through the feasibility study, system analysis and design, programming, training, conversion and installation

ISSUES OF IMPLEMENTATION

Technical factors

Technical issues can be classified in two categories:

- **Technical constraints** which results mainly from the limitations of available technology. It disappears when new technology are developed
- **Technical problems** which are not result of the technology but are caused by other factors such as scarcity of resources. It can be solved by increasing the available resources

Behavioral factors

- The way people perceive these systems and how they behave in accepting them
- User resistance is a major behavioral factor
- Reasons that employees resist new systems:
  - Change in job content
  - Loss of status
  - Change in interpersonal relationships
  - Loss of power
  - Change in decision making approach
  - Uncertainty/unfamiliarity/misinformation
  - Job security

Process factors

- Top management support for continuous financial support to maintain the systems
- Management and user commitment
- Institutionalization through which an MSS becomes incorporated

User involvement

- Participation in the system development process by users is a necessary condition

Organizational factors

- Competence skills of the MSS team
- Adequacy of resources
- Organizational politics

Values and ethics

- Prime concerns are goals of the project, process and possible impact on other systems

External environment

- Includes legal, social, economic, political etc.

IMPLEMENTATION STRATEGIES FOR DSS

Implementation strategies for DSS can be divided into four major categories:

Divide the project into manageable pieces

Keep the solution simple

Develop a satisfactory support base

Meet user needs and institutionalize the system

EXPERT SYSTEM IMPLEMENTATION

QUALITY OF THE SYSTEM

- The ES should be developed to fulfill a recognized need
- The ES should be easy to use even by a novice
- The ES should be able to increase the expertise of the user
- The ES should have explorative capabilities

- The program should be capable to respond to simple questions
- The system should be capable of learning new knowledge (i.e., the system should be able to ask questions to gain additional information)
- The program knowledge should be easily modified (i.e., add, delete, and changed)

COOPERATION OF THE EXPERTS

- For an ES to be successfully implemented it must give good advice. Such advice depends, most of all, on the cooperation of the domain expert

CONDITIONS THAT JUSTIFY THE NEEDS FOR A PARTICULAR ES

- An expert is not always available or is expensive
- Decisions must be made under pressure or missing even a single factor could be disastrous

- There is rapid employee turnover, resulting in a constant need to train new workers. Such training is costly and time-consuming
- A huge amount of data must be shifted through

SYSTEM INTEGRATION

Integration of computer based systems means that the systems are merged into one facility rather than having separate hardware, software, and communications for each independent systems.

Integration can be at the development tools level or at the application system level

TYPES OF INTEGRATION

There are two general types:

Functional integration implies that different support functions are provided as a single system. A user can access the appropriate facilities through a single, consistent interface and can switch from one task to another and back again

Physical integration refers to packaging of the hardware, software, and communication features required to accomplish functional integration

WHY INTEGRATE?

Enhancements of basic tools

Increasing the capabilities of the application

- Benefits that each technology provides to the other
- Improvements in both the process and the outcome
- It results in combining the strengths of each individual technique

PROBLEMS AND ISSUES IN INTEGRATION

Need for integration

Justification and cost-benefit analysis

Architecture of integration

People problems

Finding appropriate builders

Attitudes of employees in the information system department

Development progress

Organizational impacts

Data structure issues

Data issues

Connectivity

OPERATIONS RESEARCH

Operations research(OR) is a quantitative approach to decision making

Mostly used as a support for structure decisions

Characteristics of OR:

- Systems approach
- Analytical approach
- Interdisciplinary approach
- Deals with real world problems

OR METHODOLOGY

The steps involved are:

- **Problem Identification**
  - Need analysis
  - Cause and effect analysis
- **Model Construction**
  - Data collection
  - Model design
  - Model evaluation

- **Experimentation**
  - Feasibility analysis
  - Optimality analysis
  - Adaptivity analysis
- **Implementation**
  - Management approval
  - Test operations
  - Full implementation
- **Evaluation**

CAUSE-EFFECT DIAGRAM