UNIVERSITI TEKNIKAL MALAYSIA MELAKA

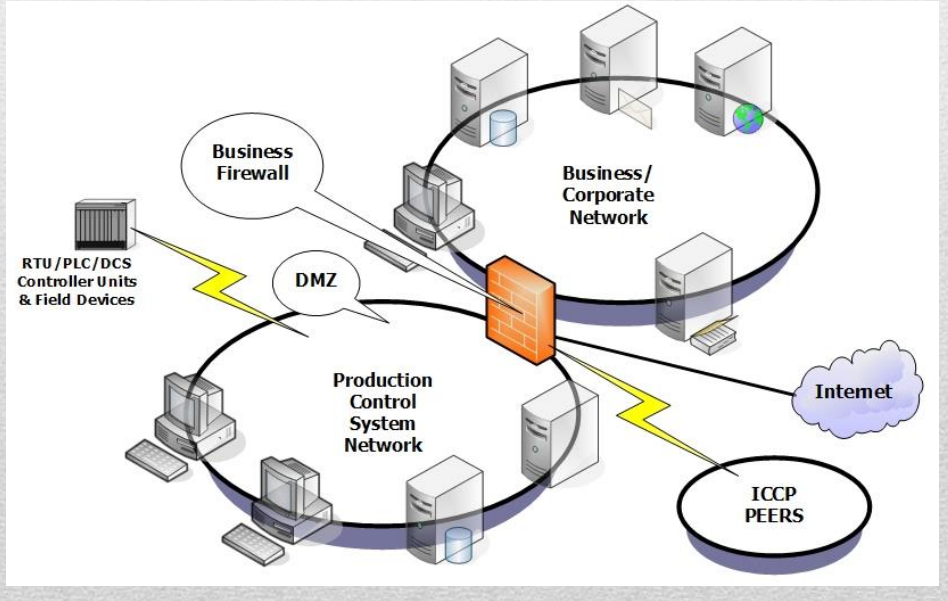
PROJECT MANAGEMENT

Pengurusan Projek

(MPSW5073 / PPSW6073)

Chapter 6:

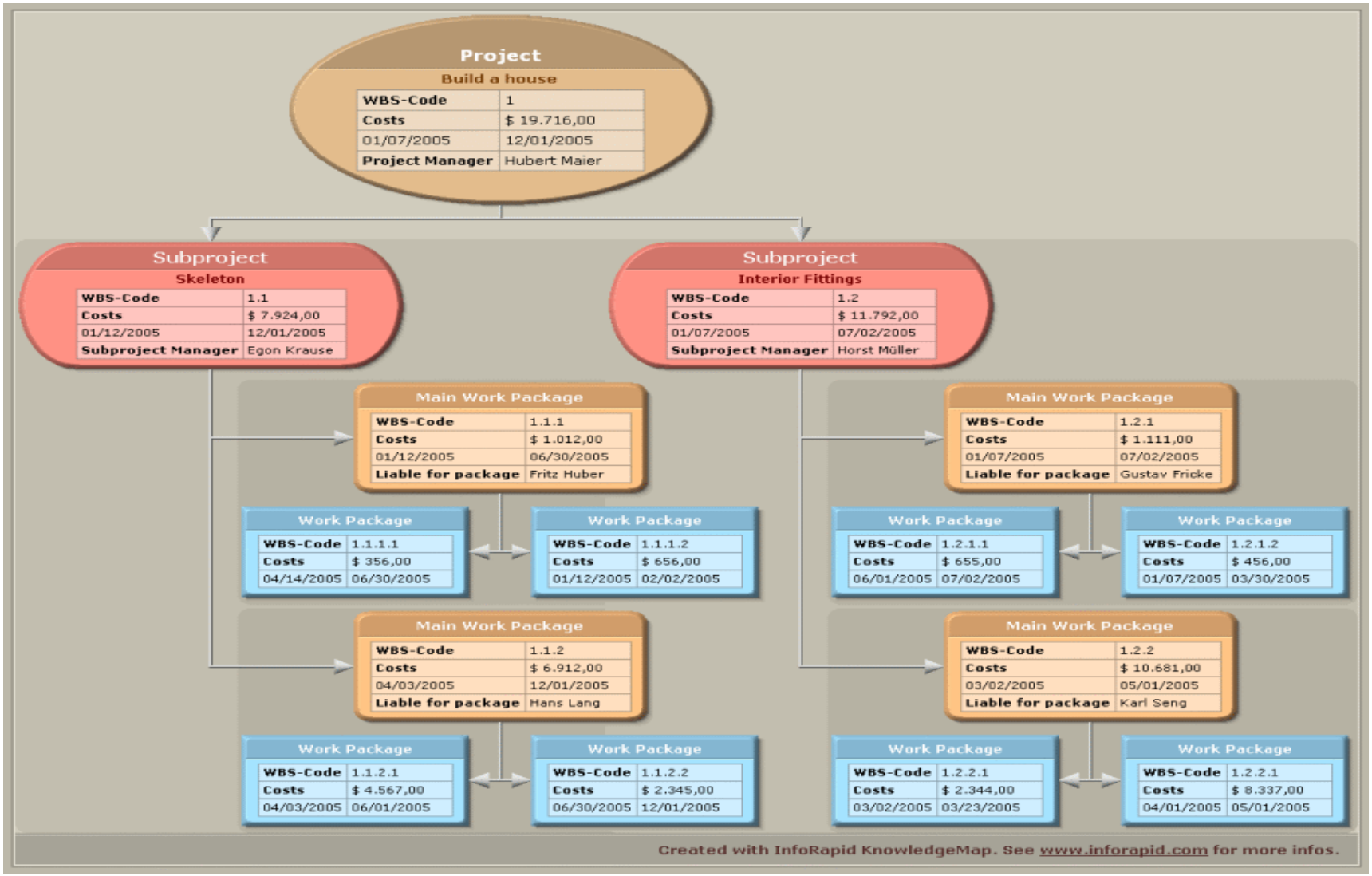
Planning and Control Functions and Tools (part I)



After studying this chapter, you should be able to:

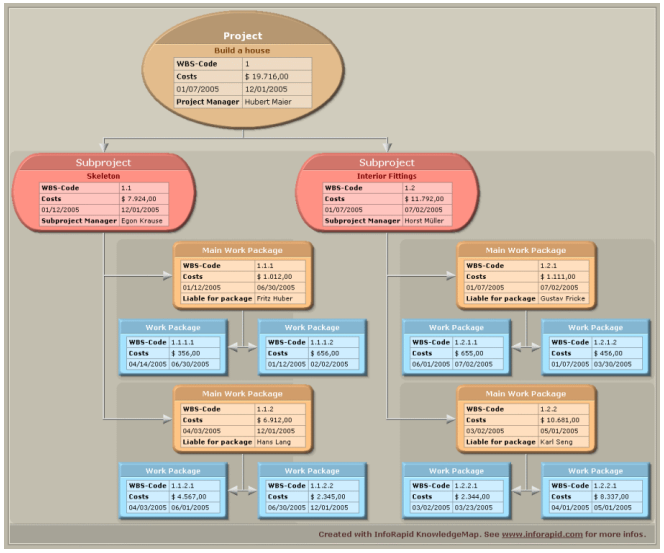
1. Describe Project/Work Breakdown Structure.
2. Identify Work Control Package.
3. Explain Task/Responsibility Matrix.

Work Breakdown Structure



WBS - Purpose

- Identify all of the work that needs to be done to complete the project.
- Structure the work into logical components and subcomponents.
- Define the work to a level of detail so individual responsibilities can be assigned.
- Summarize and report project data.



The Work Breakdown Structure

- The Work Breakdown Structure (WBS) can take a variety of forms that serve a variety of purposes
- The WBS often appears as an outline with Level I tasks on the left and successive levels appropriately indented
- The WBS may also picture a project subdivided into hierarchical units of tasks, subtasks, work packages, etc.

The Work Breakdown Structure

The WBS is an important document and can be tailored for use in a number of different ways:

- ✓ It may illustrate how each piece of the project contributes to the whole in terms of performance, responsibility, schedule, and budget
- ✓ It may list the vendors or subcontractors associated with specific tasks
- ✓ It may serve as the basis for making cost estimates or estimates of task duration
- ✓ It may be used to document that all parties have signed off on their various commitments to the project.

The Work Breakdown Structure

- General steps for designing and using the WBS:
  1. Using information from the action plan, list the task breakdown in successively finer levels of detail. Continue until all meaningful tasks or work packages have been identified
  2. For each such work package, identify the data relevant to the WBS. List the personnel and organizations responsible for each task.
  3. All work package information should be reviewed with the individuals or organizations who have responsibility for doing or supporting the work in order to verify the accuracy of the WBS.

The Work Breakdown Structure

General steps for designing and using the WBS (cont.):

4. The total project budget should consist of four elements: direct budgets from each task; an indirect cost budget for the project; a “contingency” reserve for unexpected emergencies; and any residual, which includes the profit derived from the project

5. The project master schedule integrates the many different schedules relevant to the various parts of the project

- Items 1-5 focus on the WBS as a planning tool but it may also be used to monitor and control the project.

The Work Breakdown Structure

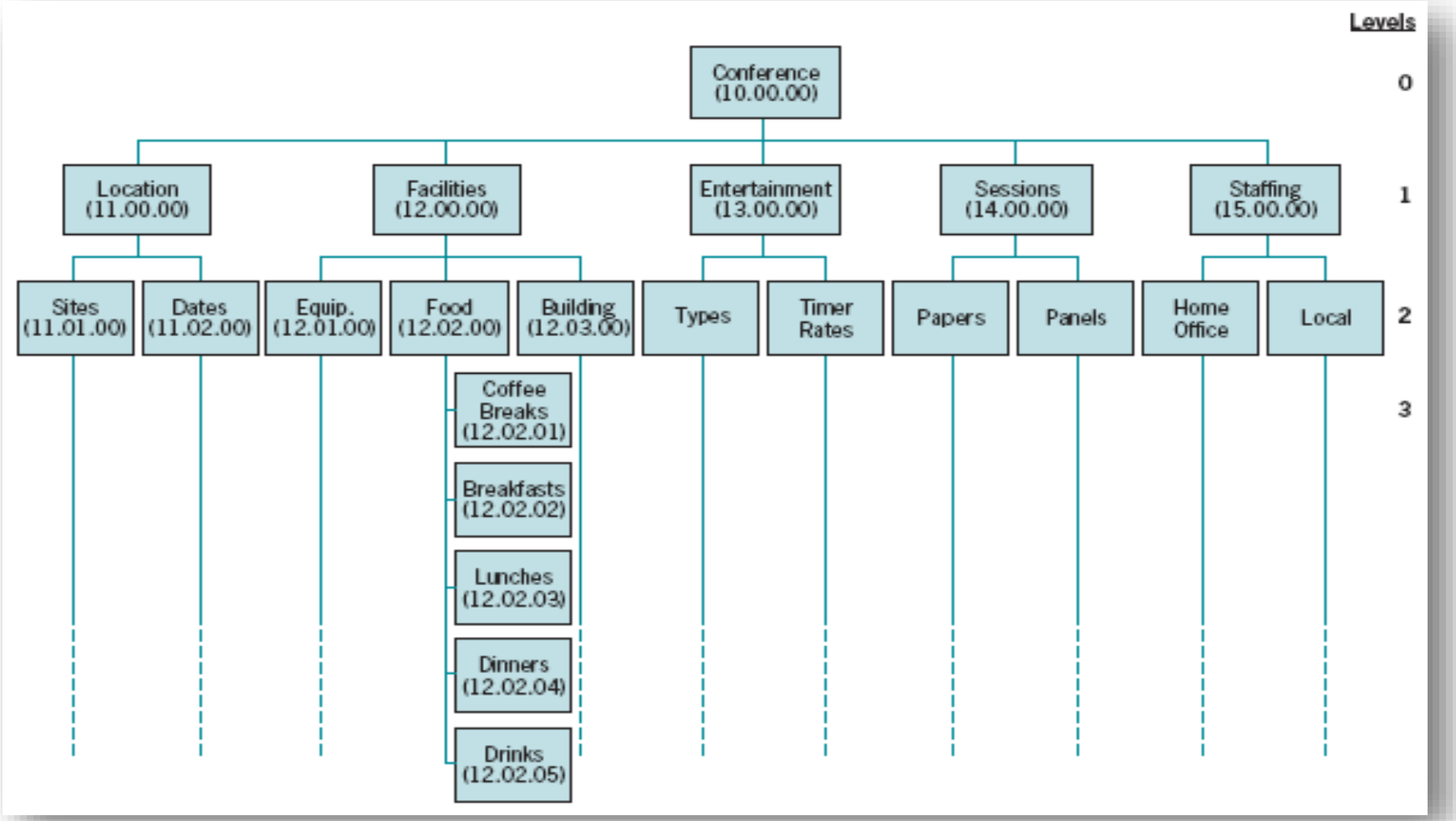
Items 6 and 7 focus on the WBS as an aid to monitor and control a project:

6. The project manager can examine actual resource use, by work element, work package, task, up to the full project level. The project manager can identify problems, harden the estimates of final cost, and make sure that relevant corrections have been designed and are ready to implement
7. The project schedule may be subjected to the same comparisons as the project budget. Actual progress is compared to scheduled and corrective action can be taken.

Format of the WBS

- Can be columnar, with sub-tasks indented under the main task elements - like the earlier example of the action plan, or visual
- Either is correct – or you can create both, depending on the purpose
- In MS Project you enter the WBS in a spreadsheet-like format, which is visually displayed as a Gantt chart

A Visual WBS for Planning a Conference



Work Control Packages

Work Control Packages

- Control is the last element in the implementation cycle of planning-monitoring-controlling
- Control is focused on three elements of a project
  - Performance
  - Cost
  - Time

Controlling Performance

- There are several things that can cause a project's performance to require control:
  - Unexpected technical problems arise
  - Insufficient resources are available when needed
  - Insurmountable technical difficulties are present
  - Quality or reliability problems occur
  - Client requires changes in specifications
  - Inter functional complications arise
  - Technological breakthroughs affect the project

Controlling Cost

- There are several things that can cause a project's cost to require control:
  - Technical difficulties require more resources
  - The scope of the work increase
  - Initial bids were too low
  - Reporting was poor or untimely
  - Budgeting was inadequate
  - Corrective control was not exercised in time
  - Input price changes occurred

Controlling Time

- There are several things that can cause a project's schedule to require control:
  - Technical difficulties took longer than planned to resolve
  - Initial time estimates were optimistic
  - Task sequencing was incorrect
  - Required inputs of material, personnel, or equipment were unavailable when needed
  - Necessary preceding tasks were incomplete
  - Customer generated change orders required rework
  - Governmental regulations were altered

Purposes of Control

- There are two fundamental objectives of control:
  - 1. The regulation of results through the alteration of activities
  - 2. The stewardship of organizational assets
- The project manager needs to be equally attentive to both regulation and conservation
- The project manager must guard the physical assets of the organization, its human resources, and its financial resources.

Physical Asset Control

Requires control of the *use* of physical assets

- Concerned with asset maintenance, whether preventive or corrective.
- Also the timing of maintenance or replacement as well as the quality of maintenance.
- Setting up maintenance schedules in such a way as to keep the equipment in operating condition while minimizing interference to ongoing work.
- Physical inventory whether equipment or material must also be controlled.

Human Resource Control

- Stewardship of human resources requires controlling and maintaining the growth and development of people
- Projects provide fertile ground for cultivating people
- Because projects are unique, it is possible for people working on projects to gain a wide range of experience in a reasonably short period of time.

Financial Resource Control

- The techniques of financial control, both conservation and regulation, are well known:
  - Current asset controls
  - Project budgets
  - Capital investment controls
- These controls are exercised through a series of analyses and audits conducted by the accounting/controller function

Financial Resource Control

- Representation of the accounting/controlling function on the project team is mandatory
- The parent organization is responsible for the conservation and proper *use* of resources owned by the client or charged to the client
- Due diligence requires that the organization proposing a project conduct a reasonable investigation, verification, and disclosure of all material facts relevant to the firm's ability to conduct the project.

Three Types of Control Processes

- Decisions must be made concerning:
  - At what points in the project will control be exerted
  - What is to be controlled
  - How it will be measured
  - How much deviation will be tolerated
  - How to spot and correct potential deviations before they occur.

Three Types of Control Processes

- No matter what the purpose in controlling a project there are two basic types of control mechanisms that can be used:
  - Go/no-go control
  - Post control
- Cybernetic control is a third, but less common control mechanism that is rarely directly applicable to projects.

Go/No-go Controls

- Take the form of testing to see if some specific precondition has been met
- Most of the control in project management falls into this category
- This type of control can be used on almost every aspect of a project
- Must exercise judgment in the use of go/no-go controls
- Go/no-go controls operate only when and if the controller uses them

Information Requirements for Go/no-go Controls

- The project proposal, plans specifications, schedules and budgets contain all the information needed to apply go/no-go controls to the project
- Milestones are the key events that serve as a focus for ongoing control activity
- These milestones are the project's deliverables in the form of in-process output or final output

Post-control

- Post-controls are applied after the fact
- Directed toward improving the chances for future projects to meet their goals
- It is applied through a relatively formal document that contains four distinct sections:
  - The project objectives
  - Milestones, checkpoints, and budgets
  - The final report on project
  - Recommendations for performance and process improvement

Characteristics of a Control System

- A good control system:
  - Should be flexible
  - Should be cost effective
  - Must be truly useful
  - Must satisfy the real needs of the project
  - Must operate in a timely manner
  - Sensors and monitors should be sufficiently accurate and precise to control the project within the limits that are functional for the client and parent organization

Characteristics of a Control System

- A good control system (cont.):
  - Should be as simple as possible
  - Should be easy to maintain
  - Should be capable of being extended or otherwise altered
  - Should be fully documented when installed
    - the documentation should include a complete training program in system operation

Control Systems

- All control systems use feedback as a control process
- The control of performance, cost, and time usually require different input data:
  - **Performance** - engineering change notices, test results, quality checks, rework tickets, scrap rates
  - **Cost** - budgets to actual cash flows, purchase orders, absenteeism, income reports, labor hour charges, accounting variance reports
  - **Schedule** - benchmark reports, status reports, PERT/CPM networks, earned value graphs, Gantt charts, WBS, and action plans

Control Tools

- Some of the most important tools available for the project manager to use in controlling the project are variance analysis and trend projection
- A budget plan or expected growth curve of time or cost for a certain task is plotted
- Actual values are plotted as a dashed line as the work is actually finished
- At each point in time a new projection from the actual data is used to forecast what will occur in the future

RESPONSIBILITY MATRIX

	Website Manager	*Web Developer*	*Content Administrator*	*Web Administrator*	*Sales Manager*
Project Planning	A	R	C	C	C
Website Construction	A	R	C	C	I
Content Review	I	C	A / R	I	I
Usability Testing	I	A	C	R	
Installation of Tracking Software	I	A		R	
Ongoing Review of Visitors		A		R	I
Sales Follow-up to Frequent Users				I	A / R

Responsibility Matrix

Once tasks are broken down into work packages on the WBS, we need to assign resources

- The assignment of people to work packages can be displayed on an LRC, which can also identify requirements for support, approval and notification.
- With this, the PM can keep track of who must approve what and who must report to whom
- The work packages must be reviewed with the people involved to ensure their accuracy and adequacy in describing the tasks to be accomplished.

Meredith & Mantel (2009) Project management: a managerial approach. 7th ed. Wiley.

Responsibility Assignment Matrix (RAM) — Purpose

- Ensure that all tasks are assigned to people
- Show levels of involvement of people to work

Responsibility Assignment Matrix

RASIC Method

MARKETING STUDY	PROJECT MANAGER	CUSTOMER	TEAM MEMBER	SENIOR MANAGEMENT	SUPPORT STAFF
IDENTIFY POTENTIAL MARKET	C		S	R	
IDENTIFY SURVEY POPULATION	C	R	S	I	
DEVELOP SURVEY	R	I	S	I	
TEST SURVEY ON SAMPLE	R	I	S		S
FINALIZE SURVEY	R	A	S	I	S
CONDUCT SURVEY	R	I	S	I	S
COLLECT SURVEY	R	I	S		
ANALYZE DATA			R/S		I
REPORT RESULTS AND SUGGESTION	R	A	S	A	S

LEGEND

R - RESPONSIBLE
A - APPROVE
S - SUPPORT (DOES THE WORK)
I - INFORM
C - CONSULT

Roadmap to Project Management Success

Form Project Team

Statement of Work

Work Breakdown

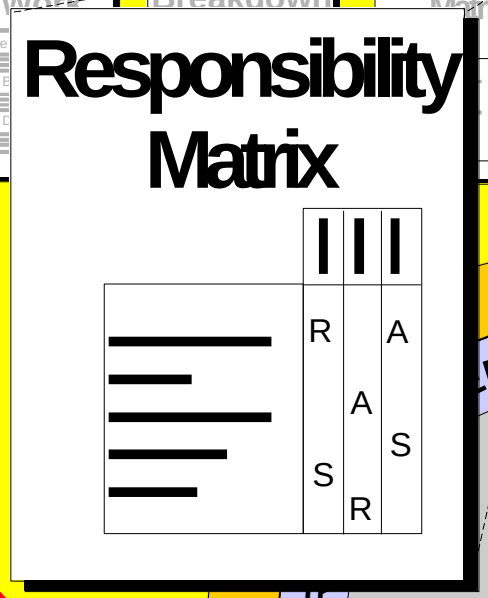
Responsibility Matrix

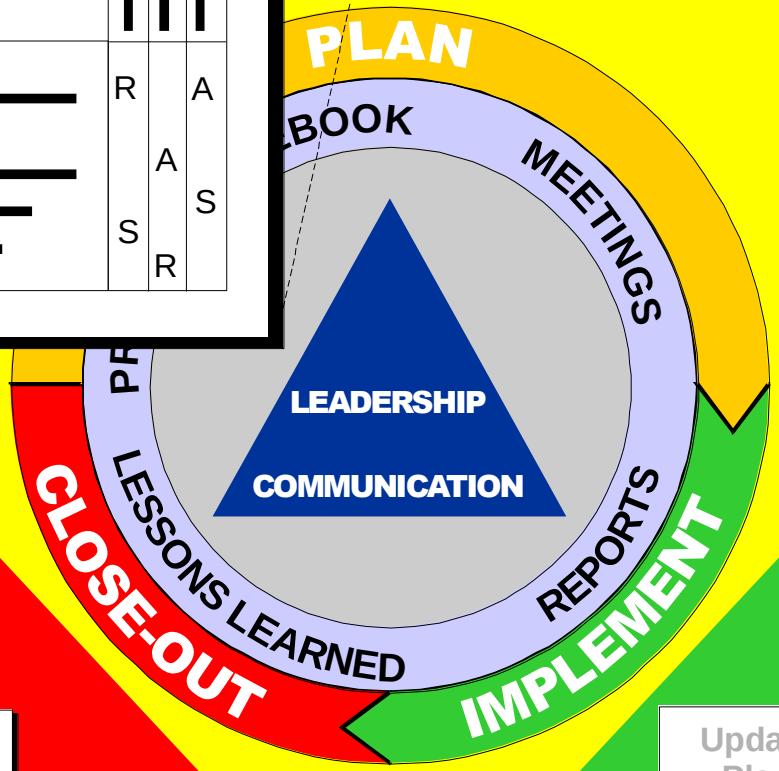
Network

Gantt

Resource Plan

Budget





Conduct Close-Out Meeting

Share Lessons Learned

Evaluate Success

Perform Tasks

Track Progress

Update Plan

Resolve Issues

Manage Change

Sample Linear Responsibility Chart

WBS / Responsibility		Project Office				Field Oper.	
Subproject	Task	Project Manager	Contract Admin.	Project Eng.	Industrial Eng.	Field Manager	
Determine need	A1	○		●	▲		
	A2	■	○	▲	●		
Solicit quotations	B1	○	■	▲		●	
Write approp. request.	C1	■	▲	○	●		
	C2		●	○	▲		
	C3	●	■	▲		■	
" " "	" " "						

Legend:
- ▲ Responsible
- ● Support
- ■ Notification
- ○ Approval

Meredith & Mantel (2009) Project management: a managerial approach. 7th ed. Wiley.

	Vice-president	General manager	Project manager	Manager engineering	Manager software	Manager manufacturing	Manager marketing	Subprogram manager manufacturing	Subprogram manager software	Subprogram manager hardware	Subprogram manager services
Establish project plan	6	2	1	3	3	3	3	4	4	4	4
Define WBS		5	1	3	3	3	3	3	3	3	3
Establish hardware specs		2	3	1	4	4	4				
Establish software specs		2	3	4	1		4				
Establish interface specs		2	3	1	4	4	4				
Establish manufacturing specs		2	3	4	4	1	4				
Define documentation		2	1	4	4	4	4				
Establish market plan	5	3	5	4	4	4	1				
Prepare labor estimate			3	1	1	1		4	4	4	4
Prepare equipment cost estimate		3	1	1	1			4	4	4	4
Prepare material costs			3	1	1	1		4	4	4	4
Make program assignments			3	1	1	1		4	4	4	4
Establish time schedules		5	3	1	1	1	3	4	4	4	4

1 Actual responsibility
2 General supervision
3 Must be consulted
4 May be consulted
5 Must be notified
6 Final approval

Simplified Linear Responsibility Chart (Fig 6-8), Meredith & Mantel (2009) Project management: a managerial approach. 7th ed. Wiley.

End of session Chapter 6:

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Thank You!!!!