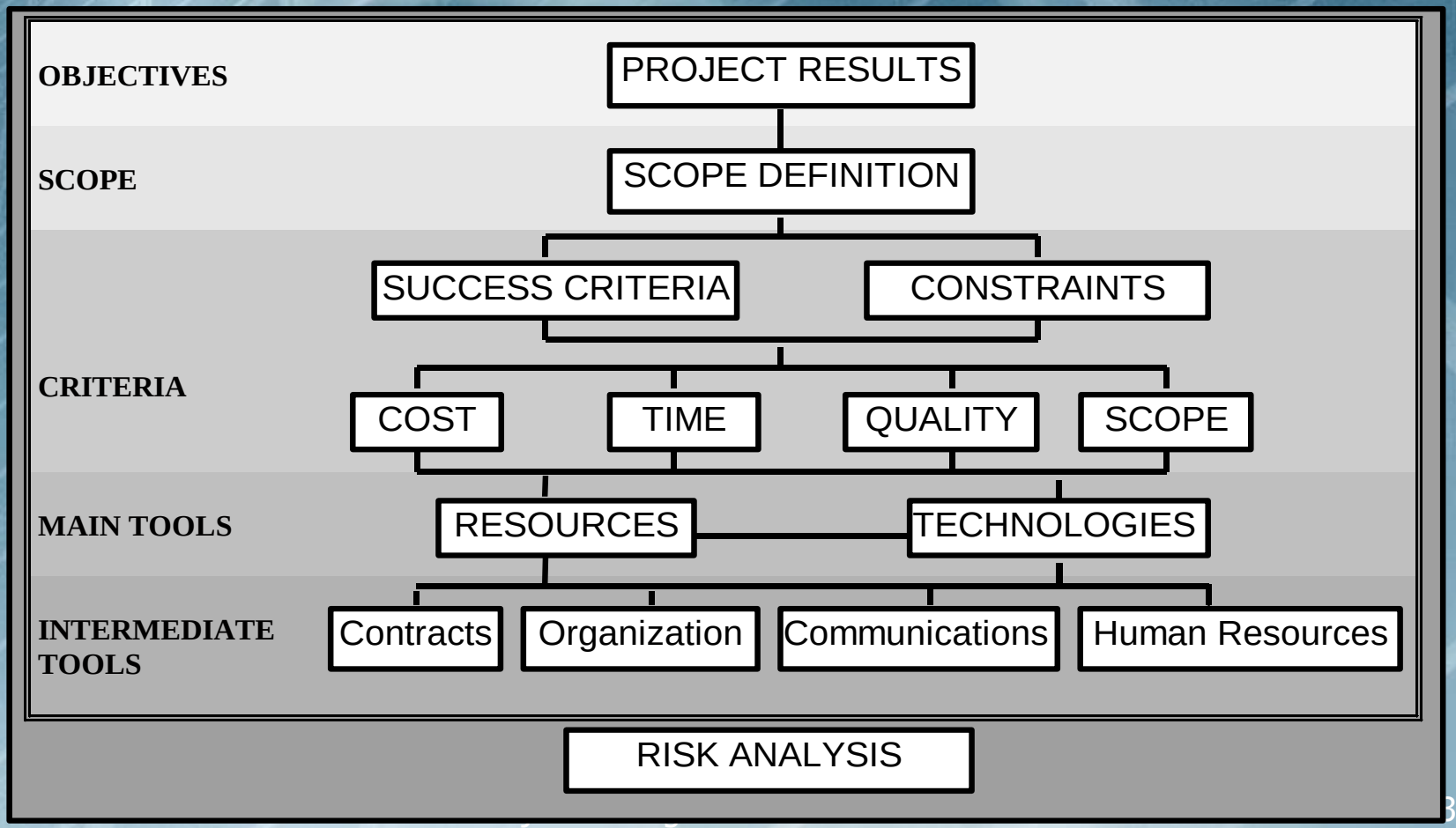
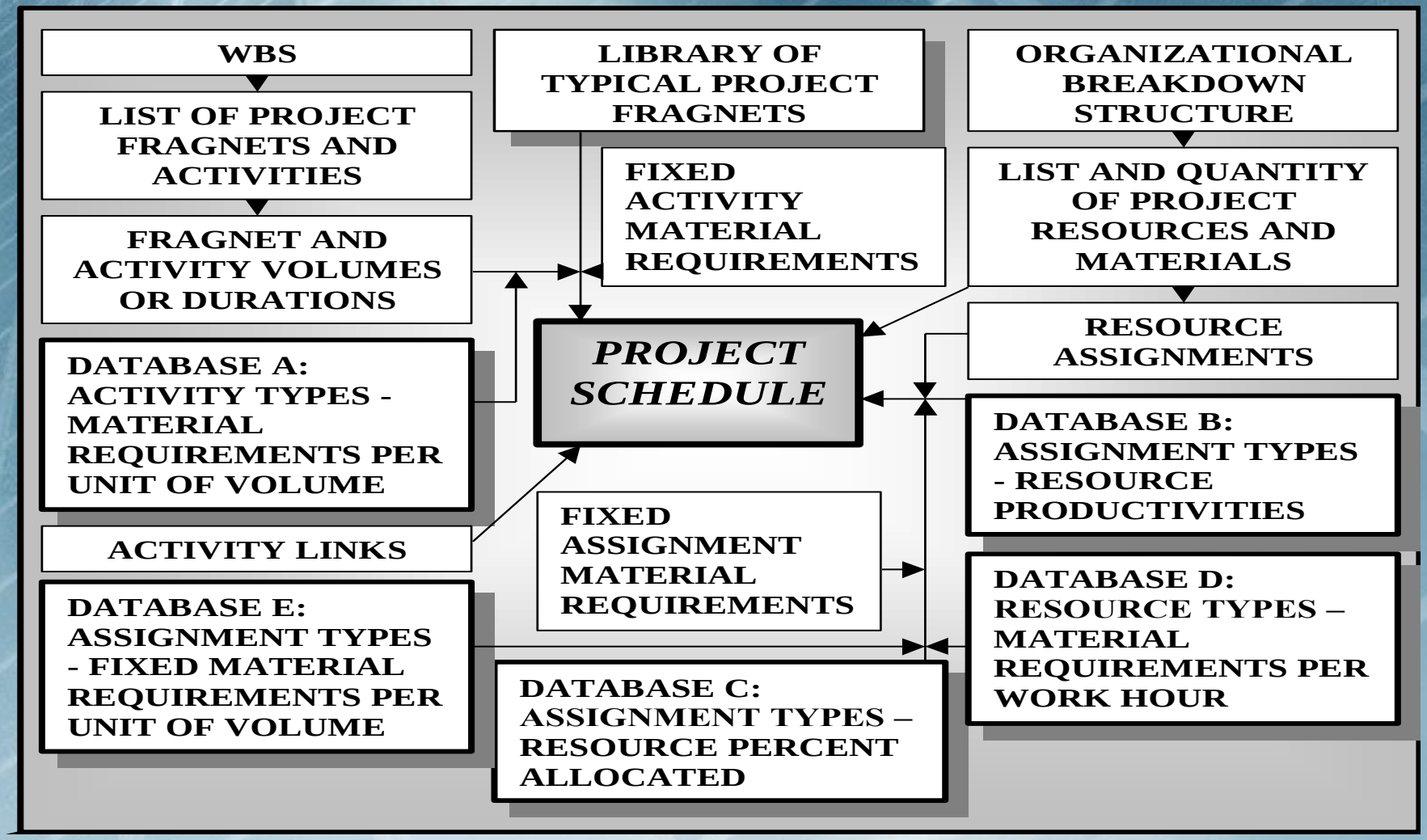
# LECTURE 8:
# Planning & Control Functions & Tools (Part II)

# PM PROCESSES

# PM LOGIC


OBJECTIVES
PROJECT RESULTS
SCOPE
SCOPE DEFINITION
SUCCESS CRITERIA
CONSTRAINTS
CRITERIA
COST
TIME
QUALITY
SCOPE
MAIN TOOLS
RESOURCES
TECHNOLOGIES
INTERMEDIATE TOOLS
Contracts
Organization
Communications
Human Resources
RISK ANALYSIS

# PROJECT SCHEDULE DEVELOPMENT



# Basic Definition of an Event

- **Event: not task / activity. It is an occurrence at a point in time that signifies the start / completion of 1 / more task.**

- **Several dates may become associated with 1 event:**

  **(a) Schedule date**

  **- Agreed & committed**

  **(b) Predicted date**

  **- Forecast & predict**

  **(c) Latest allowable date**

  **-Event must occur so that the project can be completed on time.**

# Checklist for Interface & Milestone Even Identification

- Preparation for entering a new task/activity

(d) **Target date**

- **Desired time**

(e) **Commitment date**

- **Management commitment./ Promised**

**(f) Actual date**

- **Event did occur (already happened)**

# Project Master Schedule & the Schedule Hierarchy

- Schedule = time table
- 2 levels of schedule planning:
  (a) Project level
  (b) Task level.

## Types of Schedule

2 types of schedule:

(a) Project Master Schedule (PMS)

(b) Computer Generated Master Schedule (CGMS)

# Project Master Schedule (PMS)

- Largest & biggest schedule.
- interrelates all elements & tasks of the project on a common time scale.
- Its:
  (a) Based on P/WBS.
  (b) Complete & comprehensive in scope.
  (c) Reflect contractual commitments & customer obligations (responsibility).
  (d) Assist in planning buildup & effective use of resources. (4Ms)
  (e) Include key interface & milestone events linking all tasks.
  (f) Useful for progress evaluation & management reporting.

# … Project Master Schedule (PMS)

- PMS used to refine the project progress.
- PMS may take form of a bar chart / Gantt Chart, time scale, PERT or logic diagram.
- Management Schedule Reserve is a contingency reserve to be allocated when specific tasks encounter unavoidable delays that will affect the project critical path.

## Computer Generated Master Schedule (CGMS)

- Without hand-drawing, the project scheduling computer software packages produce high quality PMS.

  Ex: MS Project Management, Primavera

# The PERT/CPM/PDM Project Level Network Plan

- PERT: Program Evaluation & Review Technique (AOA), CPM: Critical Path Method, PDM: Precedence Diagram Method (AON)

- Benefits of these include:

  - Integrate tasks with milestone events.
  - Reduction in total project duration (improve overlapping)
  - Identification of the chain of events & activities in CPM.
  - Effective integrated evaluation of actual progress by all contributors.

# Project Budget & Resource Plans

- Project = Project / Work Breakdown Structure
- 4Ms:

(a) Time - Project Master Schedule

(b) Machineries - Milestone Event / Project Master Schedule

(c) Materials - Milestone Event / Project Master Schedule

(d) Manpower - Task / Responsibility Matrix

(e) **Money**

# Project Master Schedule

| Subproject | | Task | Responsible Dept. | Dependent Dept. | 2002 J | F | M | A | M | J | J | A | S | O | N | D | 2003 J | F | M | A | M | J | J | A | S | O | N | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Determine need | A1 | Find operations that benefit most | Industrial | | | | △ ▲ | | | | | | | | | | | | | | | | | | | | | |
| | A2 | Approx. size and type needed | Project Eng. | I.E. | | | | | △ | | ▲ | | | | | | | | | | | | | | | | | |
| Solicit quotations | B1 | Contact vendors & review quotes | P.E. | Fin., I.E., Purch. | | | | | ○ | | ● | | △ ○ | ▲ | □ | | | | | | | | | | | | | |
| Write appropriation request | C1 | Determine tooling costs | Tool Design | I.E. | | | | | | | | ○ | | | ● | | △ | | | | | | | | | | | |
| | C2 | Determine labor savings | I.E. | I.E. | | | | | | | | | | | △ ▲ | | | | | | | | | | | | | |
| | C3 | Actual writing | P.E. | Tool Dsgn., Fin., I.E. | | | | | | | | | | | | | | △ ○ | | | | | | | | | | |
| Purchase machine tooling, and gauges | D1 | Order robot | Purchasing | P.E. | | | | | | | | | | | | | | | | △ | | | | | | | | |
| | D2 | Design and order or manufacture tooling | Tool Design | Purch., Tooling | | | | | | | | | | | | | | | | | | | △ | | | | | |
| | D3 | Specify needed gauges and order or mfg. | Q.C. | Tool Dsgn., Purch. | | | | | | | | | | | | | | | | | | | △ | ○ | | | | |
| Installation and startup | E1 | Install robot | Plant Layout | Mill-wrights | | | | | | | | | | | | | | | | | | | | △ | | | | |
| | E2 | Train employees | Personnel | P.E. Mfg. | | | | | | | | | | | | | | | | | | | | △ | | | | |
| | E3 | Runoff | Mfg. | Q.C. | | | | | | | | | | | | | | | | | | | | | | | △ □ | |

Legend:
- * Project completion
- □ Contractual commitment
- △ Planned completion
- ▲ Actual completion
- ^ Status date
- ○ Milestone planned
- ● Milestone achieved
- ---- Planned progress
- —— Actual progress

Note: As of Jan. 31, 2003, the project is one month behind schedule. This is due mainly to the delay in task C1, which was caused by the late completion of A2.

# WBS 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

# Simplified Linear Responsibility Chart

| | 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

# Project Budget

- Project budget = operating budget covers whole project from start to end.

- 2 types of budget:

(a) Direct project budget = cost & expenses

(b) Indirect project budget = warranty / penalty cost, charges.

Total project budget = Direct + Indirect project budget + (gross / net profit projection)

# Management Reserves

- Management Reserves = Money reserves
- Normally: Each task should be scheduled & estimated realistically. Only a few tasks should encounter major unforeseen difficulties.
- A central management reserve help PM in:

(a) Having the freedom to allocate funds from reserve to overcome the problems.

(b) Minimizing the re-budgeting funds for others.

## Project Funding Plan (PFP)

PFP is based on cash flow analysis of the project budget with the Project Master Plan.

# Budgeted & Actual Cost for Work Schedule & Performed

- **Budgeted Cost for work Schedule (BCWS)** = budgeted / planned amount of cost for work schedule to be accomplished + amount of level of effort within a given time.
- **Budgeted Cost for work performed (BCWP)** = budgeted / planned amount of cost for completed work + budgets for level of effort within a given time. Is named as earned value.
- **Actual cost for work performed (ACWP)** = amount reported as actually expended in completing the work accomplished within a given time.
- ***Schedule variance = BCWP – BCWS***
- ***Cost variance = BCWP - ACWP***

# Project File

- An orderly collection of documents reflecting all aspects of the project. It is to assure all information is continually available to PM.

- The need for Project file are:

1. When change position of PM, it will ensure smooth transition of assignment.
2. When litigation (legal) occurs, the file provides vital information.
3. When similar project undertaken, it provides data for use (pricing, source of supply).
4. Post completion audit of Project File will indicates weakness & strengths for further action.

# Outline of the Project File

- 1. General Project Info.
  - 1.0 The project summary plan: scope, objectives, approach
  - 1.2 Project Appropriation Request (PAR) 9product development, capital, facilities, data processing systems projects)
  - 1.3 R&D cases (R&D or product development projects)
  - 1.4 Product plan (product development projects)
  - 1.5 Contract documents (sales projects)
    - 1.5.1 Request for proposal & all modifications thereto
    - 1.52 Proposals
    - 1,53 Original signed contracts & modifications & all documents & specs incorporated in the contract by reference

- 2. Management & organization
  - 2.1 Key organization chart
  - 2.2 Linear responsibility chart
  - 2.3 Key project personnel
    - 2.3.1 X Company
    - 2.3.2 Y Company
  - 2.4 PM & key team member job specs.
  - 2.5 Key functional managers & staff assigned to project
  - 2.6 Policies & directives
- 3.Technical
  - 3.1 Technical approach
  - 3.2 Systems, production& components specs
  - 3.3 Drawings & reports
  - 3.4 Design review minutes
  - 3.5 Production plans & configuration status
  - 3.6 Engineering change notice
  - 3.7 QA, reliability, maintainability, supportability, assurance
  - 3.8 Field service & engineering & value engineering
- 4. Financial

- 4. Financial
  - 4.1 Estimates & budgets
  - 4.2 Cost accounting reports
  - 4.3 Project P & L
  - 4.4 Contract status report
  - 4.5 Project Chart of account
  - 4.6 Billings & payment vouchers

5. Work Plans & Schedules
   - 5.1 PBS
   - 5.2 Master schedule & milestone chart
   - 5.3 Network plans or bar charts
   - 5.4 Detailed schedules

6. Work Authorization
   - 6.1 Work orders – internal
   - 6.2 Work orders – other affiliated companies
   - 6.3 Major purchase orders
   - 6.4 subcontracts

- 7. Evaluation & Reporting
  - 7.1 Project evaluation reports & charts
  - 7.2 Project evaluation meeting minutes
  - 7.3 Management reports
  - 7.4 Customer reports
  - 7.5 Trip reports
  - 7.6 Audit reports

- 8. Communications
  - 8.1 Internal & external communications

- 9. Project Security
  - 9.1 Work classification
  - 9.2 Visitations
  - 9.3 Clearance lists

# Exercise

1. Advantages (benefits) of planning and why?
2. What are the obstacles to planning?
3. Why PMs do not plan?
4. What happens if you don't plan or only do a partial planning?
5. How to improve the planning effort of PMs?
6. What is the minimum information you need to start planning? (List 10)

*To be submitted not later 11.9.2008*
*(in compliance with academic etiquette)*

*(10 Marks)*