PROJECT CONTROL USING CPM

By

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Control:

- The process of comparing planned versus actual and correcting undesirable deviations

What:

- Time and Money

General Objective:

- To complete the project according to plans & specifications with minimum total cost

Specific Objectives:

1. Monitoring: to detect, evaluate, and forecast any deviations from plans
2. Updating: to allow for timely corrective actions

Level (degree) of control is affected by:

1. Size and complexity of the project
2. Size and structure of the organization (contractor)
3. Contractor's past experience
4. Degree of importance of being on target
5. Uncertainty of target estimate (time and cost)
6. Occurrence of undesirable events
7. Demand of the owner

Time (progress) Control:

CPM is a useful tool for control:

1. It pinpoints trouble spots before they occur
2. It provides selectivity of important activities to control

Prerequisites to control

- Complete and detailed network

Two phases:

1. Monitoring
2. Updating

Monitoring

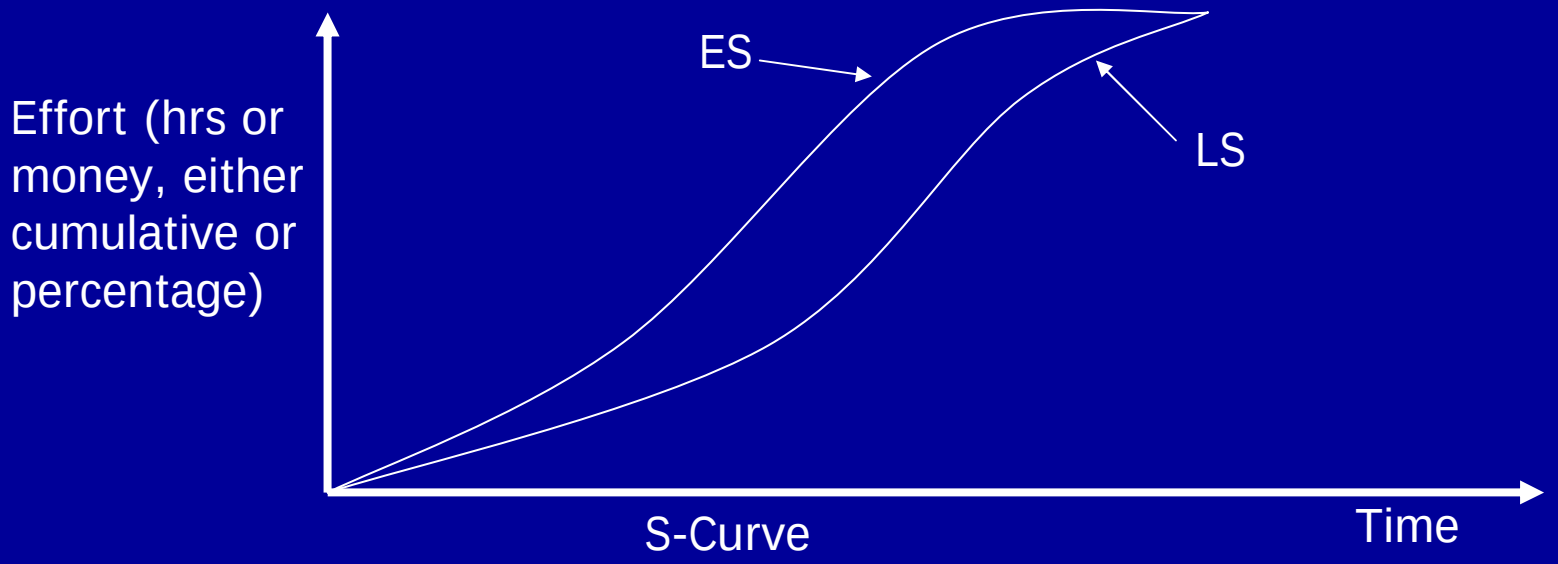
- A major task is obtaining information (mostly from the field) about the progress of the project.

Ways of obtaining Progress Information:

1. General (overall) projects
2. By activity
3. Only critical activities

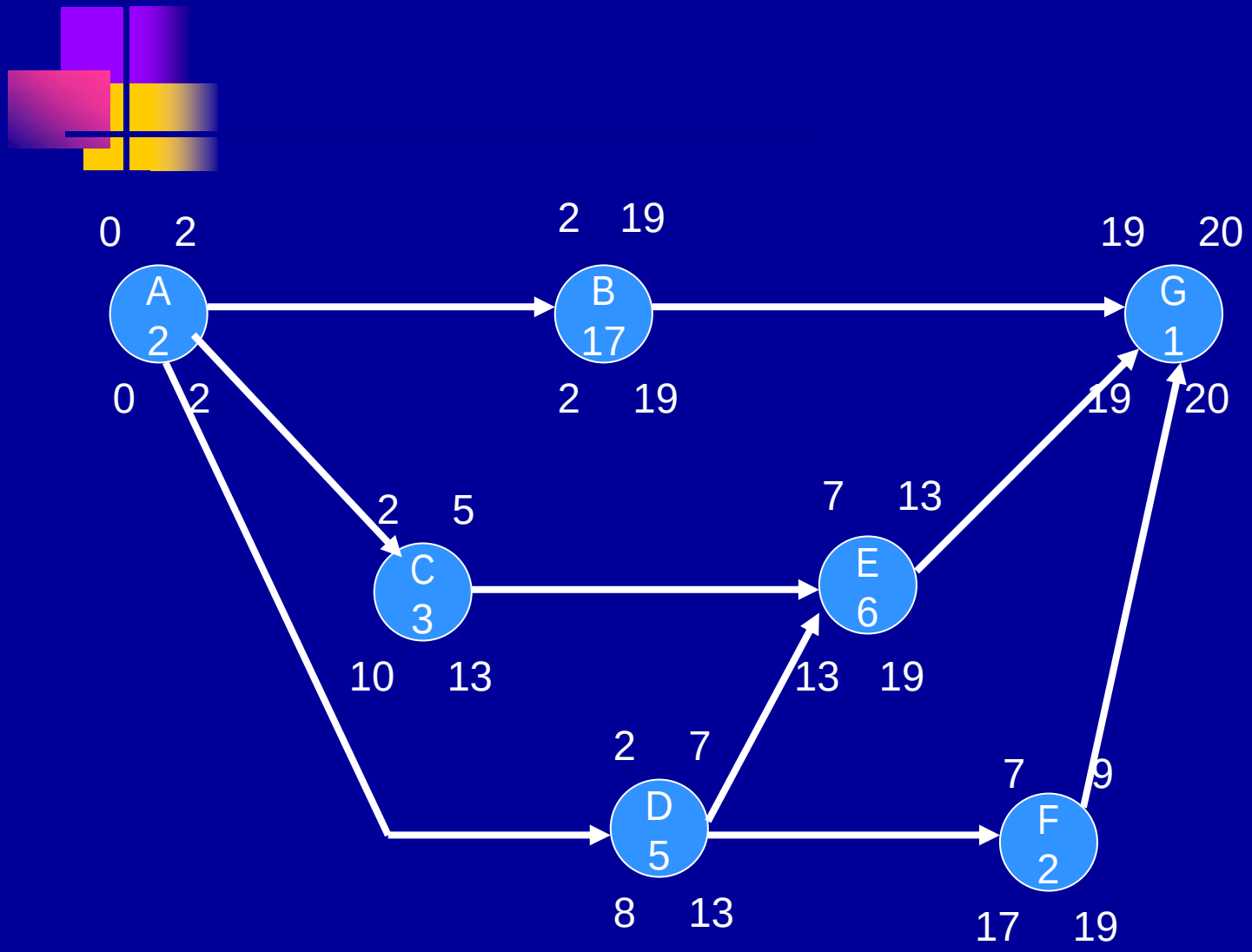
1. General (overall) progress (the S curve)

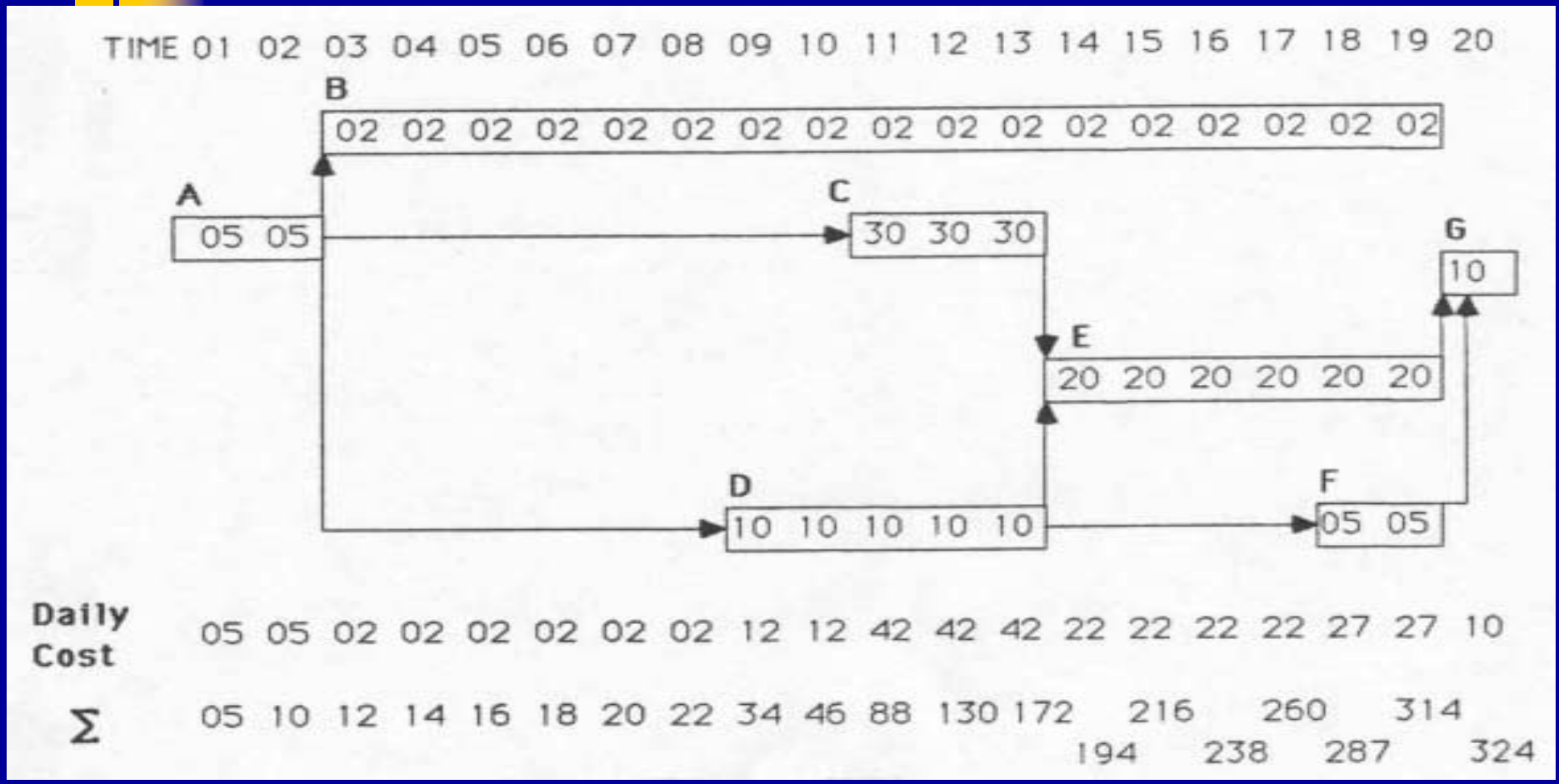
- Completion effort is measured by:
  - Manhours
  - Or Cost (more popular)
- Multiple S curves for any project-bounds ES LS



Example: Obtaining S curve based on LS

ACTIVITY	DURATION (DAYS)	COST RATE (SR/DAY)
A	2	500
B	17	200
C	3	3000
D	5	1000
E	6	2000
F	2	500
G	1	1000


0 2
A
2
0 2
2 19
B
17
2 19
19 20
G
1
19 20
2 5
C
3
10 13
7 13
E
6
13 19
2 7
D
5
8 13
7 9
F
2
17 19


TIME 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20
B
02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02 02
A
05 05
C
30 30 30
G
10
E
20 20 20 20 20 20
D
10 10 10 10 10
F
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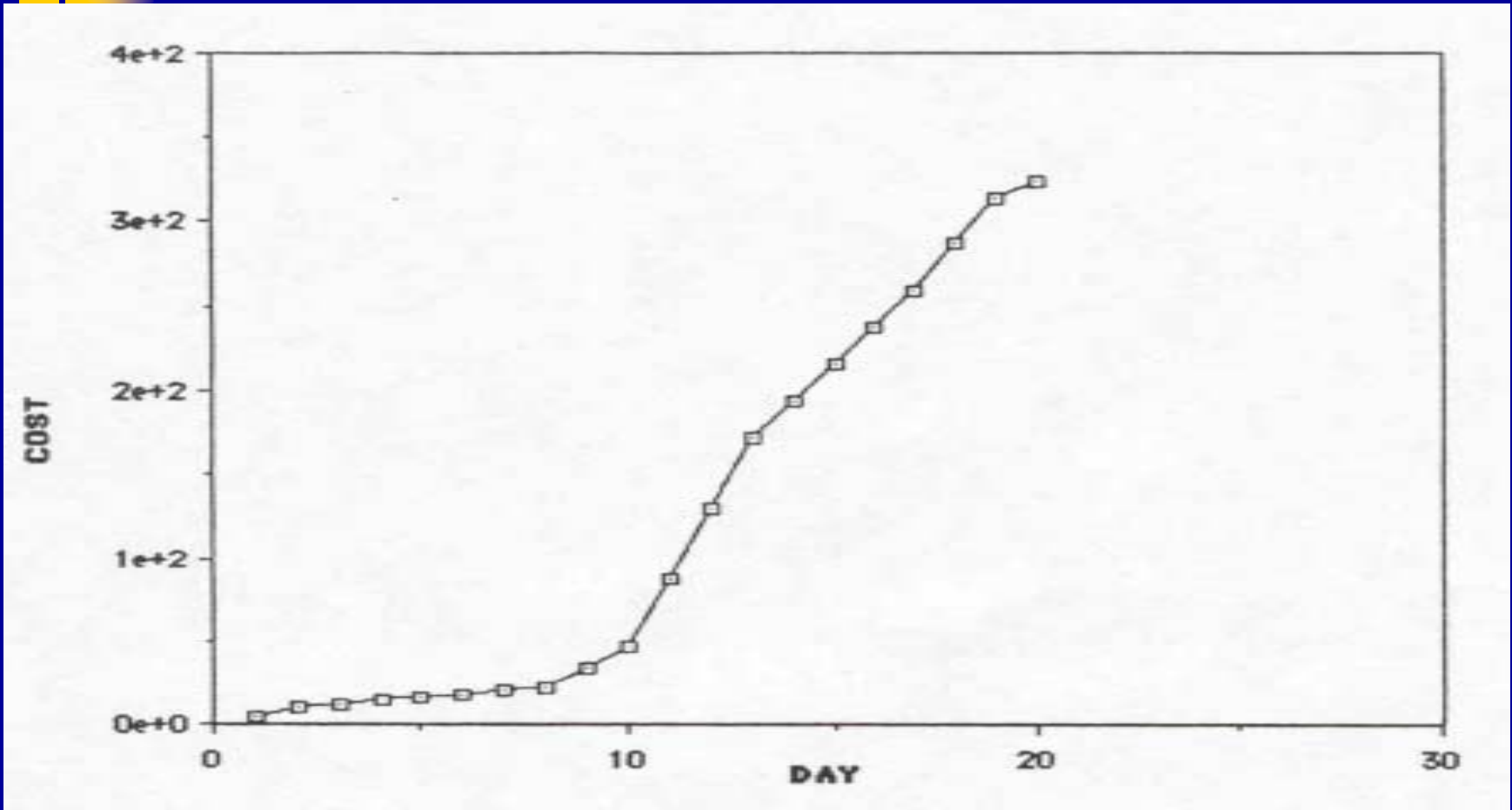
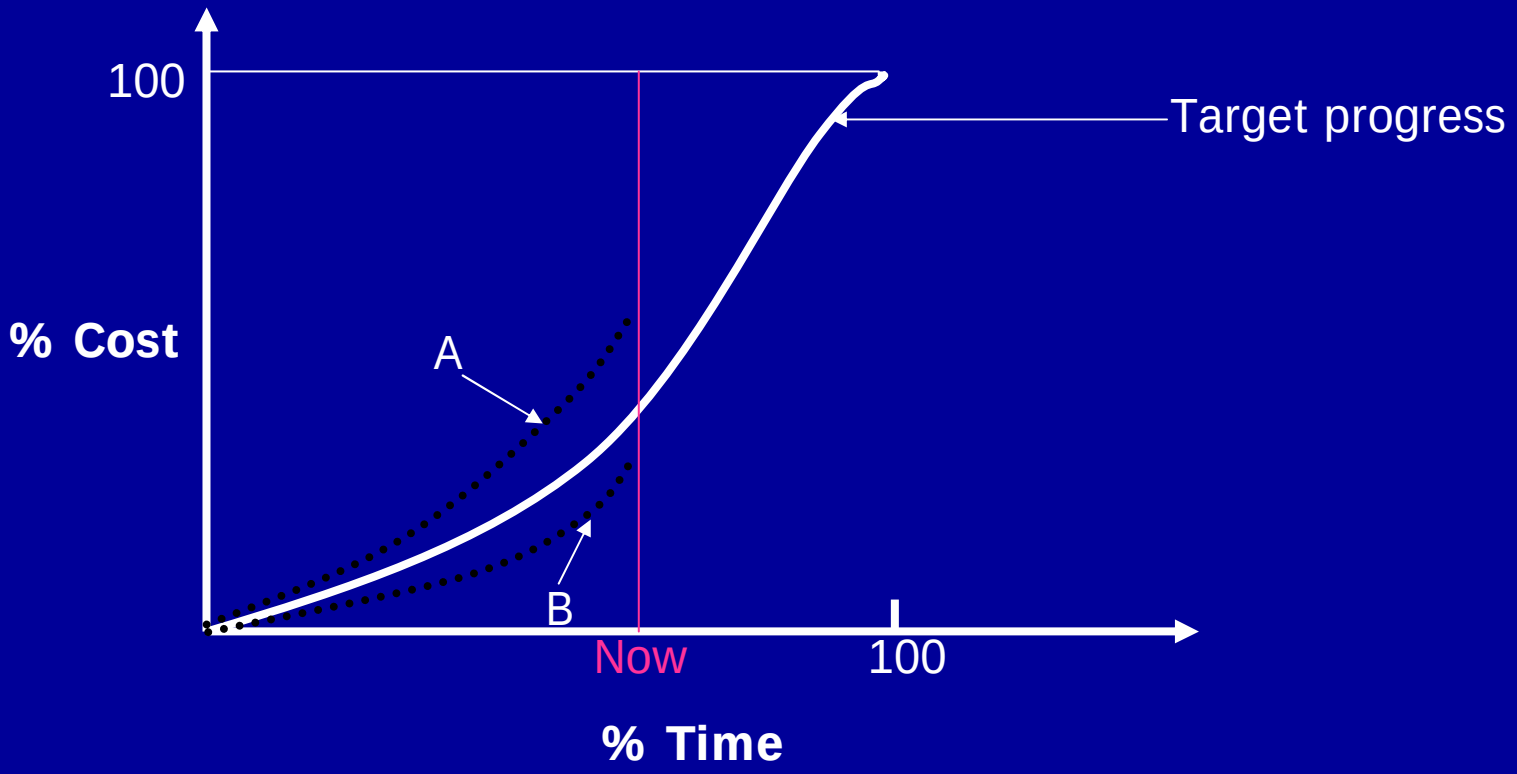
Daily Cost
05 05 02 02 02 02 02 02 12 12 42 42 42 22 22 22 22 27 27 10
Σ
05 10 12 14 16 18 20 22 34 46 88 130 172 216 260 314
194 238 287 324

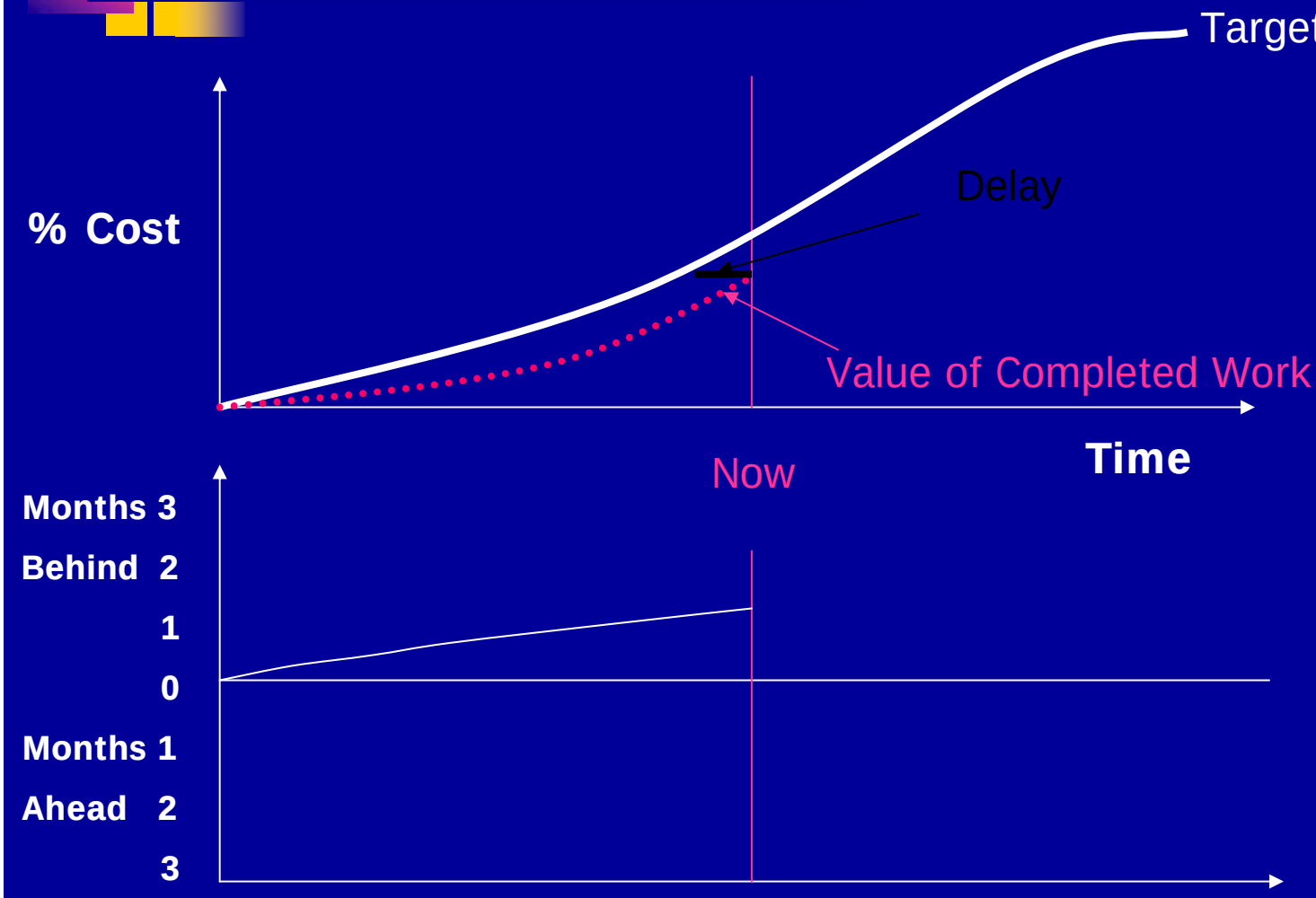

4e+2
3e+2
2e+2
1e+2
0e+0
COST
0
10
20
30
DAY

Approach

- Target S curve is based on planned schedule
- Compare target curve with actual



- S curve can be supplemented to be more meaningful (examples)



2. By activity

- Needs a status report for each reporting period
- Reviewing period can be daily, weekly, ….. etc.

Activities in the status report:

1. Activities in progress (in the review period)
2. Activities due to start (in the review period)
3. Activities due to finish (in the review period)

Information in the status report:

1. Activities number and description
2. Start date (actual or scheduled)
3. Finish date (actual or scheduled)
4. Percentage of completion

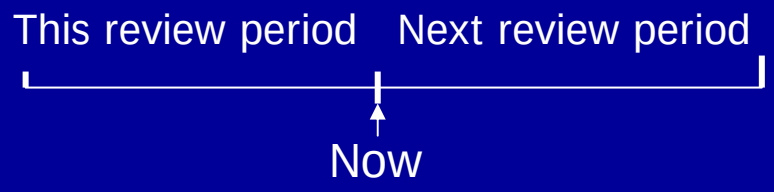
Example

Critical Path Program—Report on Activity Status

Works Section: _____ Date: _____

Reported by _____

Activity Arrow Numbers	Activity Description	Started ? / Not Started ? / Finished ?	Scheduled Start Date	Scheduled Finish Date	Status (% complete on above date)	Expected or Actual Finish Date	Reasons For Delay, If Any.



For all activities that are:

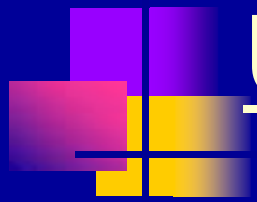
a. Completed this period

b. In progress

c. Due to Start or Finish this or next period

3. Only critical activities

- Above # 2 is done for only critical activities
- **Weakness:** neglected non-critical activities may become critical.



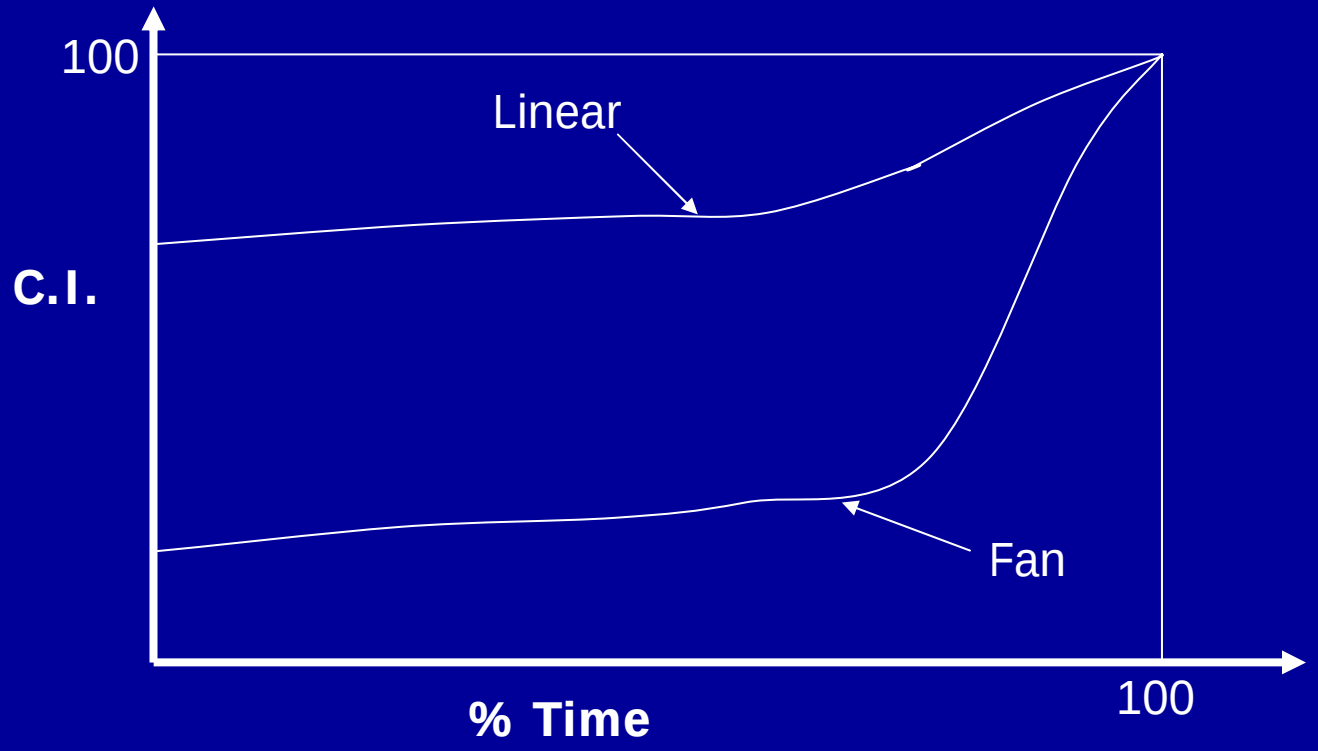
Updating

- Bringing the project to date. It is the process of modifying the target plan to continue meeting the project requirements (quality and time) with minimum cost.

- It is the replanning & rescheduling of what remains in the project.

Updating intervals

- Uniform intervals:
  - Suitable for linear networks



Criticality Index, C.I. = No. Remaining Critical Activities X 100

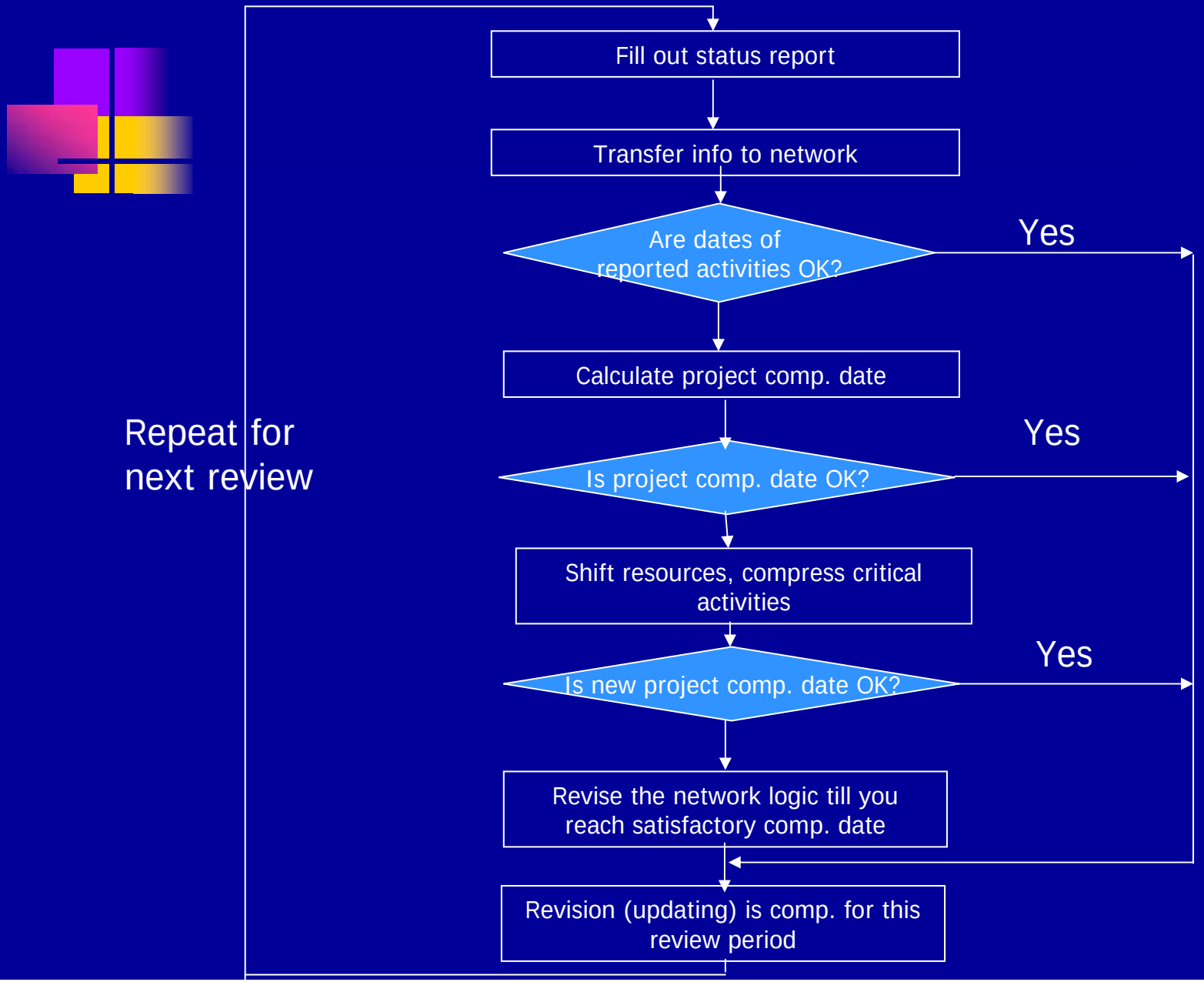
No. Remaining Activities

Updating intervals

2. Decreasing-length intervals:
   - Suitable for fan-shaped networks

3. Random intervals:
   - Updating is made at certain project milestones

General Procedure for Updating



Major advantage of CPM:

- Logical determination of activities that should be adjusted (time and logic) to complete the project on time.

Money control

- Two elements: Cost and Liquidity (cash)

Cost Control: Steps

1. Report actual cost
2. Compare with planned (budgeted) cost
3. Take corrective action.

- CPM facilitates cost control:
  - Activity is the unit of analysis (vs the grouping found in the takeoff estimate)

Typical form:

Form for cost reporting & Comparisons

1 2 3 4 5 6

Activity No. & Description	Budgeted Cost	Percentage completion	Value of work	Actual cost	Overrun or underrun

2 Estimated Cost (Direct + Indirect + Overhead)

4 = 2 X 3

5 Obtained from accounting department as reported by field personnel

Can be used to improve future estimates

6 = 5 - 4