# A Short Introduction to Project Management

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# Why Project Management?

Why manage a project, why not just do it?

- need to know what to do before trying to do it
- ensure that goals achieved
- detect deviations from plan early in order to take remedial action (or to take advantage of positive deviations)
- increase overall efficiency in performing project
- reduce risk of failure, cost or time overrun

# What is a Project?

## A project is defined by:

- unambiguous goal: concrete deliverables
- time deadline: completion date
- resource budget: money, person-days, etc.

# Goals: Unambiguous, Clear

Goal, deliverables specified so that it is always absolutely clear whether project is:

- not yet started
- started but not yet finished
- finished
- "Developing a program for ..." is *not* enough.
- delivery form? how many? where?
- training, other supporting services, etc. etc.?

## **Activities**

- Divide and conquer
- Subdivide a project into activities, each with
- unambiguous goal: concrete deliverables
- time deadline: completion date
- resource budget: money, person-days, etc.
- I.e., each activity is a subproject
- Subdivide activities further until each activity is small enough to be understood easily

## **Activities**

# An activity

- is performed over an interval of time
- consumes resources

## Examples:

- design PlayCard
- review PlayCard
- test PlayCard
- document the player module

### **Events**

#### An event

- takes place at a point in time
- does not consume resources

## Examples:

- source code for PlayCard completed and submitted to reviewer
- source code for player module submitted to TAs
- project report submitted to client

## **Milestones**

A milestone is a particularly important event, a significant accomplishment

## Example:

- completion of the design, review and testing of the PlayCard and InformMove access routines
- completion of the design, review and testing of the InitGame, DealCard and ReportPoints access routines

# **Project Planning**

## For each activity determine:

- prerequisite activities (which other activities must be finished before this activity can start)
- when to perform (schedule activities)
- who will perform (estimate and coordinate personnel allocation)
- what other resources needed (estimate and coordinate resource allocation)

Resolve resource allocation conflicts (iteratively)

# **Planning Aids**

# PERT plan

- shows interdependencies between activities
- does not show time scale

#### Gantt chart

- shows time scale clearly
- does not show interdependencies between activities
- Use both. Neither is enough.

## **Execute, Monitor and Control**

Let the project members do their work

— For a while —

Then monitor progress

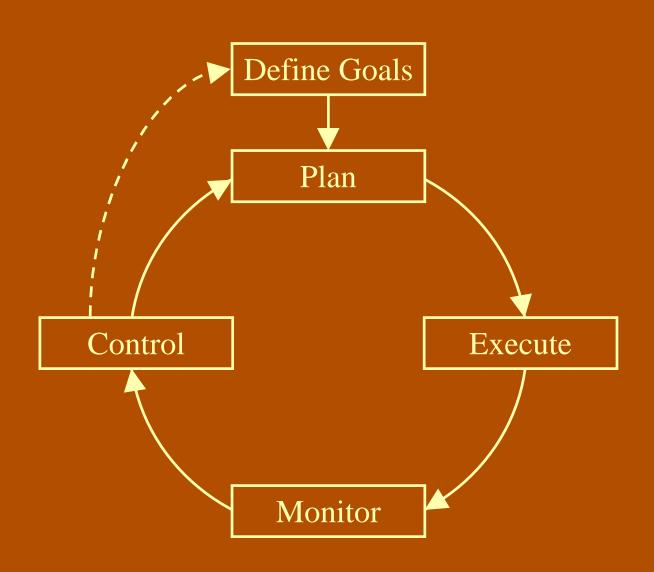
Control actual progress against plan, evaluate

Modify plan as appropriate

(Modify goals if necessary and possible)

Repeat this cycle

# Feedback Loop of Project Management



## Monitor and Review: How Often?

- frequently enough to give time to take corrective action
- effort for monitoring and replanning should pay off in increased overall efficiency and reduced risk of cost or time overrun or failure
- rule of thumb:
  - informally: continually
  - formally: 1 to 10% of project time between reviews

## **PERT Charts**

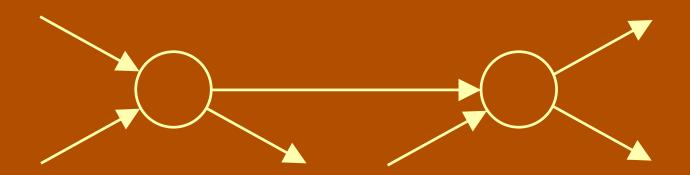
# Program Evaluation and Review Technique

- One (of several) conventions for drawing PERT charts:
  - event = circle
  - activity = arrow
- an arrow is drawn between two circles
- start circle has outgoing arrows, end circle has incoming arrows, other circles have both

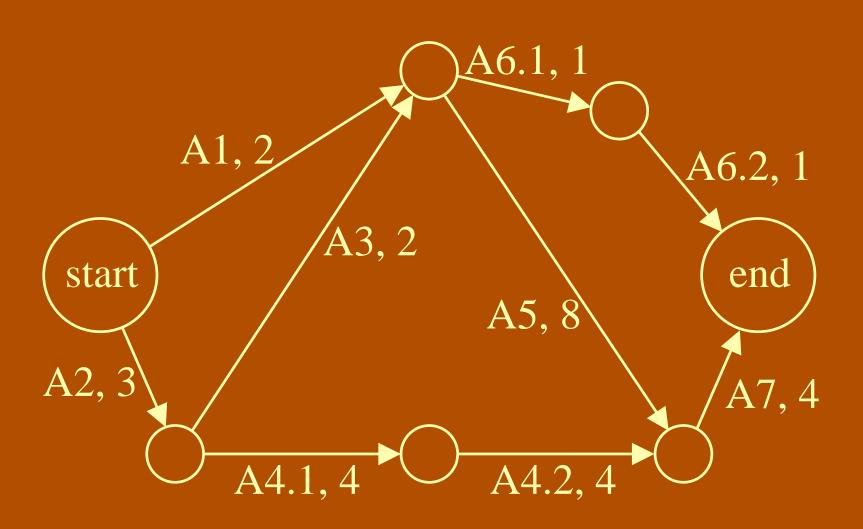
## **PERT Charts**

#### PERT chart

- an event (circle) *occurs* when *all* incoming activities (arrows) are finished
- an activity (arrow) can start only when its preceding event (circle) has occured



# **Example PERT Chart**



## **PERT Chart Calculations**

Forward calculation: earliest possible times for each activity and event:

- begin at start circle at current time
- earliest possible activity start time
- earliest possible activity completion time
- earliest possible event time

## **PERT Chart Calculations**

Reverse calculation: latest permissible times for each activity and event:

- begin at end circle at planned completion time
- latest permissible activity completion time
- latest permissible activity start time
- latest permissible event time

*Slack* is the difference between earliest possible and latest permissible times for an activity, event

## **Critical Path**

The path along which the slack is zero (or minimum) is the *critical path* 

Any delay on the critical path will delay project completion

Project manager must monitor activities on the critical path especially carefully and critically

## **Gantt Charts**

Horizontal bar chart

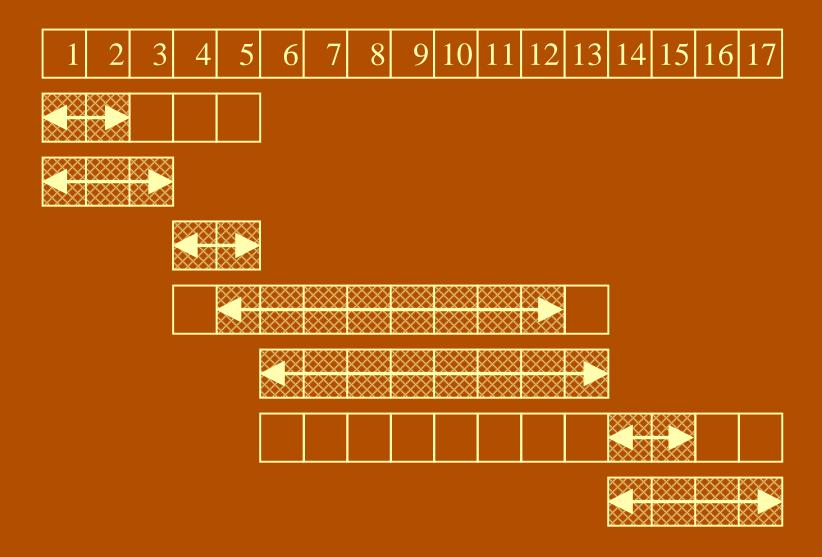
Gantt chart for activities, another for resources

Horizontal scale is *calendar* time

Each bar shows

- earliest possible start to latest permissible completion
- planned start to planned completion
- or planned utilization of a particular resource

# **Example Gantt Chart**



## **Conclusions**

Successfully completed projects: *not luck* but due to good

- planning
- execution
- monitoring
- control
- i.e. good project management is necessary if the goal is to be achieved on time and in budget