

# Top Ten Scheduling Mistakes and How to Avoid Them

Session PS.10

# Seattle



June 28 - July 1, 2009

at the Sheraton Seattle Hotel

*TCM: Improving Decision Making in a Green World*

**Joseph A. Lukas**  
PE, CCE, PMP

AACE International's 53<sup>rd</sup> Annual Meeting

Seattle, Washington

## Joe Lukas Biography

- **Degree:** BS in Chemical Engineering, 1974
- **University:** Syracuse University
- **Years of Experience:** 35 years
- **Professional Field:** Project Management
- **Something you do not know about me:**
  - Scuba Diver (Cozumel, BVI, Florida Keys)
  - Used to race motorcycles (before kids)
  - Sky-diving (before kids)
  - Used to have a full-head of blond hair



## What Will Be Covered?

- Top ten list of mistakes people make when preparing project schedules based on my experiences in reviewing project schedules.
- Recommended procedure to follow when preparing project schedules.



## Topic #1: Common Scheduling Mistakes

### **Top Ten List of Scheduling Mistakes:**

10. Not using the project summary task, header, footer and legend
9. Not Using Start & Complete Milestones
8. Linking Summary Tasks
7. Confusing Duration and Work
6. Misuse of Constraints

## Topic #1: Common Scheduling Mistakes

### Top Ten List of Scheduling Mistakes:

5. Missing Task Relationships (“Hangers”)
4. Lack of Schedule Contingency
3. Incorrect Schedule Logic
2. Inappropriate Level of Detail
1. Lack of Scheduling Knowledge

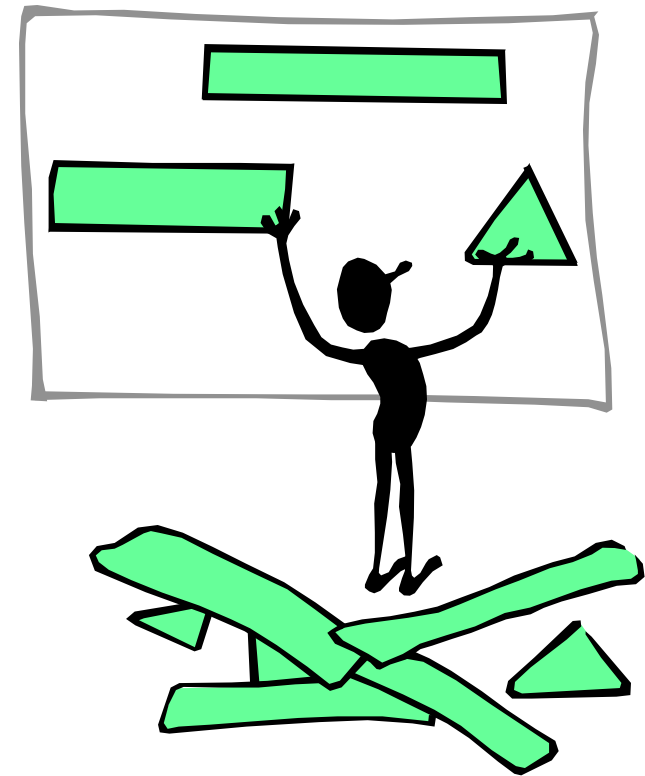
# Scheduling Mistakes: #1

## Lack of Scheduling Knowledge

- Problem: difficult to prepare a correct and efficient schedule without knowing **Critical Path**

### Method:

- Forward and backward pass.
- Critical Path determination.
- Float calculation:
  - Free Float (Free Slack)
  - Total Float (Start Slack)



## Scheduling Mistakes: #2

### Inappropriate Level of Detail

- Use 20/80 Rule – not 8/80 (*which can lead to excessive # of tasks*).
- Use sub-project schedules (*such as detailed design schedule*) & link to your project schedule.
- Use progressive elaboration during project life to build each successive phase of your schedule.



# Scheduling Mistakes: #2 Inappropriate Level of Detail

## This Includes the Structure of Project Tasks and Proper Naming of Deliverables & Activities

Defined as "tasks" in scheduling software

- Major Deliverables

- Deliverables

*May not be needed for small or medium projects, probably >1 level for large projects*

- Work Package Deliverables

*Lowest level for control*

Use 20/80 Rule

- Activities

*Steps needed to create the deliverable*



## Scheduling Mistakes: #2 Inappropriate Level of Detail

- ✓ Data Flow Diagram
- ✓ Risk Management Plan
- ✓ Training Manual Outline
- ✓ Test Plan

**Deliverables are written as a noun!**

- ✓ Conduct unit test for program 21A
- ✓ Review requirements document
- ✓ Prepare report specification draft
- ✓ Write script for interface module

**Activities are written as an active verb-noun combination!**

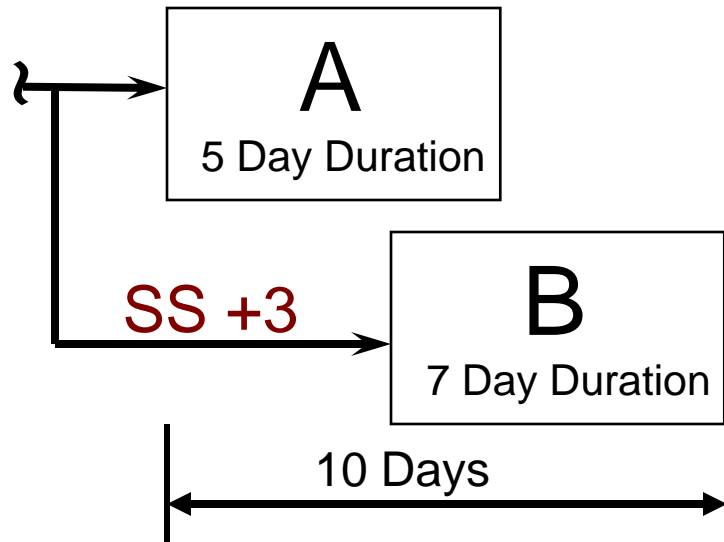
## Scheduling Mistakes: #3 Incorrect Schedule Logic

- **Gantt View:** not useful for checking schedule logic (hard to follow relationships).
- **Network Diagram:** not useful since can't easily see/follow entire schedule on screen.
- **BEST PRACTICE:**
  - Plot the schedule on one large sheet (many copy vendors can plot schedules).
  - Tape on a wall and track the logic.

## Scheduling Mistakes: #3 Incorrect Schedule Logic

- **Common Problem:** incorrect use of SS with lag instead of FF with lag.
- Example:
  - Task A = Equipment Layout Drawing (5 days).
  - Task B = Detailed Piping Drawings (7 days).
  - Can start detailed drawings once equipment layout drawing started.

# Scheduling Mistakes: #3 Incorrect Schedule Logic



- Task A duration increased to 10 days.
- Task B still shows completion in 10 Days!

**Start-to-Start  
With 3 day lag**

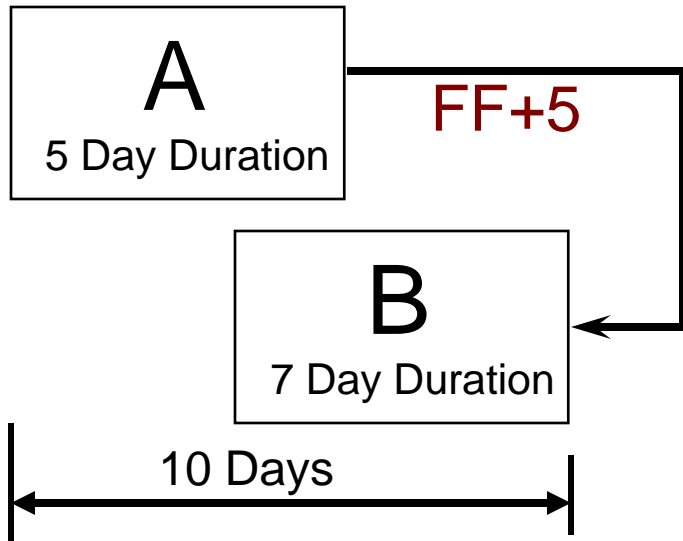
Task Name	Duration	Sep 30, '07							Oct 7, '07						
		S	M	T	W	T	F	S	S	M	T	W	T	F	S
Task A	5 days	[Gantt bar]													
Task B	7 days	[Gantt bar]							[Gantt bar]						
Task A	10 days	[Gantt bar]							[Gantt bar]						
Task B	7 days	[Gantt bar]							[Gantt bar]						

**Original  
Plan**

**Actual**

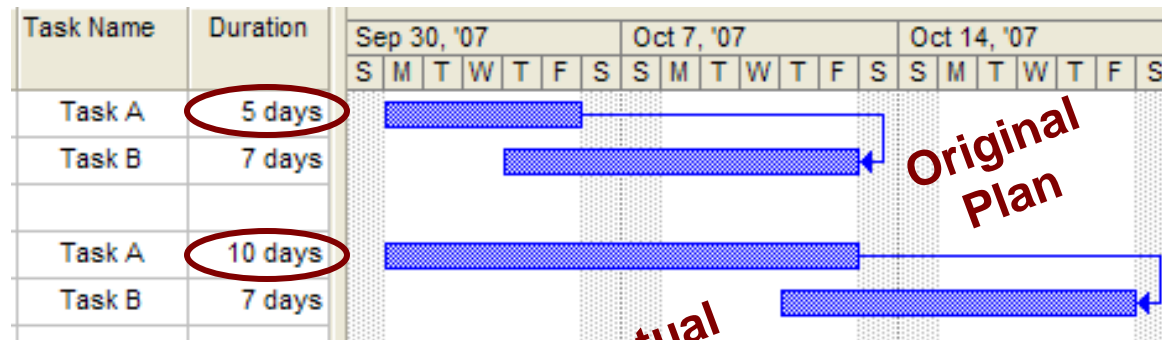
# Scheduling Mistakes: #3

## Better Schedule Logic



- Task A duration increased to 10 days.
- Task B now shows completion in 15 Days!

**Finish-to-Finish  
With 5 day lag**

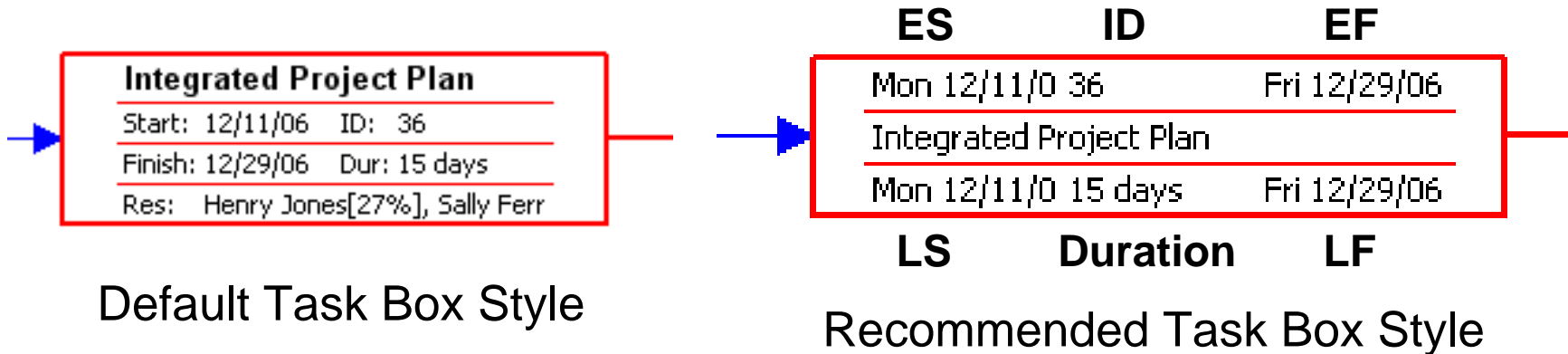


# Scheduling Mistakes: #3

## Checking Schedule Logic

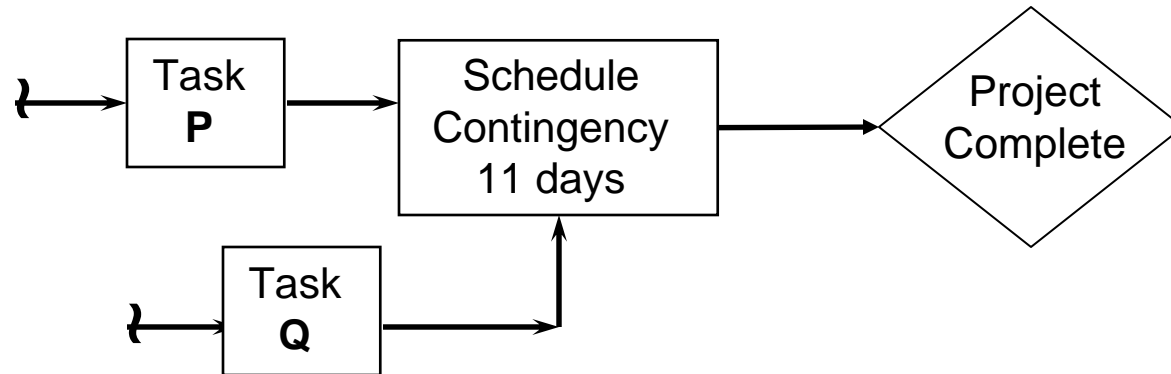


- Default task box is not useful for checking schedule logic.
- Change task box style to show early & late start, early & late finish so you can check schedule calculations.



## Scheduling Mistakes: #4

### Lack of Schedule Contingency



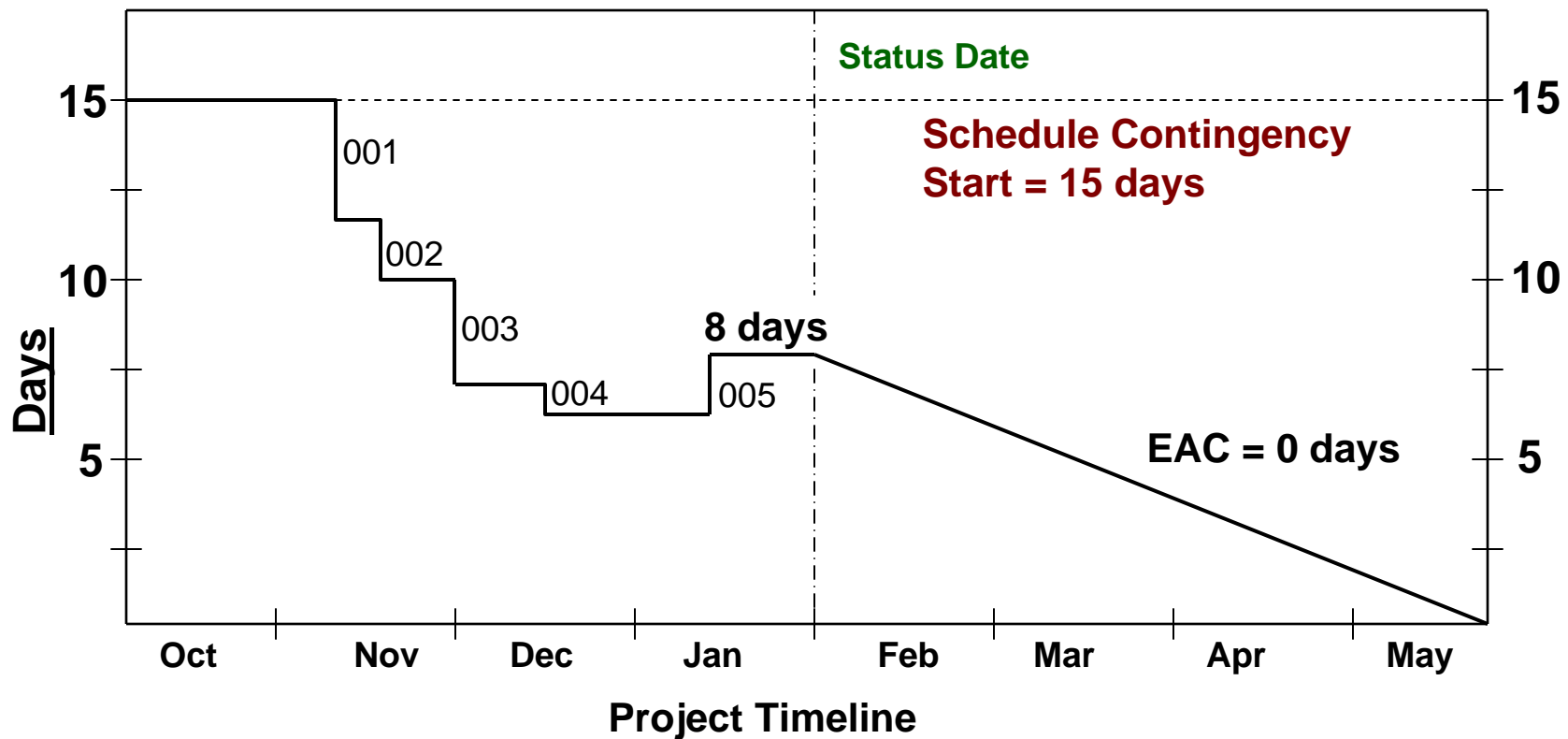
- Adjust the project contingency task duration up or down based on actual progress:
  - Result => project completion date stays constant.
  - Project completion date only changes when the Project Team deems it appropriate.



# Scheduling Mistakes: #4

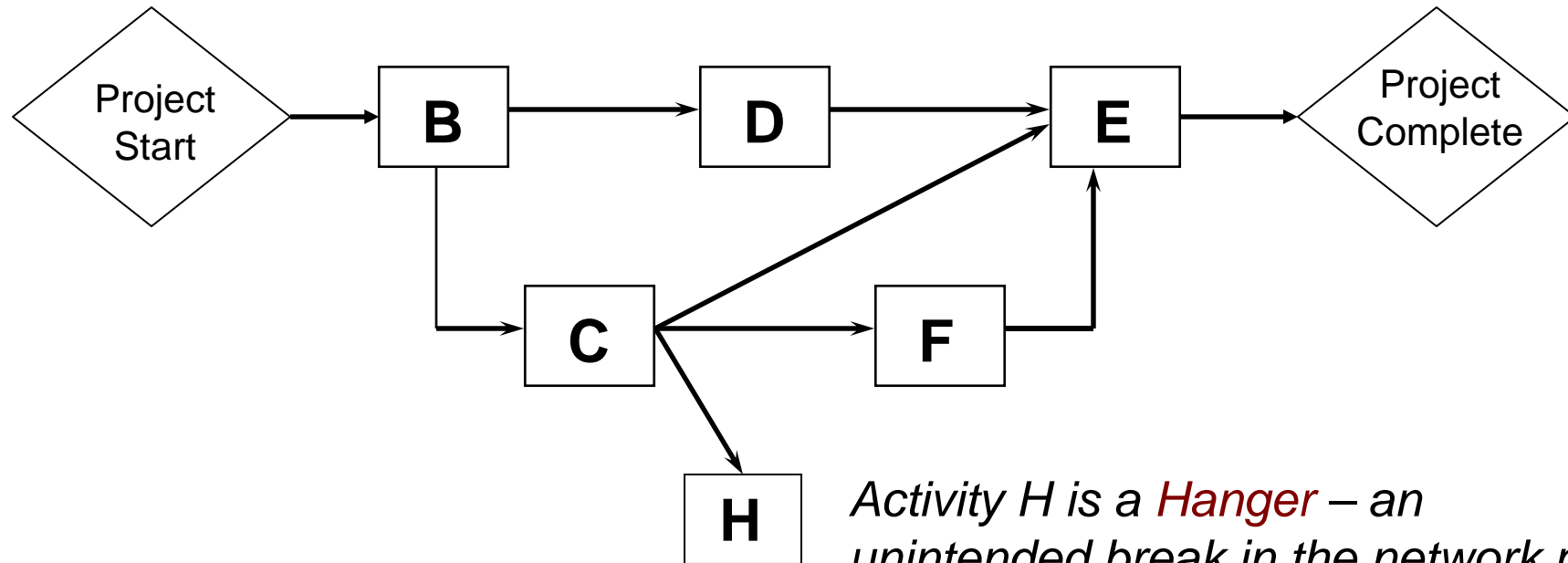
## Lack of Schedule Contingency

- Use a contingency log and drawdown graph (below) to track remaining schedule contingency.



# Scheduling Mistakes: #5

## Missing Task Relationships



- ✓ All tasks should have at least one predecessor (except the Project Start milestone).
- ✓ All tasks should have at least one successor (except the Project Complete milestone).

# Scheduling Mistakes: #5

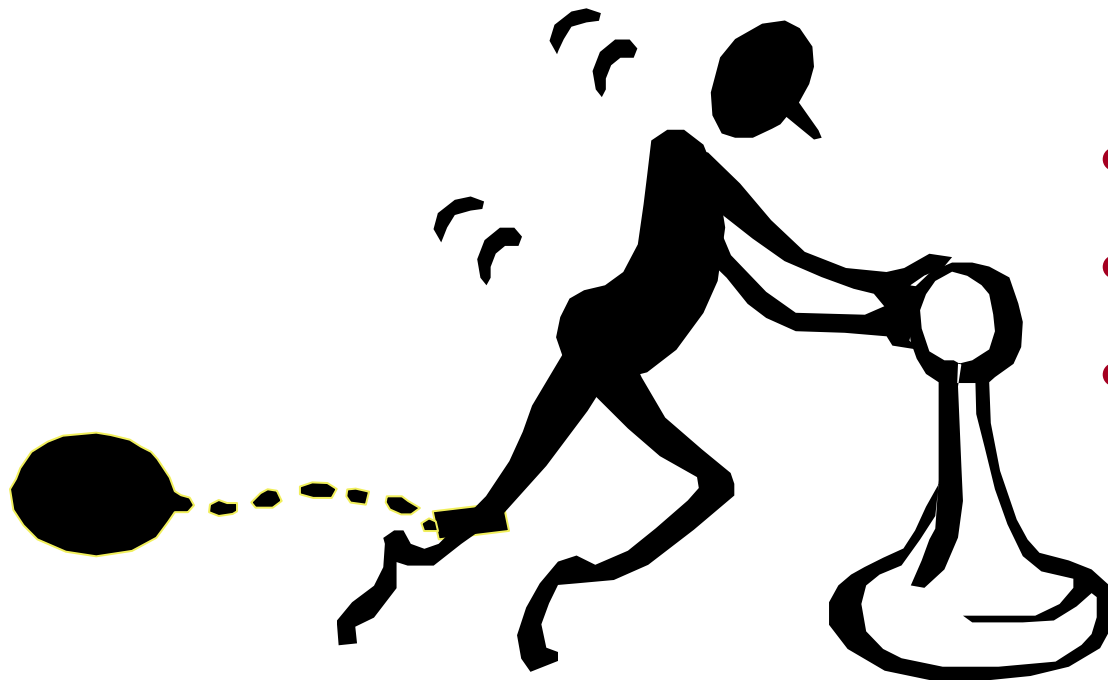
## How to Check for Hangers

- Add Successor column to Gantt Chart View.
- Scroll Predecessor and Successor columns for missing links.
- **Exception:** Summary Level Tasks should not be linked.

Task Name	Duration	Predecessors	Successors
<b>These are NOT hangers – see schedule mistake #8</b>			
<input type="checkbox"/> <b>Build, Configure &amp; Integrate</b>	<b>90 days</b>		
Database and Conversion Programs Build	40 days		62
Time Tracking Application Configuration	15 days	59,55,61	63
Unit Test Time Tracking Application	15 days	51,62	68
PeopleSoft Interface Module Build	30 days	53,59	65
Unit Test PeopleSoft Interface	20 days	64,51	
Weekly Reports Build	10 days	53,59	67
Unit Test Weekly Reports	10 days	66,51	68
Module Tests	10 days	63,67,51	69
Systems Integration Test	5 days	68,51	76

**Hangers**

## Scheduling Mistakes: #6 Misuse of Constraints



- **Constraint Types**
  - Flexible
  - Inflexible
  - Semi-flexible
- **Constraint Rules**
- **Negative Slack**
- **Deadlines**

## Scheduling Mistakes: #6

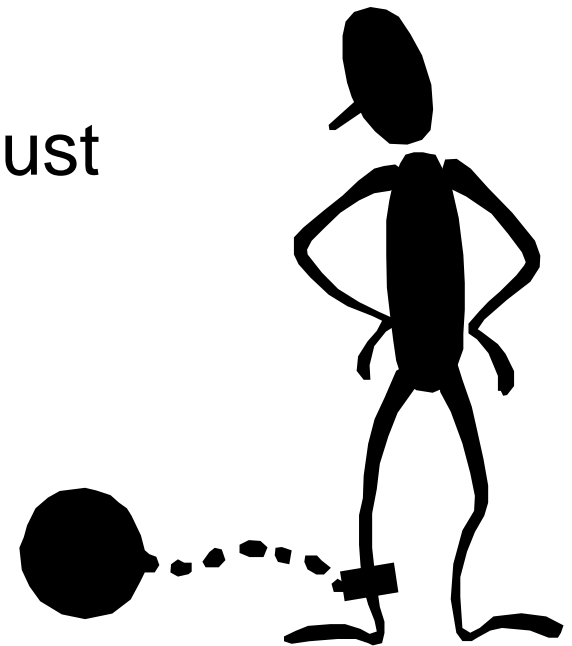
### Misuse of Constraints

- **Flexible Constraint:** Schedule software can change the task start & finish date.
- Default constraint type used:
  - **As Soon As Possible (ASAP):** default constraint type applied to tasks when scheduling from the project start date.
  - **As Late As Possible (ALAP):** default constraint type applied to all new tasks when scheduling from the project finish date.

## Scheduling Mistakes: #6 Misuse of Constraints

- **Inflexible Constraint:** task *must* begin or end on a given date. Called 'hard constraint':
  - **Must Start On (MSO):** Task must start on an exact date.
  - **Must Finish On (MFO):** Task must finish on a exact date.

**KEY POINT:** *You should only use an inflexible constraint if the task start or finish date is fixed by factors beyond the control of the project team!*



## Scheduling Mistakes: #6

### Misuse of Constraints

- **Semi-flexible Constraint:** task has a start or finish date boundary & schedule can move dates within the boundary - 'soft' constraint:
  - **Start No Earlier Than (SNET):** task will not start *before* a specific date.
  - **Start No Later Than (SNLT):** task will not start *after* a specific date.
  - **Finish No Earlier Than (FNET):** task will not finish before a specific date.
  - **Finish No Later Than (FNLT):** task will not finish after a specific date.



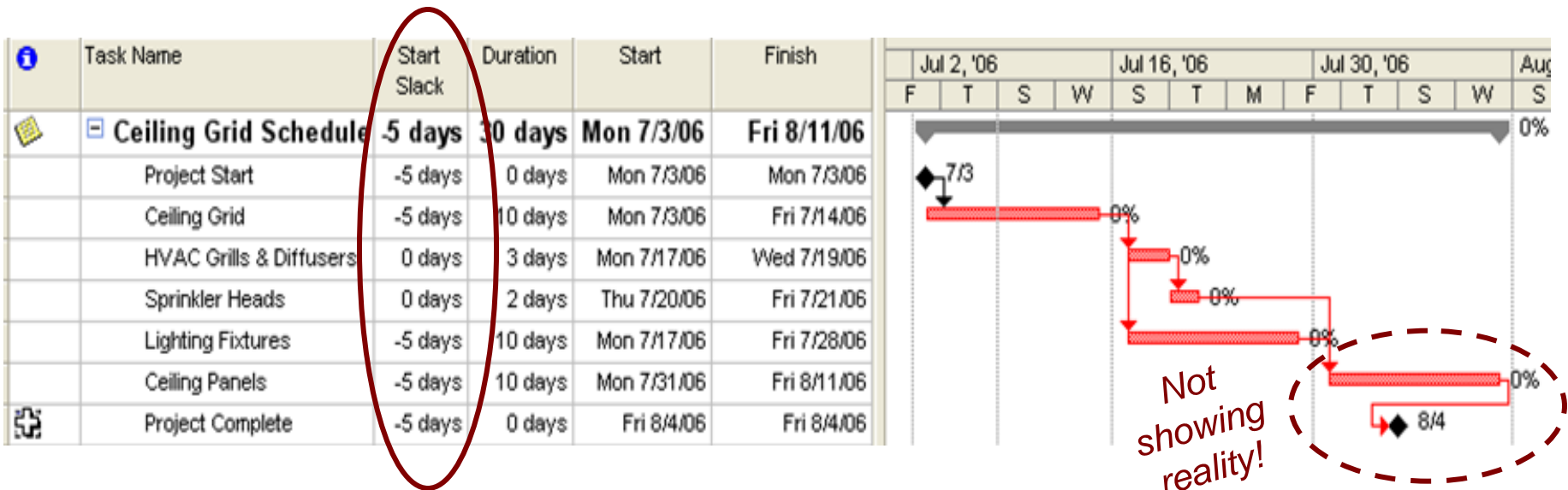
## Scheduling Mistakes: #6

### Misuse of Constraints

- Entering a Finish date for a task (for example, in the **Finish** Column) applies an FNET constraint to the task.
- Entering a Start date for a task (for example, in the **Start** Column) applies an SNET constraint to the task.
- **RECOMMENDATION:** *Never* enter dates - let the schedule software calculate dates!

# Scheduling Mistakes: #6 Misuse of Constraints








- In this case a 'Must Finish On' 8/4 was added to the Project Complete milestone (was 8/11).
- The start & end dates for the preceding tasks don't change (note the 5 days of negative float), but successor tasks end dates would change.



# Scheduling Mistakes: #6

## Misuse of Constraints

- Example of constraints overuse:

		Task Name	Constraint Type	Constraint Date
5		 <b>Pilot Testing</b>		
6		 <b>Journal History Pilot</b>		
7		Run Test Plan	Finish No Later Than	Tue 9/20/05
8		End User Testing	Start No Later Than	Tue 9/20/05
9		Code Changes	Finish No Later Than	Fri 10/21/05
10		Retest	Finish No Later Than	Mon 10/31/05
11		 <b>Refining Pilot</b>		
12		Run Test Plan	Finish No Later Than	Tue 9/20/05
13		End User Testing	Start No Later Than	Tue 9/20/05
14		Code Changes	Finish No Later Than	Fri 10/21/05
15		Retest	Start No Later Than	Fri 10/21/05
16				

## Scheduling Mistakes: #6

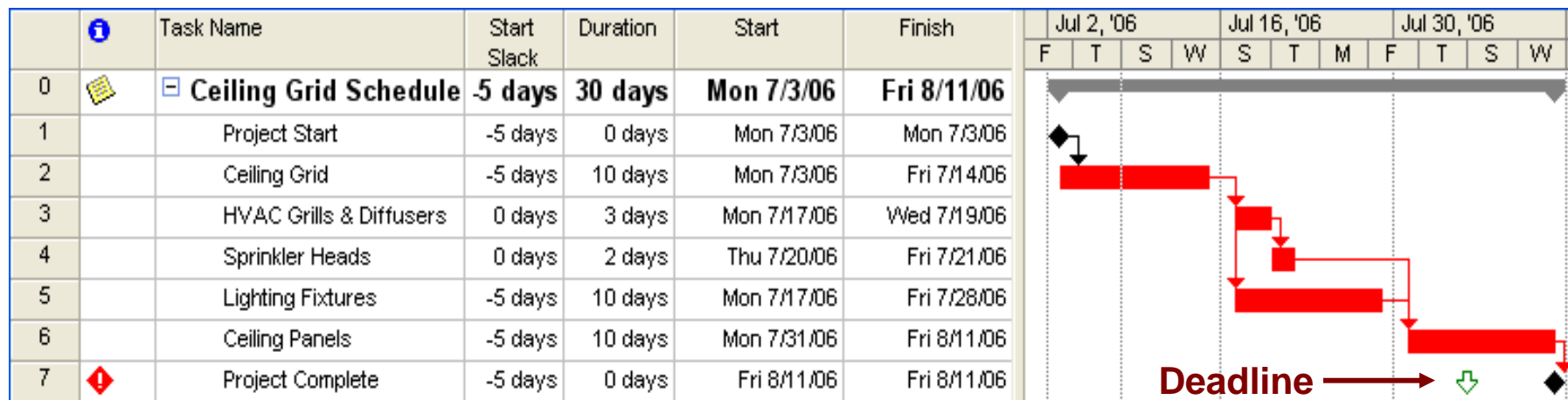
### Misuse of Constraints

- Constraints limit scheduling flexibility!
- Example: You have a five-day task that you want to finish by Friday, October 13<sup>th</sup>:
  - Today is October 3<sup>rd</sup>.
  - You add a 'Must Finish On' constraint to the task.
  - Schedule software will move the start date out to Monday, October 9<sup>th</sup> so you finish on October 13<sup>th</sup>.
  - Even if task can be started/finished earlier, scheduling software will *not* reschedule the task to start earlier!

# Scheduling Mistakes: #6

## Use Deadlines

- **Deadline:** an option to constraints! Deadline for a task indicates the latest date you want the task to be completed:
  - Notification if task scheduled completion date > deadline.
  - Deadline dates do *not* impact task logic.



## Scheduling Mistakes: #7

### Confusing Work & Duration

### Definitions:

- **Duration** = how long (the elapsed time) it will take to complete the task, **not** counting non-working time such as week-ends.
- **Work** = how many hours of effort (work) are needed to complete the task.
- **Resources** = specific people or work groups that will do the work of the task.
- **Availability** = what % of time each resource is available to work on the task.

## Scheduling Mistakes: #7 Confusing Work & Duration

### Duration and Work Relationship:

- **Units** = the number of resources and the availability of those resources:
  - For example: if Helen is 100% available and Joe is 50% available to work on a task, the number of resource units is 1.50.
- Duration, Work and Resources/Availability are related – you can *only* specify two and scheduling software calculates the third value:

$$\text{Duration} = \text{Work} / \text{Units}$$

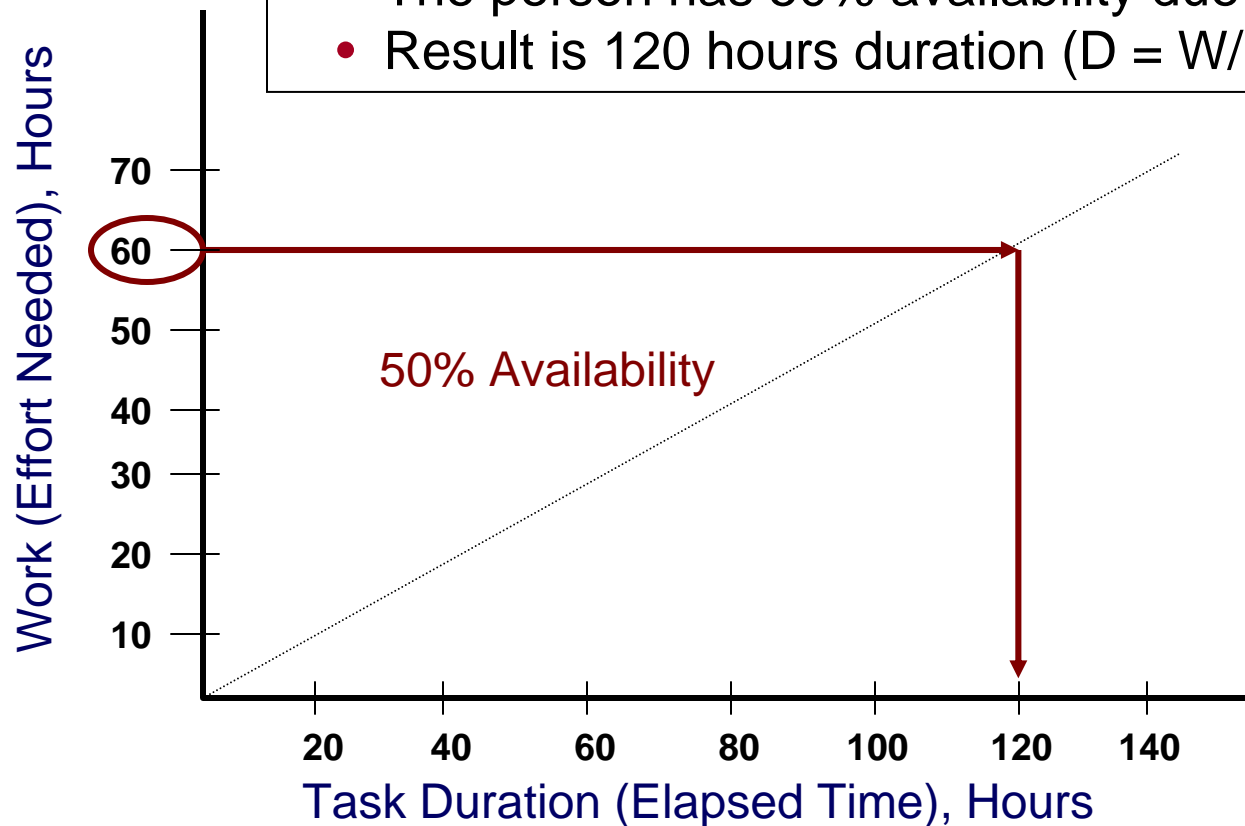


# Scheduling Mistakes: #7

## Confusing Work & Duration

### Duration and Work Relationship:

- Individual has 60 hours of effort to complete a task.
- The person has 50% availability due to other commitments.
- Result is 120 hours duration ( $D = W/U = 60/0.5$ ).



## Scheduling Mistakes: #7

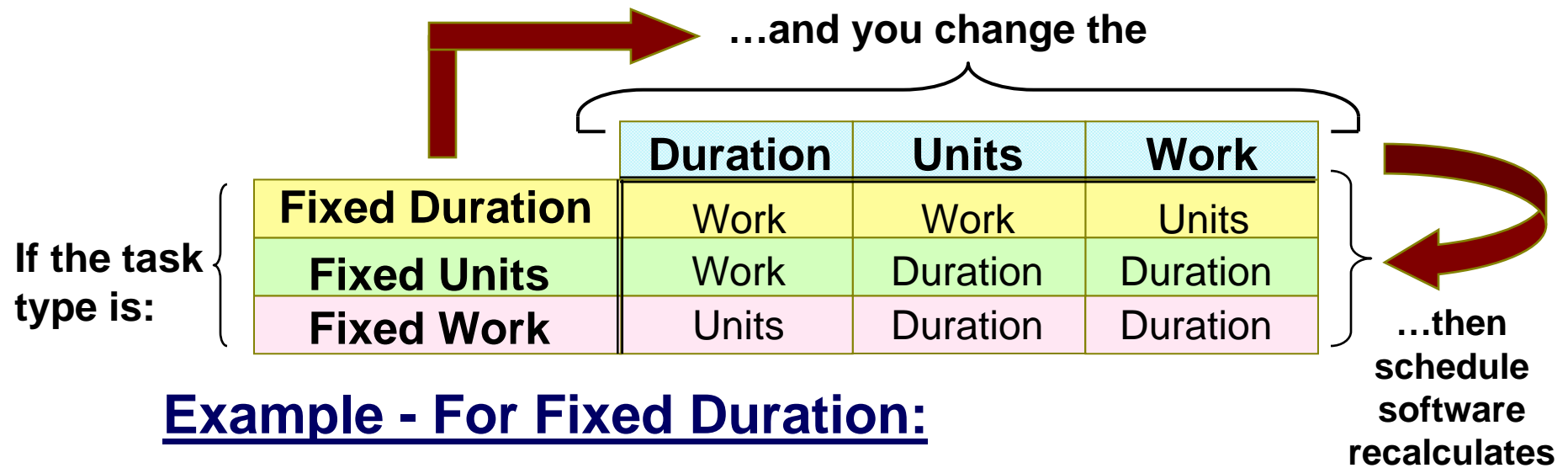
### Confusing Work & Duration

- Schedule software allows you to decide on the **Task Type** for scheduling each task:
  - **Fixed Units:** resources and availability do not vary. If you change Work or Duration, the other value changes.
  - **Fixed Work:** required work amount does not vary. If you change Units or Duration, the other value changes.
  - **Fixed Duration:** time period does not vary. If you change Units or Work, the other value changes.

# Scheduling Mistakes: #7

## Confusing Work & Duration

### Task Type Relationships:



### Example - For Fixed Duration:

- Change the duration, work is recalculated.
- Change the units, work is recalculated.
- Change the work, units are recalculated.

## Scheduling Mistakes: #7 Confusing Work & Duration

### When to Use Specific Task Types:

- Use **Fixed Duration:**
  - Resources not assigned to tasks.
  - For Program/Project summary schedules.
- Use **Fixed Work:**
  - Work hours & resources assigned to tasks.
  - Resource availability can be varied.
- Use **Fixed Units:**
  - Work hours & resources assigned to tasks.
  - Resource availability is fixed.

**Recommended  
Default!**

**Very Infrequently  
Used!**

## Scheduling Mistakes: #7 Confusing Work & Duration

### Effort Driven Scheduling:

- Scheduling method where the task work remains constant regardless of the number of resources assigned.
- As resources are added to a task, the duration decreases, but the work remains the same and is distributed among the assigned resources.
- Effort driven scheduling adjusts the task duration *only if you add or delete resources from a task!*

# Scheduling Mistakes: #7

## Confusing Work & Duration

- Effort Driven Scheduling Recommendation:
  - Leave effort driven scheduling checked.
  - Uncheck only for those very infrequent tasks where it doesn't apply.

Task type: Fixed Units

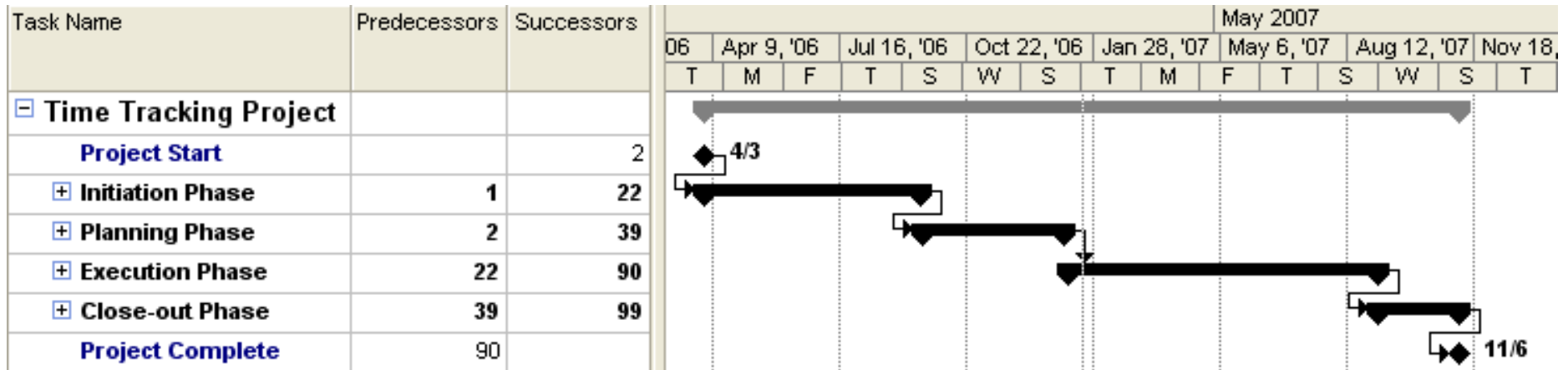
Calendar: None

Effort driven

Scheduling ignores resource calendars

**Located in the Task Information dialog box**

# Scheduling Mistakes: #8 Linking Summary Tasks



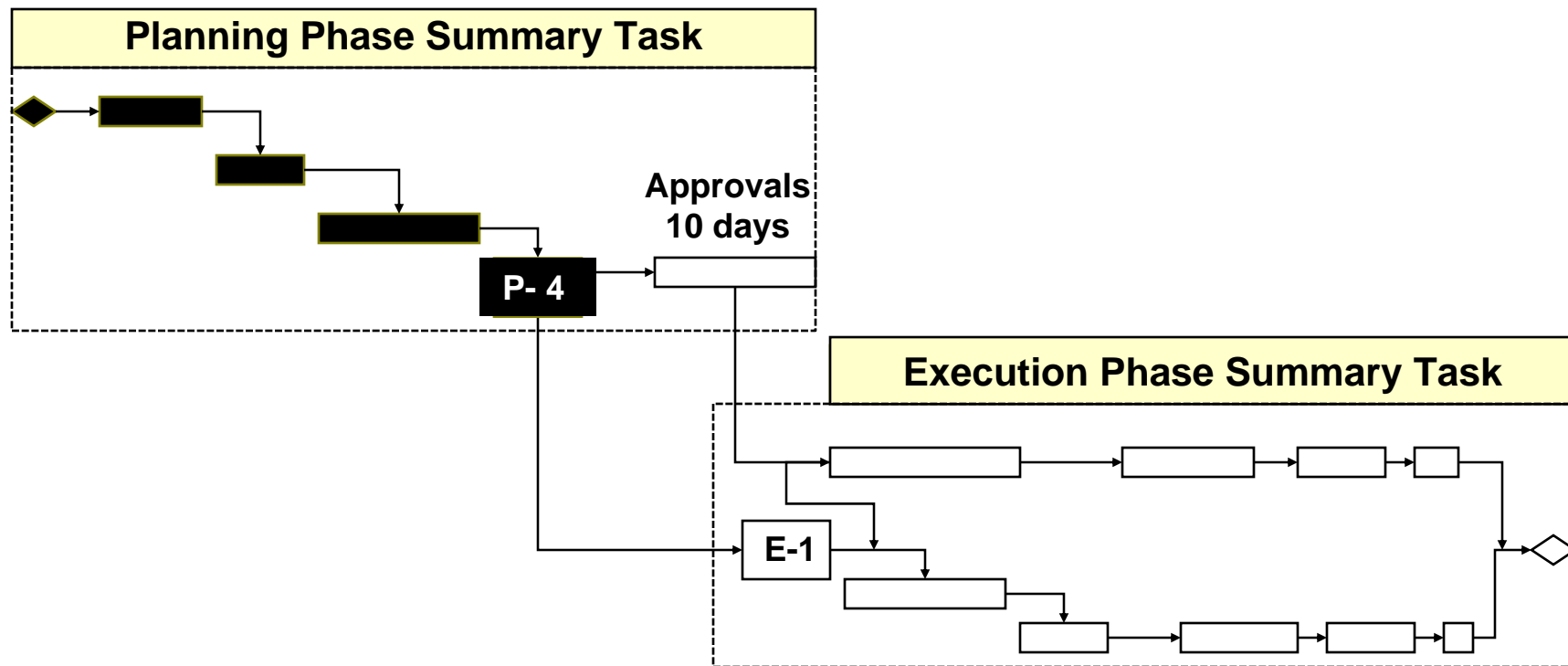
- Some people like to show linked phases (sample above), or will link summary tasks to other summary tasks or to lower level tasks.
- **PROBLEM:** on many projects some phase tasks may be able to start before completion of the prior phase.
- Linking phases means entire phase must be completed before next phase begins.



# Scheduling Mistakes: #8

## Linking Summary Tasks

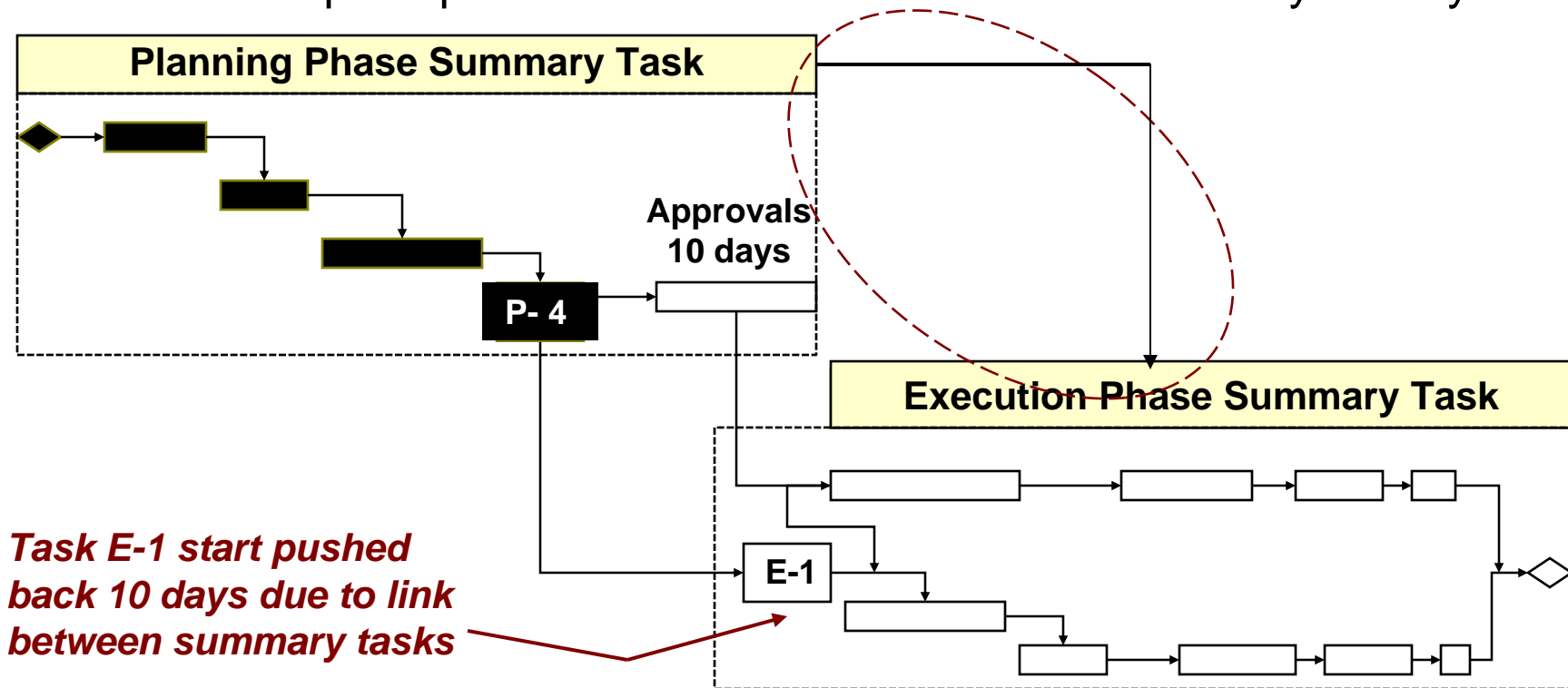
- On many projects some tasks can start before completion of the prior phase.
- Example: starting work on detailed specifications or obtaining price quotes while waiting for final funding approval.



# Scheduling Mistakes: #8

## Linking Summary Tasks

- Linking the Summary Level Planning and Execution Phase Tasks means no Execution Phase tasks can start until the Planning Phase is complete.
- In this example it pushes out the start date for Task E-1 by 10 days.

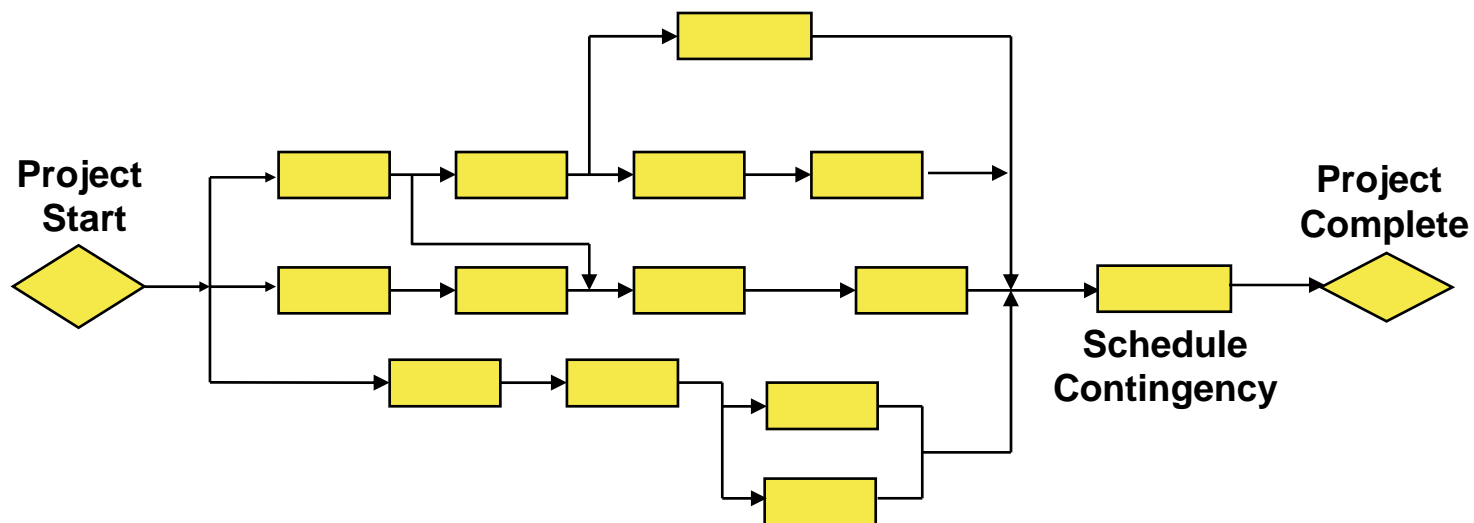


*Task E-1 start pushed back 10 days due to link between summary tasks*

# Scheduling Mistakes: #9

## Lack of Start & Complete Milestones

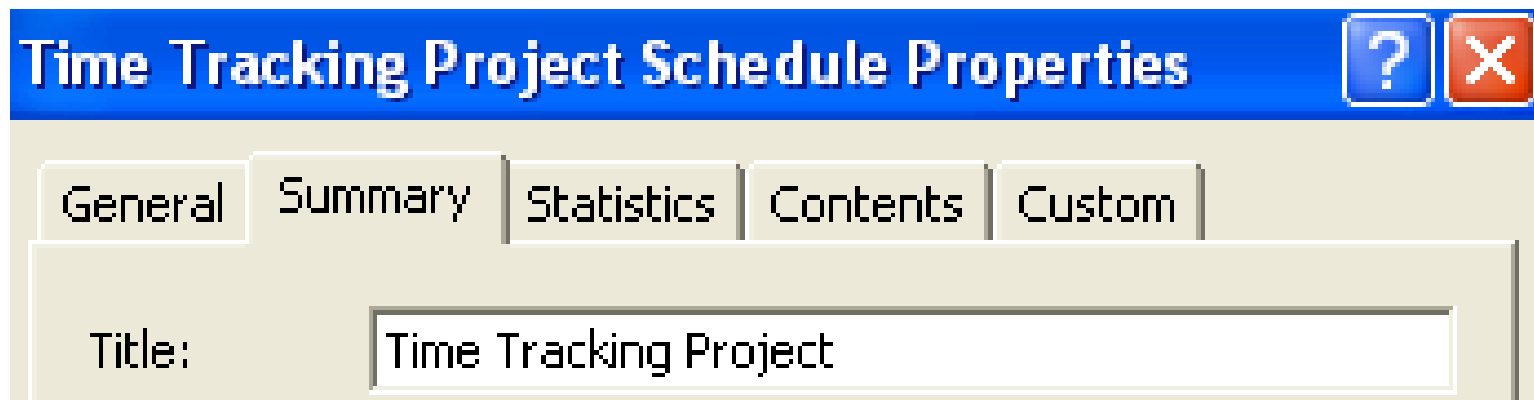
- First task - **Project Start** Milestone.
- Last task - **Project Complete** Milestone.
- Helps ensure no 'hangers'.



## Scheduling Mistakes: #10

### Project Summary Task

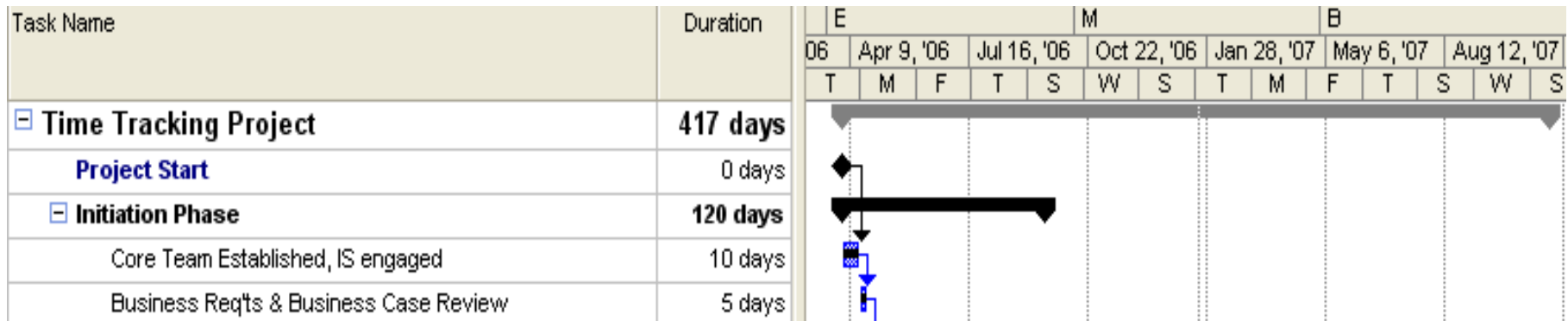
- For new projects: add **Project Summary Task**:
  - Go to 'File', 'Properties' and in the 'Title' field input your project name.
  - Go to 'Tool's, 'Options', 'View' tab and click on 'Show Project Summary Task'.



# Scheduling Mistakes: #10

## Project Summary Task

- **Project Summary Task** will be the first task listed in the Gantt View (task #0).



*When you print the schedule, the legend field shows:*

Project Summary 

## Scheduling Mistakes: #10

### Header, Footer & Legend

- Common mistake: not using header, footer and legend leaving unknown Version (revision) number & Date.
- Go to 'File', 'Page Set-up' and click on the 'Header', 'Footer' and 'Legend' tabs.
- **BEST PRACTICE:** define a common template for projects (impress your clients).

## Scheduling Mistakes: #10 Header, Footer & Legend

- **Header:** Project Title & Company Logo.
- **Footer:**
  - Left: Date of update.
  - Center: Page # of # Pages.
  - Right: Updated by (or Project Manager).
- **Legend:**
  - File name.
  - Version (revision) number.



## Suggested Scheduling Procedure

1. Set-up Project Start and Project Summary Task:
  - Set the task type to “Fixed Duration”.
  - Input the project start date.
  - Add the project summary task to your schedule.
  - On line 0 of your schedule (which is now the Project Summary Task), add your project name in the ‘Task Name’ column.
  - Add the header, footer and legend information.

## Suggested Scheduling Procedure

2. Working from the Gantt chart view, enter tasks and establish relationships:
  - Enter the project start and complete milestones.
  - Enter the list of tasks for your project.
  - Establish the task relationships.
  - Enter the work (effort) for each task.
  - Enter a first guess of duration for each task.

# Suggested Scheduling Procedure

3. Add each resource by name or work group to the Resource Sheet, along with availability.
4. From the Gantt chart view, split the screen and assign resources to tasks.

29	Systems Interface Diagram Update	5 days	Mon 10/16/06	Fri 10/20/06
30	Requirements Document (complete-approved)	10 days	Mon 10/23/06	Fri 11/3/06

Name: 
 Duration: 
 Effort driven

Start: 
 Finish: 
 Task type: 
 % Complete:

ID	Resource Name	Units	Work
1	Sally Ferris	20%	8h
2	Joe Jefferson	20%	8h
5	Henry Jones	10%	4h

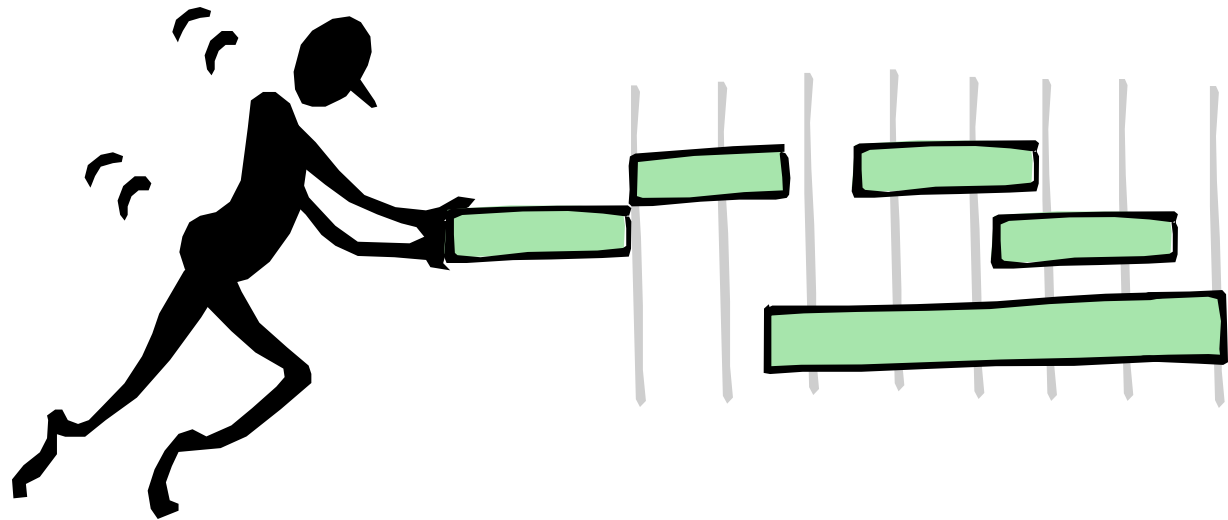
ID	Predecessor Name	Type	Lag
23	Functional Requirements Verif	FS	0d
26	Software Selection	FS	0d

## Suggested Scheduling Procedure

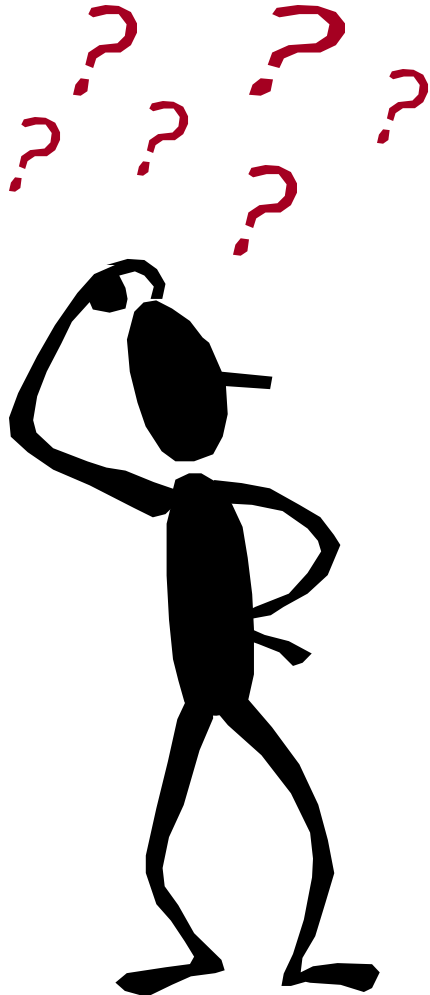
5. From the Gantt Chart, review the schedule and critical path and check for hangers.
6. Plot the schedule and do a final check for logic. Update the schedule based on this review.
7. Conduct a final check for overload of resources using the Resource Graph. Then, if desired, change the task type to "Fixed Work".
8. Once the schedule is finalized, set this as your project baseline.

# Conclusion

- Watch for the common scheduling mistakes outlined in this presentation!
- Follow the suggestions in this presentation when preparing schedules!



# Questions?



**Joe Lukas, PE, CCE, PMP**  
Vice-President  
**PMCentersUSA**

**609-575-9306 (cell)**

**888-762-3683 (work)**

**joe.lukas@pmcentersusa.com**