

Project Management

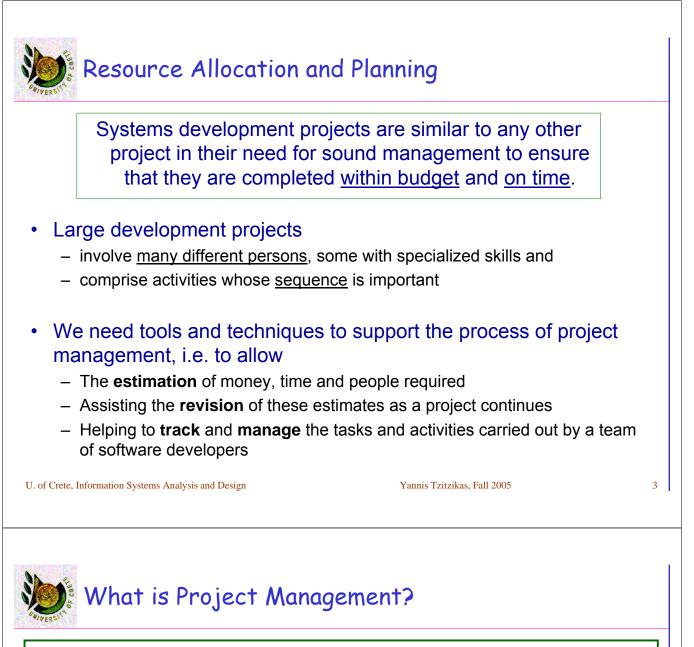
Lecture : 5 Date : 11-10-2005 Yannis Tzitzikas University of Crete, Fall 2005



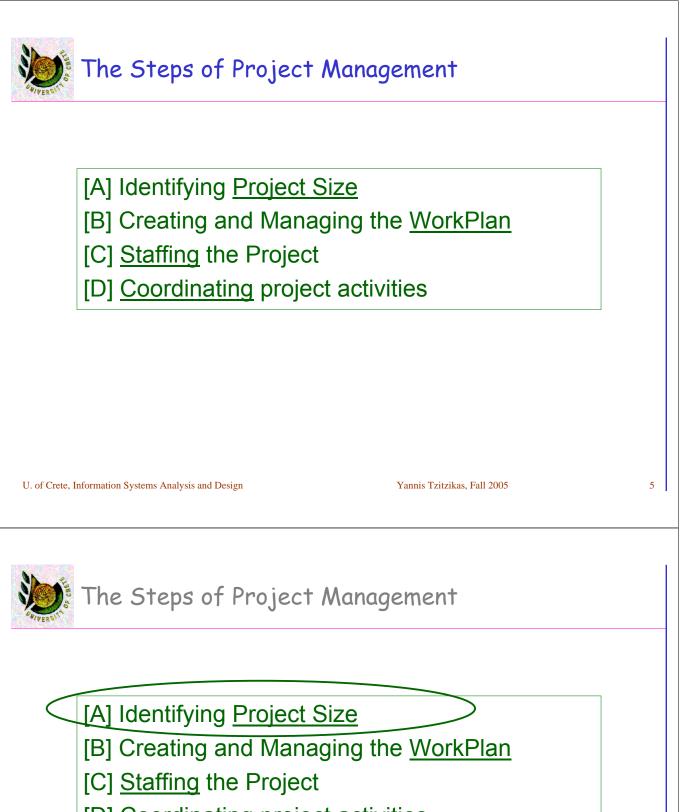
- Introduction
 - Resource Allocation and Planning
 - What is Project Management

Steps of Project Management

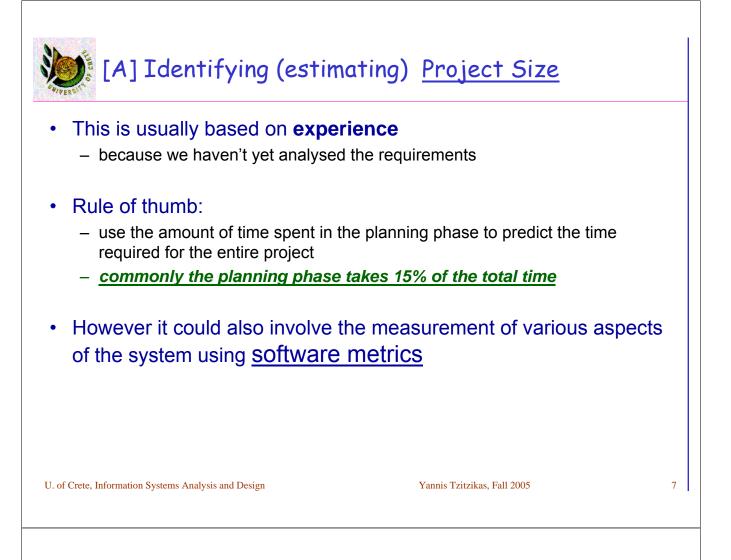
- Identify Project Size
 - the function point approach
- Create and Manage the WorkPlan
 - Critical Path Analysis (CPA)
 - Gantt charts
- Staffing the Project
- Coordinating project activities
- Vars
 - Managing iterations
 - Timeboxing



- **Project Management**: the process of planning and controlling the development of a system within a specified time frame at a minimum cost with the right functionality
- Key person: Project manager



[D] Coordinating project activities





Software metric:

 A measure of some aspect of software development, either at project level (cost, duration), or at the level of application (size, complexity)

Types of Software Metrics:

- One distinction (past vs future)
 - Result (or control) metrics
 - Predictor metrics
- Another distinction
 - Process metrics
 - <u>Product</u> metrics



[A] Identifying (estimating) Project Size The Function Point Approach

Steps:

- (a) Estimate system size
 - (a1) estimate function points
 - (a2) estimate lines of code
- (b) Estimate effort required
 - in man months

(c) Estimate time required

• in months

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Function Point Approach: (a1) Estimate Function Points

Count the number of

- inputs (e.g. data entry screens)
- outputs (e.g. reports)
- queries (e.g. db queries)
- program interfaces

Example

- 6 inputs
- 19 outputs
- 10 queries
- 15 files
- 3 program interfaces

Remark:

 At the beginning we don't know exactly how many they are. So we make an <u>estimation</u>. In the next phases of the project we can revise them. Don't forget that <u>planning is a</u> <u>continuous process</u>.



Then we partition them according to their complexity to: low / medium / high

Remark:

- don't take into account here the skills of the team.

Example	
– 6 inputs	(3 low, 2 medium, 1 high)
– 19 outputs	(4 low, 10 medium, 5 high)
– 10 queries	(7 low, 0 medium, 3 high)
– 15 files	(0 low, 15 medium, 0 high)
– 3 program interfaces	(1 low, 0 medium, 2 high)

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(a1.1) Estimate Function Points Quantify the complexity



		Complexity		
Description	Low	Medium	High	Total
Inputs	x 3	x4	x_6	
Outputs	4 x 4	10 x 5	5 x 7	101
Queries	x 3	x 4	x 6	
Files	x 7	x 10	x 15	
Program Interfaces	x 5	x7	x 10	
TOTAL UN/	ADJUSTED	FUNCTION P	OINTS (TUFP)	338



Each team may have low or high expertise on some things.

How we could take into account the expertise of the team ?



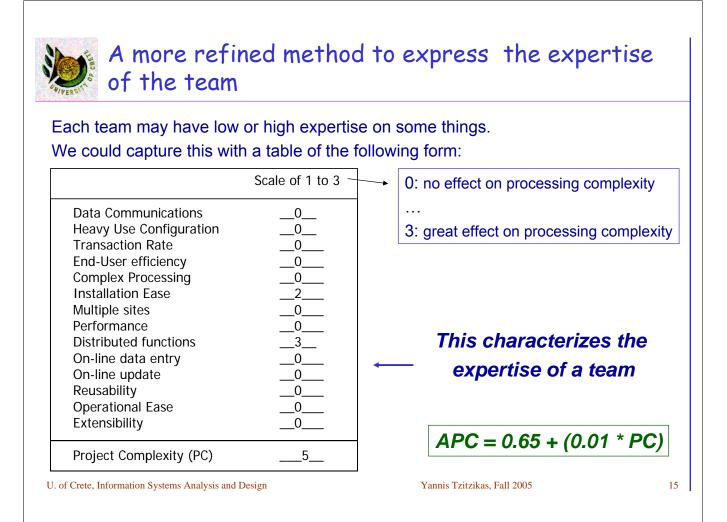
Adjusting the Processing Complexity

TAFP = TUFP * APC

- TAFP: Total Adjusted Function Points
- TUFP: Total Unadjusted Function Points
- APC: Adjusted Processing Complexity

A simple rule is to assume that APC is equal to

- 0.65 for very simple (for the team) systems
- 1 for normal systems
- 1.35 for complex systems

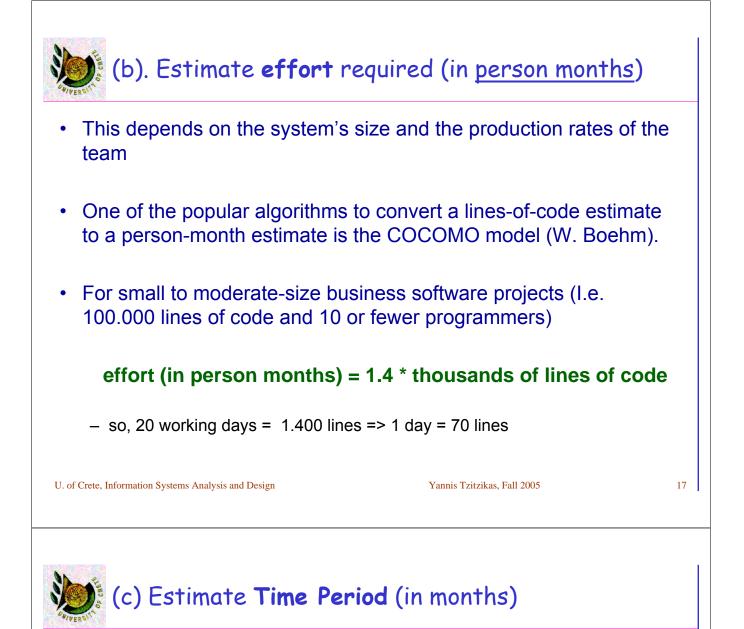




(a2) Estimate lines of code: Converting Function Points to Lines of Code

Language	LOC/Function Code Point
C	130
COBOL	110
JAVA	55
C++	50
Turbo Pascal	50
Visual Basic	30
PowerBuilder	15
HTML	15
Packages	15
(e.g., Access, Excel)	10-40

Source: Capers Jones, Software Productivity Research



• Historical data or estimation software can be used as aids for this.

A rule of thumb schedule time (months) = 3 * person-months ^(1/3)

- E.g. a project with effort 14 months should be scheduled to take a little more than 7 months to complete
- // note: Adhamls law on parallelism related



[A] Identifying Project Size

[B] Creating and Managing the WorkPlan

[C] Staffing the Project

[D] Coordinating project activities

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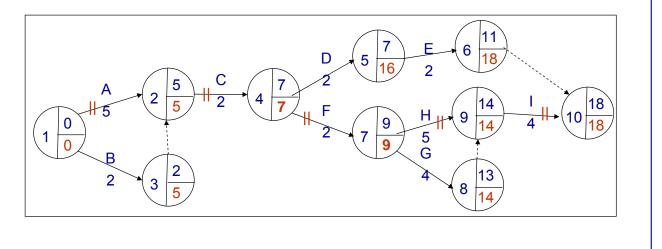
• Tools and techniques

- Critical Path Analysis (CPA)

- Gantt charts



- Originally known as PERT (Project Evaluation and Review Technique)
 - Developed in the late 50s for use on major weapons development projects for the US Navy



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The <u>steps</u> for preparing a CPA chart

- 1. List all project activities and milestones
- 2. Determine the dependencies among the activities
- 3. Estimate the duration of each activity
- 4. Draw the CPA chart

1. List all project activities and milestones

How to identify tasks:

- Top-down approach
 - · Identify highest level tasks
 - · Break them into increasingly smaller units
 - e.g. Dennis page 94 (steps to organize an IT course)
 - this is the work breakdown structure (WBS)

- Methodology

• Using standard list of tasks (e.g. from the adopted methodology)

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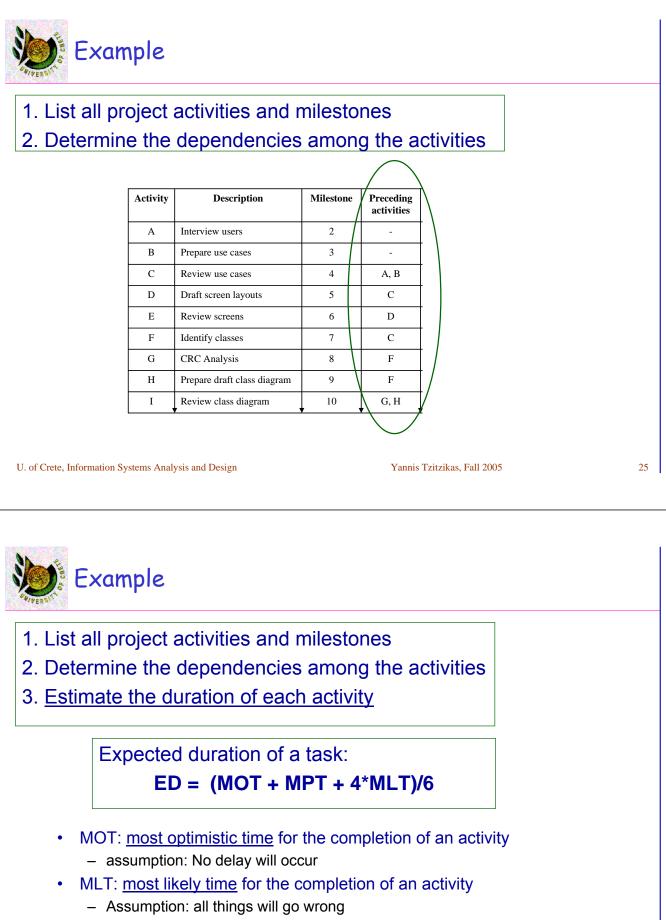
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1. List all project activities and milestones

Activity	Description	Milestone
A	Interview users	2
В	Prepare use cases	3
С	Review use cases	4
D	Draft screen layouts	5
Е	Review screens	6
F	Identify classes	7
G	CRC Analysis	8
Н	Prepare draft class diagram	9
I	Review class diagram	10



• MPT: most pessimistic time for the completion of an activity



- 1. List all project activities and milestones
- 2. Determine the dependencies among the activities
- 3. Estimate the duration of each activity

Activity	Description	Milestone	Preceding activities	Expected duration	\
А	Interview users	2	-	5	I
В	Prepare use cases	3	-	2	Ī
С	Review use cases	4	A, B	2	Ì
D	Draft screen layouts	5	С	2	Ì
Е	Review screens	6	D	2	İ
F	Identify classes	7	С	2	Ì
G	CRC Analysis	8	F	4	İ
Н	Prepare draft class diagram	9	F	5	
I	Review class diagram	10	G, H	4	V

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A	Workplan	Example
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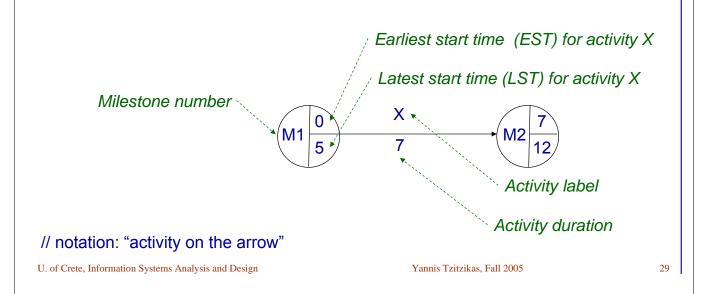
Work Plan Information	Example
Name of task	Perform economic feasibility
Start date	Oct 11, 2005
Completion date	Oct 20, 2005
Person assigned	Student X
Deliverable(s)	Cost-benefit analysis
Completion status	Open
Priority	High
Resources needed	Spreadsheet
Estimated time	4 hours
Actual time	2 hours

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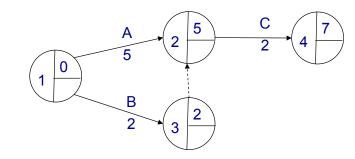


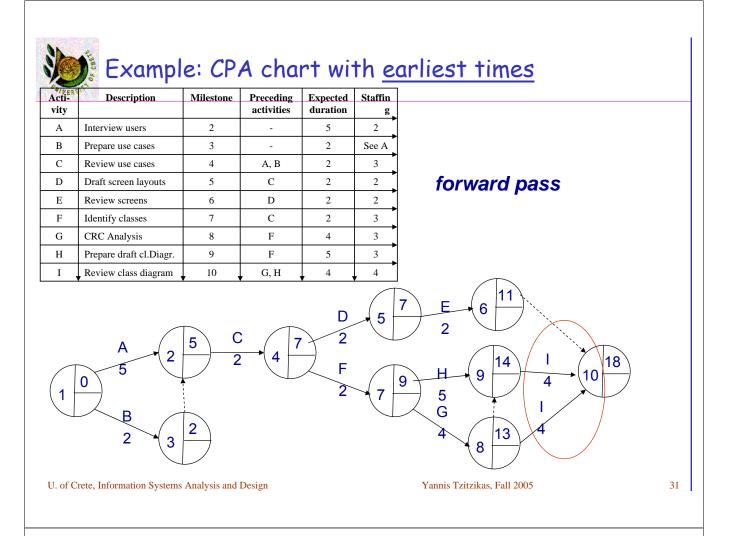
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- 2. Determine the dependencies among the activities
- 3. Estimate the duration of each activity
- 4. Draw the CPA chart



Example: : CPA chart with <u>earliest times</u>

Acti- vity	Description	Milestone	Preceding activities	Expected duration	Staffin g
А	Interview users	2	-	5	2
В	Prepare use cases	3	-	2	See A
C	Review use cases	4	A, B	2	3
D	Draft screen layouts	5	С	2	2
Е	Review screens	6	D	2	2
F	Identify classes	7	С	2	3
G	CRC Analysis	8	F	4	3
Н	Prepare draft cl.Diagr.	9	F	5	3
I,	Review class diagram	10	G, H	4	4





Example: CPA chart with earliest times

Acti- vity	Description	Milestone	Preceding activities	Expected duration	Staffin g	
А	Interview users	2	-	5	2	
В	Prepare use cases	3	-	2	See A	
С	Review use cases	4	A, B	2	3	
D	Draft screen layouts	5	С	2	2	
Е	Review screens	6	D	2	2	
F	Identify classes	7	С	2	3	
G	CRC Analysis	8	F	4	3	
Н	Prepare draft cl.Diagr.	9	F	5	3	
I	Review class diagram	10	G, H	4	4	(
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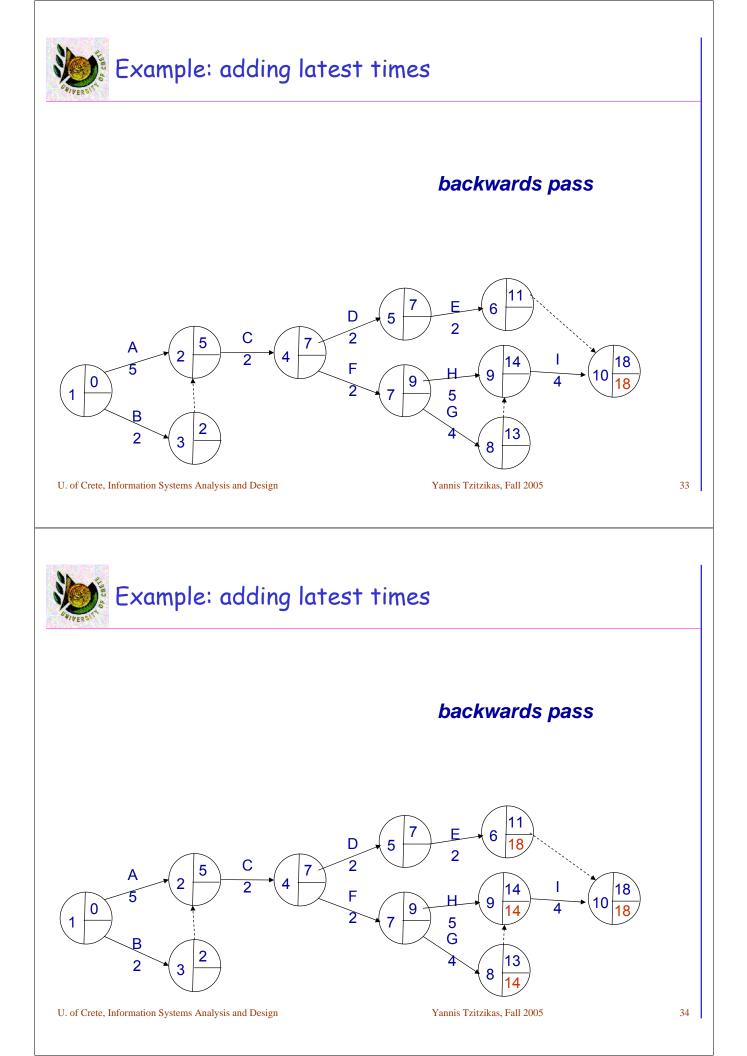
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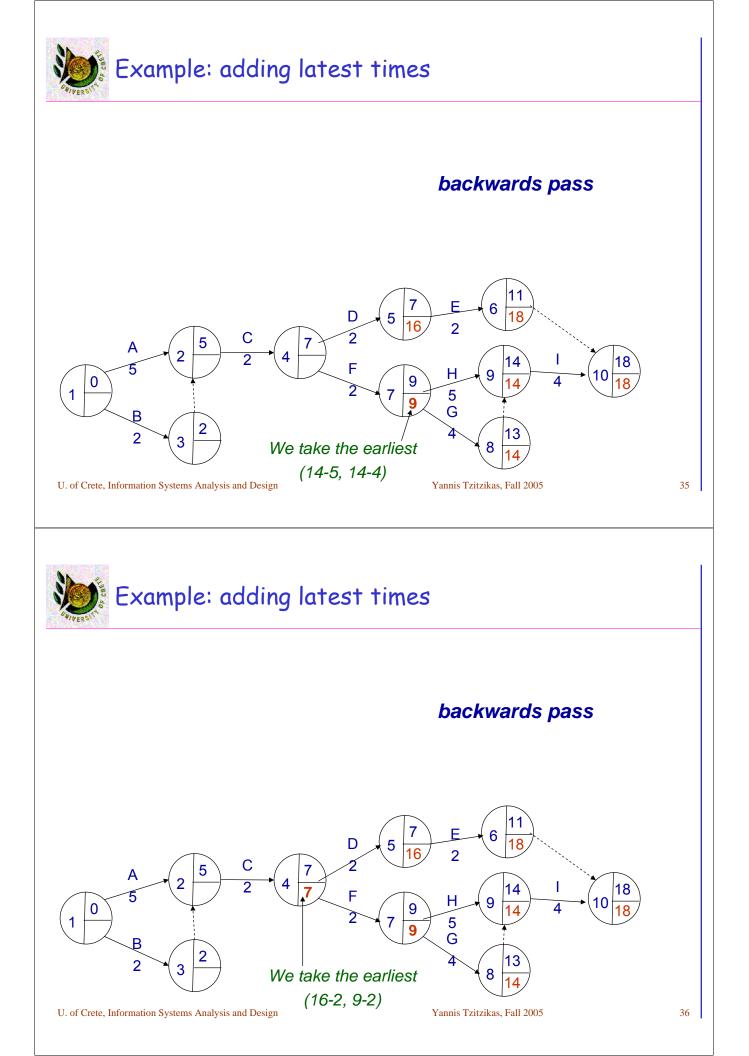
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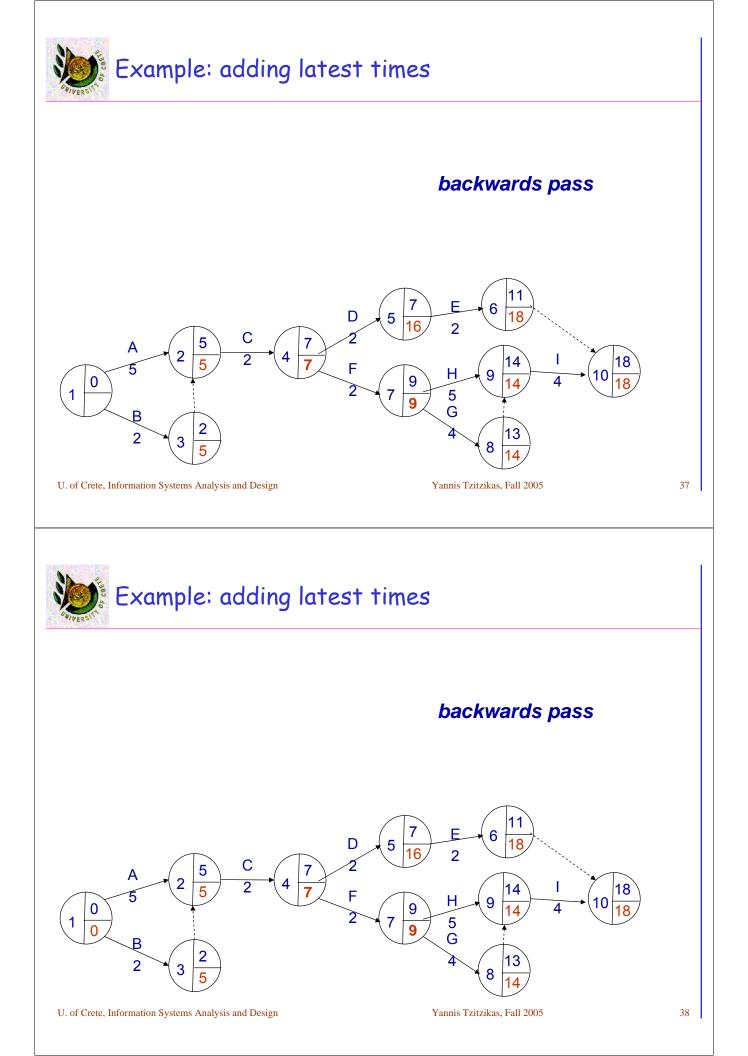
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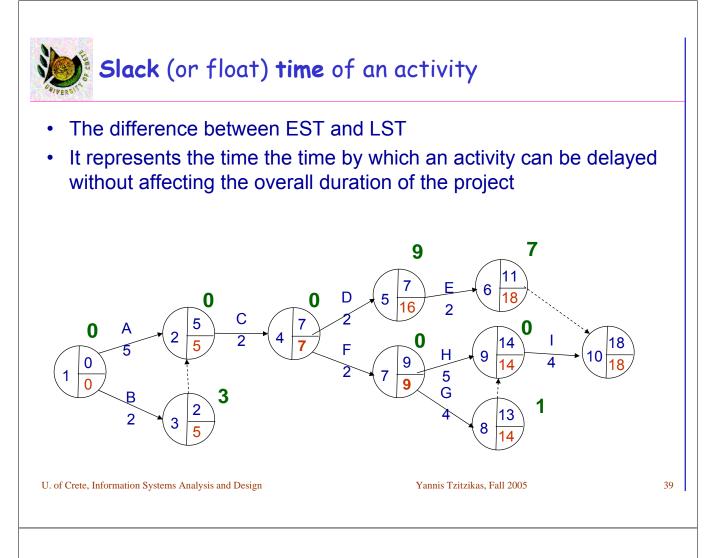
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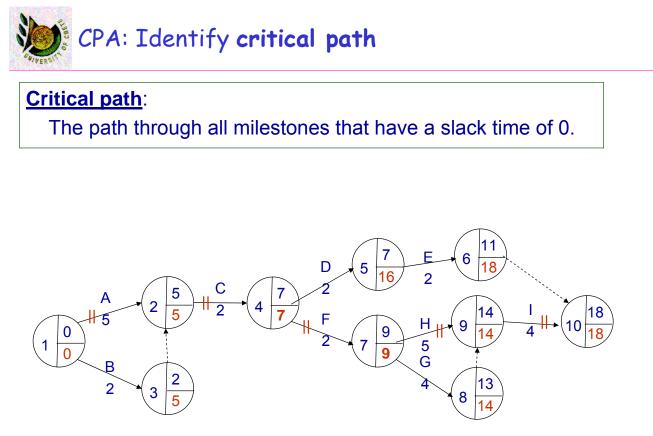
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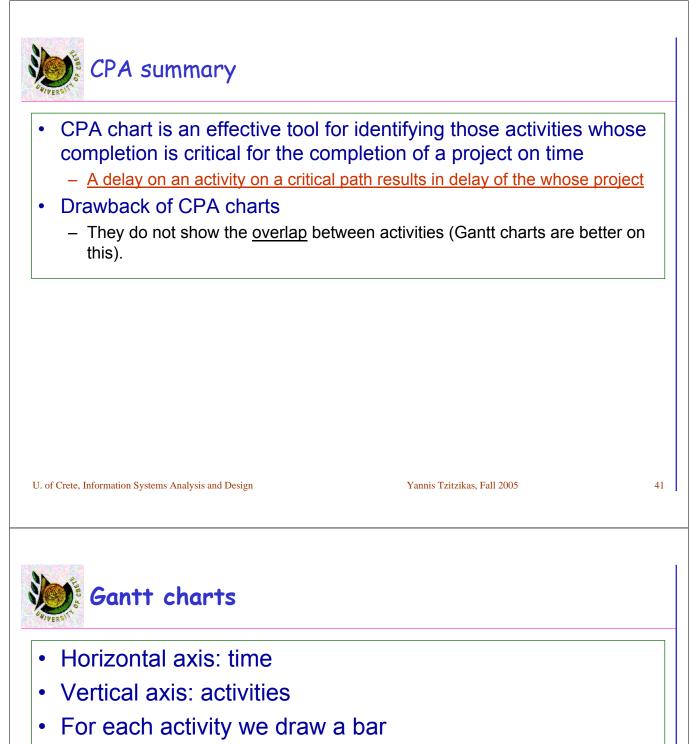












- length of bar: *ED* of the activity
- Dash lines/boxes can be used to show its slack time

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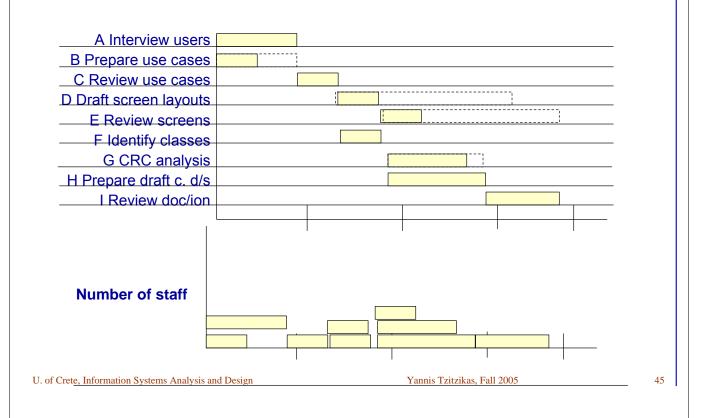
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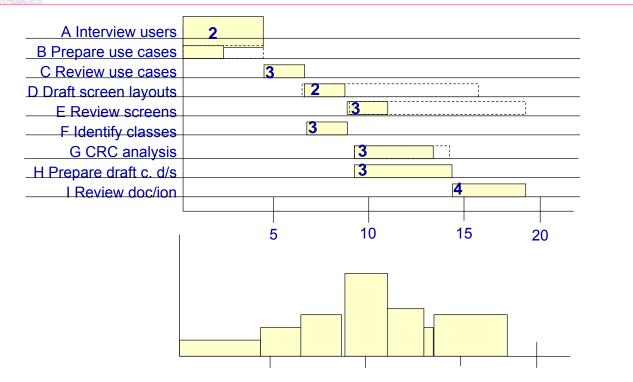
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From a Gantt chart to stacked bar graph



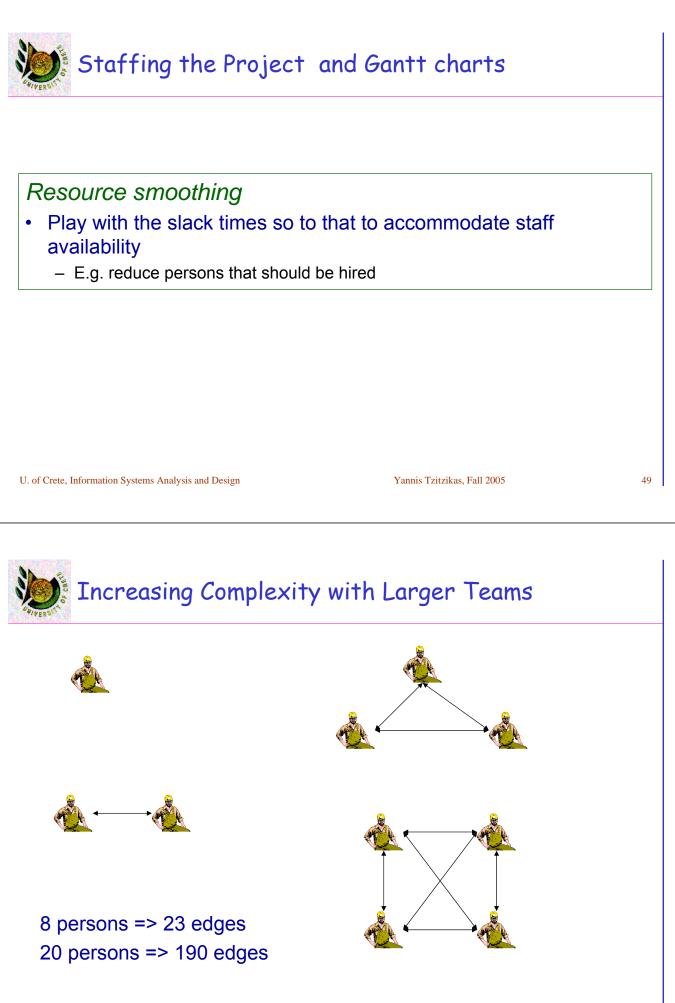


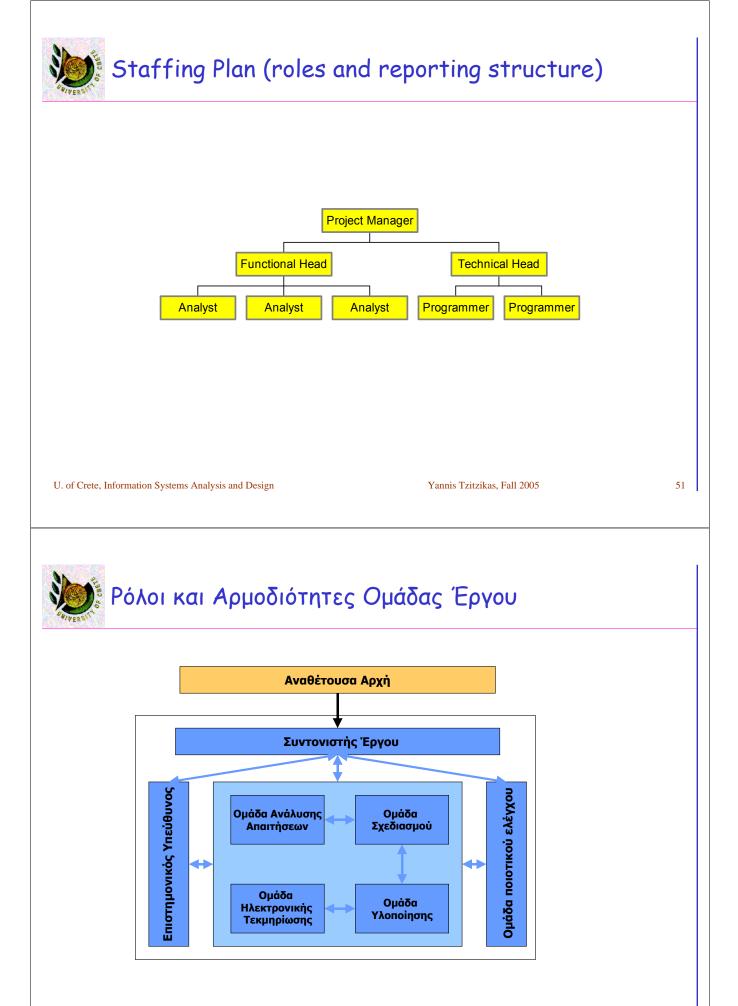
From a Gantt chart to stacked bar graph





- how many persons should be assigned to the project?
- How to assign project roles to team members?
- · Match people's skills with the needs of the project
- Develop a reporting structure for the team
- may also include
 - motivating the team to meet the project's objectives
 - minimizing conflict among team members
 - Conflicts can be minimized by defining clearly the roles on a project.







[A] Identifying Project Size

[B] Creating and Managing the WorkPlan

[C] Staffing the Project

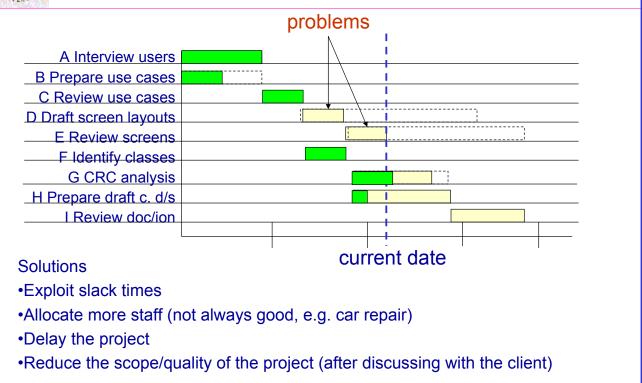
[D] Coordinating project activities

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Monitoring and Coordinating the project



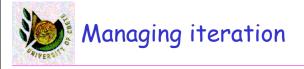


- When a critical path activity is behind schedule it may not be possible to regain the lost time
- In that case the project manager has only 2 options
 - A: move forward the project deadline
 - B: reduce the scope/quality of the project
- The choice should be discussed with the client
 - B: requires analysis in order to see what to omit in order to reach the deadline

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- Challenge: <u>How to control the number of iterations?</u>
- Recall: prototyping is an incremental development activity.
- Prototyping activities should be accompanied <u>by objectives</u> that allows us to provide criteria to control the number of iterations
 - At the end of an iteration the <u>prototype is evaluated</u> against pre-defined objectives. In practice it may be difficult to determine whether the objectives of a prototyping activity have been met
 - e.g. UI with objective: make users happy (happiness is an endless process)
 - a tip: Continue the iterations until fewer than 5 cosmetic changes are requested on a single iteration
 - other tips:
 - The prototyping must be completed on December and must not exceed 30 developerhours.

Dynamic Systems Development Methods (DSDM)

Management and control framework for rapid application development (RAD) The distinction between RAD and prototyping is blurred RAD: build a working system rapidly Prototyping: again build rapidly a system (but with partial functionality) Typically to confirm some aspect of the requirements / arch/ etc. .. Key difference (wrt process control): - Instead of considering the requirements stable, DSDM fixes resources for the project, fixes the time available, and then sets out to deliver only what can be achieved within these contraints 57 U. of Crete, Information Systems Analysis and Design Yannis Tzitzikas, Fall 2005 DSDM: Timeboxing Key points: - Fixed deadline - Reduced functionality, if necessary - Fewer "finishing touches" We need to prioritize the requirements that will be actioned during a timebox MoSCoW rules (Must Should Could Want) for requirements



Timeboxing Steps

- 1/ Set delivery date
 - Deadline should not be impossible
 - Should be set by development group
- 2/ Prioritize features by importance
- 3/ Build the system core
- 4/ Postpone unfinished functionality
- 5/ Deliver the system with core functionality
- 6/ Repeat steps 3-5 to add refinements and enhancements

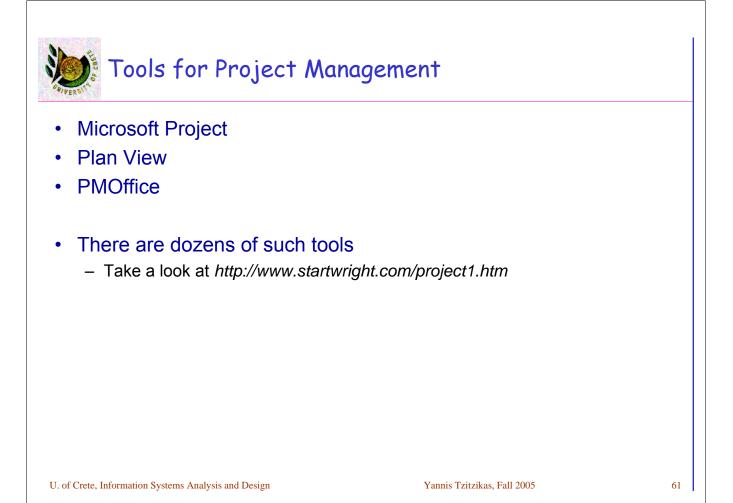
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- Overly optimistic schedule
- · Failing to monitor schedule
- · Failing to update schedule
- Adding people to a late project



Reading and References

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