

Informatik-Projektentwicklung

– Lecture 4 –

Prof. Dr. Peter Müller

Software Component Technology

Wintersemester 03/04

ETH

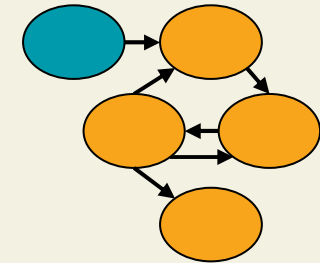
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Project Initiation

A project charter is:

- a. A formal, approved document used to guide both project execution and project control
- b. A document issued by senior management that provides the project manager with the authority to apply organizational resources to project activities
- c. A narrative description of products and services to be supplied
- d. A document describing the organizational breakdown structure of the company

Initiation Process: Summary



■ Purpose

- To formally authorize a new project or that an existing project should continue into its next phase
- Repeating the initiation process at the start of each phase helps to keep the project focused on the business need

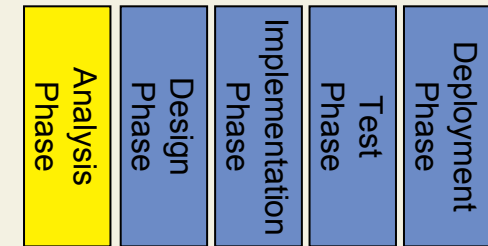
Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none">1. Product description2. Strategic plan3. Project selection criteria4. Historical information	<ol style="list-style-type: none">1. Project selection methods2. Expert judgment	<ol style="list-style-type: none">1. Project definition2. Project charter3. Project manager assigned

Project Initiation

Assumptions are:

- a. Factors that influence the change control system
- b. Factors that limit the project management team's options
- c. Factors that are considered to be true, real, or certain
- d. Factors that influence the scope of the project

Modeling Example



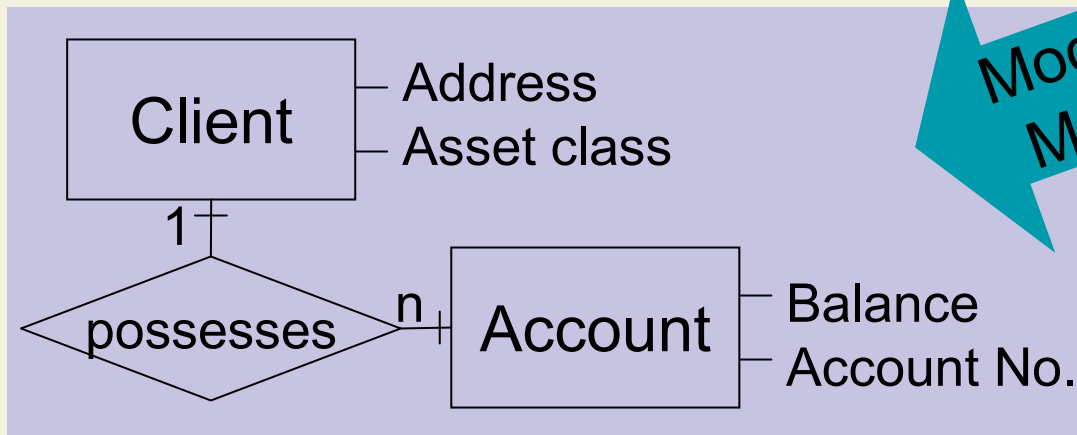
Bank client

Abstraction

Tuple of

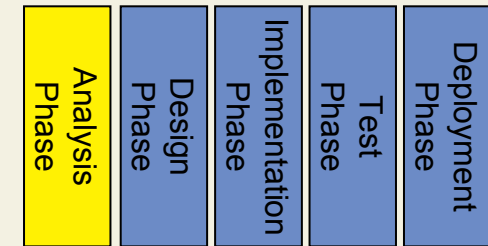
- Address
- Asset class
- At least one account

Modeling Method



ER-Diagram

Analysis Phase: Summary



- Purpose
 - To extract the “needs” of a system – what the system must do to satisfy the client, not how the system will be implemented
- Main Deliverables
 - Approved product definition
- Main actors
 - Business experts, business analysts
- Tools and techniques
 - Modern structured analysis (MSA)
 - Object-oriented analysis (OOA)

Getting the Projects Started

- Assignment of participants to projects is published:
se.inf.ethz.ch/teaching/ws2003/37-801/index.html
- Product orders are available online
- Next tasks
 - Develop project definition (perform project initiation)
 - Develop product definition (perform analysis phase)
 - Develop work breakdown structure and initial schedule (described today)
- **Deadline: November 20, 2003**
- Think of progressive elaboration, use assumptions!

Presentations

- Each group has to present a management summary of their documents
 - 4 (four) minutes for the presentation plus 3 for questions
 - No own computers
 - Both managers should be involved
- Topics to be covered
 - Essentials of developed deliverables
 - Project status
- Presentations for “Publications Viewer” have to be in English
- **Date: November 24, 2003**

Presentation Schedule for Next Week

- Rooms
 - Caritas: HG E1.2
 - Publications Viewer: HG E 22
 - Publications Editor: HG E 33.1
- Presentations start at 8:15 in the indicated rooms
- Lecture starts at 9:30 in HG E1.2

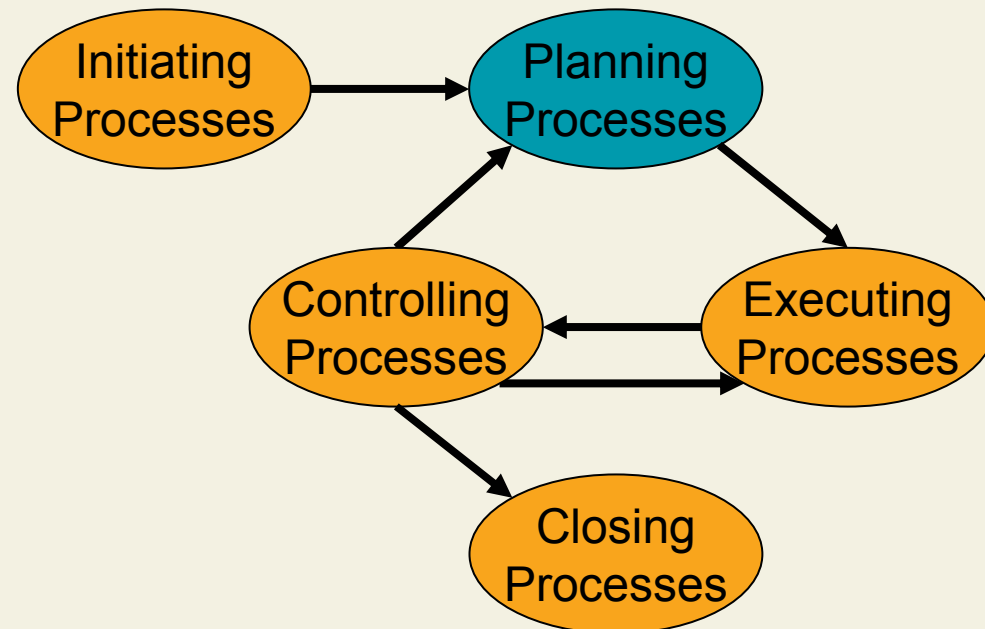
Agenda for Today

4. Project Planning

4.1 Overview

4.2 Scope

4.3 Schedule

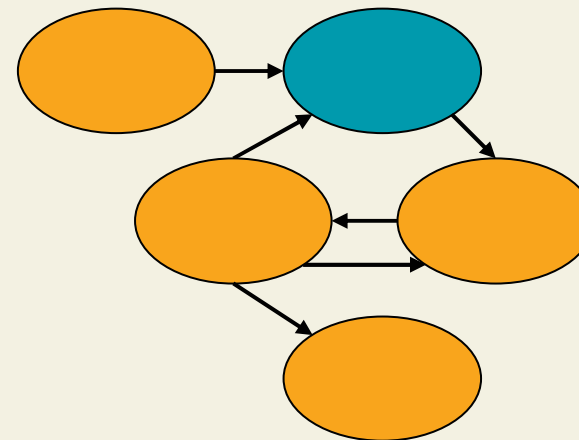


4. Project Planning

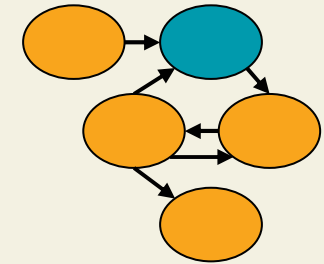
4.1 Overview

4.2 Scope

4.3 Schedule

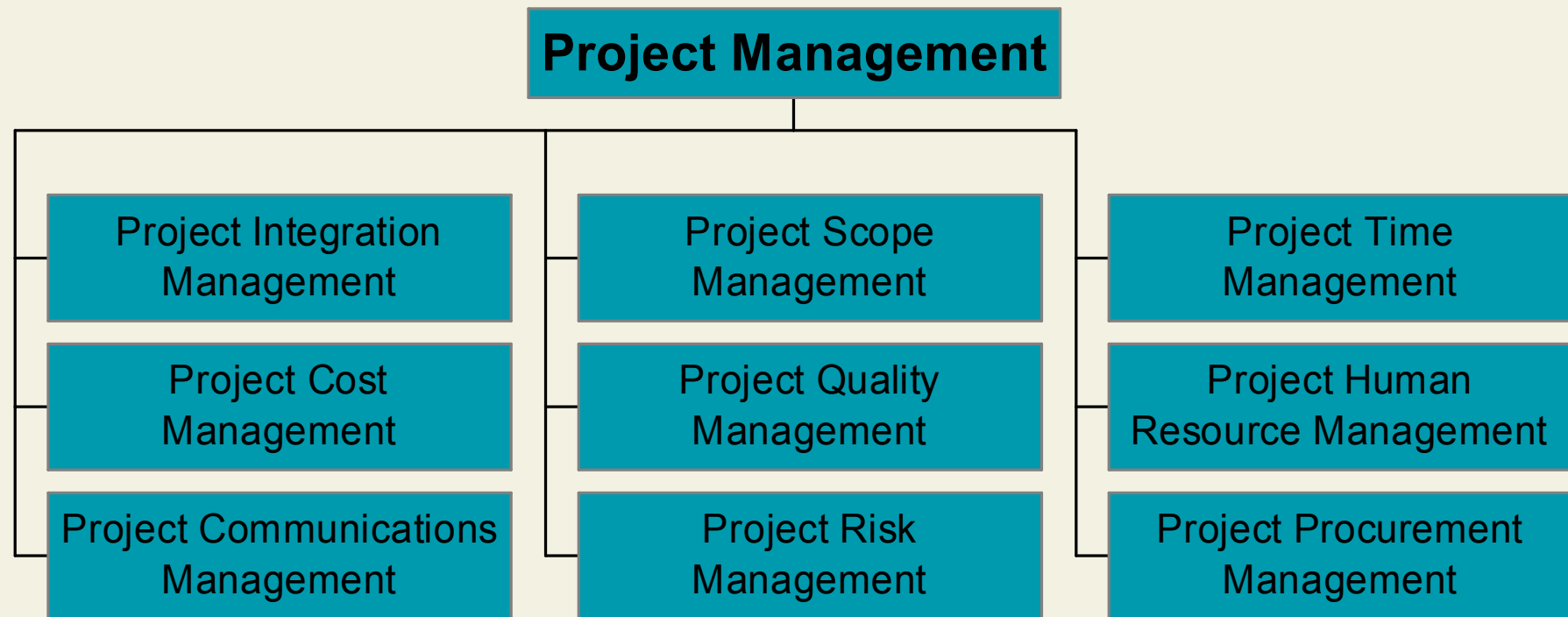
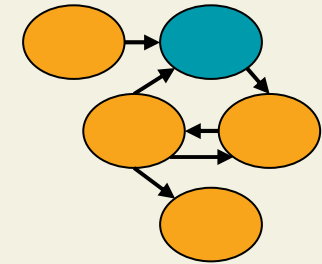


Why Do We Need a Project Plan?

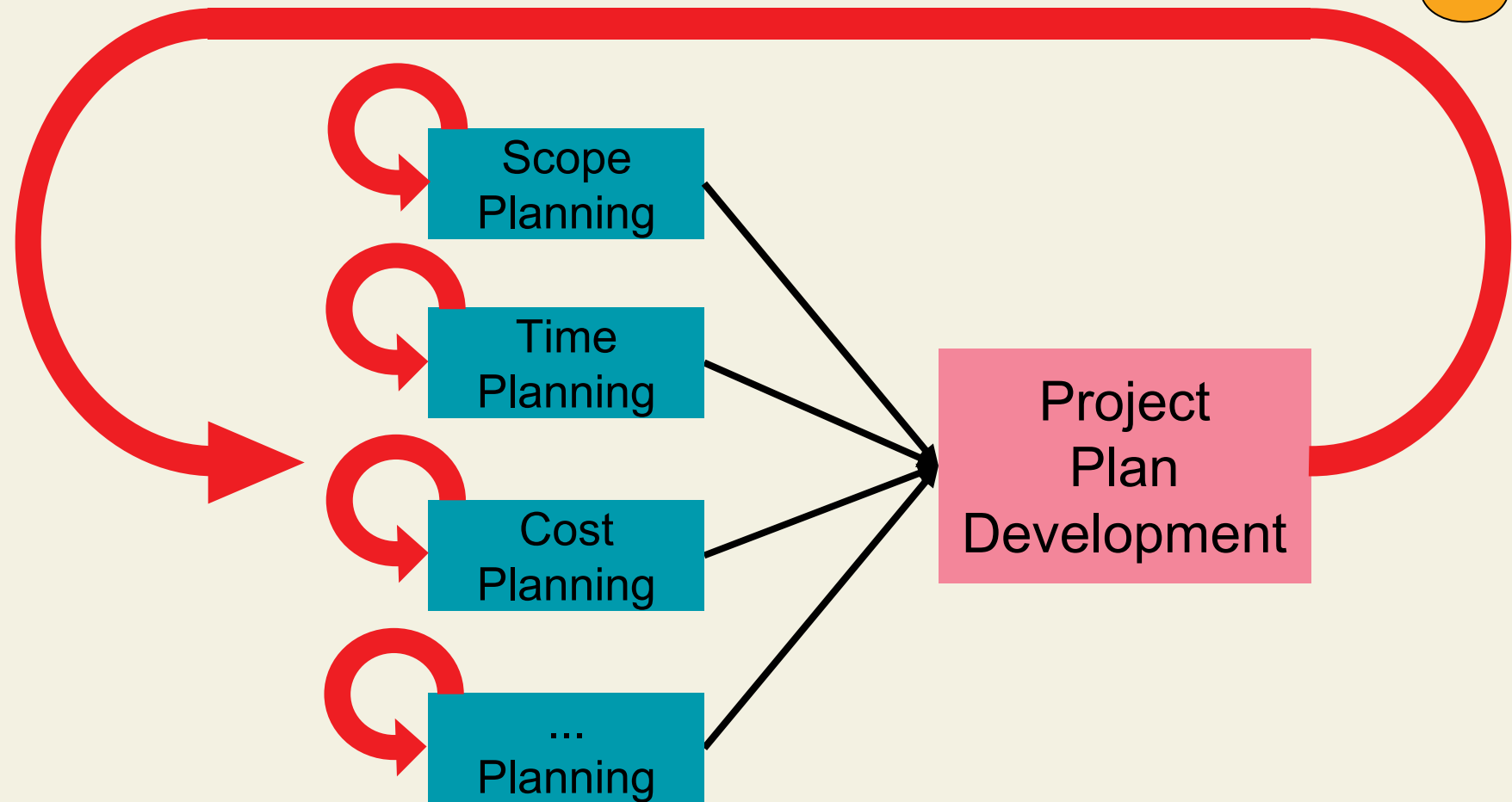


- Unique product or service
- Guide project execution
- Document project planning assumptions
- Document planning decisions regarding alternatives chosen
- Facilitate communication among stakeholders
- Provide baseline for progress measurement and project control

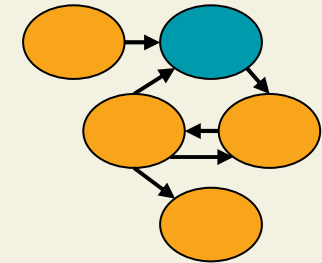
Aspects of Project Planning



Planning Iterations

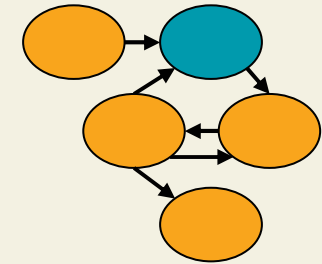


Project Plan Document



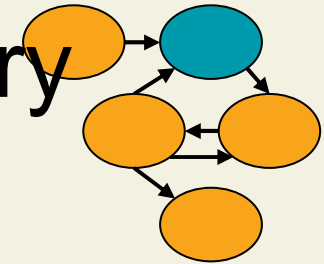
- A formal, approved document
- A project plan is not just a schedule!
- Contains
 - Project management approach
 - Scope, schedule, cost estimates, resources, responsibilities
 - Subsidiary management plans for scope, schedule, cost, quality, etc.
 - Performance measurement baselines for scope, schedule, and cost
 - Open issues and pending decisions

Baseline



- Definition:
The originally approved plan plus or minus approved changes.
- Baselines are used to compare the actual performance and forecasts of the project with the original plan

Project Plan Development: Summary



- Purpose
 - To create a consistent document that can be used to guide both project execution and project control
- Plan your work and work your plan!

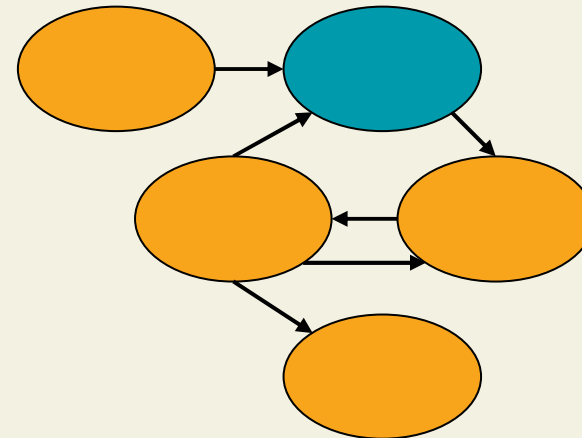
Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none">1. Other planning outputs2. Constraints3. Assumptions	<ol style="list-style-type: none">1. Project planning methodology2. Stakeholder skills and knowledge	<ol style="list-style-type: none">1. Project plan

4. Project Planning

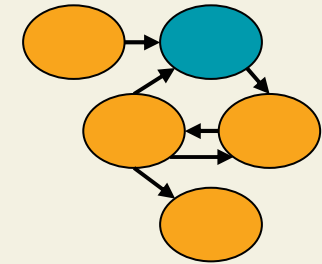
4.1 Overview

4.2 Scope

4.3 Schedule



Scope Planning: Summary

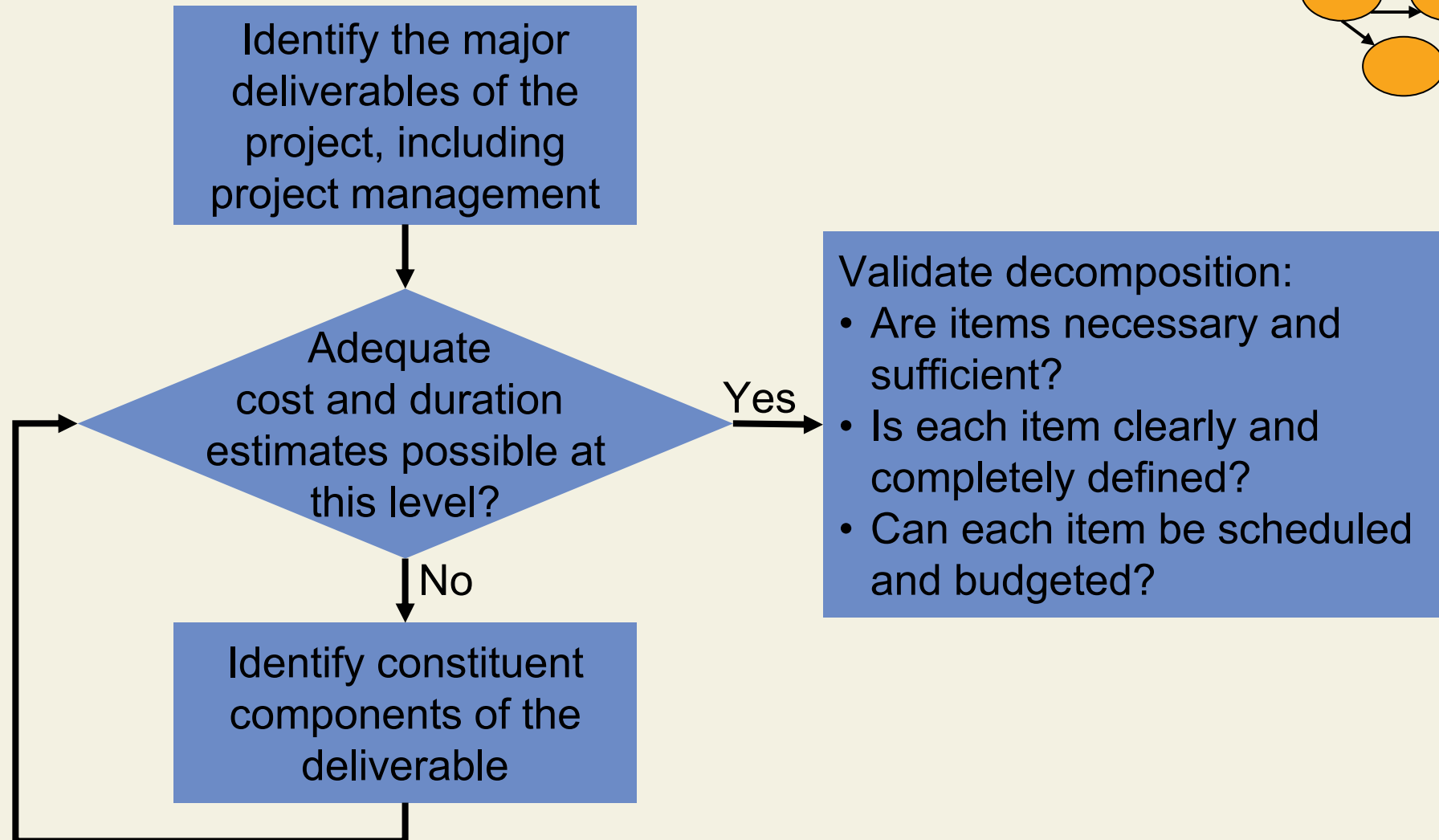
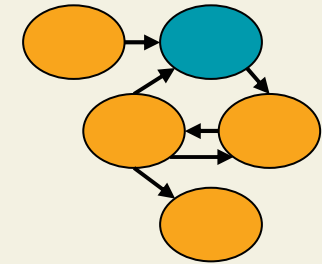


■ Purpose

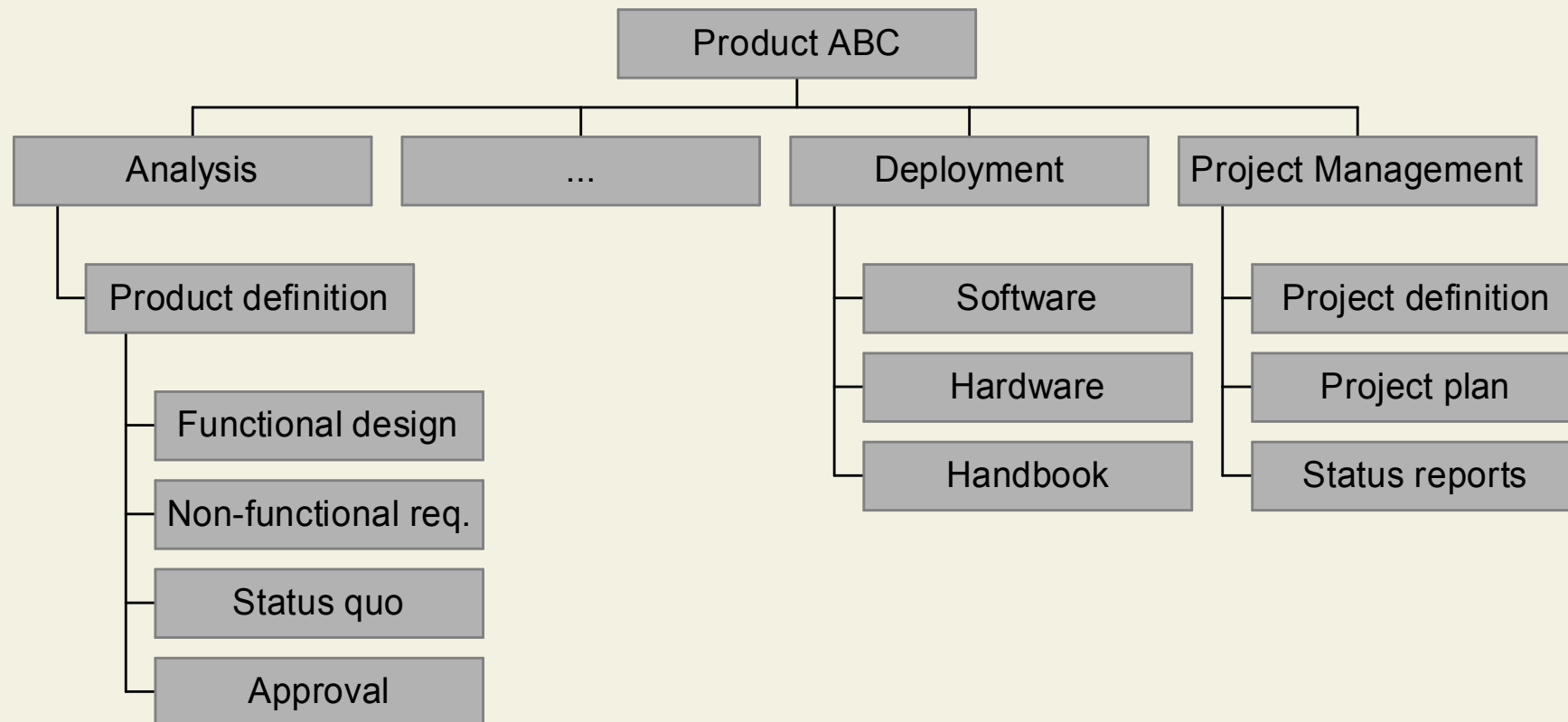
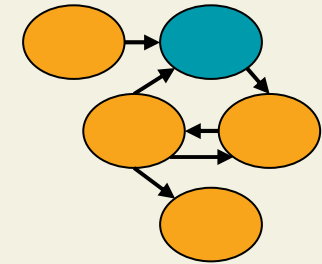
- To progressively elaborate and document the project scope

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none">1. Product description2. Project charter	<ol style="list-style-type: none">1. Product analysis2. Benefit/cost analysis3. Alternatives identification4. Expert judgment	<ol style="list-style-type: none">1. Scope Statement2. Scope management plan

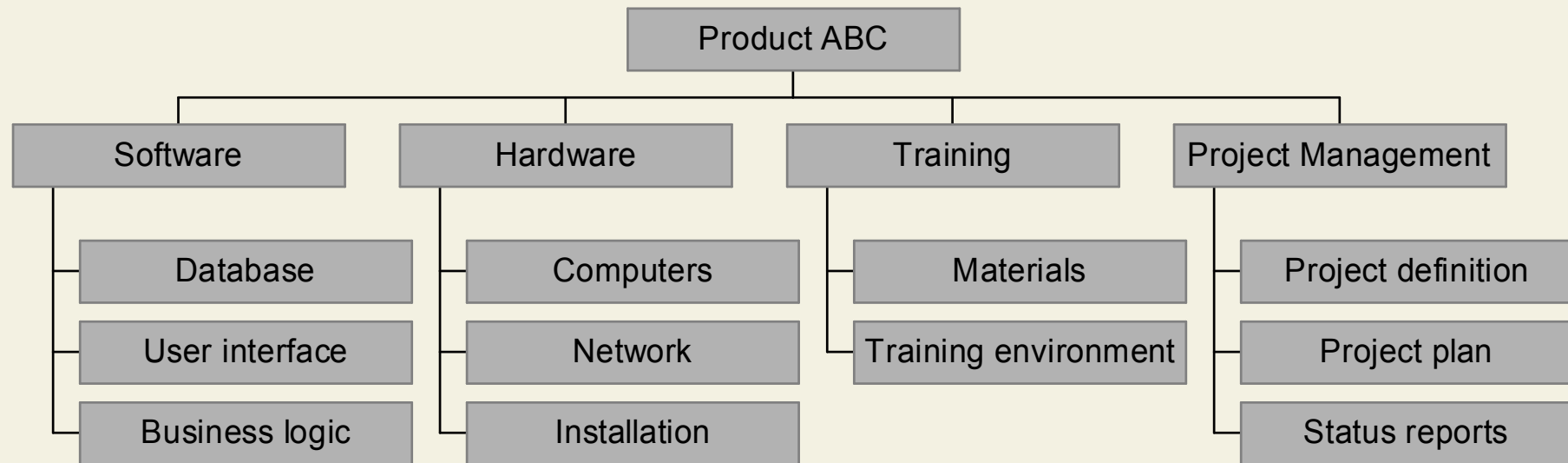
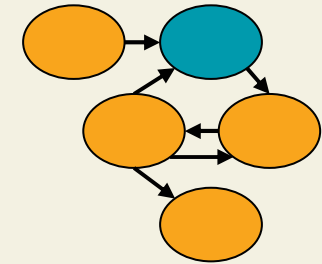
Decomposition of Deliverables



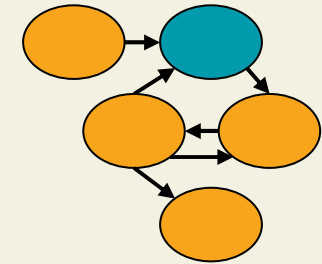
Decomposition Example 1



Decomposition Example 2



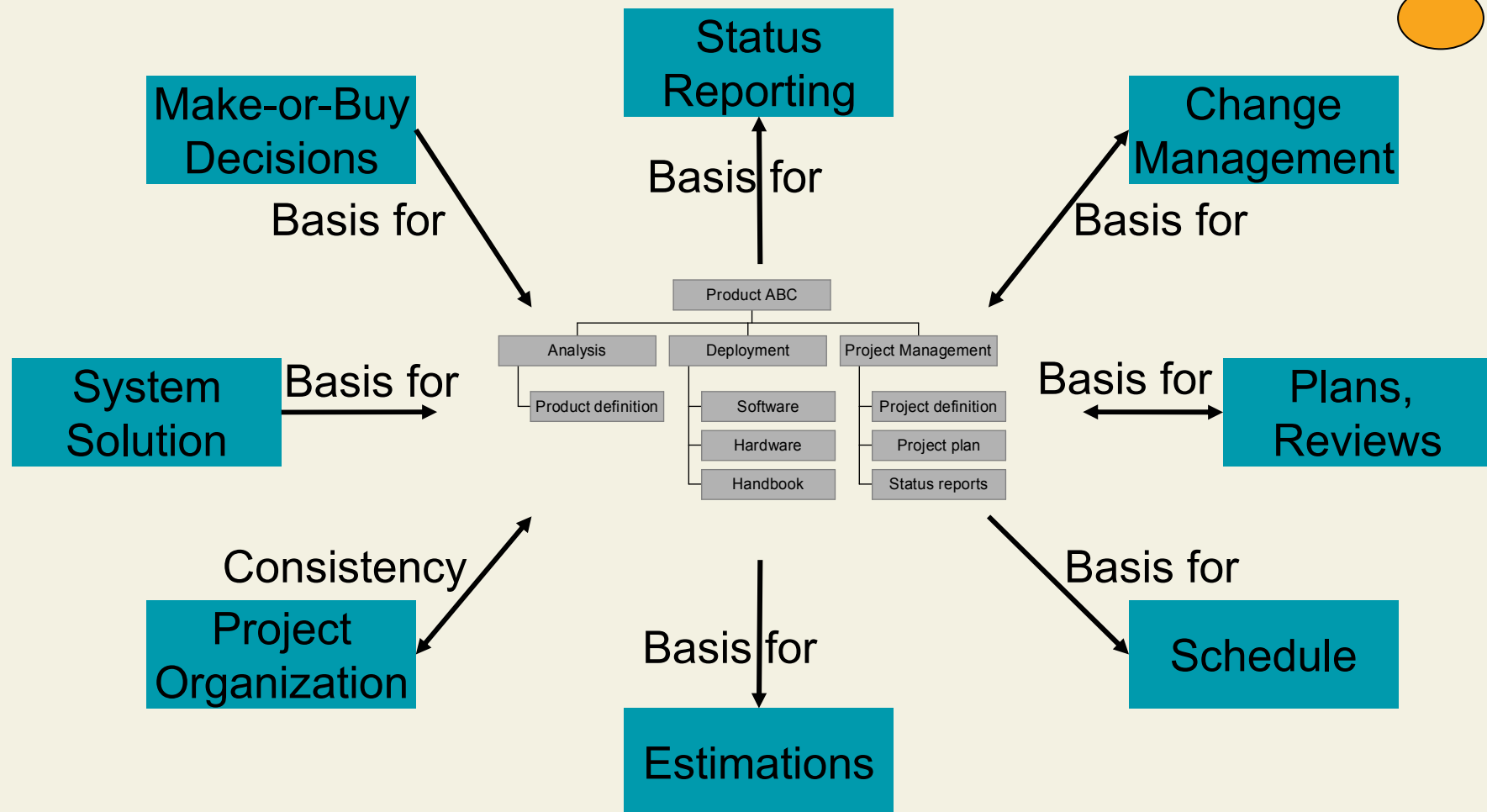
Work Breakdown Structure (WBS)



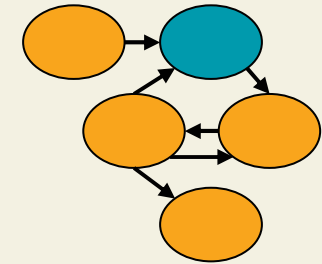
- Definition:

A deliverable-oriented, hierarchical grouping of project elements that organizes and defines the total work scope of the project. Each descending level represents an increasingly detailed definition of the project

WBS Relationships



Scope Definition: Summary



■ Purpose

- To subdivide the major project deliverables into smaller, more manageable components

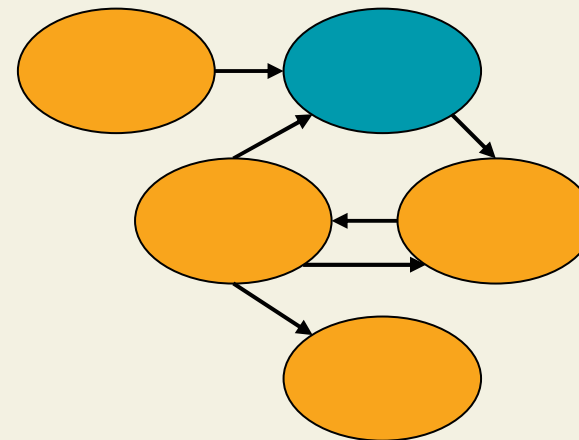
Inputs	Tools & Techniques	Outputs
1. Scope statement	1. Decomposition 2. WBS templates	1. Work breakdown structure 2. Scope statement updates

4. Project Planning

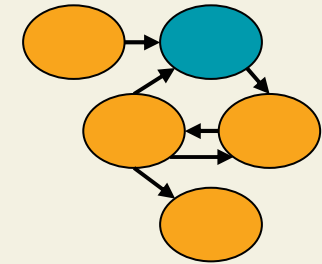
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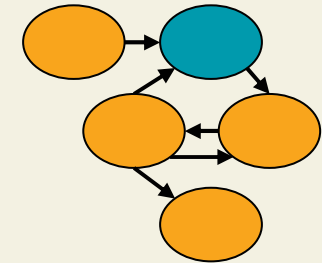
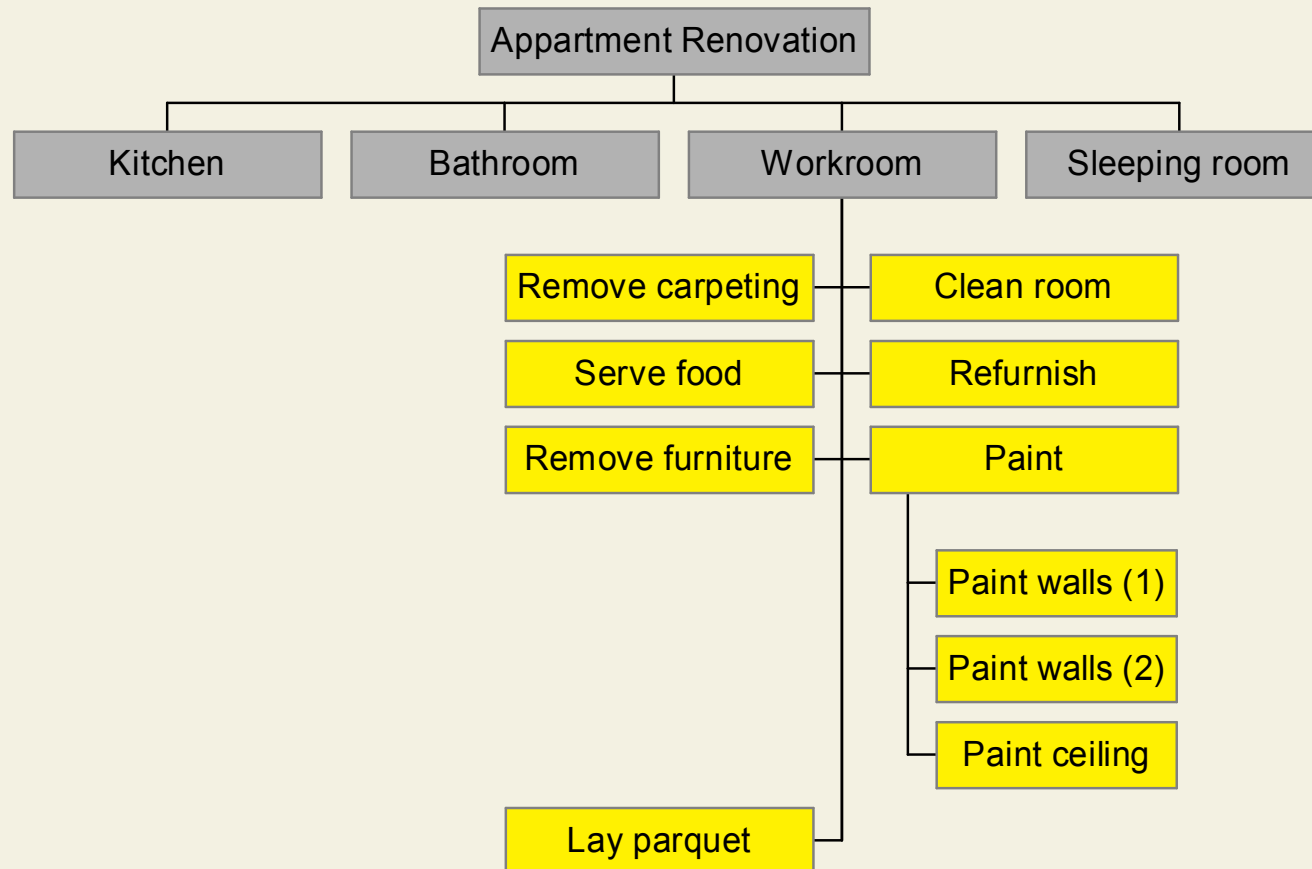


Purpose of Scheduling



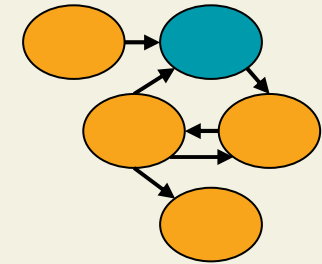
- Track the progress of the project
- Determine how possible changes might affect the project
- Communication
 - Will the activities be completed in time?
 - When are which resources needed?
 - When will major milestones be reached?

Activities



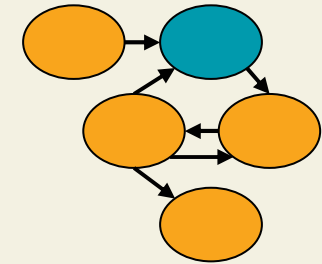
- Rule of thumb: 40 to 80 person hours per activity

Milestones



- Definition:
A significant event in the project, usually completion of a major deliverable
- Milestones have no effort or duration
- Milestones do not have resources
- Example: Painting completed

Activity Definition: Summary

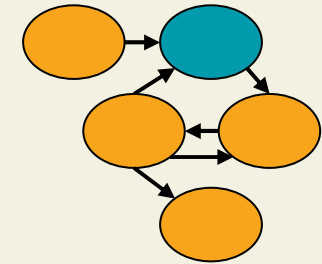


■ Purpose

- To identify and document the specific activities that must be performed to produce the deliverables documented in the WBS.

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none">1. WBS2. Project definition	<ol style="list-style-type: none">1. Decomposition	<ol style="list-style-type: none">1. Activity list2. WBS updates

Dependencies

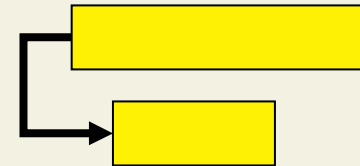


- Logical relationships among activities

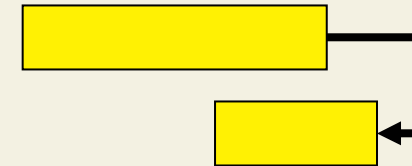
- Finish-to-Start (FS)



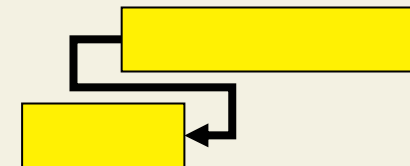
- Start-to-Start (SS)



- Finish-to-Finish (FF)

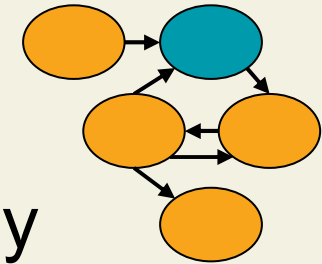


- Start-to-Finish (SF)

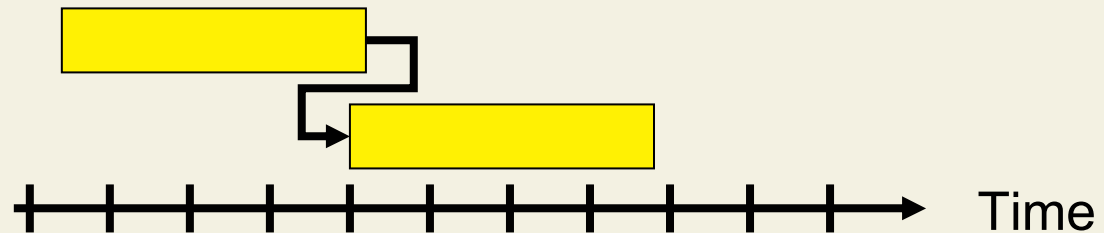


- Dependencies can be mandatory (hard logic) discretionary (soft logic), or external

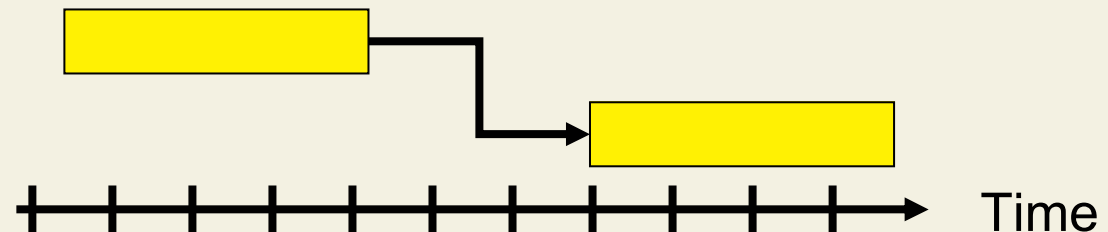
Lag and Lead



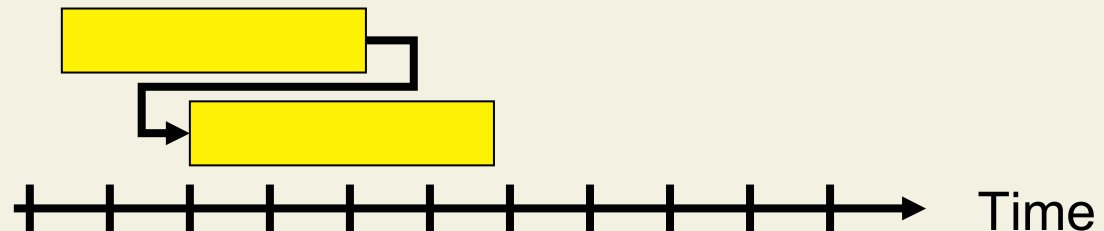
- Modify a logical relationship to direct a delay or acceleration of the successor task
- No modifier



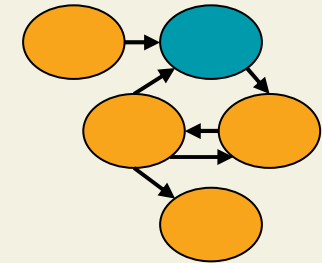
- Lag (+3 units)



- Lead (-2 units)

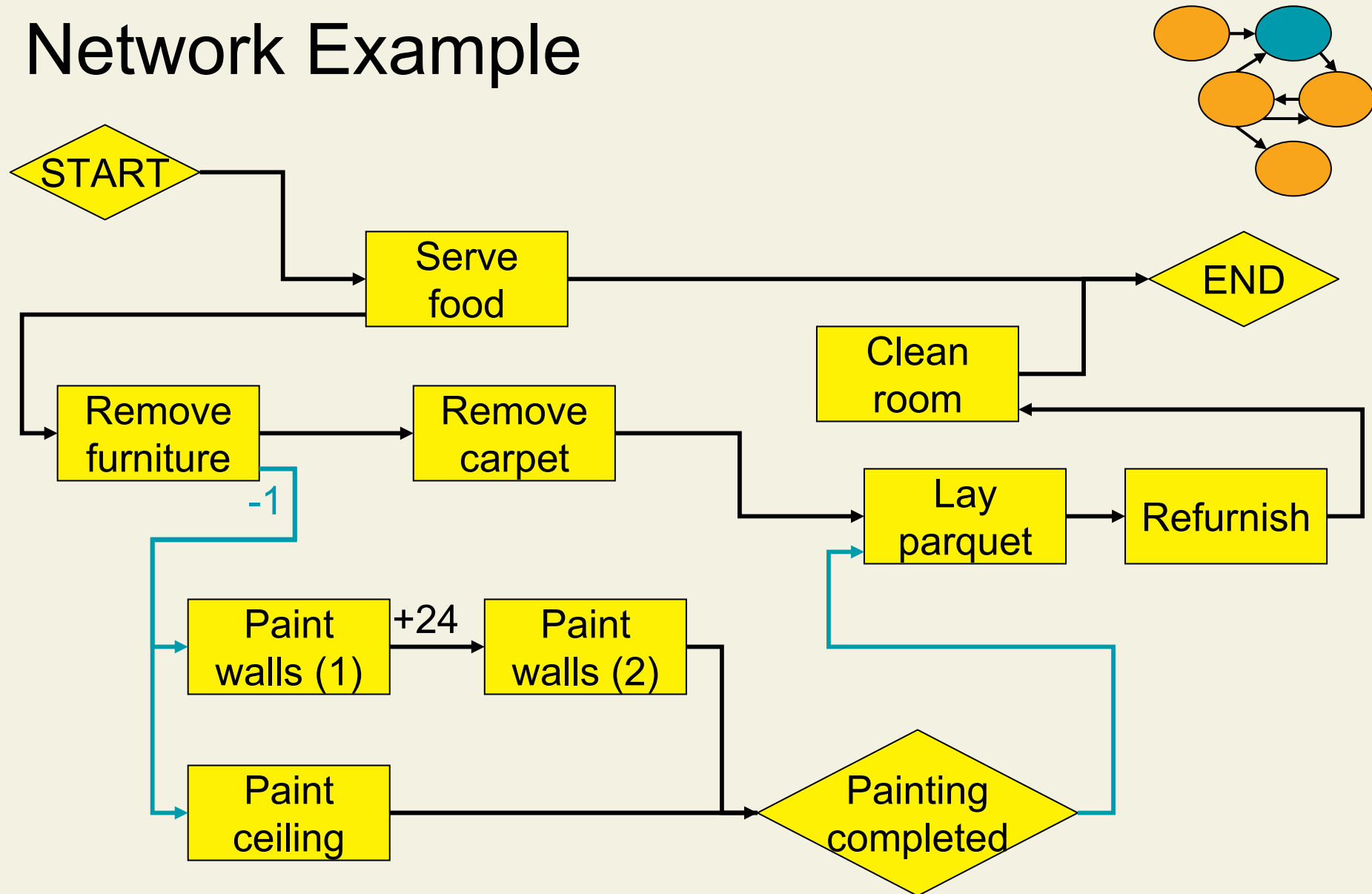


Network Diagrams

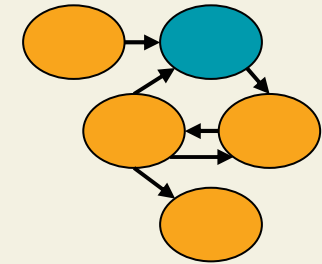


- Precedence Diagramming Method
 - Show all activities (depicted by boxes)
 - Show the logical flow (depicted by arrows)
 - Clearly illustrate dependencies
- Rules
 - Each activity has at least one predecessor and successor (start and end as milestones)
 - No loops, no dangling arrows
- Other network diagramming methods
 - Arrow diagramming method (activity-on-arrow)
 - Conditional diagramming methods

Network Example



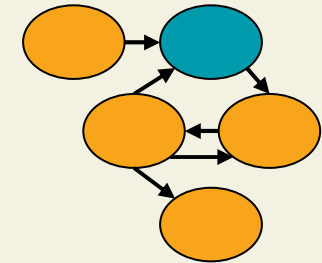
Activity Sequencing: Summary



- Purpose
 - To identify and document logical relationships among activities

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none">1. Activity list2. Product description3. Dependencies<ul style="list-style-type: none">• Mandatory• Discretionary• External	<ol style="list-style-type: none">1. Network diagramming	<ol style="list-style-type: none">1. Network diagrams2. Activity list updates

Resource Planning: Summary

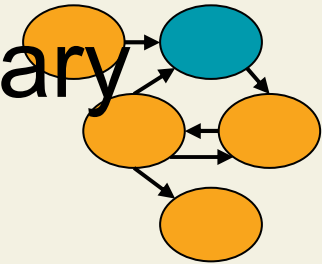


■ Purpose

- To determine what physical resources (people, equipment, materials) and what quantities of each should be used and when they would be needed to perform project activities

Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none">1. Activity list2. Activity duration estimates3. Resource pool description	<ol style="list-style-type: none">1. Expert judgment	<ol style="list-style-type: none">1. Resource requirements

Activity Duration Estimating: Summary

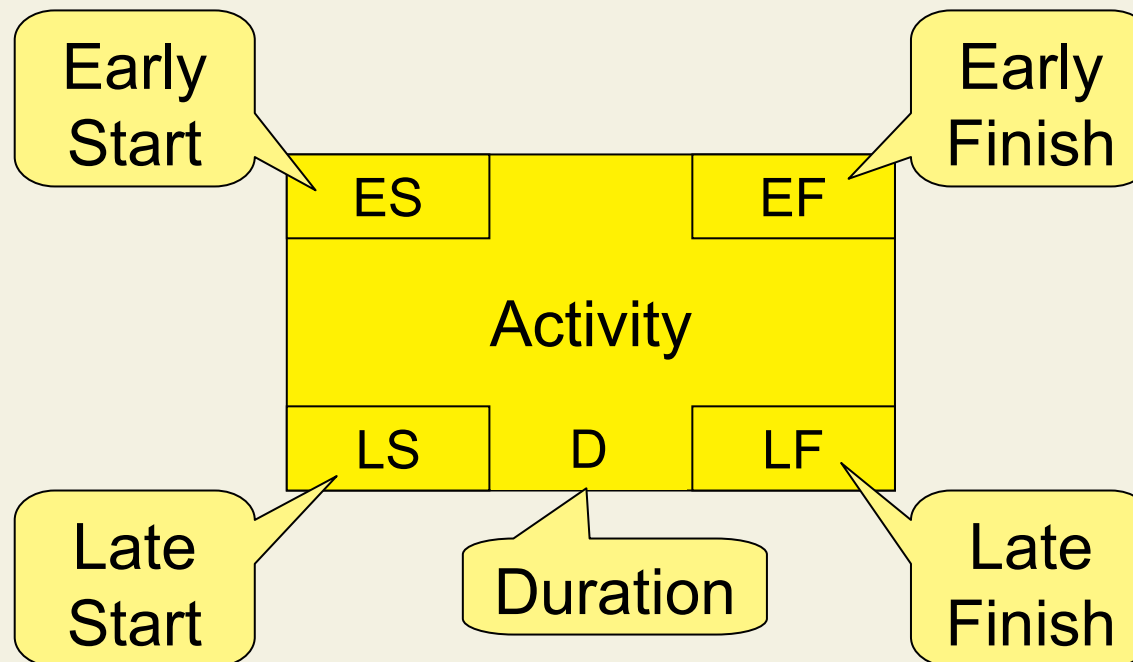
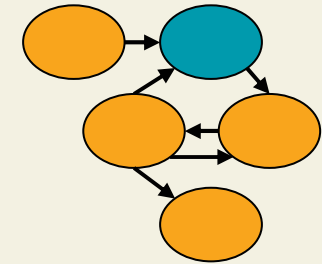


- Purpose
 - To estimate durations based in information on project scope and resources
- $\text{Duration} = \text{Effort} / \text{Resources}$

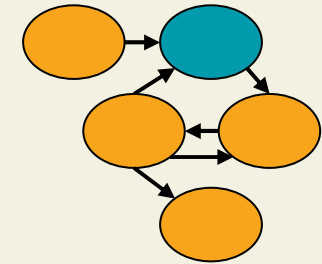
Inputs	Tools & Techniques	Outputs
<ol style="list-style-type: none">1. Activity list2. Constraints3. Assumptions4. Resource requirements5. Identified risks	<ol style="list-style-type: none">1. Expert judgment2. Estimating techniques3. Reserve time	<ol style="list-style-type: none">1. Activity duration estimations2. Basis of estimates3. Activity list updates

Computing a Schedule

- A schedule consists of the planned dates for all activities and milestones
- Notation



Forward Pass

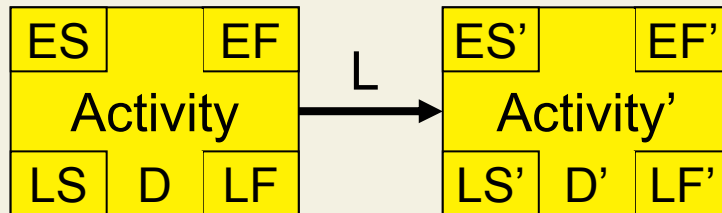


- Determines overall project duration
- First activity starts on time unit 0
- Calculation of the early start and early finish dates
- For Activity A:

$$ES(A) = \text{MAX}_{P \in \text{predecessors}(A)} ES_P(A)$$

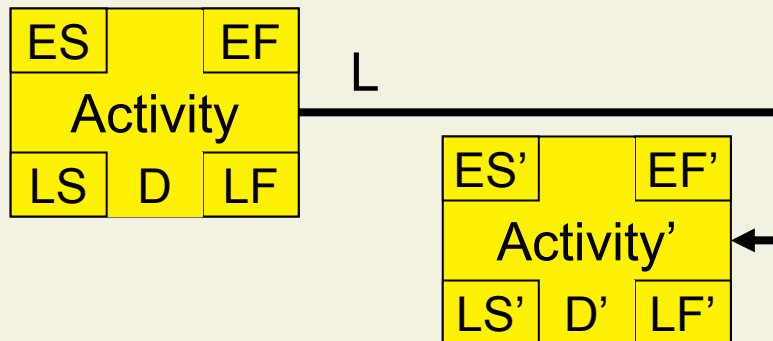
$$EF(A) = ES(A) + \text{Duration}(A)$$

Calculating Early Start



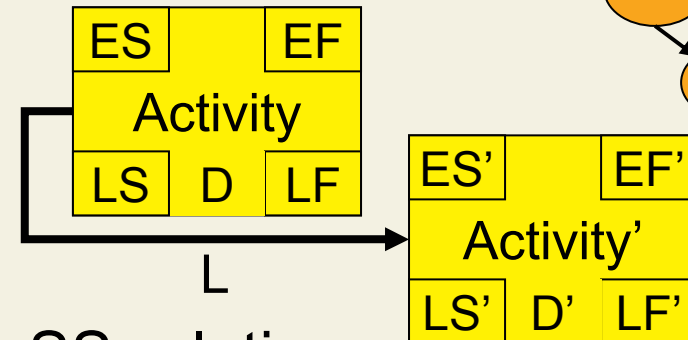
FS-relation:

$$ES' := EF + L$$



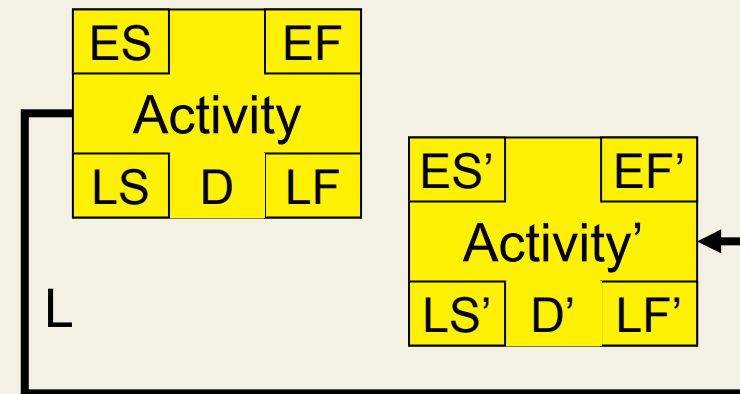
FF-relation:

$$ES' := EF + L - D'$$



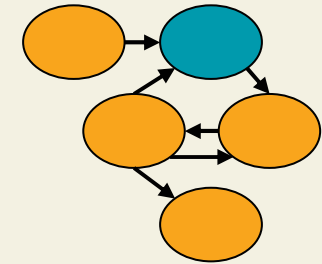
SS-relation:

$$ES' := ES + L$$

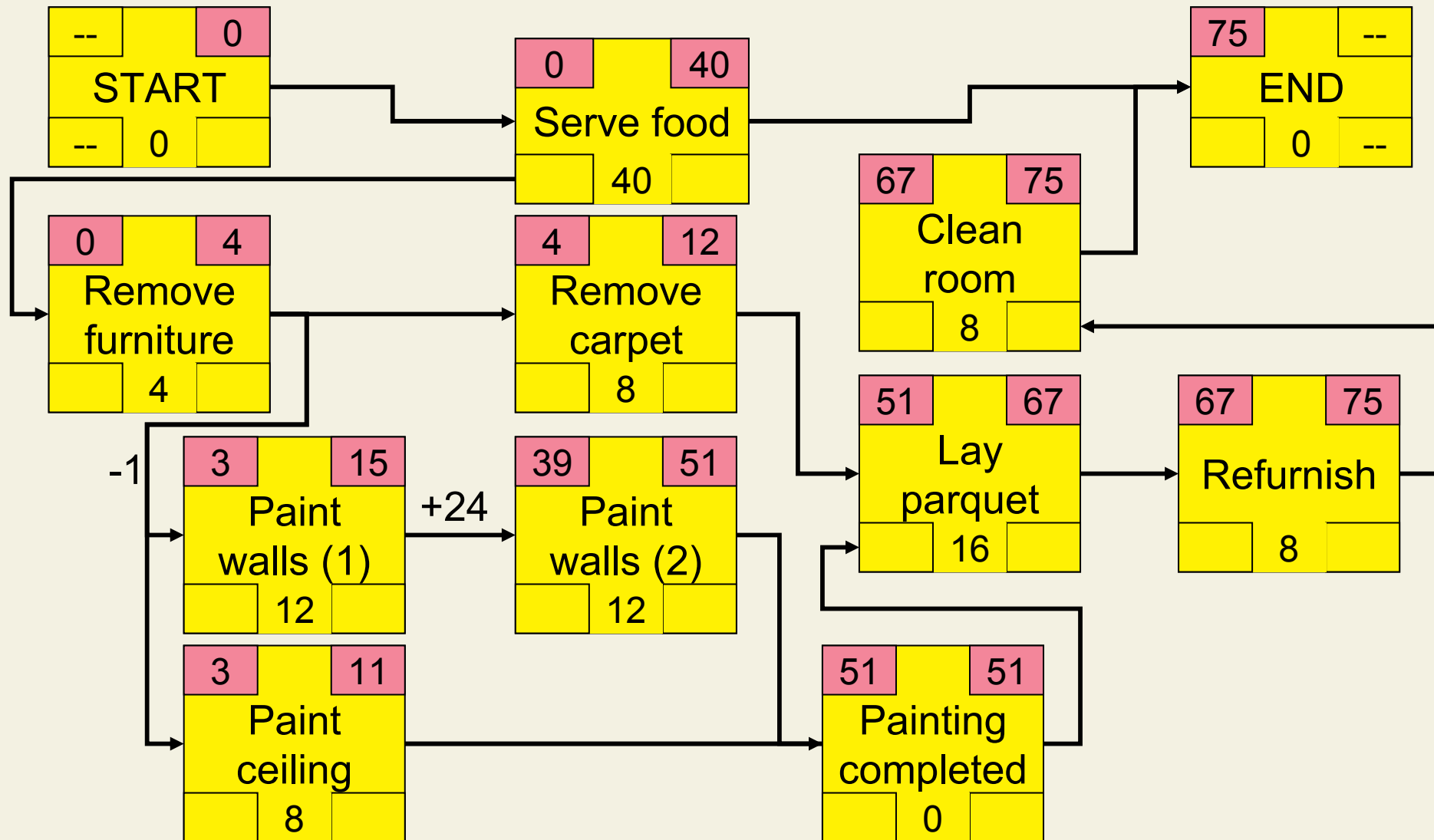


SF-relation:

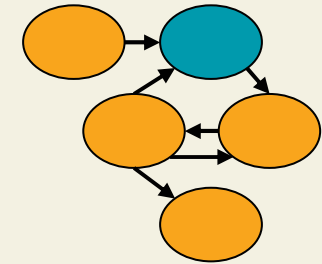
$$ES' := ES + L - D'$$



Forward Pass Example

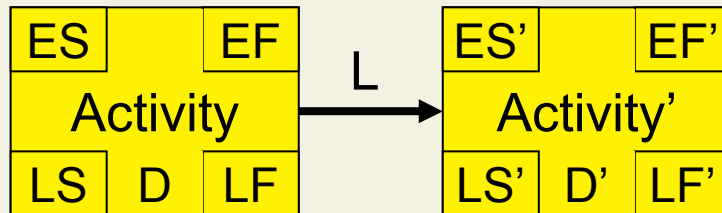


Backward Pass



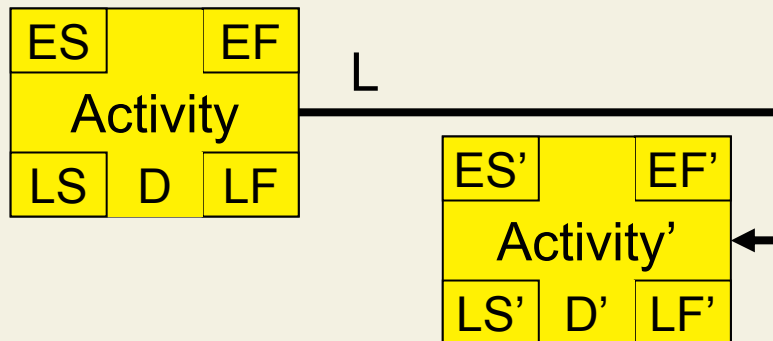
- Determines latest possible dates for each activity that do not delay the overall project
- Last activity ends at time unit of project duration
- Calculation of the late start and late finish dates
- For Activity A:
$$LF(A) = \min_{P \in \text{successors}(A)} LF_P(A)$$
$$LS(A) = LF(A) - \text{Duration}(A)$$
- The logic is “inverted”
 - early \leftrightarrow late, start \leftrightarrow finish, + \leftrightarrow -, primed \leftrightarrow unprimed

Calculating Late Finish



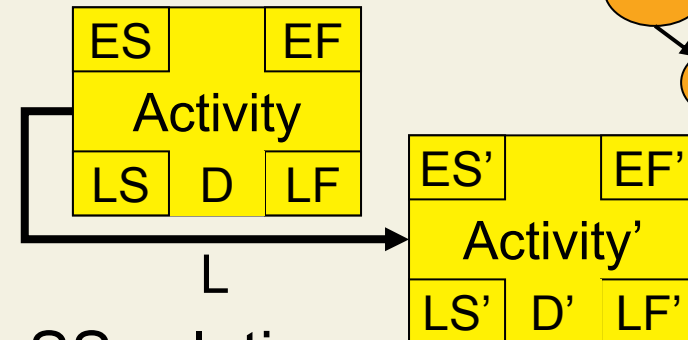
FS-relation:

$$LF := LS' - L$$



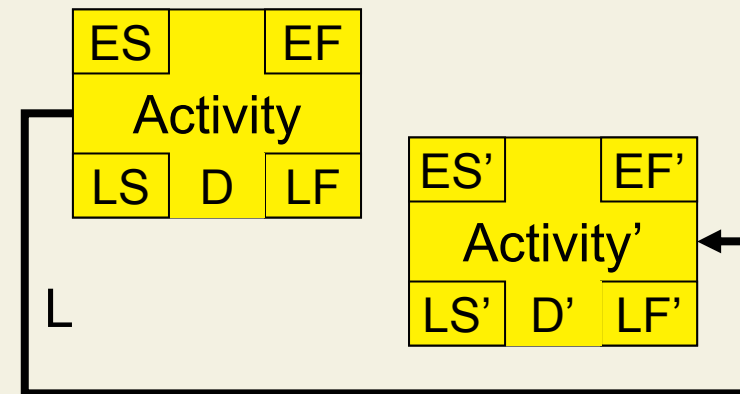
FF-relation:

$$LF := LF' - L$$



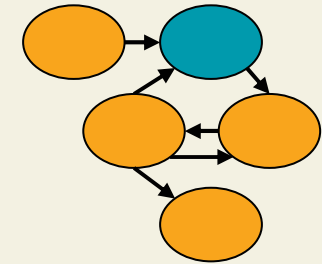
SS-relation:

$$LF := LS' - L + D$$

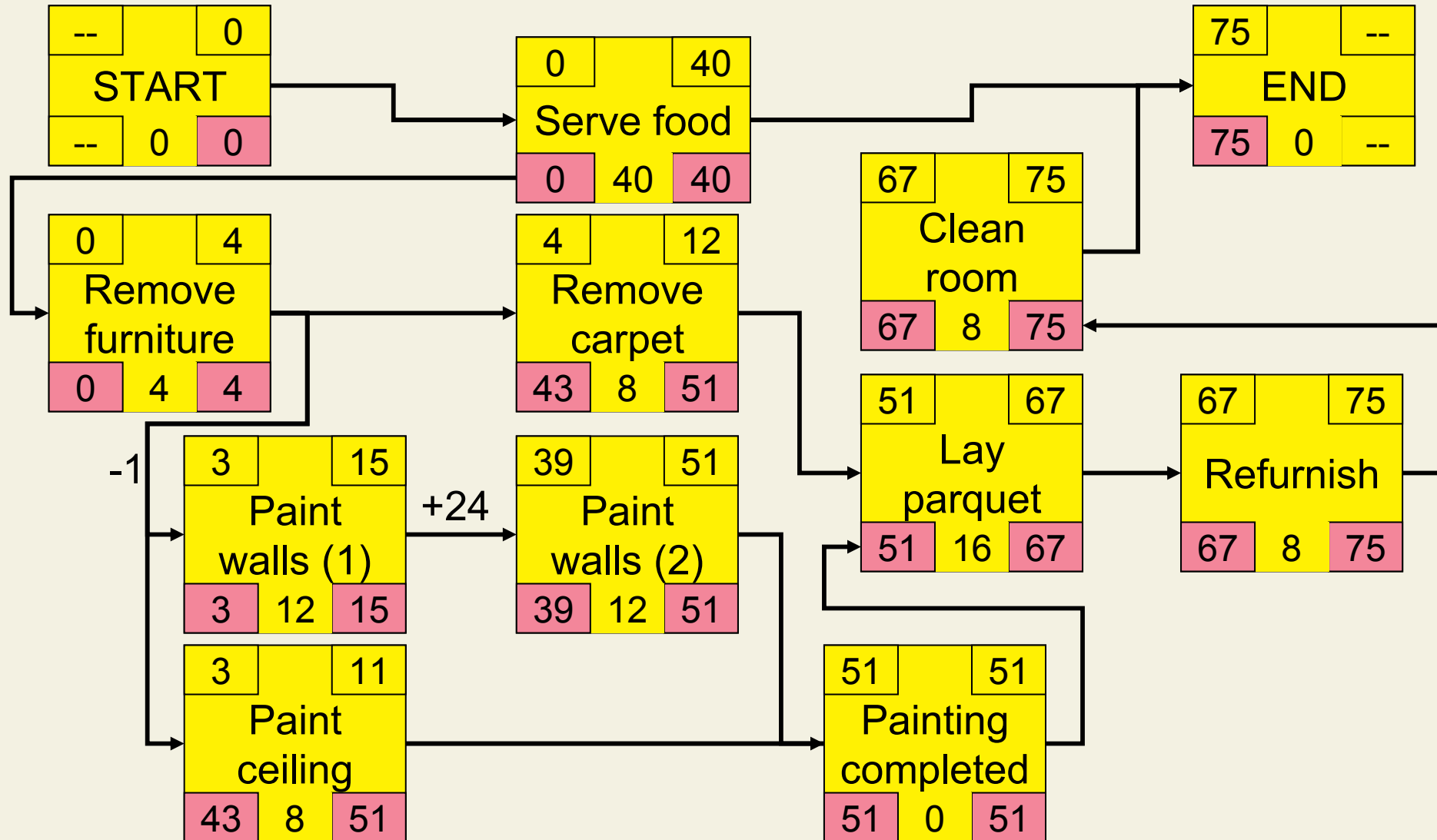


SF-relation:

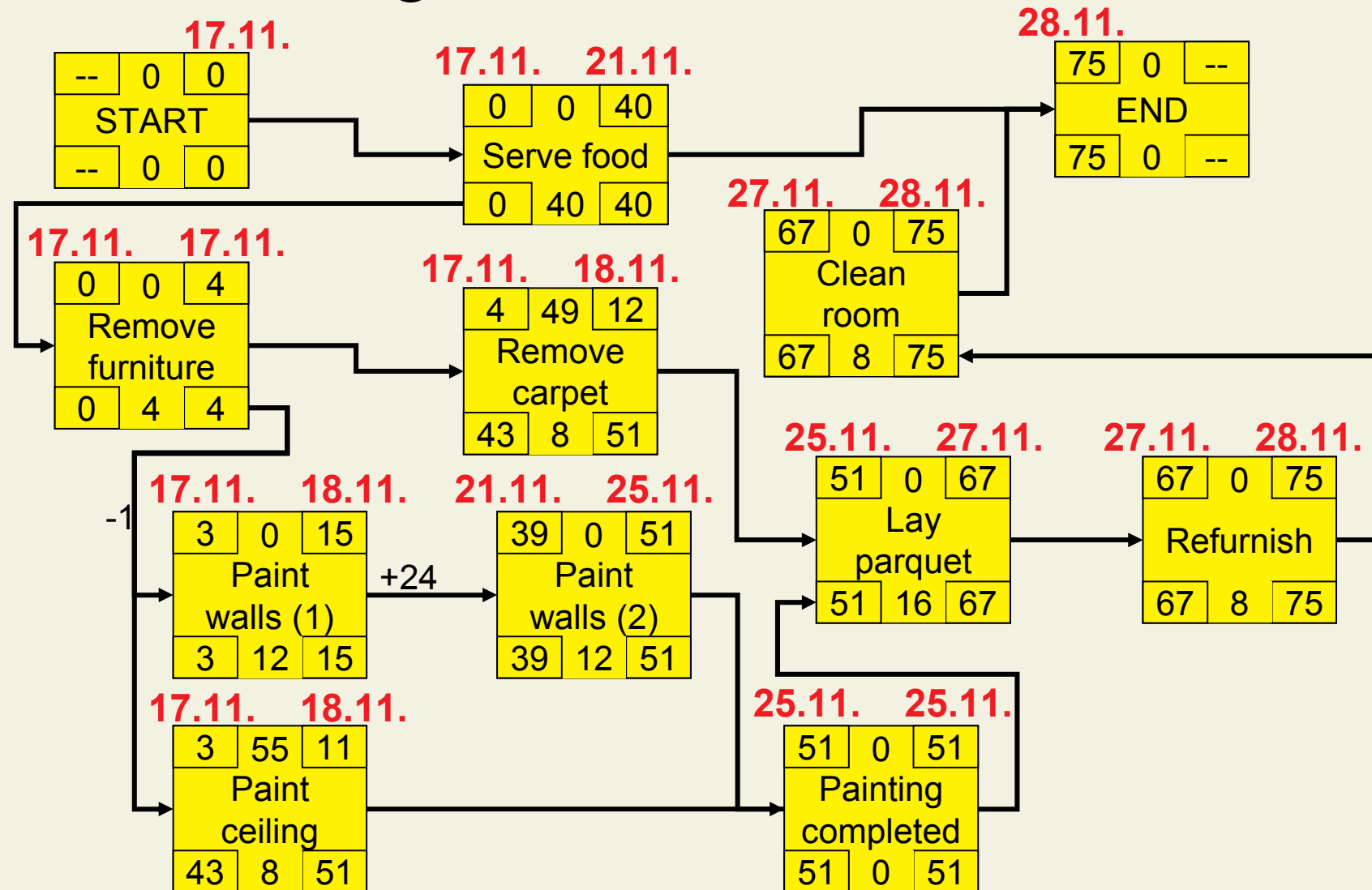
$$LF := LF' - L + D$$



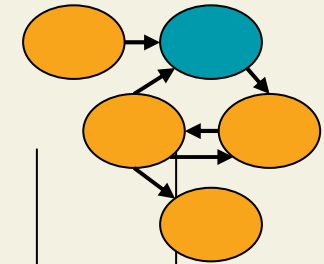
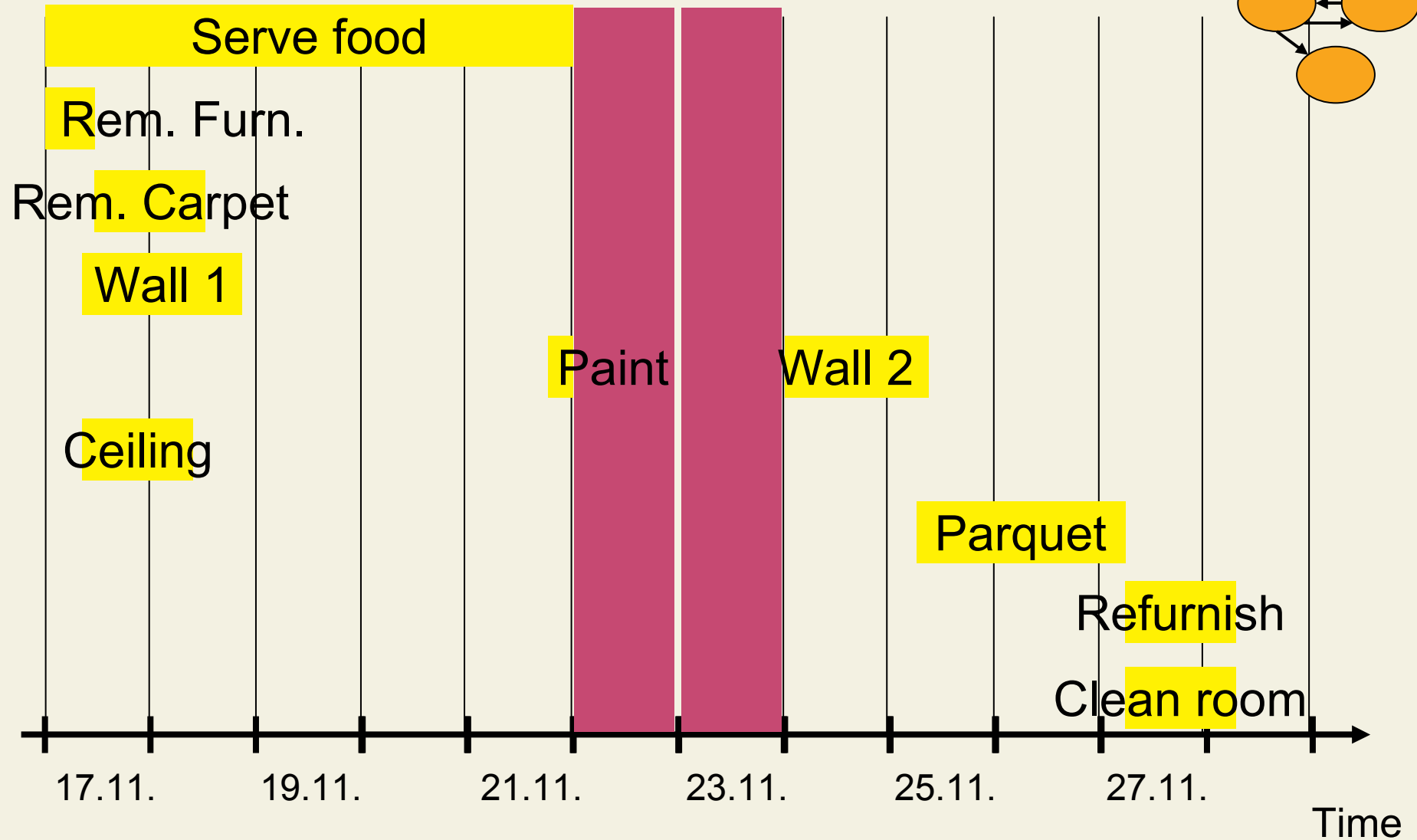
Backward Pass Example



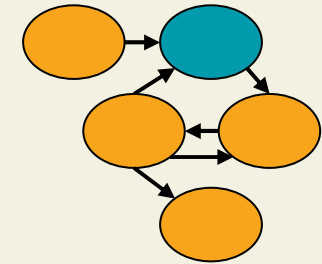
Network Diagrams with Dates



Bar (Gantt) Charts



Milestone Charts



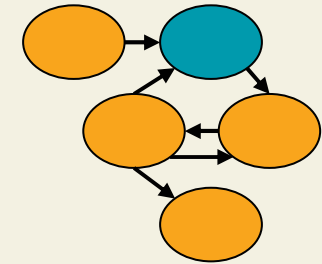
Current Date

Milestone	17.11.	18.11.	19.11.	20.11.	21.11.	22.11.	23.11.	24.11.	25.11.	26.11.	27.11.	28.11.
START	▼ △											
Painting completed									△			
END												△

Planned △

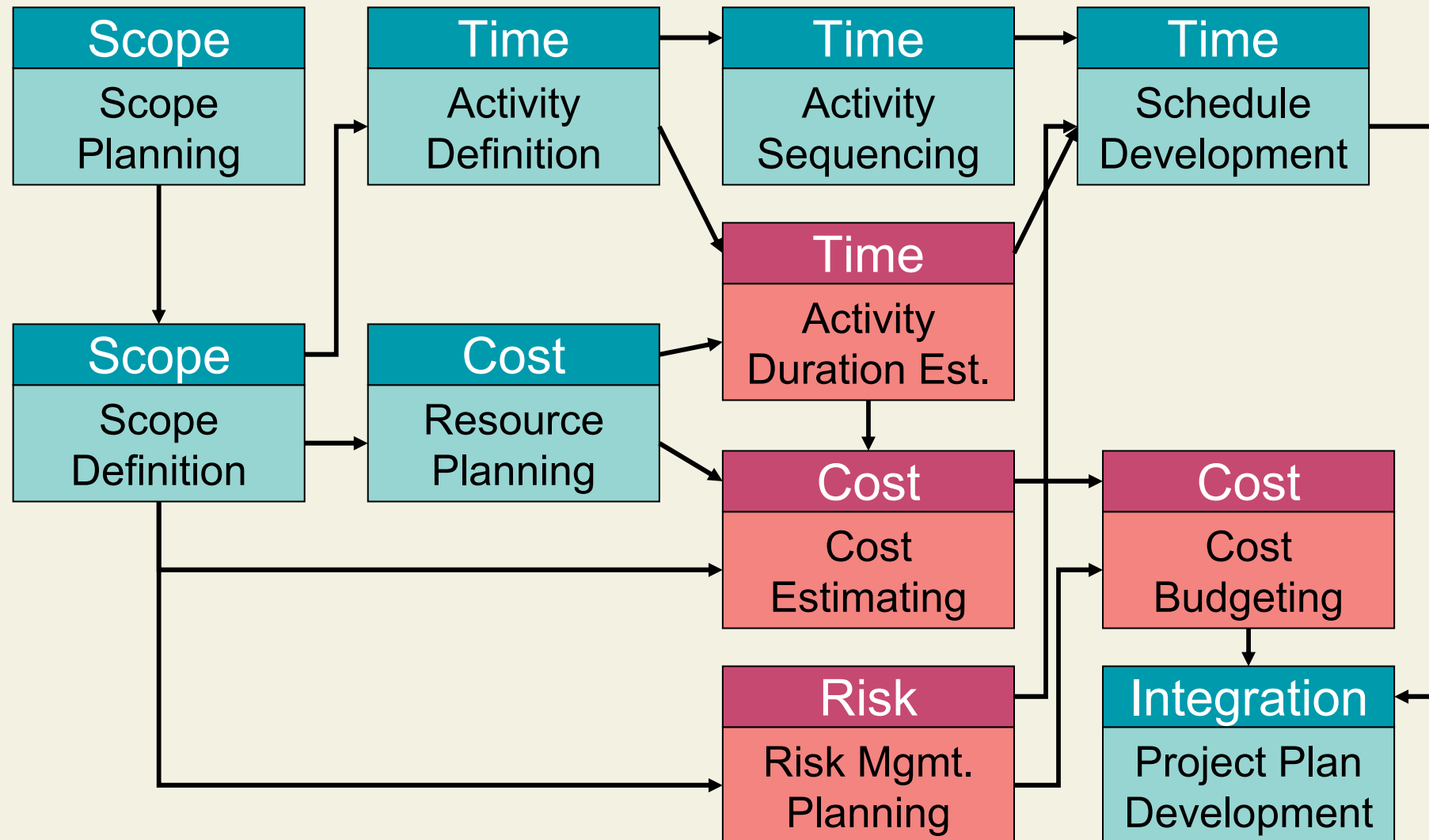
Actual ▼

Diagramming Methods



- Network diagrams
 - Show dependencies and workflow
 - Purpose: planning
- Gantt charts
 - Show dates and durations
 - Purpose: reporting and progress tracking
- Milestone charts
 - Show major events
 - Purpose: reporting to management and customer

Main Planning Processes



Systematics of Processes

	Initiating	Planning	Executing	Controlling	Closing
Integration		Project Plan Dev.	Project Plan Execution	Integr. Change Control	
Scope	Initiation	Scope Planning Scope Definition			
Time		Act. Definition, Act. Sequencing, Schedule Dev.			
Cost		Resource Planning			
Quality					
HR					
Comm.					
Risk					
Procurement					