IT Project Management

(Lecture 6)

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Previous Lecture

– Scoping Process Group (1/5)

    – Developing Conditions of Satisfaction (COS)

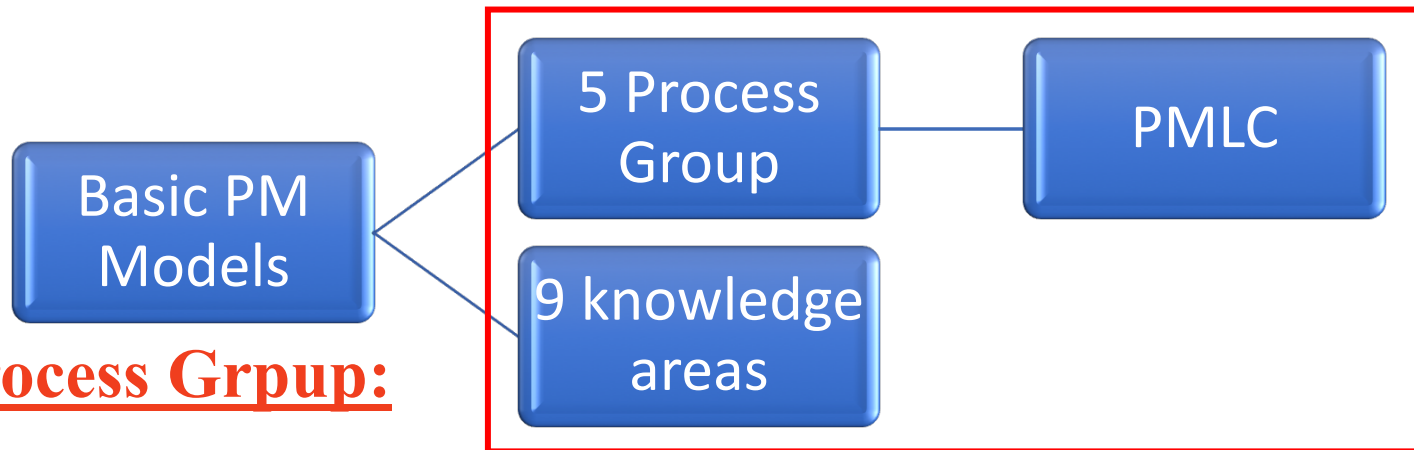   – Project Overview Statement (POS)

Outline

- Planning Process Group (2/5)

  - Work Breakdown Structure (WBS)

  - Estimate activity duration

Basic PM Models

– Basic of all Project Management (PM) models are:

Previous Lecture

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Basic PM Models ── 5 Process Group ── PMLC
              └─── 9 knowledge areas
```

– **Process Grpup:**

1. ~~Scoping Process Group~~

2. Planning Process Group ← **Now**

3. Launching Process Group

4. Monitoring & Controlling Process Group

5. Closing Process Group

Planning PG

– Why Do We Need Planning?

1. planning can actually decrease the time required to complete a project,

2. Planning reduces risks and increases understanding of project.

3. Planning improves efficiency and it can increase productivity.

Planning PG

– Project Planning Tools:

    – There are good programs are released for this aim.

        – Ex: "MS Project". Which is a product of Microsoft company.

    – Beside from many other software, you can simply use stick notes, markers, whiteboard and pens.

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– The outline of Planning Process Group:

1. Identify project activities.

2. Estimate activity duration.

3. Determine resource requirements.

4. Construct/analyze project network diagram.

5. Prepare the project proposal

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❖ Identify project activities: (1/5)

- To identify the work of the project a hierarchical decomposition is created.

- It defines the work down to a sufficient level of detail so that estimates of <u>time, cost, and resource requirements</u> can be made. The artifact is called the **<u>Work Breakdown Structure (WBS)</u>**
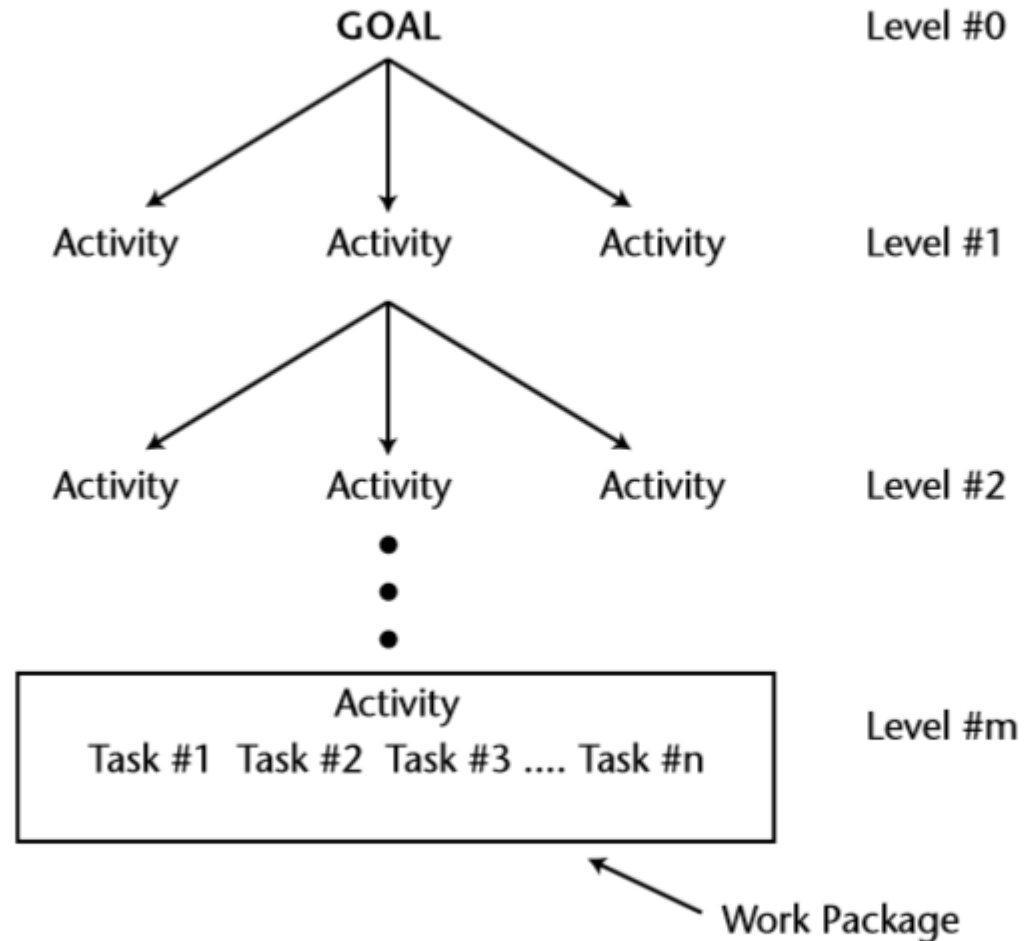
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❖ Identify project activities: (1/5)

– **What is Work Breakdown Structure (WBS) ?**

– The WBS is a hierarchical description of the work that must be done to complete the project as defined in the Project Overview Statement (POS). Several processes can be used to create this hierarchy.

– The requirements document is the input to the WBS construction process.

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❖ Identify project activities: (1/5)

   – **What is Work Breakdown Structure (WBS) ?**

   – Example of WBS:

GOAL	Level #0
Activity Activity Activity	Level #1
Activity Activity Activity	Level #2
Activity Task #1 Task #2 Task #3 .... Task #n	Level #m

Work Package

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS) :**

– To understand the WBS, you need to be familiar with three terms

    I.   The first term is "*activity*" : an **_activity_** is simply a chunk of work.

    II.   The second term is "*task*": a **_task_** is a smaller chunk of work.

    III.   The third term is "work package": a <u>work package is</u> a complete description of how the tasks that make up an activity will actually be done. It includes a description of the what, who, when, and how of the work.

Planning PG

❖ Identify project activities: (1/5)
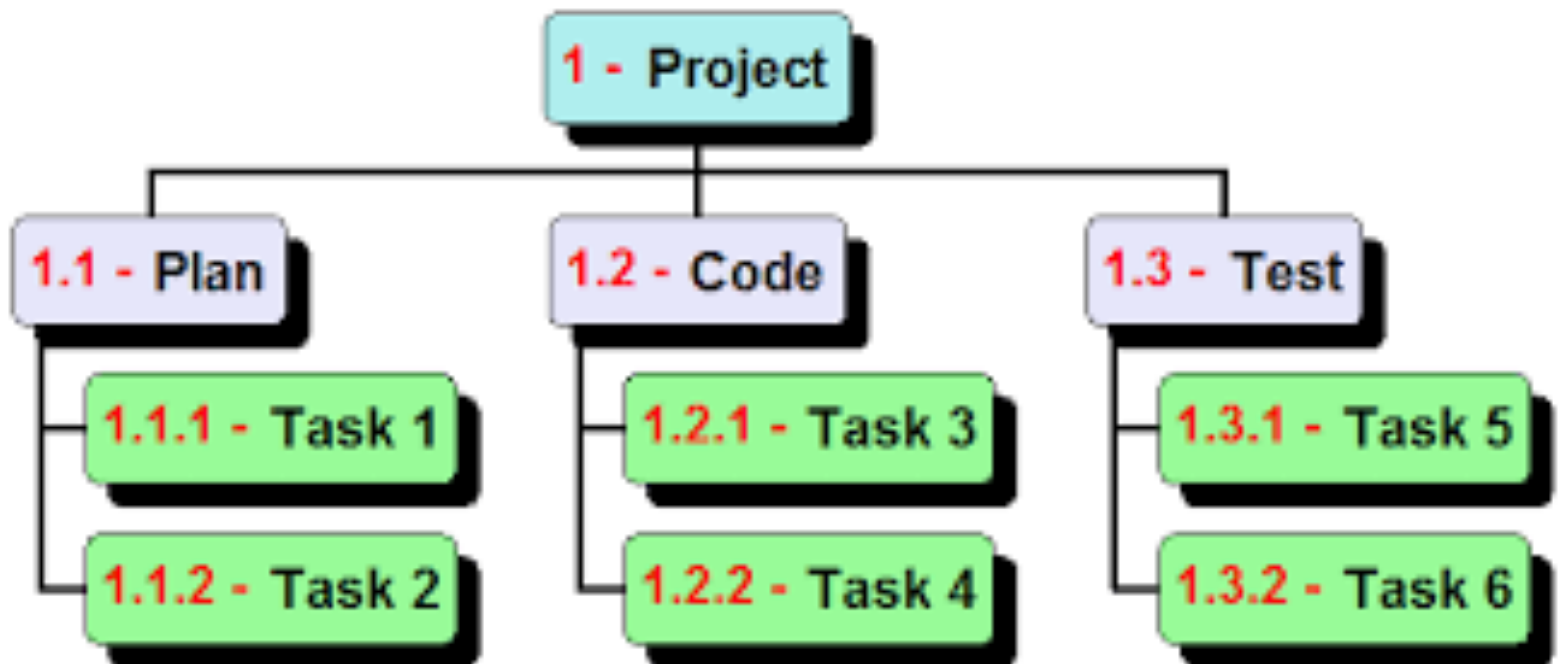
➢ **Work Breakdown Structure (WBS) :**

– In previous example: Activities turn to tasks at some level in the hierarchy.

– An activity is composed of two or more tasks.

– When the tasks that make up an activity are complete, the activity is complete.

– Breaking down work into a hierarchy of activities, tasks, and work packages is called **decomposition**.

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❖ Identify project activities: (1/5)

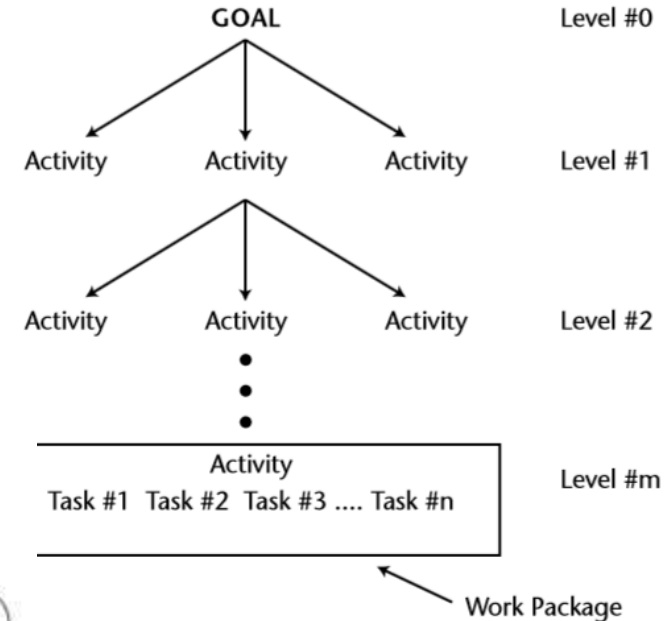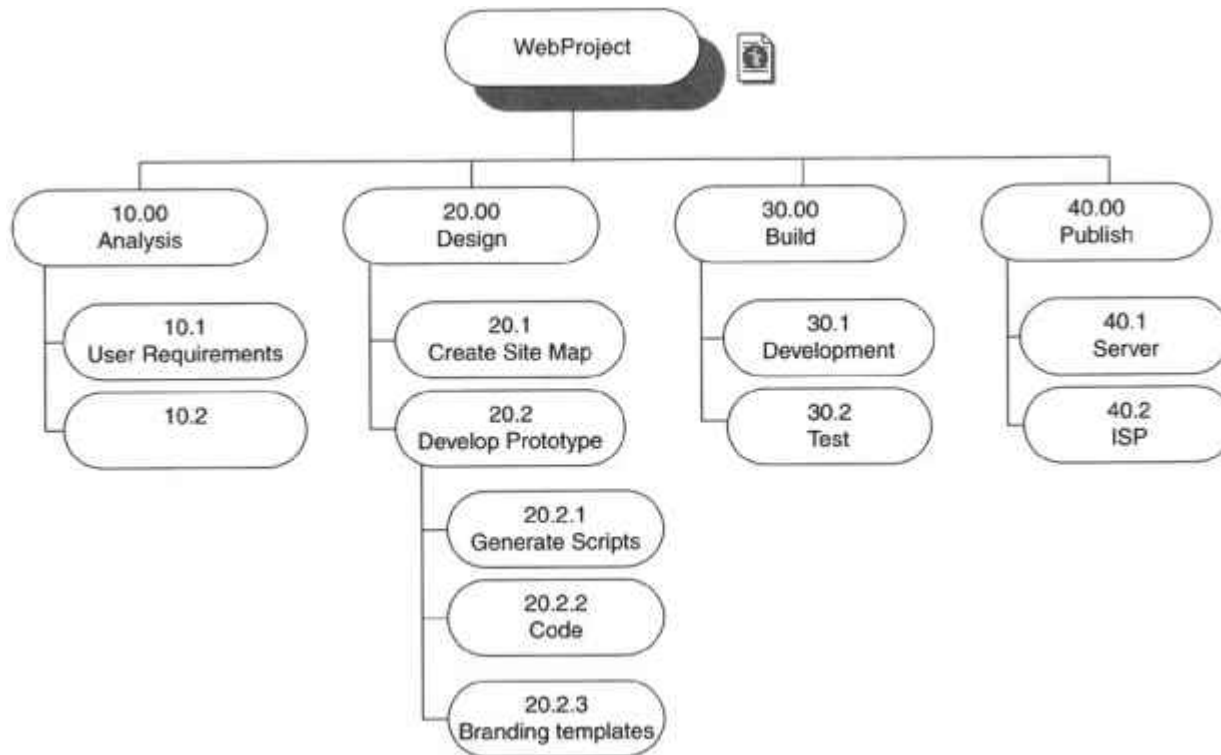➢ **Work Breakdown Structure (WBS) :**

– Ex:

Planning PG

❖ Identify project activities: (1/5)

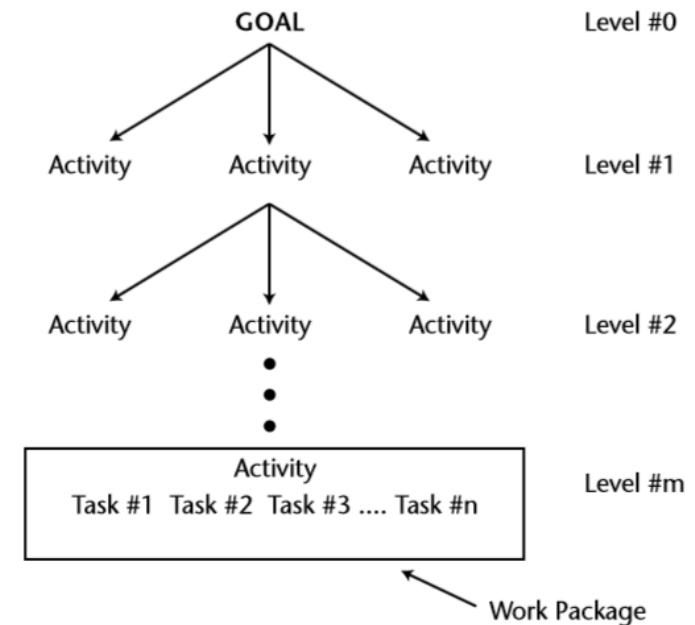➢ **Work Breakdown Structure (WBS):**

– Ex:

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS) :**

– Example:

– The goal statement from the POS is defined as a Level 0 activity in the WBS.

– The next level, Level 1, is a decomposition of the Level 0 activity into a set of activities defined as Level 1 activities.

– When the work associated with each Level 1 activity is complete, the Level 0 activity is complete. For this example, that means the project is complete.
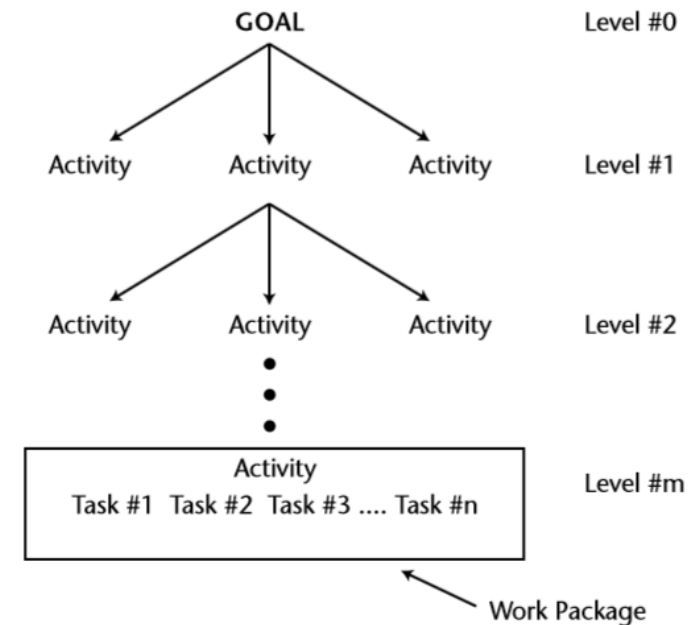

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❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS) :**

– Example:

– As a **general rule:** when an activity **at Level n** is decomposed into a set of activities **at Level n + 1** and the work associated with those activities is <u>complete</u>, the **activity at Level n**, from which they were defined**, is complete**

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– The WBS has four uses:

1. **Thought process tool:** It helps project manager and the planning team visualize exactly how the work of project can be defined and managed effectively.

2. **Architectural design tool:** The WBS is a picture of the work of the project and how the items of work are related to one another

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– The WBS has four uses:

3. **Planning tool:** the WBS gives the project team a detailed representation of the project as a collection of activities that must be completed in order for the project to be completed. It is <u>at the lowest activity level</u> of the WBS that we will estimate <u>effort, elapsed time, and resource requirements</u>; build a schedule of when the work will be completed; and estimate deliverable dates and project completion.

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– The WBS has four uses:

4. **Project status reporting tool:** the WBS is used as a structure for reporting project status. The project activities are consolidated (that is, rolled up) from the bottom as <u>lower-level activities are completed</u>. As work is completed, activities will be completed. Completion of lower-level activities <u>causes higher-level activities to be partially complete</u>.

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– Generating the WBS:

  – The best way to generate the WBS is as part of the **Joint Project Planning (JPP)** session.

  – **The JPPS is** a group session in which all of the people who are involved in the project meet to develop the detailed plan.

  – **The objective of JPPS** is simple to say but hard to act, which is; "To develop a project plan that meets the COS as negotiated between the requestor and the provider and as described in the POS."

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– Generating the WBS:

  – Two approaches can be used to identify the project activities:

    I. **Top-down approach**

    II. **Bottom-up approach**
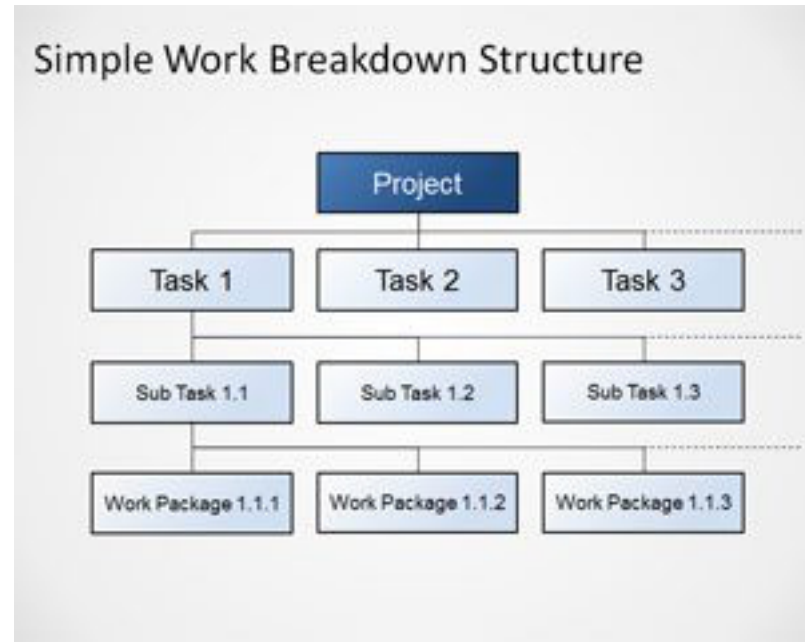
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❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– Generating the WBS:

I. **Top-down approach:**

– The top-down approach <u>begins at the goal level</u> and successively partitions work <u>down to lower levels</u> of definition until the participants are satisfied that the work has been sufficiently defined.

Simple Work Breakdown Structure

– Project activities are defined in this approach <u>at a sufficient level</u> of detail to enable you **to estimate time, cost, and resource requirements**. Because <u>the activities are defined to this level</u> of detail, project time, cost, and resource requirements are estimated much **more accurately.**

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– Generating the WBS:

I. **Top-down approach:**

– Once the activities are described, you can sequence the project work so that as many activities as possible are <u>performed in parallel</u>, rather than in sequence.

– This approach is by far more <u>popular than the bottom-up approach</u>. Why? Because it is <u>more logical! It is only rational</u> to first define a solution to a problem and then dissect the solution into the steps required to implement them.

– There are two differences of the top-down approach, which are "**<u>Team approach</u>**" and "**<u>Sub-team approach</u>**" can be used for the needs of project.

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– Generating the WBS:

II.   **Bottom-up approach:**

– This approach is more like a brainstorming session than an organized approach to building the WBS, where team members are asked to make a list of <u>low-level tasks</u> needed to complete the project.

– This approach is resource intensive since it assumes that <u>all members of the team have sufficient domain knowledge</u> and a complete understanding of the project requirements in order to be <u>able to identify and integrate tasks at different levels</u>.

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

- Generating the WBS:

  II.   Bottom-up approach:

  - The bottom-up approach works as follows:

    - The first steps are the same as those for the top-down approach. Namely, the entire planning team agrees to the first-level breakdown.

    - The planning team is then divided into as many groups as there are first-level activities.

    - Each group then makes a list of the activities that must be completed in order to complete the first-level activity. To do this, they proceed as follows:

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❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– Generating the WBS:

II. Bottom-up approach:

– The bottom-up approach works as follows:

1. Someone in the group identifies an activity and announces it to the group. If the group agrees, then the activity is written on a slip of paper and put in the middle of the table. The process repeats itself until no new ideas are forthcoming.

2. The group then sorts the slips into activities that seem to be related to one another. This grouping activity should help the planning team add missing activities or remove redundant ones

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– Generating the WBS:

II. Bottom-up approach:

– The bottom-up approach works as follows:

3. Once the team is satisfied it has completed the activity list for the first- level breakdown, the members are finished. Each group then reports to the entire planning team the results of its work.

4. Final critiques are given, missing activities are added, and redundant activities are removed.
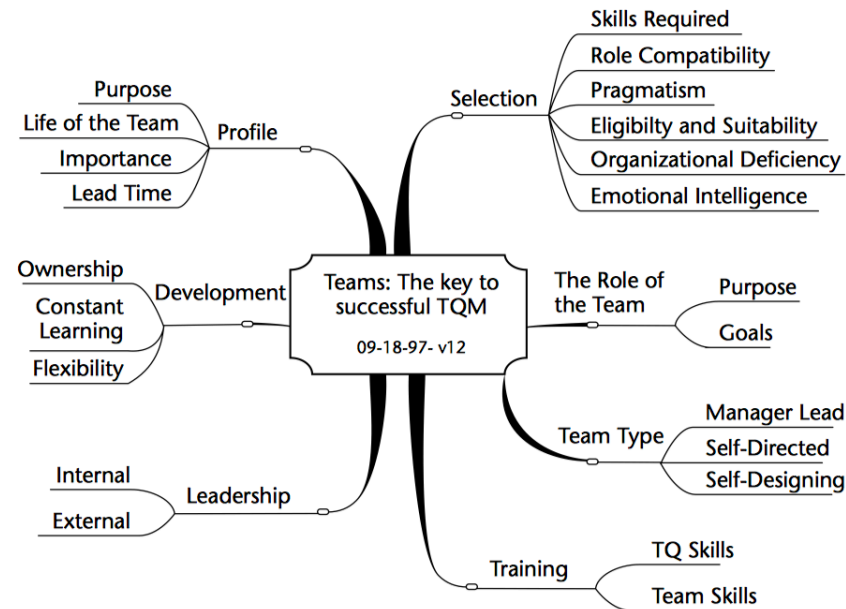
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❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– WBS for Small Project use technique called **MindMapping**.

– Mindmapping has been popularized by Joyce Wycoff and Tony Buzan. The technique is best described as a graphic dump of your brain.

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– <u>Six Criteria to Test</u> for Completeness in the WBS:

1. **Status and completion are measurable:**

– The project manager can question the status of an activity at any point in time during the project. If the activity has been defined properly, that question is answered easily.

– Example:

- The activity is supposed to take 4 months of full-time work. I've been working on it for 2 months full-time. I guess I must be 50 % complete.

- The activity is writing a system documents about 300 pages. I've written 150 pages, so I guess I am 50 % complete.

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– Six Criteria to Test for Completeness in the WBS:

2. **Activity is bounded:**

– Each activity should have a clearly defined start and end event

3. **Activity has a Deliverable:**

– The deliverable is a visible sign that the activity is complete. This sign could be an approving manager's signature, a physical product or document, the authorization to proceed to the next activity, or some other sign of completion. The deliverable(s) from an activity is output from that activity, which then becomes input to one or more other activities that follow its completion

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– <u>Six Criteria to Test</u> for Completeness in the WBS:

    4. **Time and cost are easily estimated:**

        – Each activity should have an estimated time and cost of completion. Being able to do this at the lowest level of decomposition in the WBS enables you to aggregate to higher levels and estimate the total project cost and the completion date

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– <u>Six Criteria to Test</u> for Completeness in the WBS:

5. Activity duration is within acceptable limits:

– It is a good practice to don't have any task longer than 2 week duration, but this is not a rule.

– The danger you avoid is longer-duration activities whose delay can create a serious project-scheduling problem.

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

– <u>Six Criteria to Test</u> for Completeness in the WBS:

6. Work assignments are independent:

– It is important that each activity be independent.

– Once work has begun on the activity, it should continue reasonably well without interruption and without the need for additional input or information until the activity is complete.

– You can choose to schedule it in parts because of resource availability, but you could have scheduled it as one continuous stream of work.

Planning PG

❖ Identify project activities: (1/5)
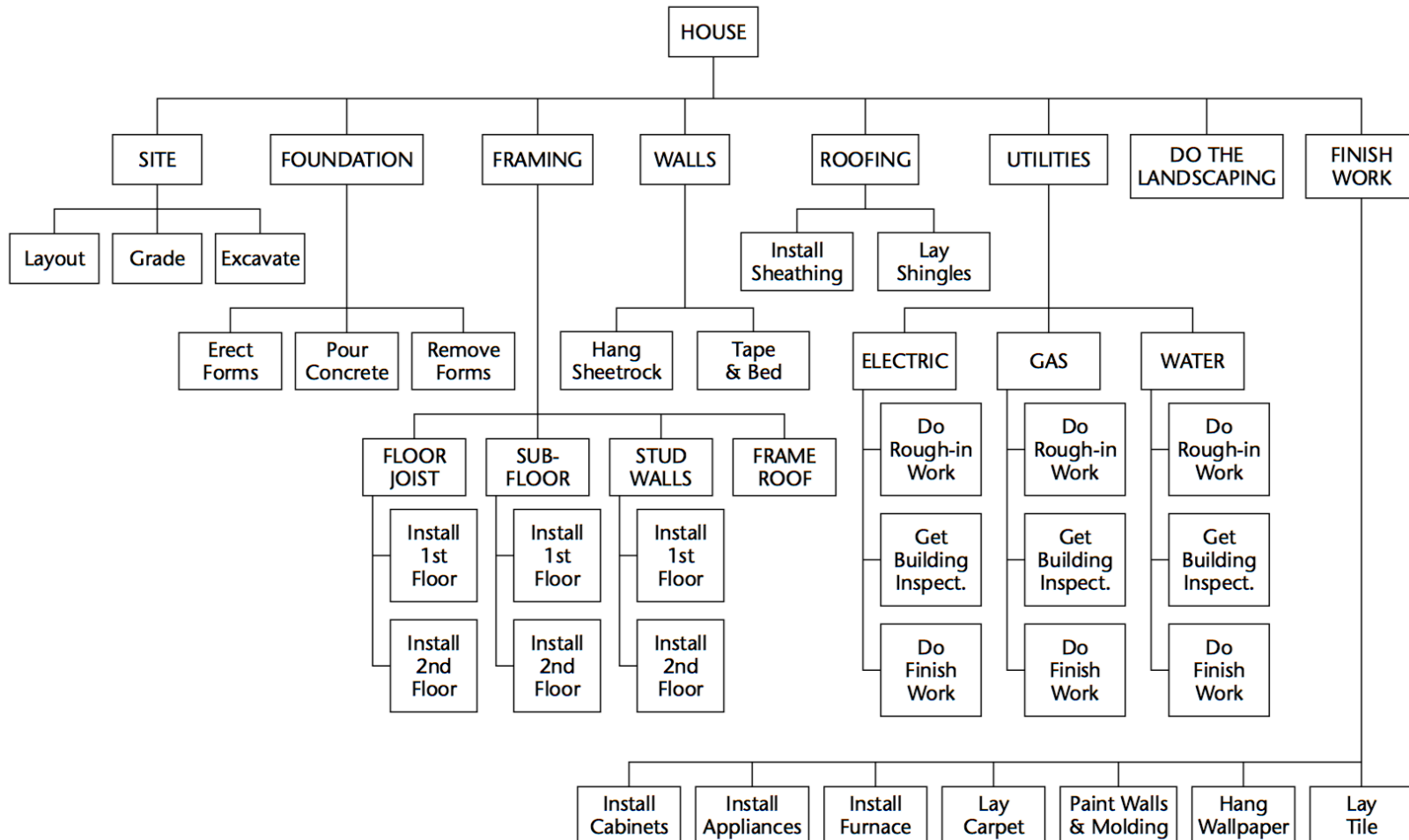
➢ **Work Breakdown Structure (WBS):**

Figure 4-3 WBS for a house

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**

Indented outline WBS for a house

1. SITE PREPARATION
   1.1 Layout
   1.2 Grading
   1.3 Excavation
2. FOUNDATION
   2.1 Erect Forms
   2.2 Pour Concrete
   2.3 Remove Forms
3. FRAMING
   3.1 Floor Joists
      3.1.1. Install First-Floor Joists
      3.1.2. Install Second-Floor Joists
   3.2 Subflooring
      3.2.1. Install First-Floor Subflooring
      3.2.2. Install Second-Floor Subflooring
   3.3 Stud Walls
      3.3.1. Erect First-Floor Stud Walls
      3.3.2. Erect Second-Floor Stud Walls
   3.4 Frame the Roof
4. UTILITIES
   4.1 Electrical
      4.1.1. Do Rough-in Work
      4.1.2. Get Building Inspection
      4.1.3. Do Finish Work
   4.2 Gas
      4.2.1. Do Rough-in Work
      4.2.2. Get Building Inspection
      4.2.3. Do Finish Work
   4.3 Water
      4.3.1. Do Rough-in Work
      4.3.2. Get Building Inspection
      4.3.3. Do Finish Work
5. WALLS
   5.1 Hang Sheetrock
   5.2 Tape and Bed
6. ROOFING
   6.1 Install Sheathing
   6.2 Lay Shingles
7. FINISH WORK
   7.1 Install Cabinets
   7.2 Install Appliances
   7.3 Install Furnace
   7.4 Lay Carpet
   7.5 Paint Walls and Molding
   7.6 Hang Wallpaper
   7.7 Lay Tile
8. LANDSCAPING

Planning PG

❖ Identify project activities: (1/5)

➢ **Work Breakdown Structure (WBS):**
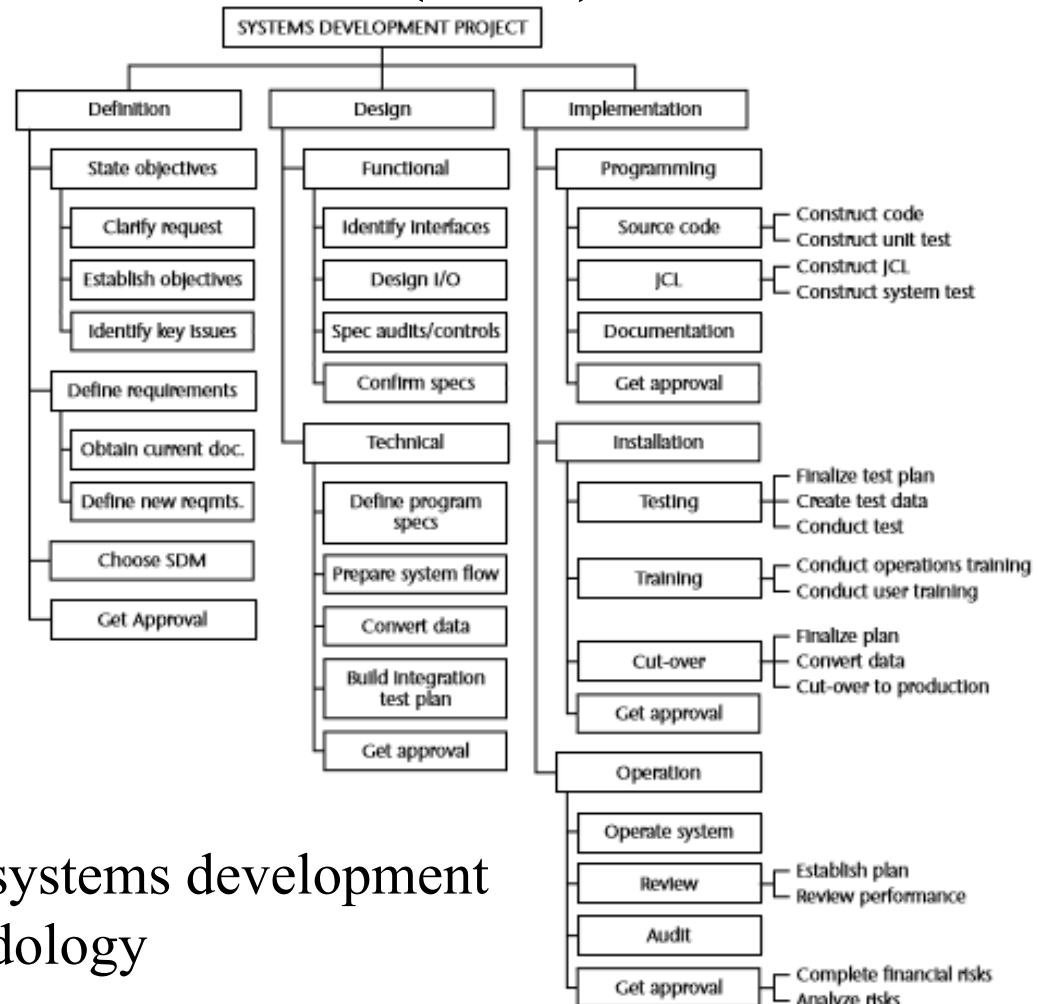
WBS for a waterfall systems development methodology

Planning PG

– The outline of Planning Process Group:

1. ~~Identify project activities.~~

2. Estimate activity duration.

3. Determine resource requirements.

4. Construct/analyze project network diagram.

5. Prepare the project proposal

Planning PG

❖ Estimate activity duration : (2/5)

– Before you can estimate duration, you need to make sure everyone is working from a common definition.

– The duration of a project is the elapsed time in business working days, not including weekends, holidays, or other non-work days.

– Work effort is labor required to complete a task. That labor can be consecutive or nonconsecutive hours.
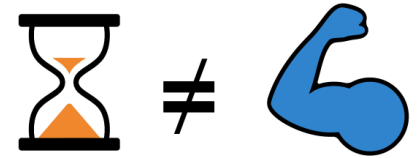
Planning PG

❖ Estimate activity duration : (2/5)

➢ **Duration & Effort**

– Duration and Effort **are not the same** thing

⌛ ≠ 💪

Effort vs. Duration

– **Effort:** is the amount of work required to complete a task, the number of person hours, person days, person weeks it takes to complete a task. It used to estimate cost of resources.

– **Duration:** is the time that elapses between the start and end of the task, the number of business or calendar days over which the task will be done. It used to estimate timeframe.

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Resource Loading VS Task Duration**

– The duration of a task is influenced by the amount of resources scheduled to work on it.

– Adding more resources to hold a task's duration within the planning limits can be effective. This is called "**crashing the task**."

– The crash point is that point where adding more resources will increase task duration.

 – Ex: chair in front of door

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Variation in Task Duration**

– Task duration is a random variable. <u>Because</u> you cannot know what factors will be operative when work is underway on a task, you cannot know exactly how long it will take.

– There are several causes of variation in the actual task duration:

- Varying skill levels.
- Unexpected events.
- Efficiency of work time.
- Mistakes and misunderstandings.
- Common cause variation.

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Six Methods for Estimating Task Duration**

1. **Similarity to other activities**

   – Some of the activities in your WBS may be similar to activities completed in other projects.

   – Your or others' recollections of those activities and their duration can be used to estimate the present task's duration.

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Six Methods for Estimating Task Duration**

2. Studying historical data

– Every good project management methodology includes a project notebook that records the estimated and actual task duration.

– This historical record can be used on other projects.

– The recorded data becomes your knowledge base for estimating task duration

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Six Methods for Estimating Task Duration**

3.   Seeking expert advice

– When the project involves a breakthrough technology or a technology that is being used for the first time in the organization, there may not be any local experience or even professionals skilled in the technology within the organization. In these cases, you will have to appeal to outside authorities.

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Six Methods for Estimating Task Duration**

4. Applying Delphi technique

– The Delphi technique can produce good estimates in the absence of expert advice.

– This is a <u>group technique</u> that extracts and summarizes the knowledge of the group to arrive at an estimate.

– After the group is briefed on the project and the nature of the task, each individual in the group is asked to make his or her best guess of the task duration.

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Six Methods for Estimating Task Duration**

4. Applying Delphi technique
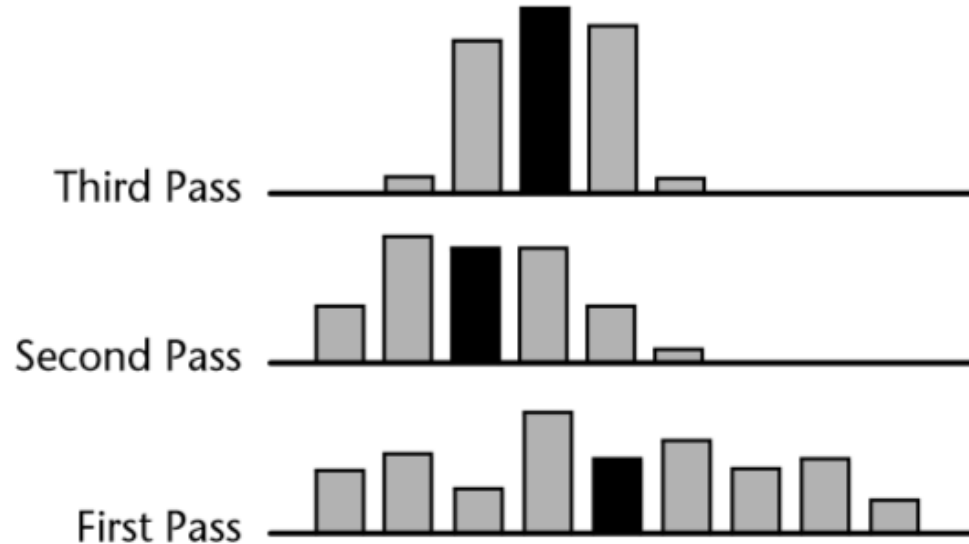
Planning PG

❖ Estimate activity duration : (2/5)

➢ **Six Methods for Estimating Task Duration**

5. Applying the three point technique

– Task duration is a random variable. If it were possible to repeat the task several times under identical circumstances, duration times would vary. That variation may be tightly grouped around a central value, or it might be widely dispersed.

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Six Methods for Estimating Task Duration**
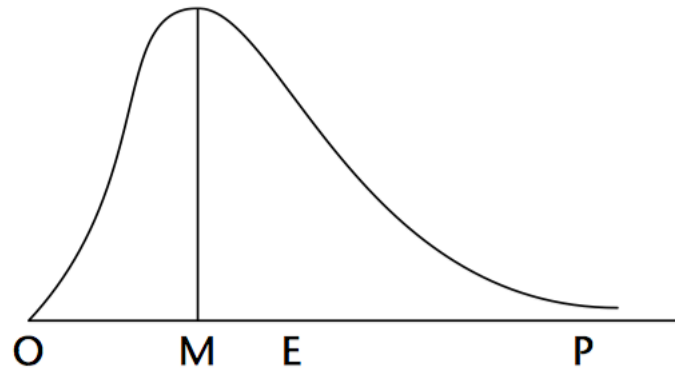
5. **Applying the three point technique**

– The three point technique gives you a framework for doing just that. To use the method, you need three estimates of task duration:

• **Optimistic:** The optimistic time is defined as the shortest duration one has had or might expect to experience given that everything happens as expected.

• **Pessimistic:** The pessimistic time is that duration that would be experienced (or has been experienced) if everything that could go wrong did go wrong, yet the task was completed.

• **Most likely**: The most likely time is that time usually experienced

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Six Methods for Estimating Task Duration**

5. **Applying the three point technique**

O: Optimistic
P: Pessimistic
M: Most Likely

$$E = \frac{O + 4M + P}{6}$$

Figure 5-3 The three-point method

Planning PG

❖ Estimate activity duration : (2/5)

➢ **Six Methods for Estimating Task Duration**

5. Applying the wide-band Delphi technique

– Combining the <u>Delphi and three point methods</u> results in the wide-band Delphi technique.

Questions & Answers