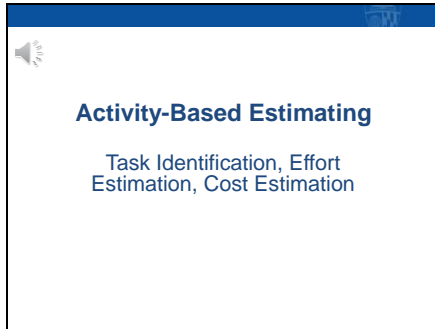
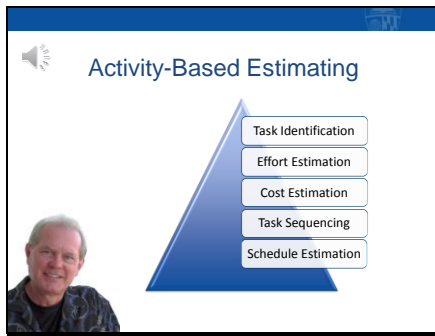


1



In this lecture we'll discuss the activity-based project estimating technique.

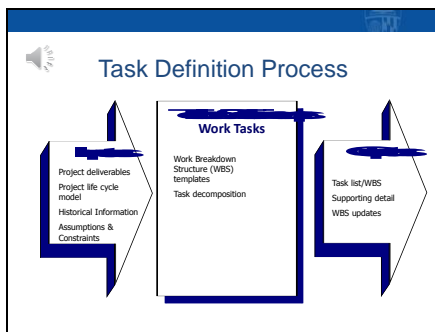
2



As mentioned in an earlier lecture, activity-based estimating is the most accurate estimating technique in practice. It consists of five tasks or activities: task identification, effort estimation, cost estimation, task sequencing, and schedule estimation.

We'll discuss the first three activities in this lecture, and discuss the remaining ones in later lectures.

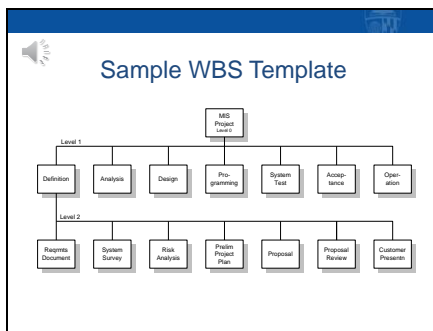
3



The task definition process involves developing something called a work breakdown structure (WBS). The work breakdown structure is a list of all the work that will be performed on the project. Each part of a project may have a different work breakdown structure, and each different group that collaborates on the project may have their own work breakdown structures.

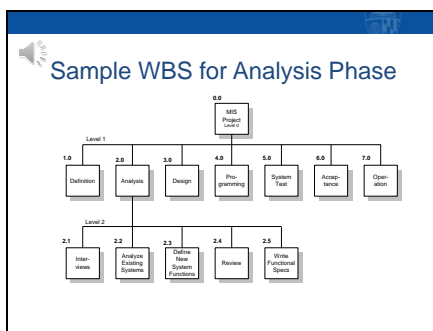
For example, the requirements analysts will have a work breakdown structure, the developers will have one, the testers will have one, and so forth. The work breakdown structures may all be developed by the project manager, or may be developed by various groups and then coordinated through the project manager, depending upon the practices in a given organization.

4



Here's an example of a work breakdown template for a simple software development project. Note that the work breakdown structure is hierarchical. The first level has a component for each phase in the project life cycle. The second level breaks the work in each phase into major tasks. Only the tasks for the definition phase second level are shown in this example.

5

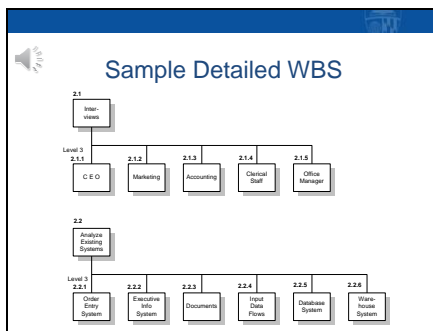


Here's an example of the major tasks for the requirements analysis phase at the second level. The tasks consist of performing interviews, analyzing existing systems, defining new functionality, conducting a requirements review, and writing the formal requirements documentation.

Note that the work breakdown structure doesn't show the order in which the tasks are performed...only the tasks that must be performed. Sequencing the tasks is a different step in the project planning process.

Each of the level two tasks for the analysis phase could be broken down into more specific sub-tasks. This is sometimes called task refinement.

6



As an example of task refinement, this illustration shows a further breakdown of the sub-tasks required to perform the interviews and analyze the existing systems.

What's important to remember is that any task that consumes effort...meaning time that will be spent on something...should be included in the project work breakdown structure so that it can be estimated and budgeted. For example, there should be at least one component for, say, weekly progress meetings...that's an often-overlooked task. Other types of meetings such as customer meetings and reviews also need to be included and are often overlooked as well.

And, for some parts of the project we may need to perform rework...so that should either appear as a task somewhere, so that its effort can be estimated and not forgotten...or, it should be built into the appropriate task estimates. Rework consumes a very significant part of the total effort for a project...about 50 percent...so if it isn't accounted for the project cost and schedule will not be realistic.

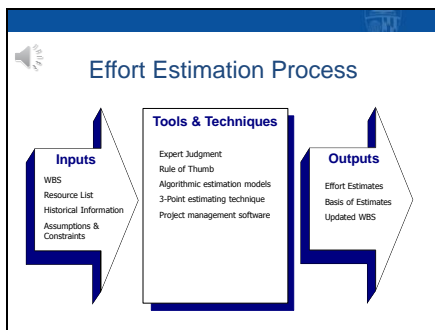
I've found that it's a good idea to make a task for it on the work breakdown structure so that it's not forgotten. When it comes to estimating the effort for each work breakdown component a separate estimate may be made for that task or the rework effort might be factored into other tasks. The important thing is not to forget to include it.

How many levels there are in the work breakdown structure is usually a management decision. Some project managers base initial plans on a first level breakdown. Sometimes that suffices, but in my experience it usually doesn't. Using too high a level can result in significantly underestimating the work that needs to be done.

In general, the deeper the work breakdown structure the more likely it is not to forget pieces of work that need to be done to successfully complete a project.

On the other hand, in my own experience, preparing detailed work breakdown structures for large projects can be very time consuming...so for estimating purposes the right level of detail needs to be decided.

7



Once the project tasks have been defined, the next step in activity-based estimating is to estimate the effort required for each task.

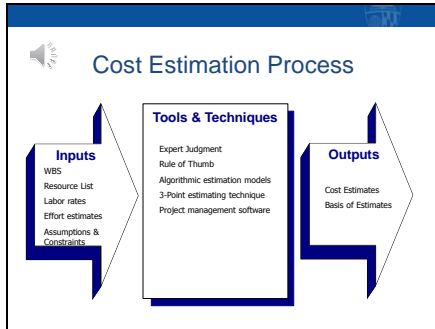
This diagram illustrates the typical inputs, outputs, and techniques used in practice.

Note that the work breakdown structure appears as an input and an output...to indicate that this process can be repeated over time, and the work breakdown structure can be updated.

The estimating techniques that were discussed in an earlier lecture can be used, in whole or in part, to actually come up with the effort estimates. We will discuss the three-point estimating technique in another lecture.

Please note that on the output side of this diagram, the basis of estimates are the assumptions that went into arriving at the estimates.

8



The next step in the activity-based estimating process is to estimate the project cost. This step can actually be deferred until later.

A key input to the cost estimating step is the effort estimate. For many software engineering projects, the primary project cost can be labor cost. In some projects that I have worked on, labor costs accounted for 80 percent or more of total project cost.

Project management software can be very helpful in computing labor costs. Most tools let you input labor rates for individual staff resources or categories of staff resources and easily calculate total labor cost estimates. Some of the estimating techniques we discussed in earlier lectures may also be used to estimate non-labor costs.

The primary outputs of this step are the project cost estimates and the basis for those estimates...meaning the assumptions that were used to derive them.

Subsequent lectures will discuss the remaining tasks in the activity-based estimating technique.