How Project Schedules Are Limited and Created

There is generally a trade-off among the three constraints—scope, cost, and schedule—and the project should have flexibility to manipulate at least one of these three constraints. Project schedules sometimes get higher priority over scope and cost when it is a time-constrained project. In addition to these constraints, the project schedule is constraints by other factors. One way to understand project schedules and how they are constructed is to understand that five factors may limit how fast a project can be completed:

1. Logical order

2. Activity duration

3. Resource availability

4. Imposed dates

5. Cash flow

- The first factor is the logical order in which activities need to be completed. For example, one needs to dig a hole before cement can be poured in it. This is covered in the section on sequencing activities.

- The second factor is how long each individual activity will take to complete. This is discussed in the section on estimating activity duration. It includes methods for estimating durations, problems with estimates, and remedies to those problems.

- The third factor is how many key resources are available at specific times in the project. For example, if six rooms were available to be painted at the same time, and fewer than six painters were available, progress would be slower. This is discussed in Chapter 9 in the section on resource availability.

- The fourth factor is imposed dates. For example, a project working on a government contract may not be able to start until the government's new fiscal year, which starts on October 1.
- The fifth and final factor is cash flow. Projects may not start until the budget is approved, but progress may also be slowed until enough revenue arrives to cover expenses. This is covered in Chapter 10.

Because project schedules are limited by these five factors, creating a realistic schedule is an iterative process. A common method of developing the schedule is to do the following:

1. First, identify all of the activities and then determine the logical order by creating a network diagram.

2. Once the order is determined, make an estimate of the time required for that activity.

3. Then assign resources to each activity, and if an assigned resource is not available when the activity is scheduled, make an adjustment of some type. The schedule can be computed with all of this information.

4. Next, it is time to compare the emerging schedule with any imposed dates and cash flow estimates.

Any inconsistencies may cause the team to adjust the schedule. Other factors often need to be considered, such as quality demands and risk factors. When all of these have been planned, the final schedule can be approved.

The pressure to complete a project as quickly as possible is often great. The sponsor or customer may try to dictate a schedule before anyone knows whether it is feasible or not. Before agreeing, the project manager must first understand what makes sense in terms of a schedule before she is in a position to know whether to accept a sponsor's suggestions or to argue about why it may be impractical. A project manager has the ethical responsibility to determine a schedule that is possible to achieve, persuade all stakeholders that the schedule makes sense, and then see to it that the project is delivered according to that agreed-upon schedule.

The remainder of this chapter and the other planning chapters describe in detail how to plan for each of these, culminating in an approved schedule and project plan that all stakeholders believe is reasonable. The project manager is then accountable to deliver the project on schedule. That project delivery is the essence of the final three chapters of this book.

Exhibit 8.2   Work Breakdown Structure with Deliverables Only

COLLEGE FUNDRAISER PROJECT

1. Project Management

2. Location

3. Information

4. Entertainment

5. Safety

6. Parking

7. Food

8. Sanitation

9. Volunteers

Exhibit 8.3   Work Breakdown Structure with Activity List Added

COLLEGE FUNDRAISER PROJECT

1. **Project Management**

2. **Location**

   2.1   CONTACT UNIVERSITY FOR PERMISSION

   2.2   DETERMINE IDEAL LOCATION TO MEET CAPACITY

   2.3   DETERMINE ALTERNATIVE LOCATION IN CASE OF INCLEMENT WEATHER

3. Information

3.1   PROVIDE TEAM INFORMATION

3.2   PRODUCE PRE-EVENT ADVERTISEMENTS

3.3   DISPLAY WELCOME SIGNS AT ALL ENTRANCES

3.4   SET UP SIGN-IN TABLE

3.5   DISPLAY SIGNS WITH RULES

4. Entertainment

4.1   FIND INFORMATION ABOUT LOCAL NOISE ORDINANCES

4.2   CONTACT LOCAL BANDS

4.3   SET UP STAGE, SPEAKERS, FUN BOOTHS

5. Safety

5.1   DETERMINE LIGHTING NEEDS

5.2   CONTACT LOCAL FIRE DEPARTMENT (EMS)

5.3   CONTACT LOCAL POLICE DEPARTMENT

5.4   OBTAIN PERMISSION TO USE WALKIE-TALKIES

5.5   COORDINATE FIRST AID BOOTH

6. Parking

6.1   FIND ADEQUATE LOTS TO ACCOMMODATE CAPACITY

6.2   COORDINATE SHUTTLE SERVICE FROM LOTS TO SITE

6.3   RESERVE SPECIAL PLACES FOR HANDICAPPED

7. **Food**

    7.1 CONTACT FOOD/BEVERAGE VENDORS FOR CONCESSIONS

    7.2 MAKE GOODIE BAGS FOR CHILDREN

    7.3 ORDER SUFFICIENT WATER

8. **Sanitation**

    8.1 PROVIDE TRASH RECEPTACLES

    8.2 PROVIDE ADEQUATE NUMBER OF PORTA-JOHNS

    8.3 COORDINATE POST-EVENT CLEAN-UP

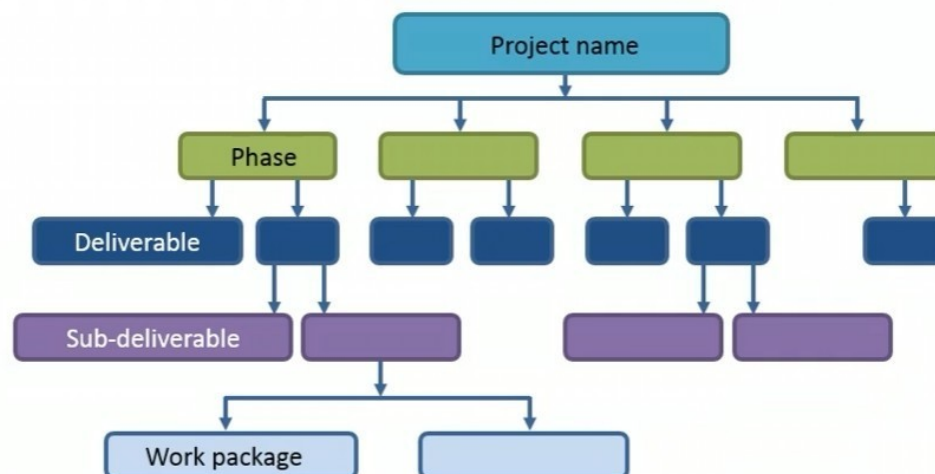   8.4 PURCHASE PAPER PRODUCTS AND SOAP

9. **Volunteers**

    9.1 RECRUIT VOLUNTEERS

    9.2 PRODUCE A MASTER VOLUNTEER ASSIGNMENT LIST

    9.3 MAKE NAMETAGS FOR ALL VOLUNTEERS

The work breakdown structure (WBS)

Work Breakdown Structure

[Topic title: Work Breakdown Structure. The presenter is Barb Waters.] You can tackle any major job in your personal or work life by breaking it down into manageable and achievable steps. In the context of project management, the work breakdown structure, or WBS, gives you control of a project by breaking work down into manageable units. To create a WBS, you use a process called decomposition. During decomposition, you subdivide the elements of your project into progressively smaller components starting with the project name and refining each level of decomposition until you are able to identify the smallest units of work that must be done.

[After project name, there is phase, then deliverable, and then sub-deliverable.] The smallest unit of work is called the work package. *[Using the WBS for Project Estimates.]* The WBS is very helpful when it comes to planning and then managing a project. It helps you define project team members' responsibilities because work packages are small enough to assign to particular project team members. This helps you to estimate the resources that will be needed for the work package and for the project as a whole. The WBS also facilitates budget creation. The cost associated with each decomposed element of a WBS will be the sum of the costs of all the elements underneath it. If you've identified all the work at each level, you can be certain that the cost associated with each identified area will be budgeted for. If you forget something your budget may be deficient.

The project manager can determine what a particular phase will cost simply by adding all costs from the lower levels of the WBS that feed into this phase. You could use this method to gauge costs at any level of the WBS, setting control accounts to monitor important cost components of the project. A WBS also helps you with scheduling. If you're using the WBS when creating the schedule, you know for sure that you've included all the work needed to complete the project. Another role that the WBS plays is in allowing better control of the project. For example, when the project manager finds that one of the team members assigned to a particular work package is going to be absent for eight weeks, he checks the WBS. To avoid delays, he

hires another team member. This will add to the cost of the project. By running this change in cost up through the WBS, he is able to get an idea of the impact this could have on the project as a whole. The project manager uses the WBS to monitor and control the project budget. Using the WBS, the project manager can ensure that no extra cost is overlooked.

He can see how budgetary changes will impact the project and so can quickly take steps to deal with problems. *[How to Word Deliverables.]* One final point to bear in mind about the WBS is that it should identify work packages or deliverables. The results of effort rather than the effort itself. A good way to do this is to make sure you list all components as nouns instead of verbs. *[Example: training materials instead of develop training materials and operating system instead of program operating system.]*

This is because the names in the WBS tell you what should be achieved, not how it should be achieved. Now we're going to talk more about what should be represented in each layer of a WBS. The top level in any WBS is the project name, which represents the ultimate goal of the project. This is the starting point for the WBS you'll create. It's at the second level that you have to decide how best to structure the project work. There's no right or wrong method of structuring a WBS. It will depend on the size and nature of the project and on company or personal preferences. For example, you might choose to structure the second level of a WBS by phases, by major deliverables, or by sub-projects.

It's important that the WBS accurately represent all the work that must go into a project. So don't forget to include the work that goes into project management. *[Lower Levels.]* Once you have decided on the upper structure for a WBS, you need to break it down further into tasks, sub-tasks and work packages. Typically, it makes sense to include from four to six levels of decomposition. This is to ensure the WBS is not overly complex and remains manageable. A good way to analyze the accuracy of a WBS is by using what's called the 100% rule. According to this, each level of decomposition must add up to 100% of the work required for the level above it. If you find this isn't applying, you need to re-evaluate the structure of the WBS. So in summary, the WBS has four main purposes. It enables you to assign responsibility to team members and control a project as it

progresses. It also enables you to create an accurate project schedule and facilitates accurate cost estimates.

To create a WBS, you decompose a project from its phases, deliverables, or sub-projects down to the lowest level work packages. There is no right or wrong structure. You just base it on the nature of your project and how it will best allow you to plan and manage the work.

The WBS

Correct Answer

☐ is used by the project manager to monitor and control the project.

Correct!

☑ breaks the project into major deliverables, tasks, sub-task and work packages.

Correct!

☑ is created using a process called decomposition.

☐ is only needed for the creation of the project budgeting.

Correct!

☑ breaks the project into phases, deliverable, sub-deliverables, and smaller pieces of work called work packages.

Question 2
7.5 / 10 pts

The WBS has the following main purposes.

Correct!

☑ It enables the project manager to [It enables the project manager to create an ac] project schedule.

Correct!

☑ It enables the project manager to facilitate accurate cost estimates.

Correct!

☑ It enables the project manager to control the project as it progresses.

Correct Answer

☐ It enables the project manager to assign responsibilities to team members and control the project as it progresses.