

Chapter Six-Schedule management

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Chapter Six-Time management

- Time management is what most people think of when they think of project managers.
- It’s where the deadlines are set and met. It starts with **figuring out what work you need to do, how you will do it, what resources you’ll use, and how long it will take. From there, it’s all about developing and controlling that schedule.**

Time Management Magnets Solution

1 Plan Schedule Management



First you define the processes you'll use to plan and control your schedule.

Schedule Management plan

2 Define Activities



Activity list

Next you come up with a list of all of the activities that will need to be completed.

The activity list is the basis for the network diagram that you create in the next process.

3 Sequence Activities



Project schedule network diagram

Next, you figure out which activities need to come before others, and put them in the right order. The main output here is a **project schedule network diagram**, a picture of how activities are related.

Knowing the stuff that needs to happen and the sequence is half the battle. Now you need to figure out who will do the work.

4 Estimate Activity Durations

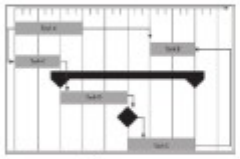


Activity duration estimates

…and then estimate the time it will take to do each activity.

You can use lots of different estimation techniques to determine how long the project will take.

5 Develop Schedule



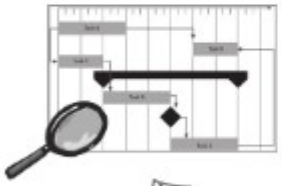
Then you build a schedule from all of the estimates and the resource and activity information you've created.

The schedule pulls all of the information together to predict the project end date.

The last process, Control Schedule, is in the Monitoring and Controlling process group.

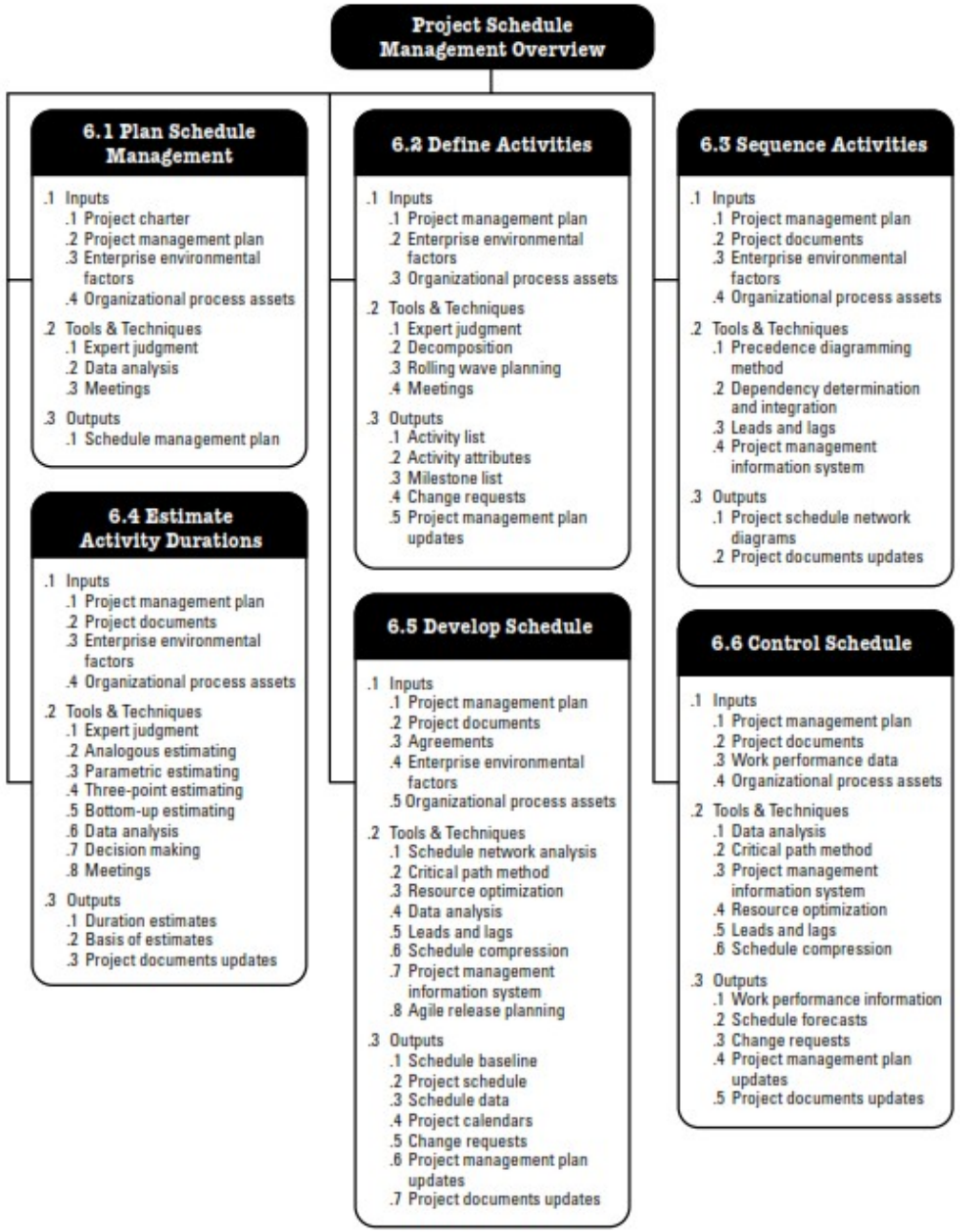


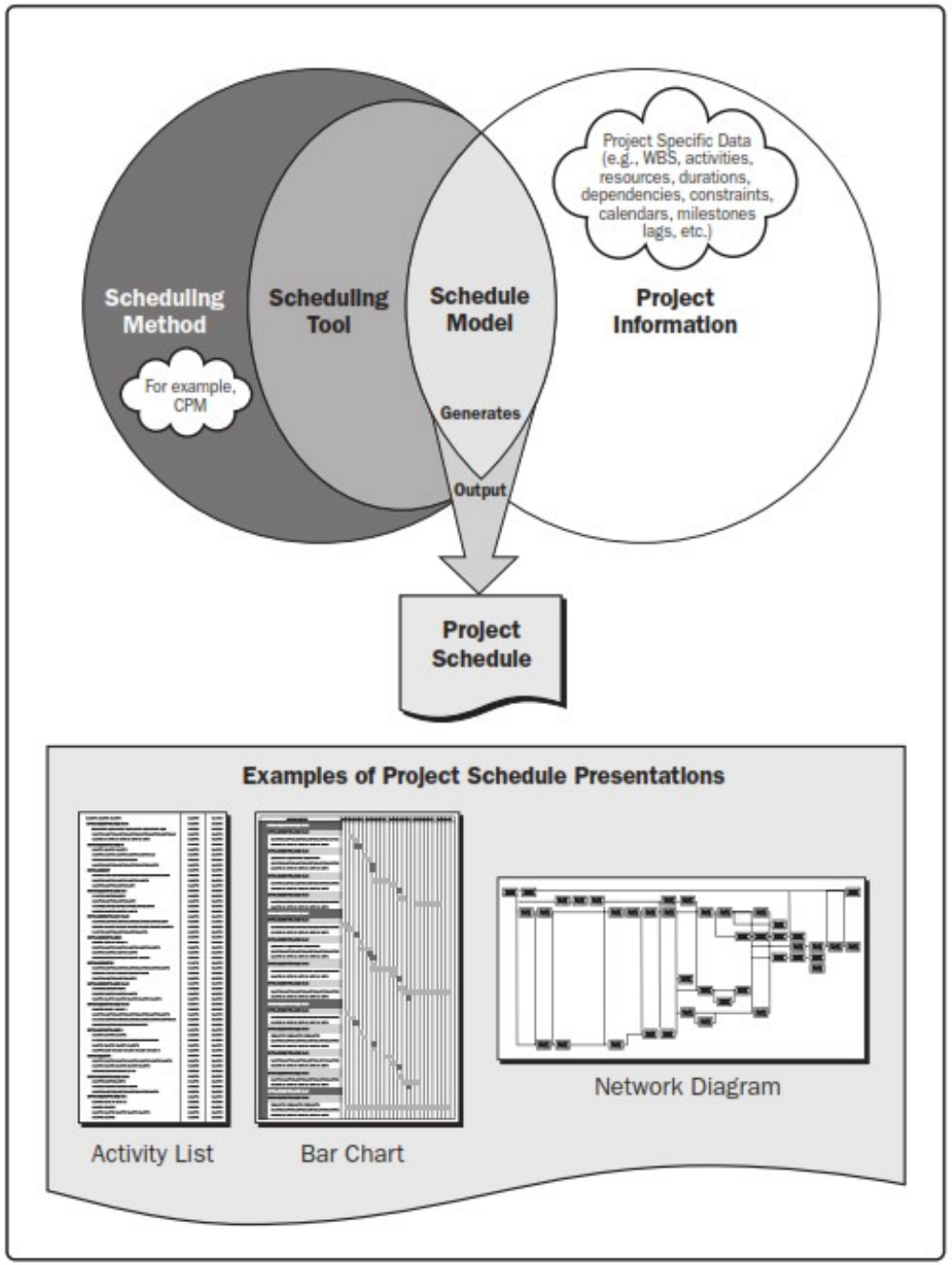
6 Control Schedule



Finally, you monitor and control changes to the schedule to make sure that it is kept up to date.

Keeping track of the issues that require schedule changes and dealing with them is as important in Schedule Management as it was in Scope Management.

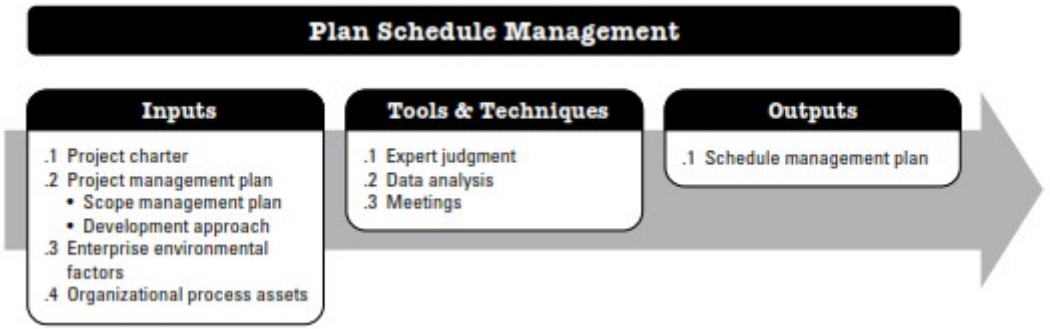

Project Schedule Management Overview
6.1 Plan Schedule Management
.1 Inputs
.1 Project charter
.2 Project management plan
.3 Enterprise environmental factors
.4 Organizational process assets
.2 Tools & Techniques
.1 Expert judgment
.2 Data analysis
.3 Meetings
.3 Outputs
.1 Schedule management plan
6.2 Define Activities
.1 Inputs
.1 Project management plan
.2 Enterprise environmental factors
.3 Organizational process assets
.2 Tools & Techniques
.1 Expert judgment
.2 Decomposition
.3 Rolling wave planning
.4 Meetings
.3 Outputs
.1 Activity list
.2 Activity attributes
.3 Milestone list
.4 Change requests
.5 Project management plan updates
6.3 Sequence Activities
.1 Inputs
.1 Project management plan
.2 Project documents
.3 Enterprise environmental factors
.4 Organizational process assets
.2 Tools & Techniques
.1 Precedence diagramming method
.2 Dependency determination and integration
.3 Leads and lags
.4 Project management information system
.3 Outputs
.1 Project schedule network diagrams
.2 Project documents updates
6.4 Estimate Activity Durations
.1 Inputs
.1 Project management plan
.2 Project documents
.3 Enterprise environmental factors
.4 Organizational process assets
.2 Tools & Techniques
.1 Expert judgment
.2 Analogous estimating
.3 Parametric estimating
.4 Three-point estimating
.5 Bottom-up estimating
.6 Data analysis
.7 Decision making
.8 Meetings
.3 Outputs
.1 Duration estimates
.2 Basis of estimates
.3 Project documents updates
6.5 Develop Schedule
.1 Inputs
.1 Project management plan
.2 Project documents
.3 Agreements
.4 Enterprise environmental factors
.5 Organizational process assets
.2 Tools & Techniques
.1 Schedule network analysis
.2 Critical path method
.3 Resource optimization
.4 Data analysis
.5 Leads and lags
.6 Schedule compression
.7 Project management information system
.8 Agile release planning
.3 Outputs
.1 Schedule baseline
.2 Project schedule
.3 Schedule data
.4 Project calendars
.5 Change requests
.6 Project management plan updates
.7 Project documents updates
6.6 Control Schedule
.1 Inputs
.1 Project management plan
.2 Project documents
.3 Work performance data
.4 Organizational process assets
.2 Tools & Techniques
.1 Data analysis
.2 Critical path method
.3 Project management information system
.4 Resource optimization
.5 Leads and lags
.6 Schedule compression
.3 Outputs
.1 Work performance information
.2 Schedule forecasts
.3 Change requests
.4 Project management plan updates
.5 Project documents updates

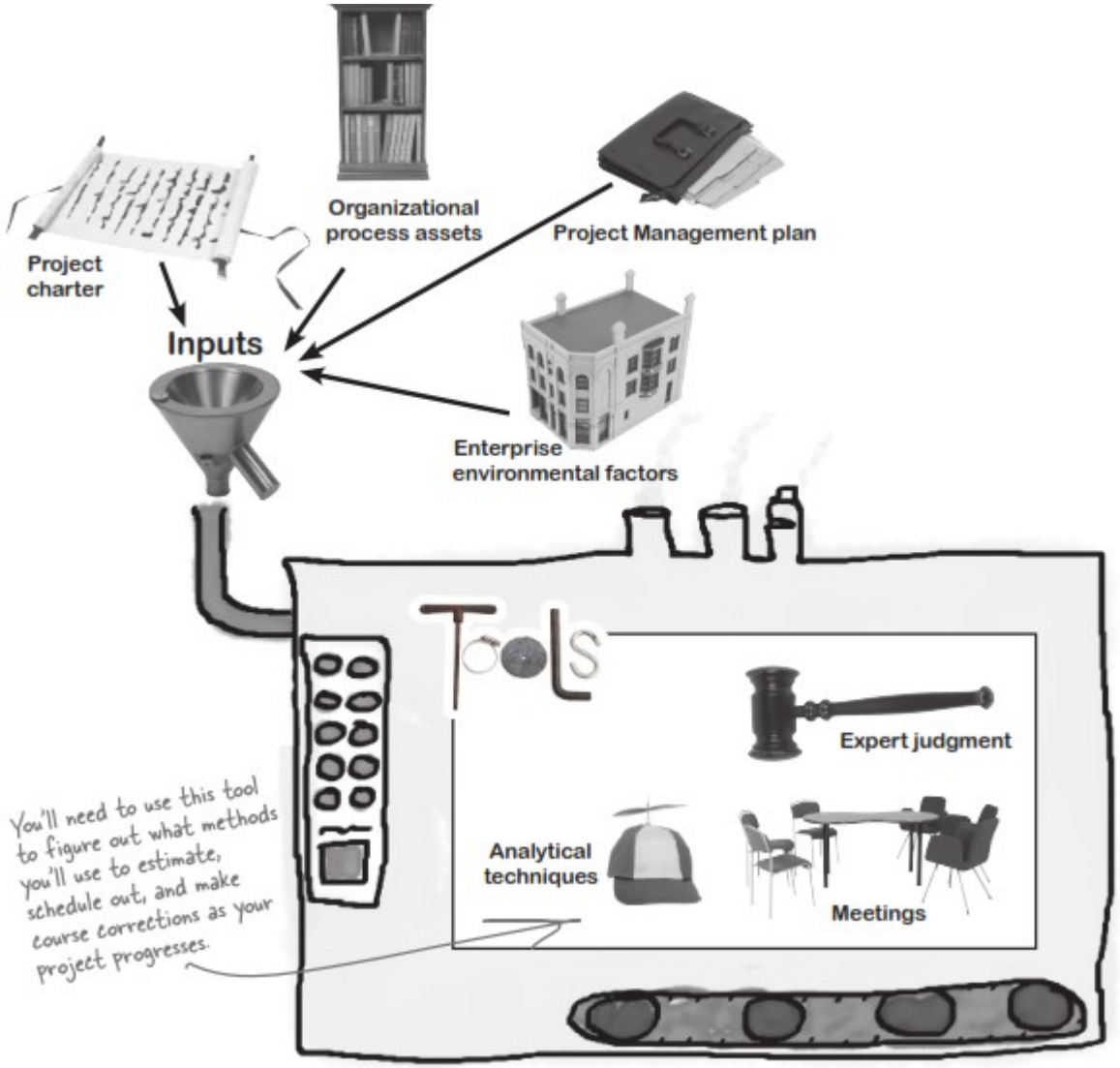

Scheduling Method
For example, CPM
Scheduling Tool
Schedule Model
Generates
Output
Project Specific Data (e.g., WBS, activities, resources, durations, dependencies, constraints, calendars, milestones lags, etc.)
Project Information
Project Schedule
Examples of Project Schedule Presentations
Activity List
Bar Chart
Network Diagram

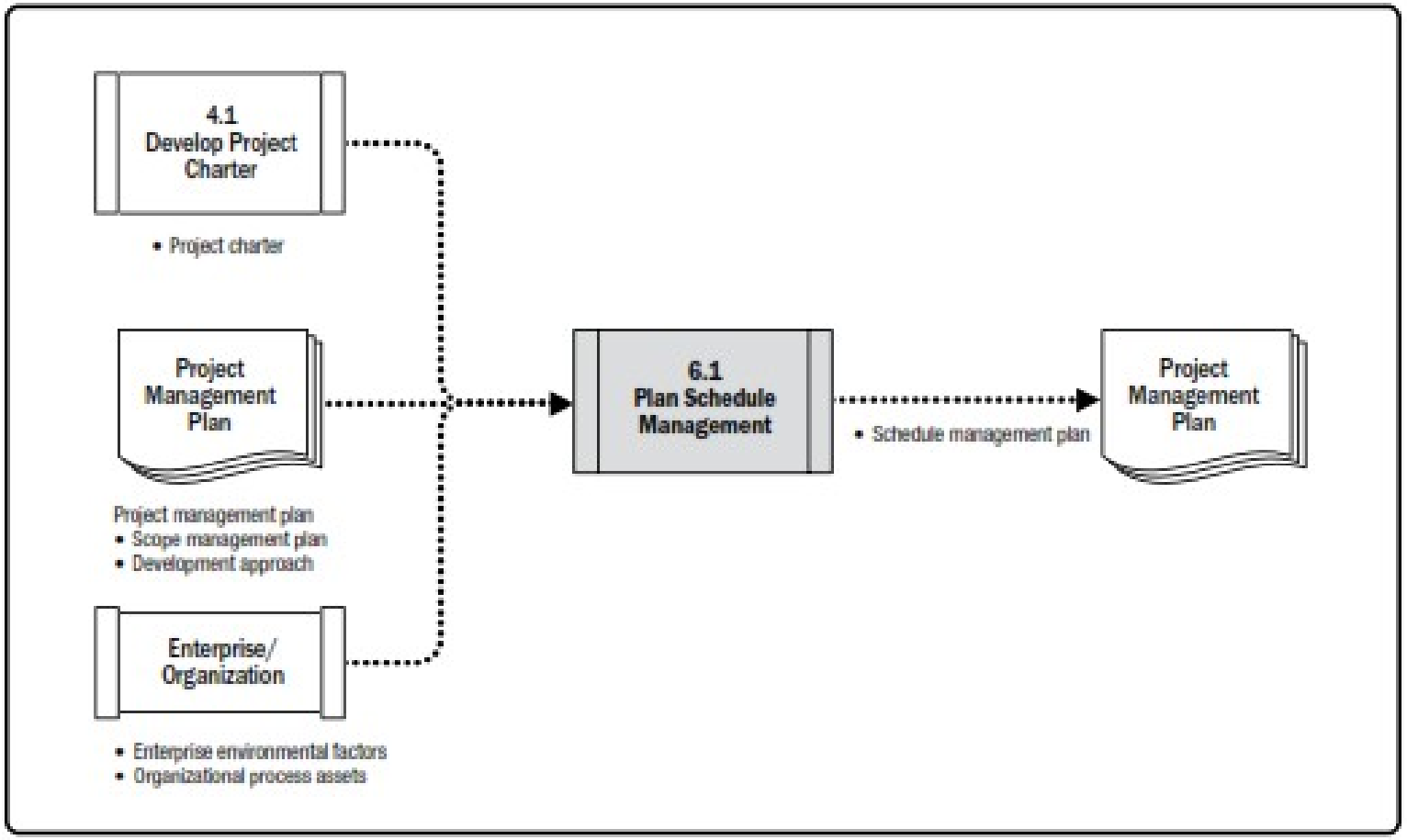
Planning process group

Plan your scheduling processes

- The **Plan Schedule Management process is just like all of the other planning** processes you've seen so far. your goal is to build a Schedule Management plan from the other project management plans, your company's culture and existing





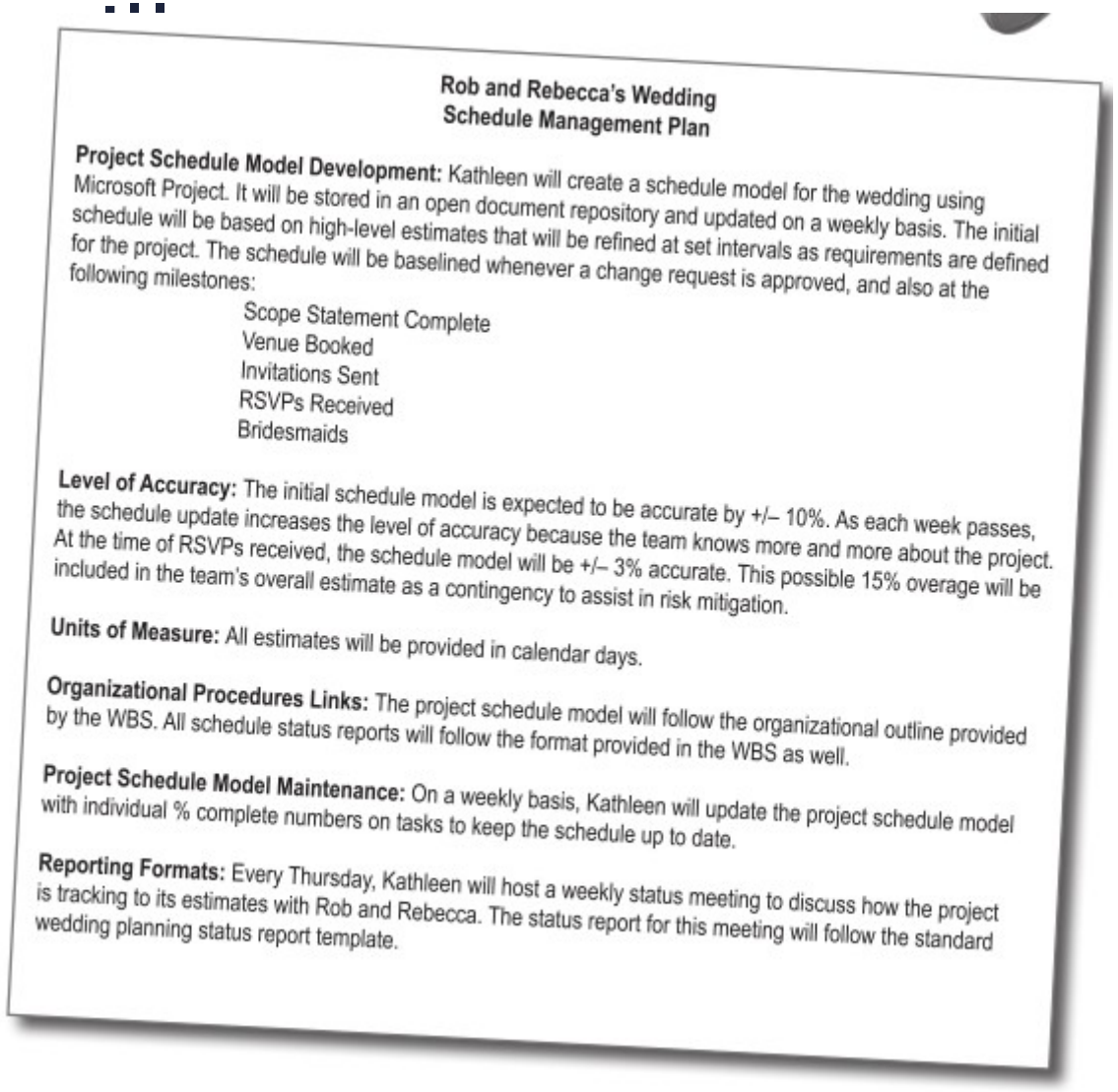

4.1
Develop Project Charter
• Project charter
Project Management Plan
Project management plan
• Scope management plan
• Development approach
Enterprise/ Organization
• Enterprise environmental factors
• Organizational process assets
6.1
Plan Schedule Management
• Schedule management plan
Project Management Plan

Content of the plan

- **Project schedule model development.** The scheduling methodology and the scheduling tool to be used in the development of the project schedule model are specified.
- **Release and iteration length.** When using an adaptive life cycle, the time-boxed periods for releases, waves, and iterations are specified. Time-boxed periods are durations during which the team works steadily toward completion of a goal. Time-boxing helps to minimize scope creep as it forces the teams to process essential features first, then other features when time permits.
- **Level of accuracy.** The level of accuracy specifies the acceptable range used in determining realistic activity duration estimates and may include an amount for contingencies.
- **Units of measure.** Each unit of measurement (such as staff hours, staff days, or weeks for time measures, or meters, liters, tons, kilometers, or cubic yards for quantity measures) is defined for each of the resources.
- **Organizational procedures links.** The work breakdown structure (WBS) (Section 5.4) provides the framework for the schedule management plan, allowing for consistency with the estimates and resulting schedules.
- **Project schedule model maintenance.** The process used to update the status and record progress of the project in the schedule model during the execution of the project is defined.
- **Control thresholds.** Variance thresholds for monitoring schedule performance may be specified to indicate an agreed-upon amount of variation to be allowed before some action needs to be taken. Thresholds are typically expressed as percentage deviations from the parameters established in the baseline plan.
- **Rules of performance measurement.** Earned value management (EVM) rules or other physical measurement rules of performance measurement are set. For example, the schedule management plan may specify:
  - Rules for establishing percent complete,
  - EVM techniques (e.g., baselines, fixed-formula, percent complete, etc.) to be employed (for more specific information, refer to the *Practice Standard for Earned Value Management* [17]), and
  - Schedule performance measurements such as schedule variance (SV) and schedule performance index (SPI) used to assess the magnitude of variation to the original schedule baseline.
- **Reporting formats.** The formats and frequency for the various schedule reports are defined.

Now you know how y… track your schedule

- The only output of the Plan Schedule Management process is the Schedule Management plan. It describes the way you'll estimate your work, track your progress, and report on it.



Rob and Rebecca's Wedding
Schedule Management Plan

Project Schedule Model Development: Kathleen will create a schedule model for the wedding using Microsoft Project. It will be stored in an open document repository and updated on a weekly basis. The initial schedule will be based on high-level estimates that will be refined at set intervals as requirements are defined for the project. The schedule will be baselined whenever a change request is approved, and also at the following milestones:

Scope Statement Complete
Venue Booked
Invitations Sent
RSVPs Received
Bridesmaids

Level of Accuracy: The initial schedule model is expected to be accurate by +/– 10%. As each week passes, the schedule update increases the level of accuracy because the team knows more and more about the project. At the time of RSVPs received, the schedule model will be +/– 3% accurate. This possible 15% overage will be included in the team's overall estimate as a contingency to assist in risk mitigation.

Units of Measure: All estimates will be provided in calendar days.

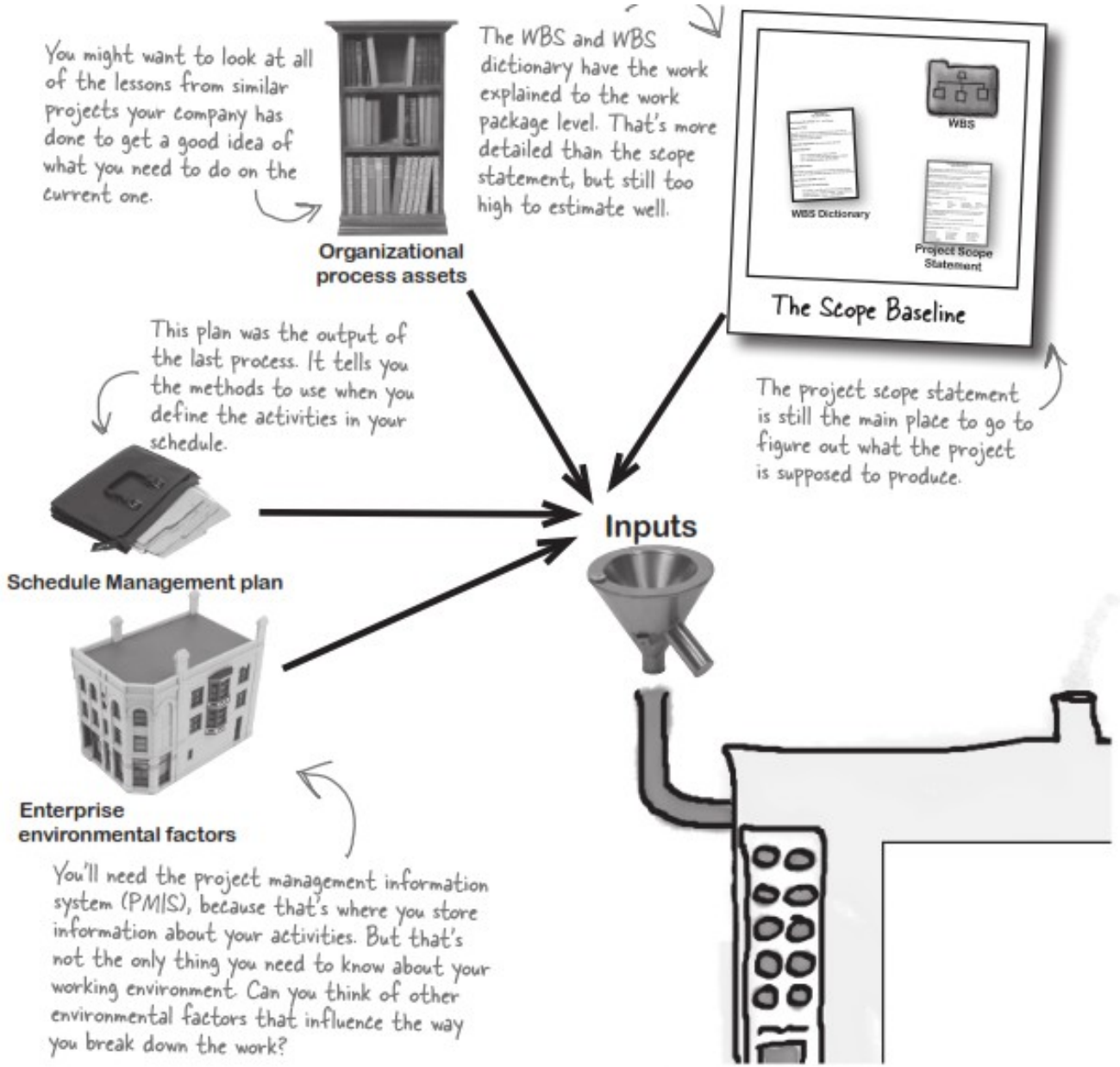
Organizational Procedures Links: The project schedule model will follow the organizational outline provided by the WBS. All schedule status reports will follow the format provided in the WBS as well.

Project Schedule Model Maintenance: On a weekly basis, Kathleen will update the project schedule model with individual % complete numbers on tasks to keep the schedule up to date.

Reporting Formats: Every Thursday, Kathleen will host a weekly status meeting to discuss how the project is tracking to its estimates with Rob and Rebecca. The status report for this meeting will follow the standard wedding planning status report template.

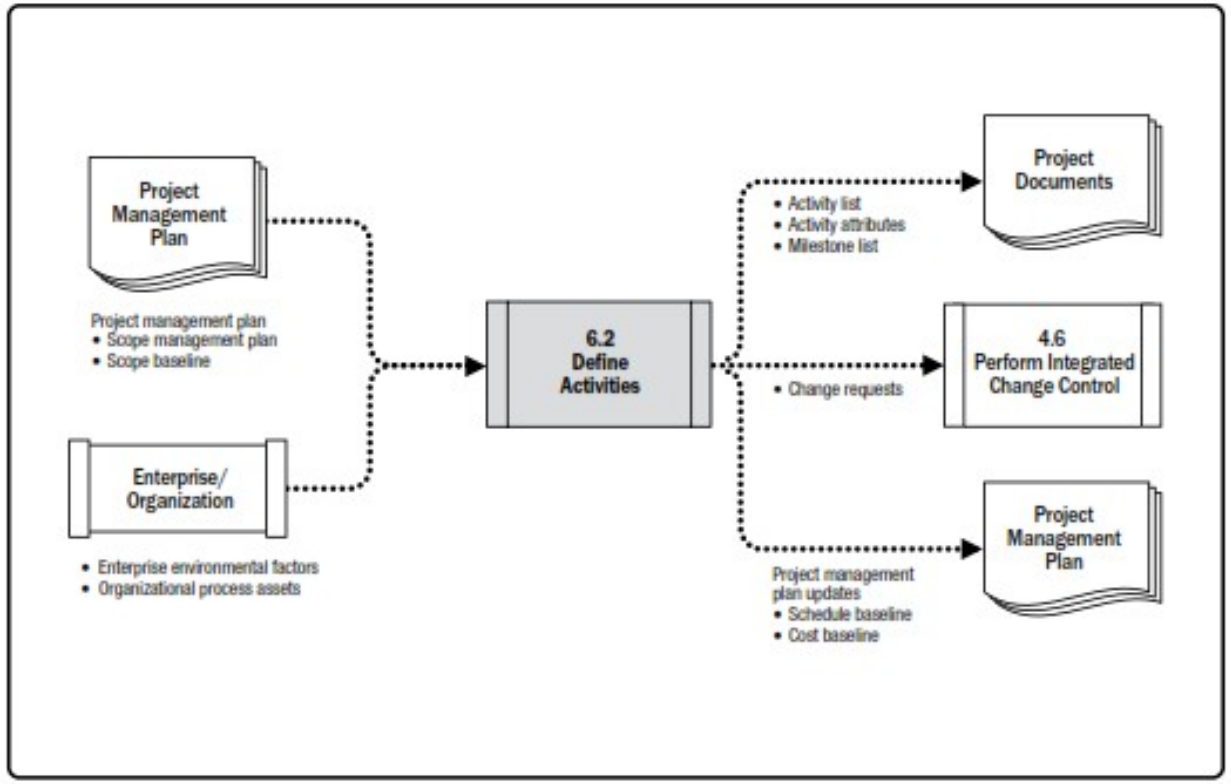
Define Activities process to break down the work

- Define Activities uses everything we already know about the project to divide the work into activities that can be estimated.
- The first step in Time Management is figuring out how the project work breaks down into activities—and that's what the **Define Activities process is for.**



Define Activities

Inputs	Tools & Techniques	Outputs
.1 Project management plan • Schedule management plan • Scope baseline .2 Enterprise environmental factors .3 Organizational process assets	.1 Expert judgment .2 Decomposition .3 Rolling wave planning .4 Meetings	.1 Activity list .2 Activity attributes .3 Milestone list .4 Change requests .5 Project management plan updates • Schedule baseline • Cost baseline



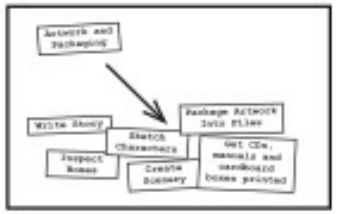
Tools and technique for Define Activities

Sometimes you start a project without knowing a lot about the work that you'll be doing later. **Rolling wave planning** lets you plan and schedule only the stuff that you know enough about to plan well.

Remember how projects are **progressively elaborated?** Rolling wave planning takes advantage of the fact that you know more about the project as you go to make plans more accurate.

Decomposition

This means taking the work packages you defined in the Scope Management processes and breaking them down even further into activities that can be estimated.



Expert judgment

Ask somebody who has done this before to give an opinion on what activities will be needed to get the job done.



Rolling wave planning

When you plan this way, you decompose only the activities that you need to plan for because they're coming up soon. You leave everything else planned at the milestone level until it gets closer to the time when you'll do it.



Flip the page for an example of this tool!

Define activities outputs

- The main output of this process is the **activity list. It's the basis for all of the** estimation and scheduling tasks you will do next. But there are a few other outputs that go along with it, and help to make the estimates more detailed and accurate.



Activity list

This is a list of everything that needs to be done to complete your project. This list is lower-level than the WBS. It's all the activities that must be accomplished to deliver the work packages.



Activity attributes

Here's where the description of each activity is kept. All of the information you need to figure out the order of the work should be here, too. So any predecessor activities, successor activities, or constraints should be listed in the attributes, along with descriptions and any other information about resources or time that you need for planning.



Milestone list

All of the important checkpoints of your project are tracked as milestones. Some of them could be listed in your contract as requirements of successful completion; some could just be significant points in the project that you want to keep track of. The milestone list needs to let everybody know which are required and which are not.

Some milestones for the wedding:

* Invitations sent
* Menu finalized
* Church booked
* Bridesmaids' dresses fitted



Change requests

As the team is working through the work they'll do, they sometimes find new information about the scope or requirements of the project. When that happens, they'll need to create a change request to update the scope of the project.

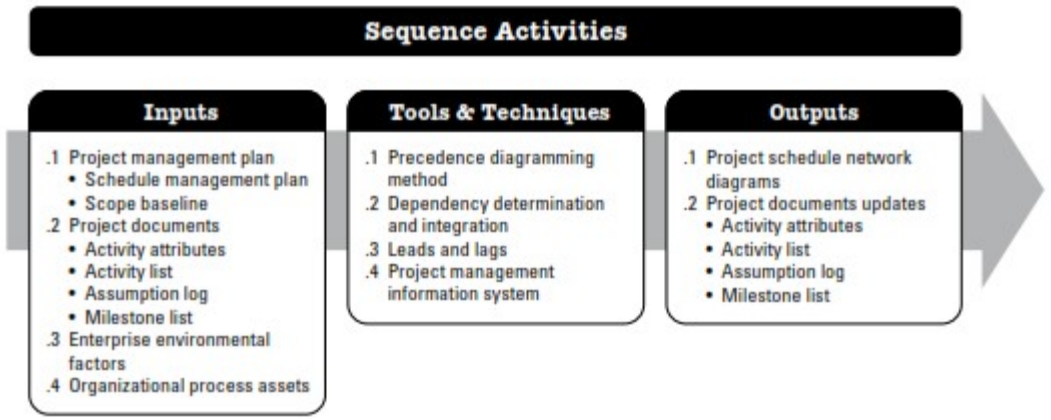


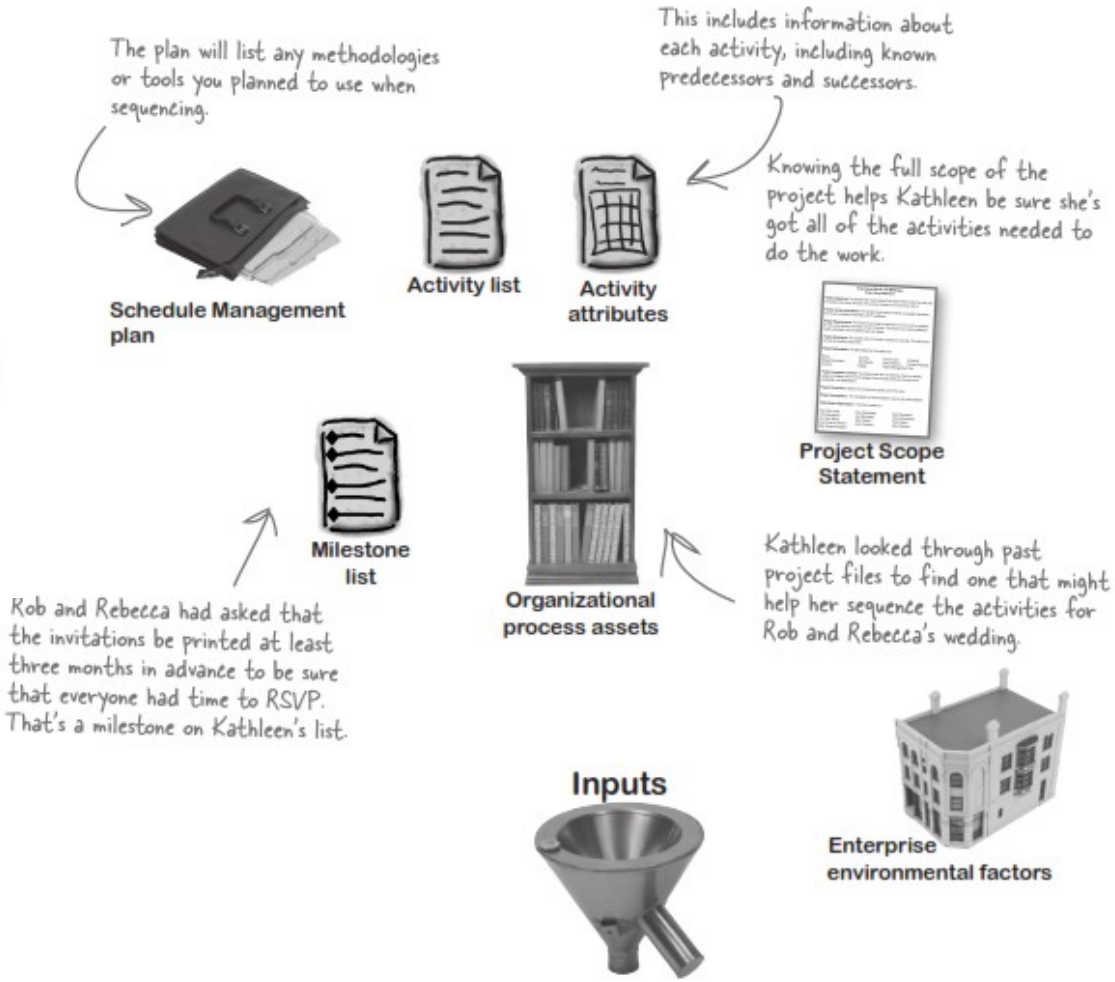
Project Management plan updates

When the team identifies new activities there will likely be changes to both the **schedule baseline** and the **cost baseline**. You'll need to put those changes through change control and then update the Project Management plan to include the new activities.



The Sequence Activities process puts everything in order





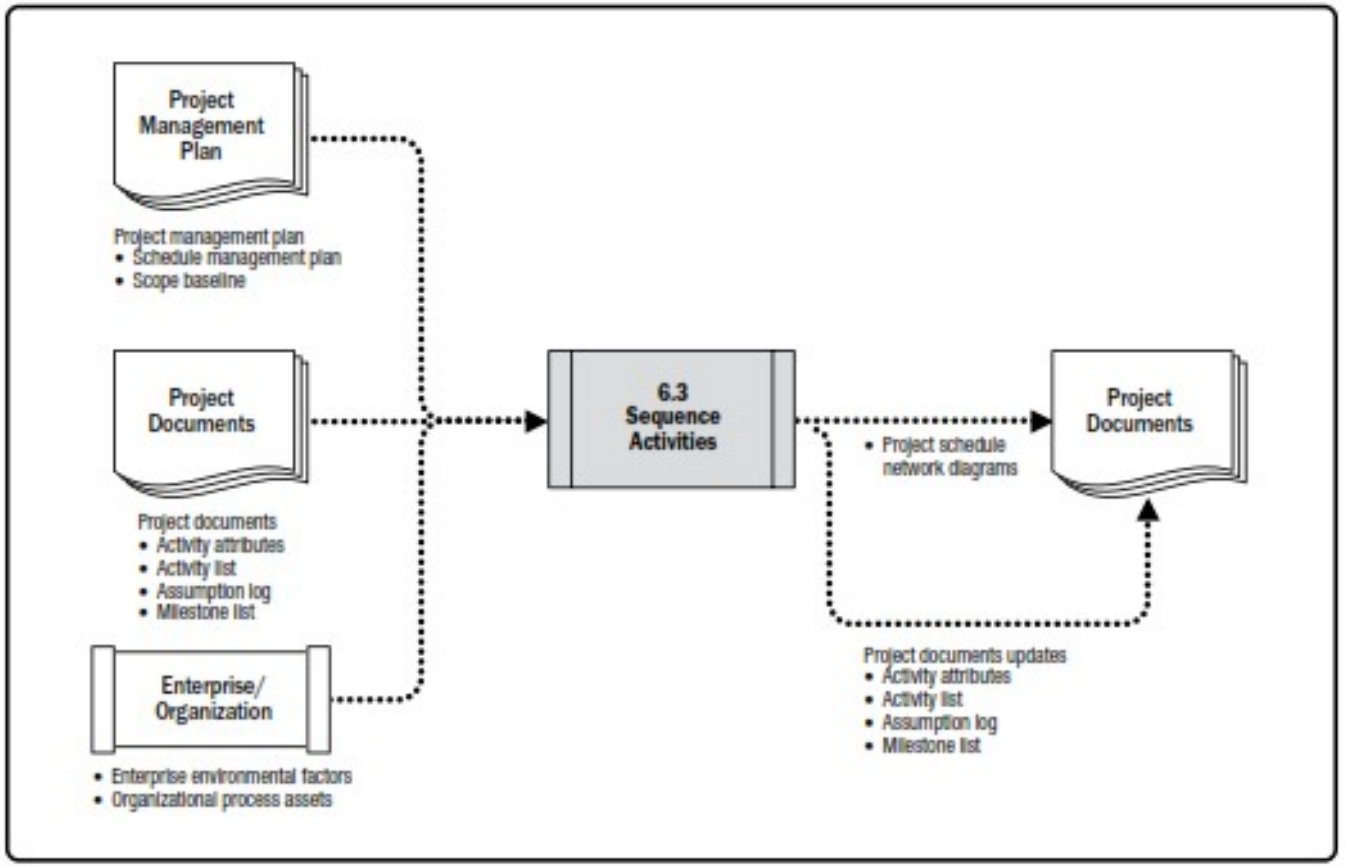
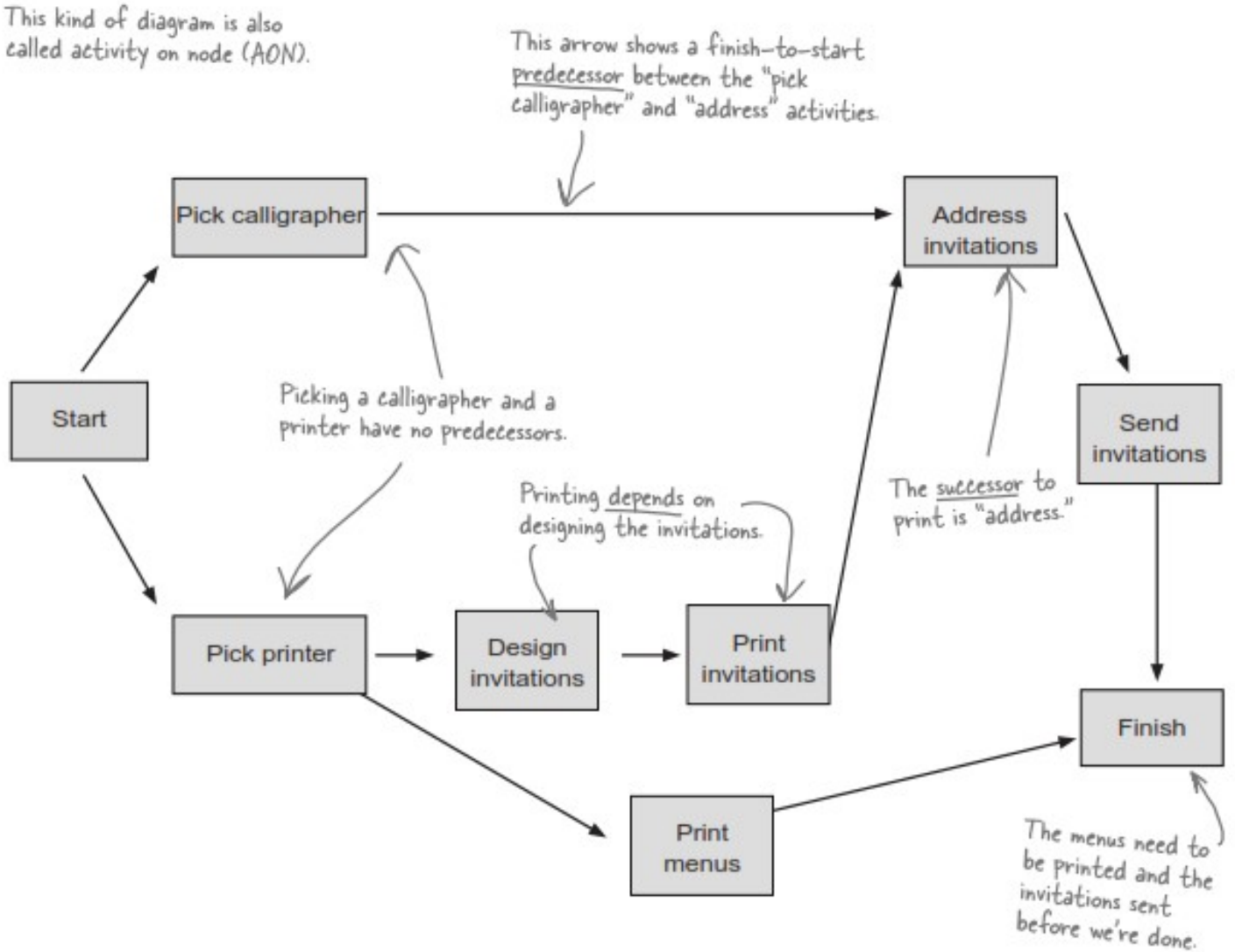

Project Management Plan
Project management plan
• Schedule management plan
• Scope baseline
Project Documents
Project documents
• Activity attributes
• Activity list
• Assumption log
• Milestone list
Enterprise/ Organization
• Enterprise environmental factors
• Organizational process assets
6.3 Sequence Activities
• Project schedule network diagrams
Project Documents
Project documents updates
• Activity attributes
• Activity list
• Assumption log
• Milestone list

Diagram the relationship between activities

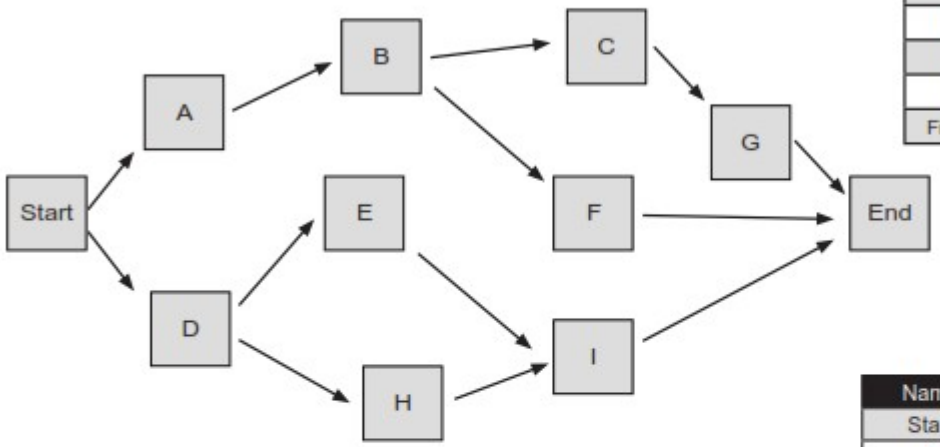
Showing the activities in rectangles and their relationships as arrows is called a **precedence diagramming method (PDM).**



Try? **precedence diagramming method (PDM)**

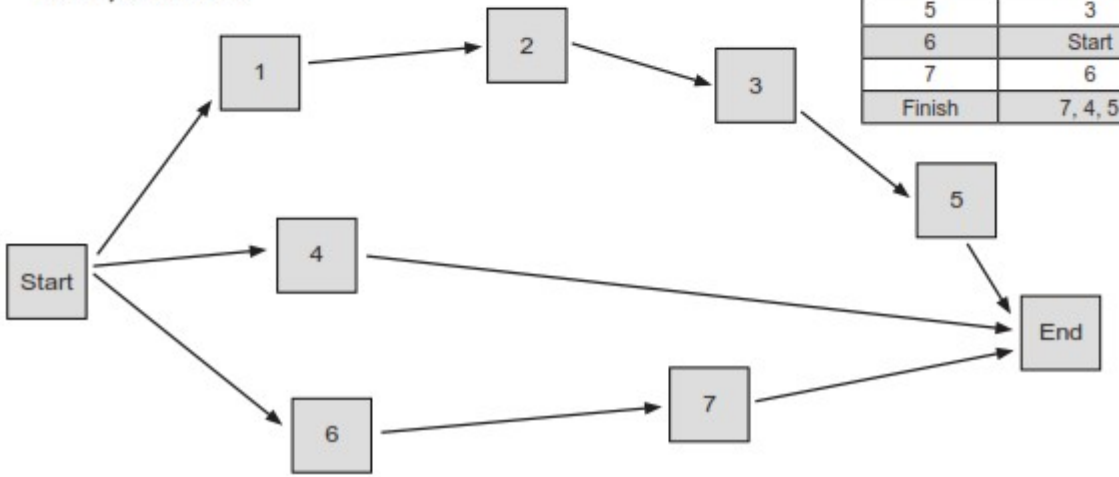
Name	Predecessor
Start	—
A	Start
B	A
C	B
D	Start
E	D
F	B
G	C
H	D
I	E, H
Finish	F, G, I

Name	Predecessor
Start	—
1	Start
2	1
3	2
4	Start
5	3
6	Start
7	6
Finish	7, 4, 5



Name	Predecessor
Start	—
A	Start
B	A
C	B
D	Start
E	D
F	B
G	C
H	D
I	E, H
Finish	F, G, I

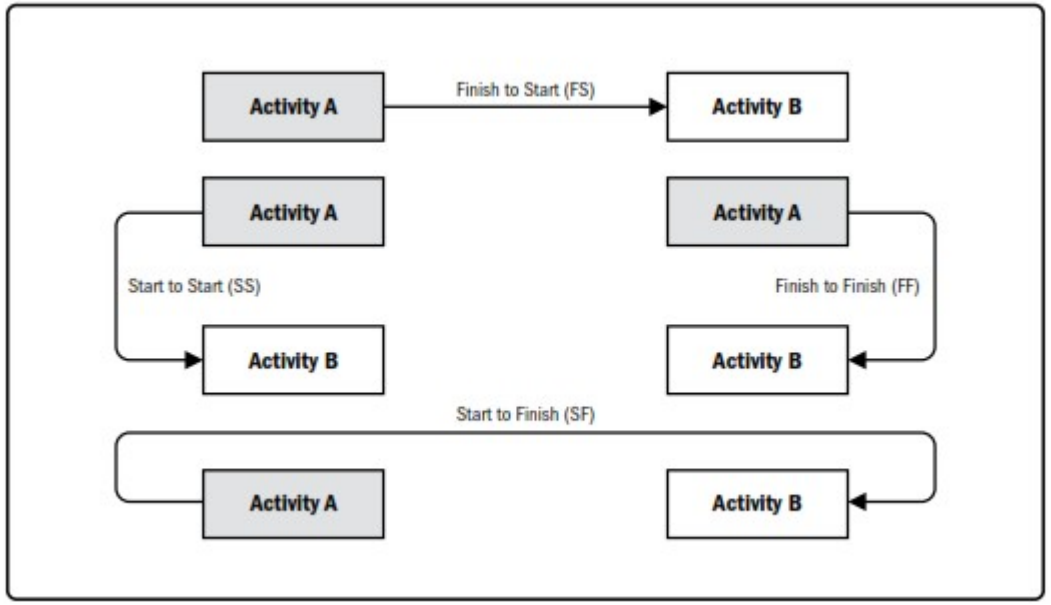
Now try another one!



Name	Predecessor
Start	—
1	Start
2	1
3	2
4	Start
5	3
6	Start
7	6
Finish	7, 4, 5

Dependencies help you sequence your activities

- The most common kind of predecessor is the **Finish to Start**. It means that one task needs to be completed before another one can start. They can all be used in network diagrams to show the order of activities. The three main kinds of dependency are **Finish to Start (FS), Start to Start (SS), and Finish to Finish (FF).**



Dependencies

External dependencies

Sometimes your project will depend on things outside the work you are doing. For the wedding, we are depending on the wedding party before us to be out of the reception hall in time for us to decorate. The decoration of the reception hall then depends on that as an external dependency.

Discretionary dependencies

Rob and Rebecca really want the bridesmaids to arrive at the reception before the couple. There's no necessity there—it's just a matter of preference. For the exam, know that you should set discretionary dependencies based on your knowledge of the best practices for getting the job done.

Mandatory dependencies

You can't address an invitation that hasn't been printed yet. So, printing invitations is a mandatory predecessor for addressing them. Mandatory predecessors are the kind that have to exist just because of the nature of the work.

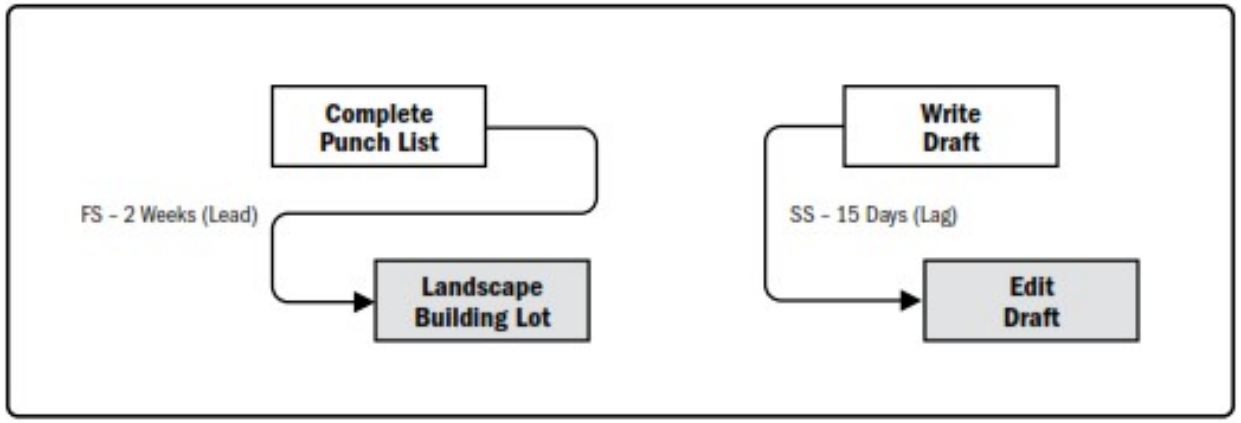
Internal dependencies

The rehearsal dinner can't begin until the happy couple leaves the church. Some dependencies are completely within the team's control.

Leads and lags add time between activities

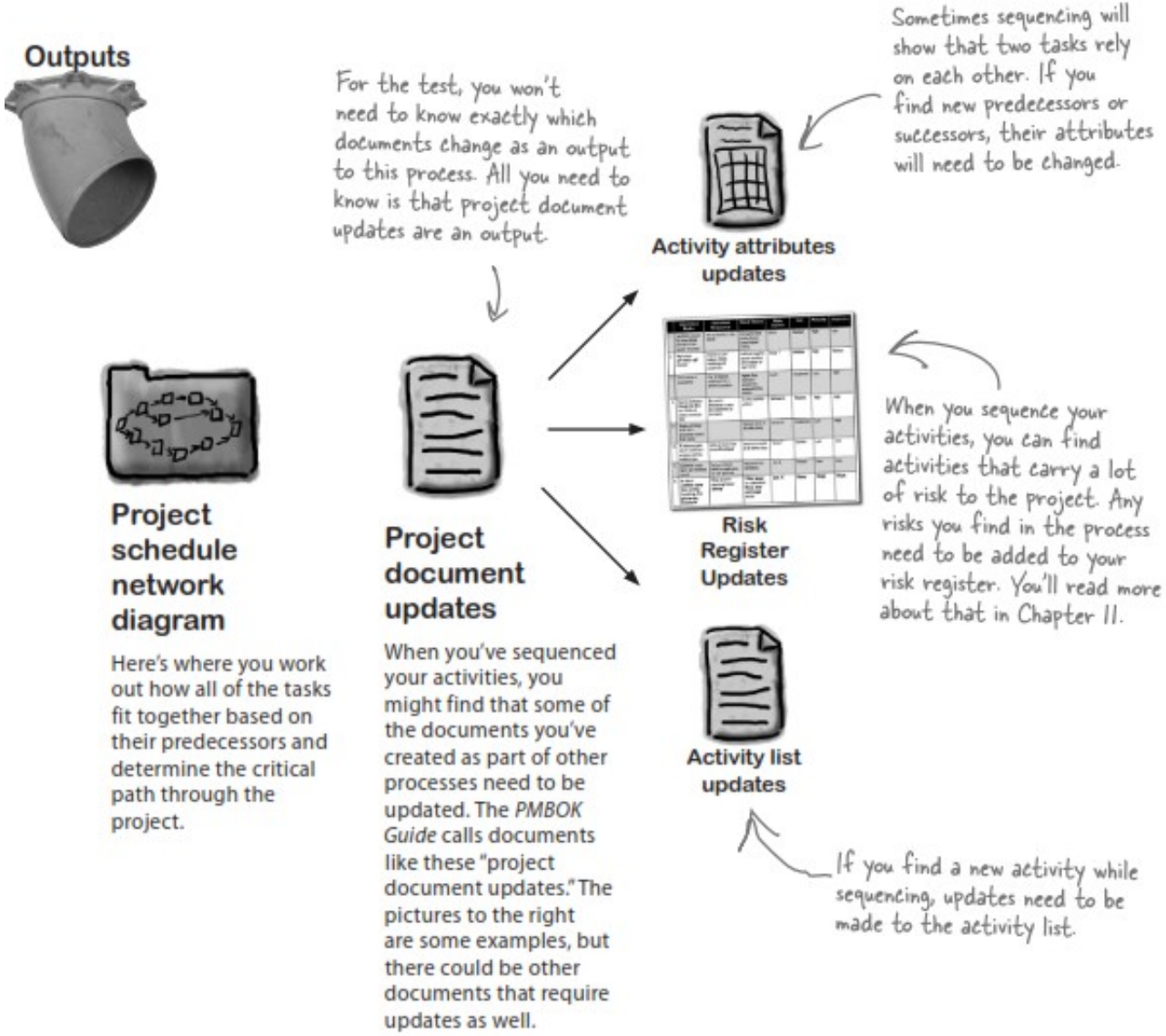
Sometimes you need to give some extra time between activities. **Lag time** is when you purposefully put a delay between the predecessor task and the successor.

Lead time is when you give a successor task some time to get started before the predecessor finishes. So you might want the caterer preparing dessert an hour before everybody is eating dinner.

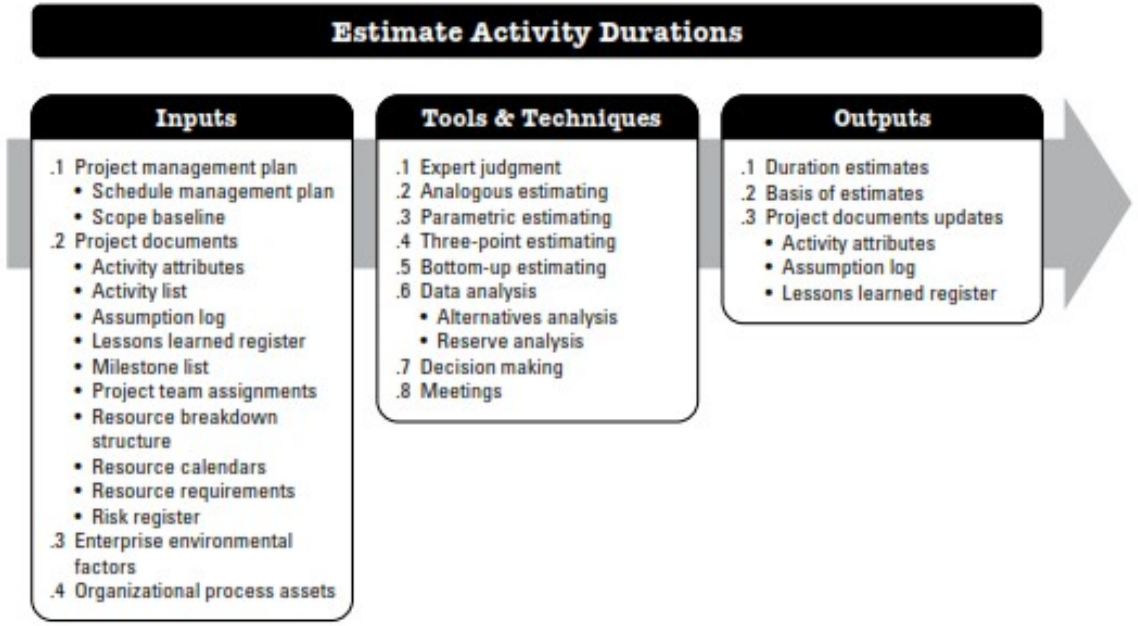


Create the network diagram

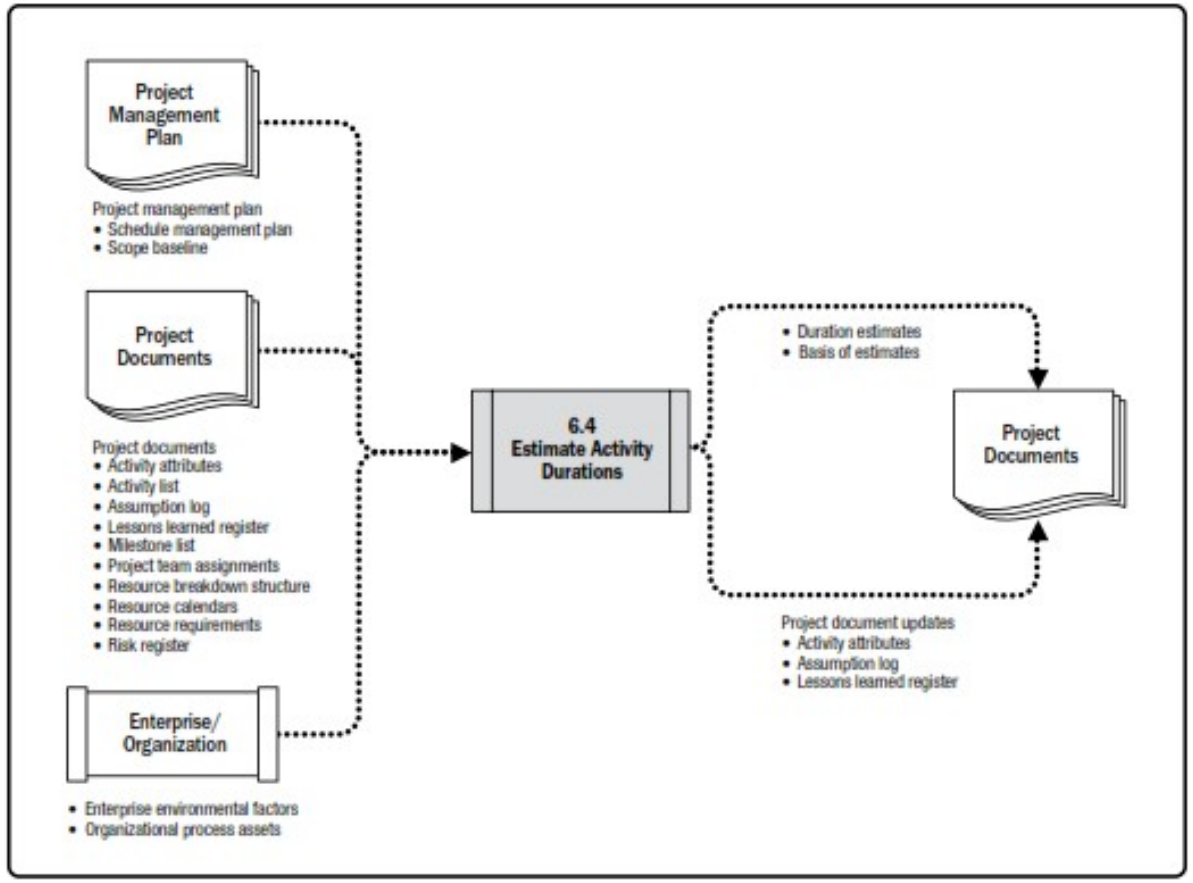
- As you sequence the activities, you will find new activities that need to be added and new attributes for activities that you didn’t know about. So, while the main product of this process is the network diagram, you also produce updates to some of the Define Activities documents and outputs of other processes, too.



Estimate Activity Duration



Dataflow


Project Management Plan
Project management plan
• Schedule management plan
• Scope baseline
Project Documents
Project documents
• Activity attributes
• Activity list
• Assumption log
• Lessons learned register
• Milestone list
• Project team assignments
• Resource breakdown structure
• Resource calendars
• Resource requirements
• Risk register
Enterprise/ Organization
• Enterprise environmental factors
• Organizational process assets
6.4 Estimate Activity Durations
• Duration estimates
• Basis of estimates
Project Documents
Project document updates
• Activity attributes
• Assumption log
• Lessons learned register

Estimation tools and techniques

- Estimating the duration of an activity means starting with the information you have about that activity and the resources that are assigned to it, and then working with the project team to come up with an estimate. Most of the time you'll start with a rough estimate and then refine it (maybe a few times!) to make it more accurate. You'll use these five tools and techniques to create the most accurate estimates.

Expert judgment will come from your project team members who are familiar with the work that has to be done. If you don't get their opinion, then there's a huge risk that your estimates will be wrong!

Analogous estimating is when you look at activities from previous projects that were similar to this one and look at how long it took to do similar work before. But this only works if the activities and the project team are similar!

Parametric estimating means plugging data about your project into a formula, spreadsheet, database, or computer program that comes up with an estimate. The software or formula that you use for parametric estimating is built on a database of actual durations from past projects.

Three-point estimates are when you come up with three numbers: a **most likely** estimate that probably will happen, an **optimistic** one that represents the best-case scenario, and a **pessimistic** one that represents the worst-case scenario. The final estimate is the average.

Reserve analysis means adding extra time to the schedule (called a *contingency reserve* or a *buffer*) to account for extra risk.

Group decision techniques help the team decide on the best estimates for the activities they've defined.

$$\left(\text{Optimistic duration} + 4\,\text{Most likely duration} + \text{Pessimistic duration}\right) \div 6 = \text{Expected duration}$$

Try?

1. A software team gathered estimates for all of the work they'd have to do to build the next major release of their flagship product. Last time it took them around 45 days, but they're hoping that the lessons learned from the past release could bring the time down to 30 days. However, the infrastructure team needs to upgrade their servers, and they are concerned that procurement delays could potentially extend the project out to 90 days.

Expected duration = _____ Optimistic duration = _____ Most likely duration = _____
Pessimistic duration = _____

2. A construction team gathered estimates for all of the work they'd have to do to build a garage. In general, they can build a garage in 20 days, but rain or cooler temperatures could stretch the project out to 30 days. If, however, the forecast is correct, warm, sunny weather might bring the duration down to just 12 days.

Expected duration = _____ Optimistic duration = _____ Most likely duration = _____
Pessimistic duration = _____

3. A project manager used data from past projects to come up with an estimate for an upcoming software system replacement project. She felt confident about a 25-day duration, but also noted that adding an extra resource could bring the schedule down to 10 days. The test team felt that the complexity of some completely new features would add additional test cases, adding a few weeks for a 40-day estimate.

Expected duration = _____ Optimistic duration = _____ Most likely duration = _____
Pessimistic duration = _____

4. A project manager in charge of a big civil engineering project came up with an estimate for a highway repaving project. The worst-case scenario was 82 days, but the team felt more certain based on past experience that they could get it done in 49 days. If all went well with their equipment and materials, it might be done in 33 days instead.

Expected duration = _____ Optimistic duration = _____ Most likely duration = _____
Pessimistic duration = _____

1. Expected duration = 50d; Optimistic duration = 30d; Most likely duration = 45d; Pessimistic duration = 90d

2. Expected duration = 20.3d; Optimistic duration = 12d; Most likely duration = 20d; Pessimistic duration = 30d

3. Expected duration = 25d; Optimistic duration = 10d; Most likely duration = 25d; Pessimistic duration = 40d

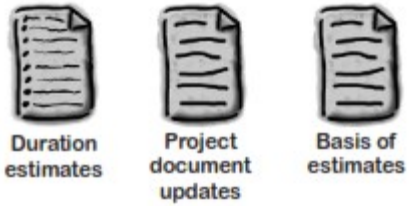
4. Expected duration = 51.8d; Optimistic duartion = 33d; Most likely duration = 49d; Pessimistic duration = 82d



Create the duration estimate

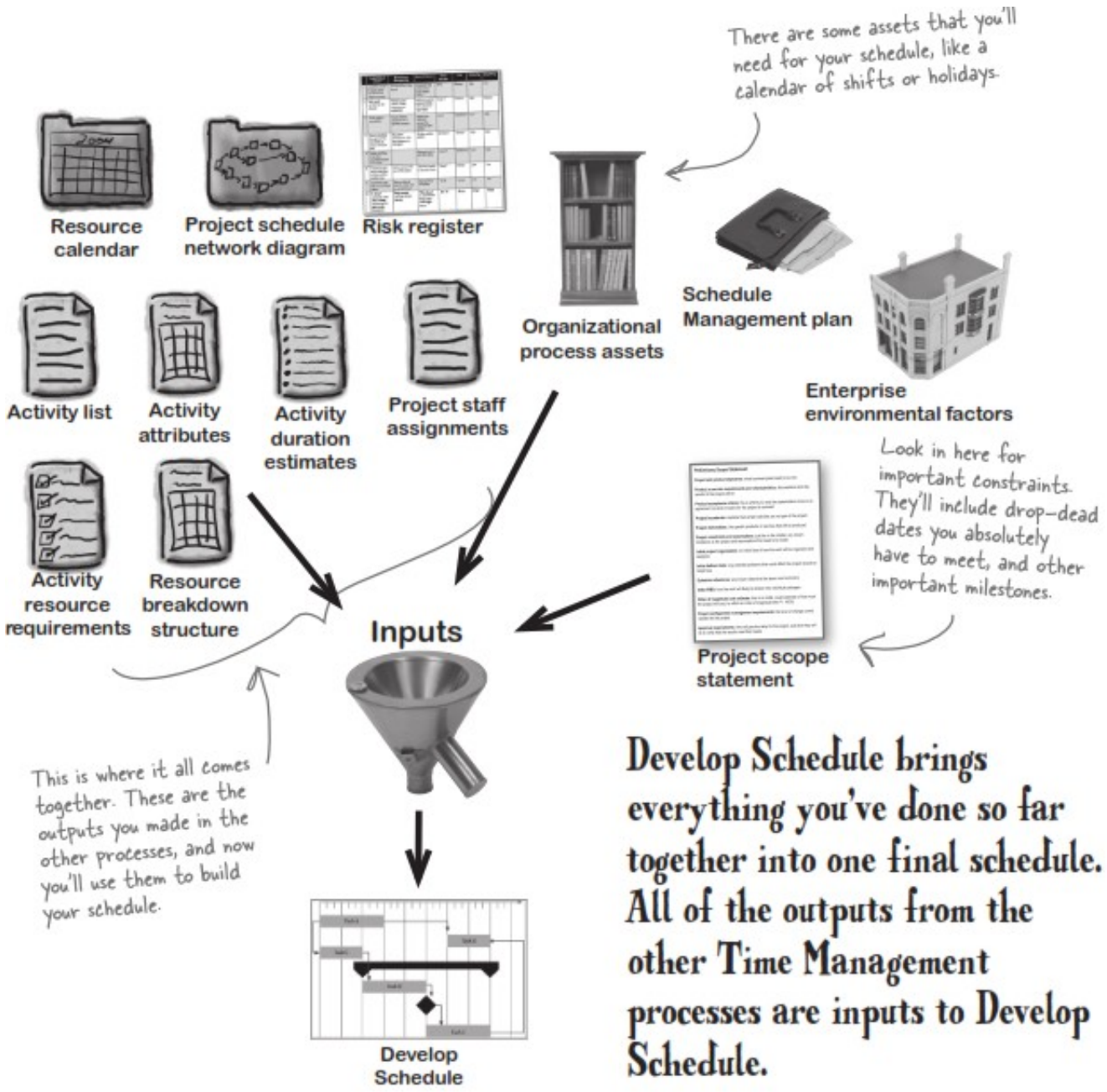
- You've got a list of activities, you know what resources are needed to actually do each activity, and you've got your estimation tools and techniques…now you have enough to create the estimates! That's the whole point of the **Estimate Activity Durations process, and it's also the main output.**
- The **activity duration estimates are estimates of how** long each activity in the activity list will take. The estimate can be in hours, ys,

The activity duration estimate consists of estimates for each activity. It's the main output of the Estimate Activity Durations process.

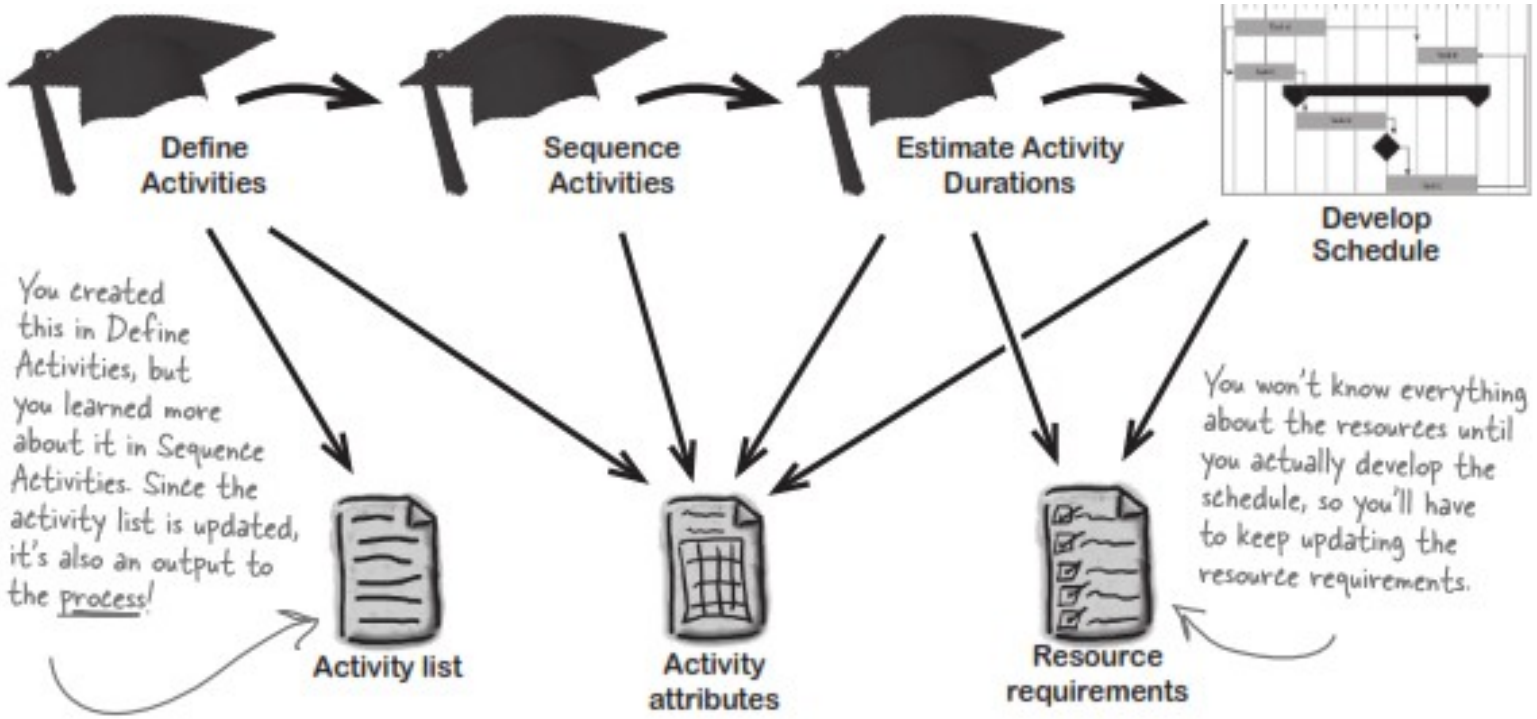


Bringing it all together

- The **Develop Schedule process is the core of Time Management. It's** the process where you put it all together—where you take everything you've done so far and combine it into one final schedule for the whole project. A lot of project managers consider this the most important part of their job. The schedule is your most important tool for managing a project.



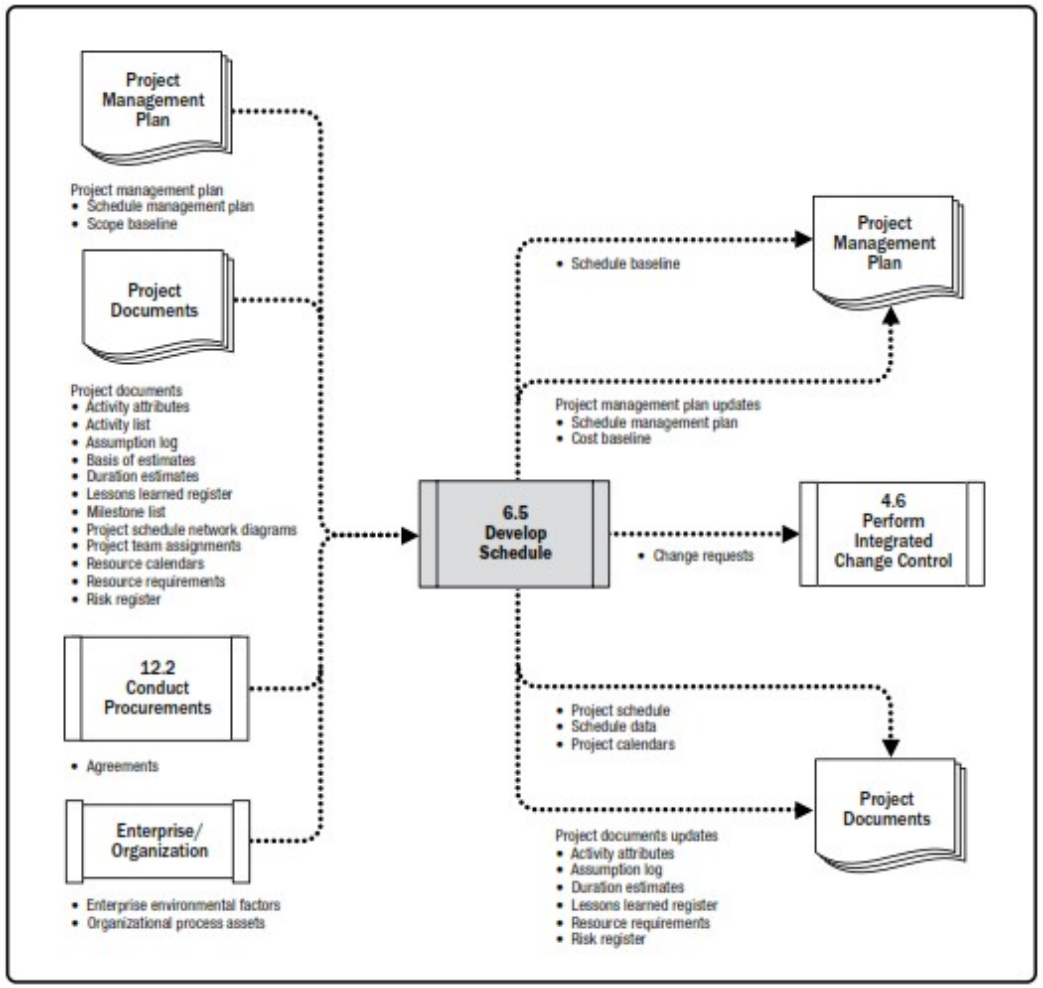
Develop Schedule



Develop Schedule

Develop Schedule

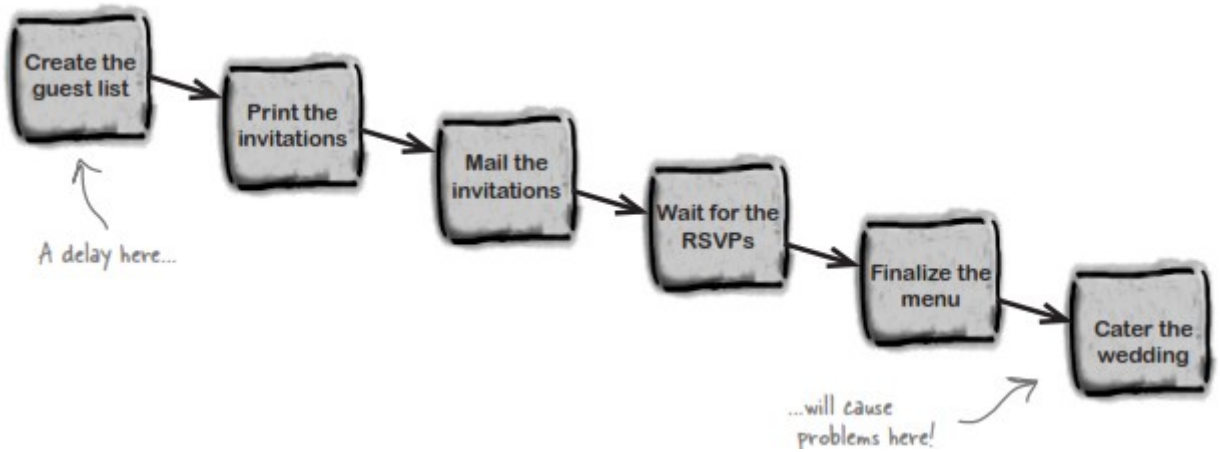
Inputs	Tools & Techniques	Outputs
.1 Project management plan • Schedule management plan • Scope baseline .2 Project documents • Activity attributes • Activity list • Assumption log • Basis of estimates • Duration estimates • Lessons learned register • Milestone list • Project schedule network diagrams • Project team assignments • Resource calendars • Resource requirements • Risk register .3 Agreements .4 Enterprise environmental factors .5 Organizational process assets	.1 Schedule network analysis .2 Critical path method .3 Resource optimization .4 Data analysis • What-if scenario analysis • Simulation .5 Leads and lags .6 Schedule compression .7 Project management information system .8 Agile release planning	.1 Schedule baseline .2 Project schedule .3 Schedule data .4 Project calendars .5 Change requests .6 Project management plan updates • Schedule management plan • Cost baseline .7 Project documents updates • Activity attributes • Assumption log • Duration estimates • Lessons learned register • Resource requirements • Risk register



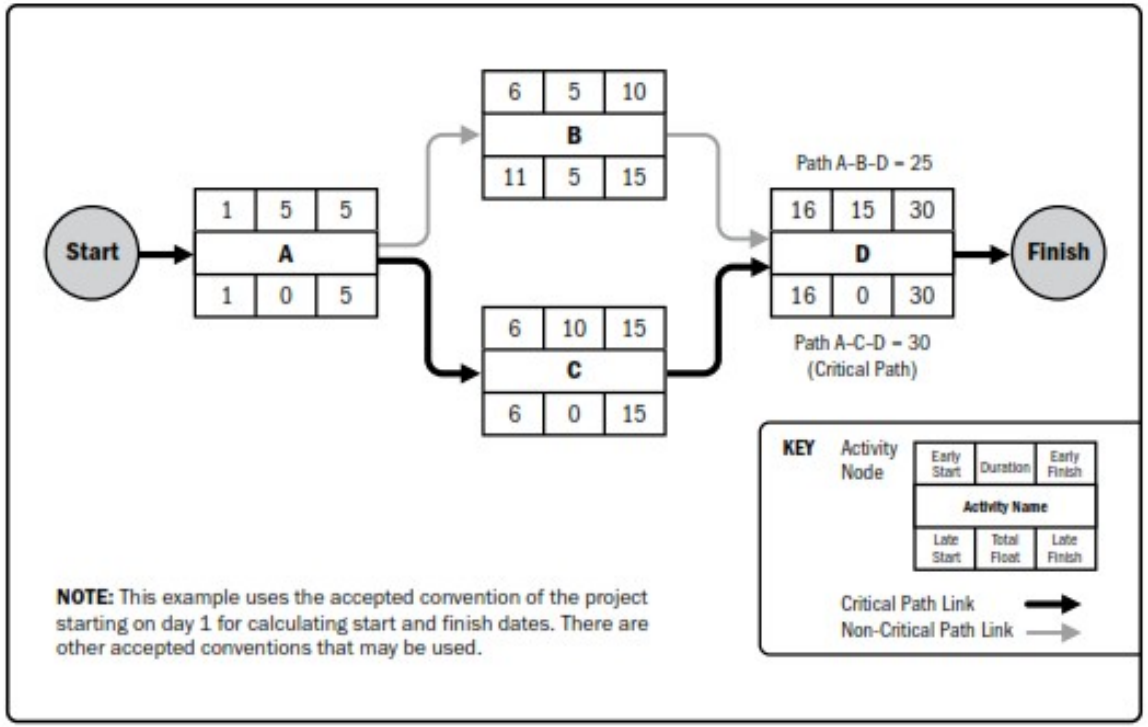
Use the critical path method to avoid big problems

- The **critical path method is an important tool for keeping your projects** on track. Every network diagram has something called the **critical path.**
- It's the string of activities that, if you add up all of the durations, is longer than any other path through the network.
- The reason that the critical path is, well, *critical, is that every single activity* on the path must finish on time in order for the project to come in on time. A ***del*** ***will cause the enti***

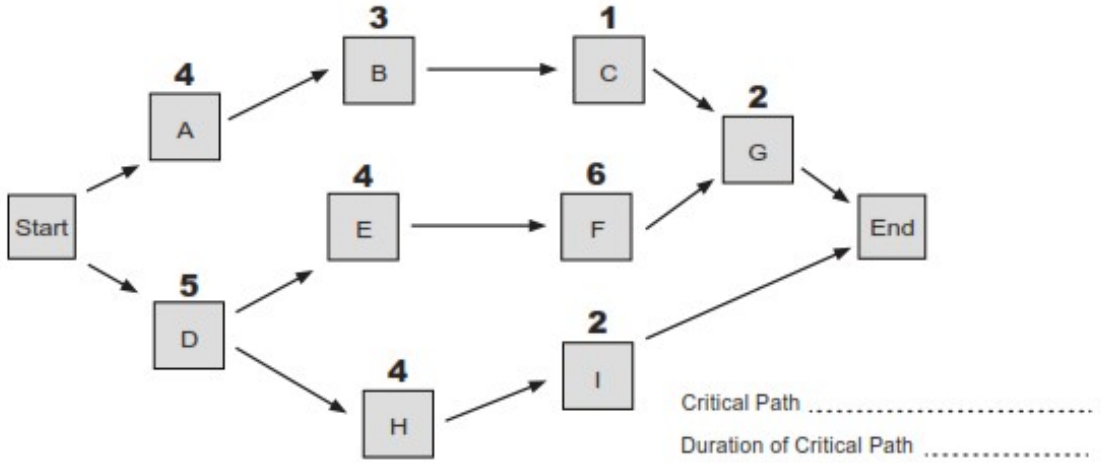
The critical path is the string of activities that will delay the whole project if any one of them is delayed.



Critical Path



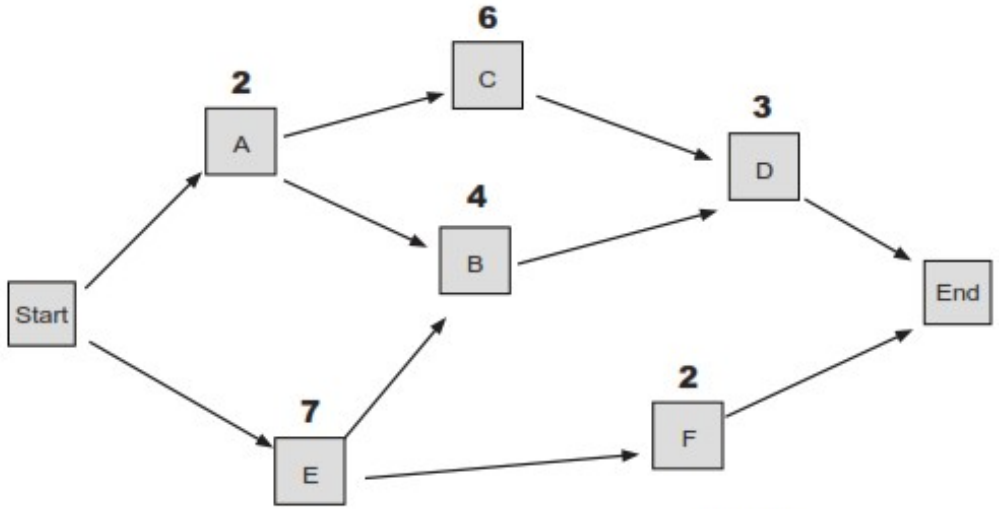
Try?



Critical Path .....

Duration of Critical Path .....

Total Number of Paths .....



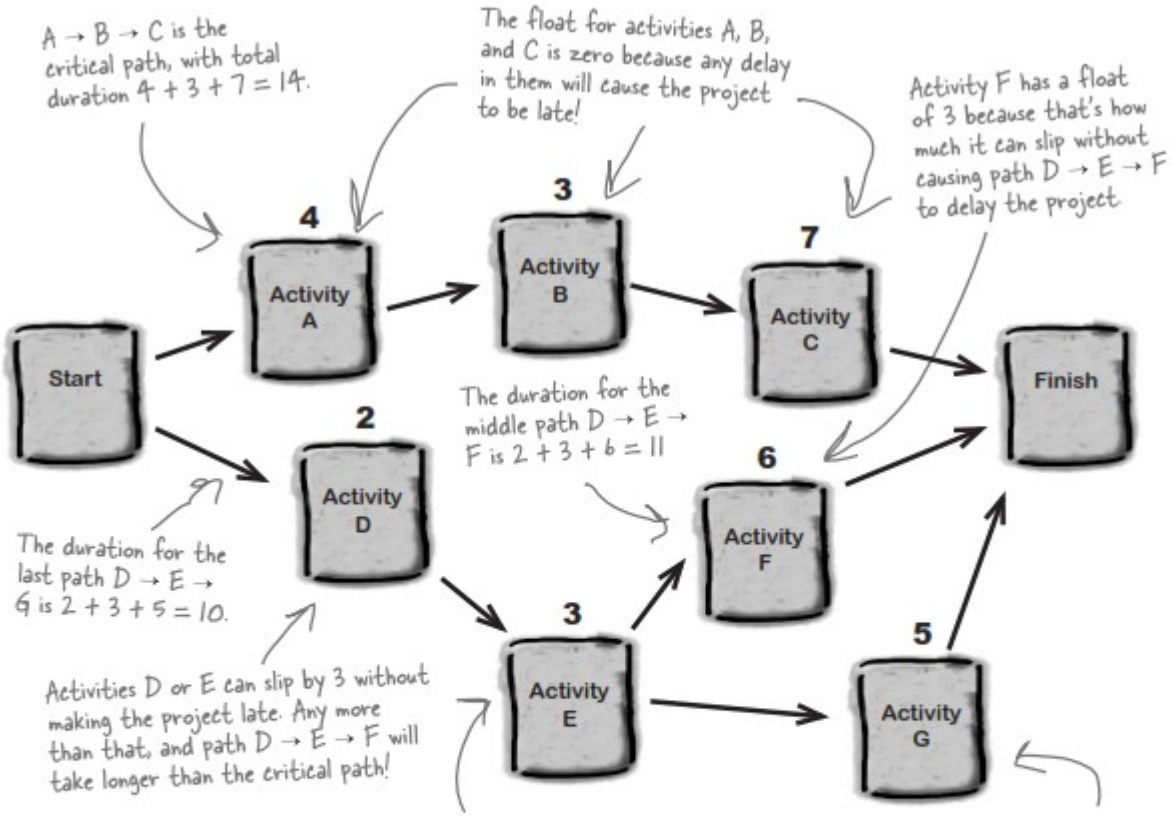
Critical Path .....

Duration of Critical Path .....

Total Number of Paths .....

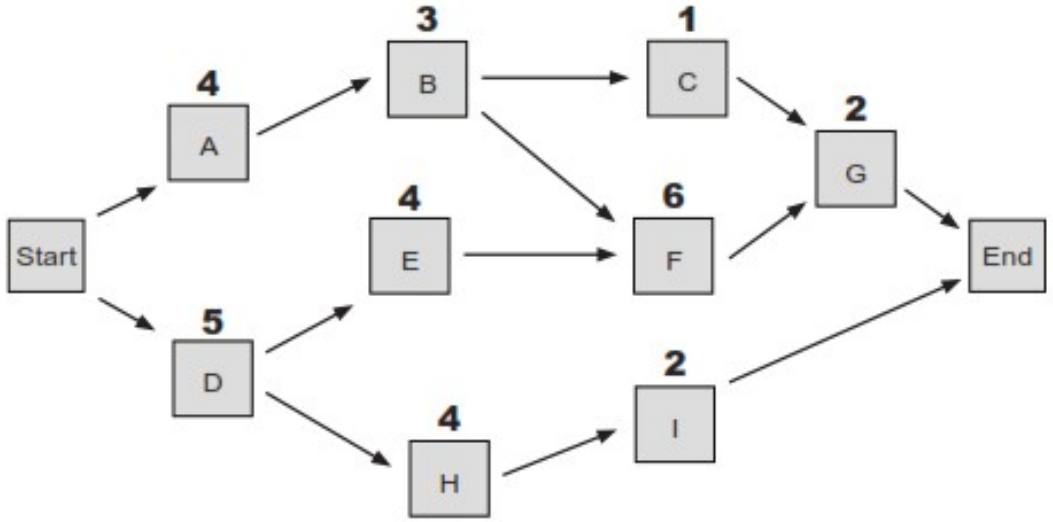
Finding the float for any activity

- Once you've figured out the critical path, there's all sorts of useful stuff you can do with it. One of the most useful things you can do is calculate the **float. The** float for any activity is the amount of time that it can slip before it causes your project to be delayed. You might also see the word *slack—it's the same thing.*



To find the float for an activity, figure out how much it can slip before it makes the project late. The float for any activity on the critical path is ZERO!

Try?



1. What is the float for each activity on the critical path? 0
2. What is the total duration for path A – B – C – G? 10
3. What is the total duration for path A – B – F – G? 15
4. What is the total duration for path D – E – F – G? 17
5. What is the total duration for path D – H – I? 11
6. Which path is the critical path? D – E – F – G
7. Write down the float for each activity:

A 2 B 2 C 7 D 0 E 0

F 0 G 0 H 6 I 6

Figure out the early start and early finish

Early start

- Is the earliest time that an activity can start. An activity near the end of the path will only start early if all of the previous activities in the path also started early. If one of the previous activities in the path slips, that will push it out.

Early finish

- Is the earliest time that an activity can finish. It’s the date that an activity will finish if all of the previous activities started early and none of them slipped.

Figure out the early start and early finish

- Coming up with the float for each activity is useful, but you can actually do better! When you have a long critical path, but the other paths in your network diagram are short, then you have a lot of freedom in when you can start and finish each of the activities that are not on the critical path. You can use **early start and early finish** to get a har n your schedule.

When you find the early start and early finish for each task, you know exactly how much freedom you have to move the start dates for those activities around without causing problems.

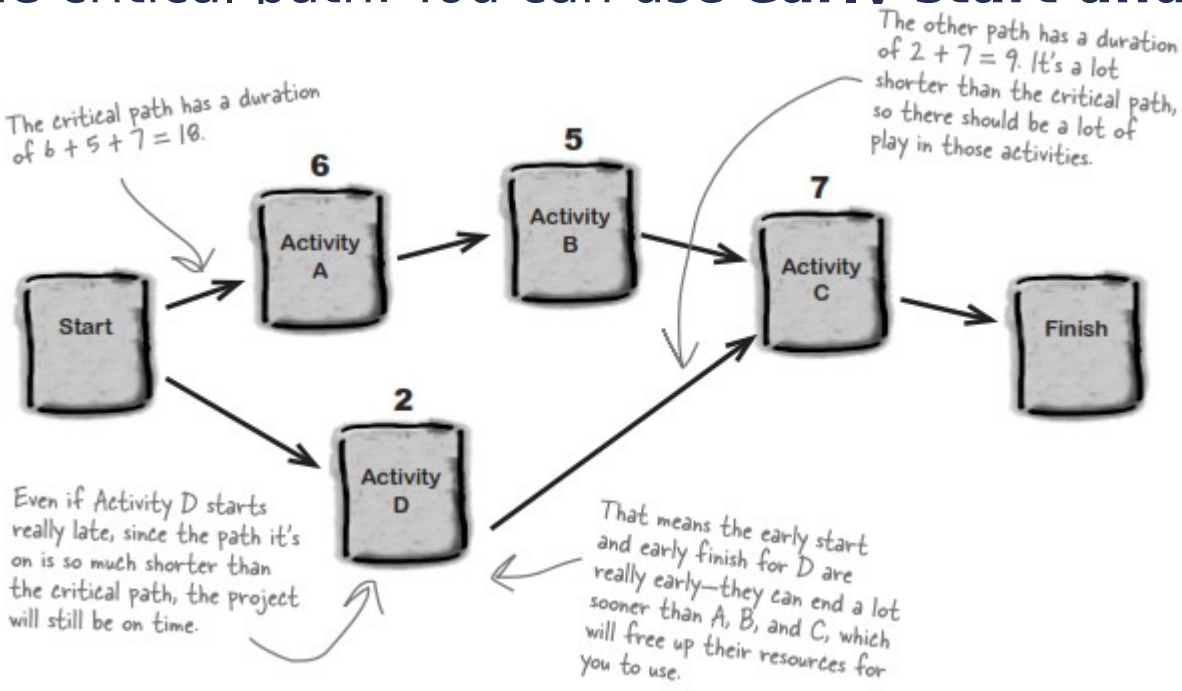


Figure out the latest possible start and finish

Late start

- Is the latest time that an activity can start. If an activity is on a path that's much shorter than the critical path, then it can start very late without delaying the project—but those delays will add up quickly if other activities on its path also slip!

Late finish

- Is the latest time that an activity can finish. If an activity is on a short path and all of the other activities on that path start and finish early, then it can finish very late without causing the project to be late.

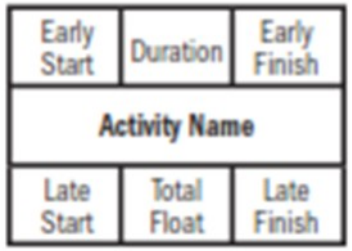
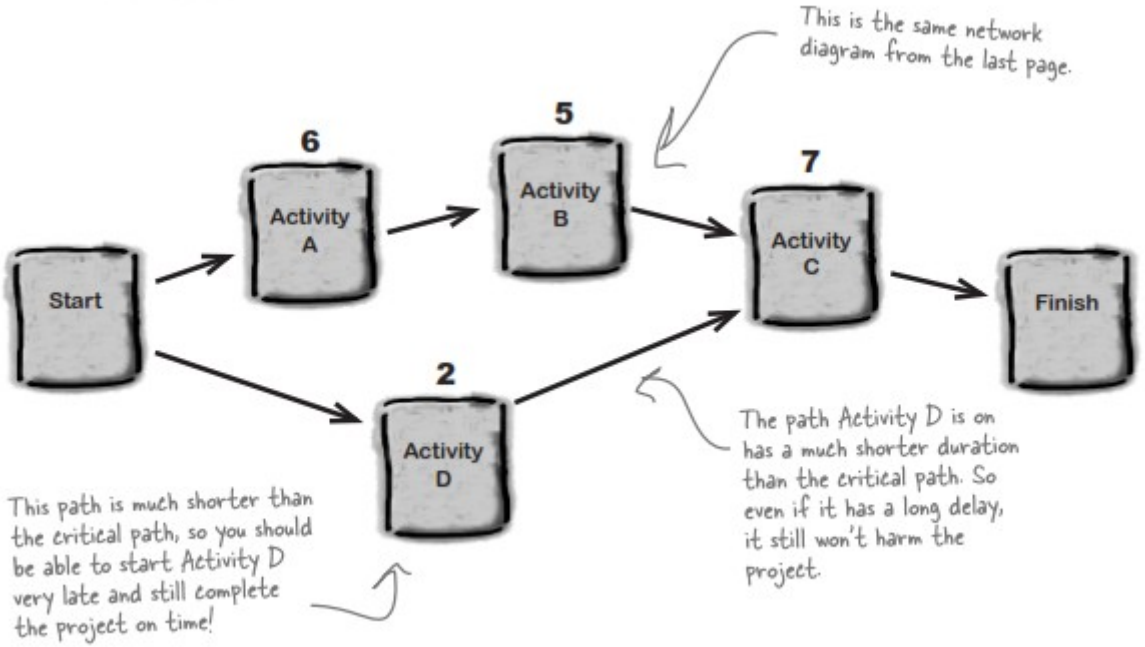


Figure out the latest possible start and finish

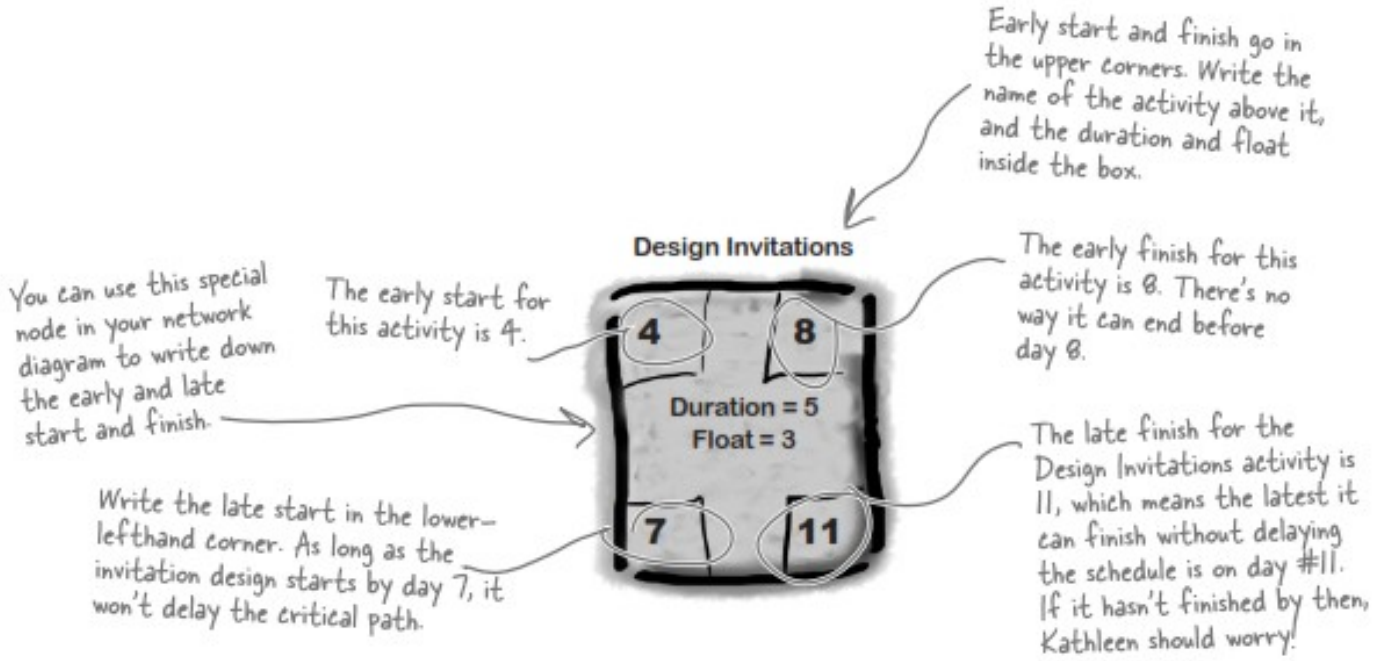
- It’s also important to know how late any activity can run before it delays the project. That’s what **late start and late finish are for! They let you** figure out how late you can start a certain task and how much it can slip before it delays your project.



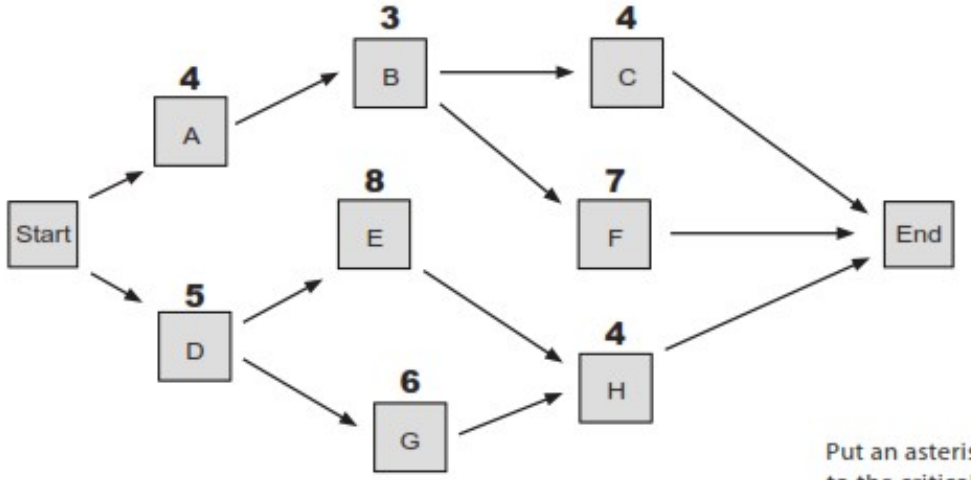
Figuring out the late start and late finish will help you see how much "play" you have in your schedule. An activity with a large late start or late finish means you have more options.

Add early and late durations to your diagrams

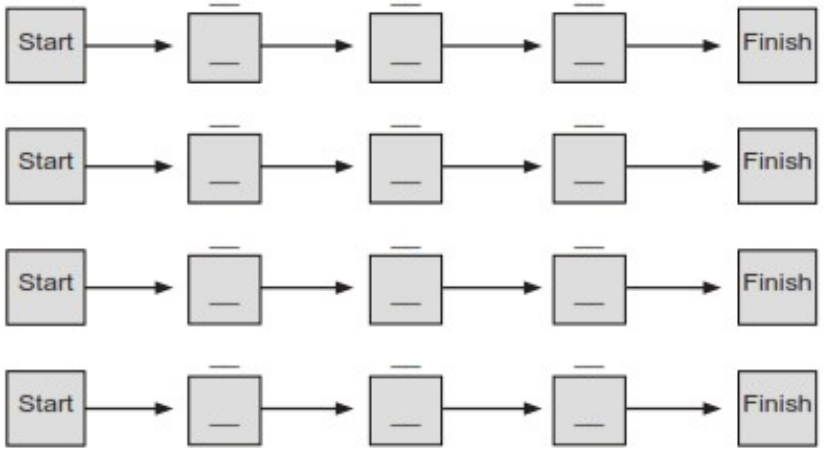
- You can use a method called forward pass to add the early start and finish to each path in your network diagram. Once you've done that, you can use backward pass to add the late start and finish. It makes your network diagrams look a little more complicated, but it gives you a lot

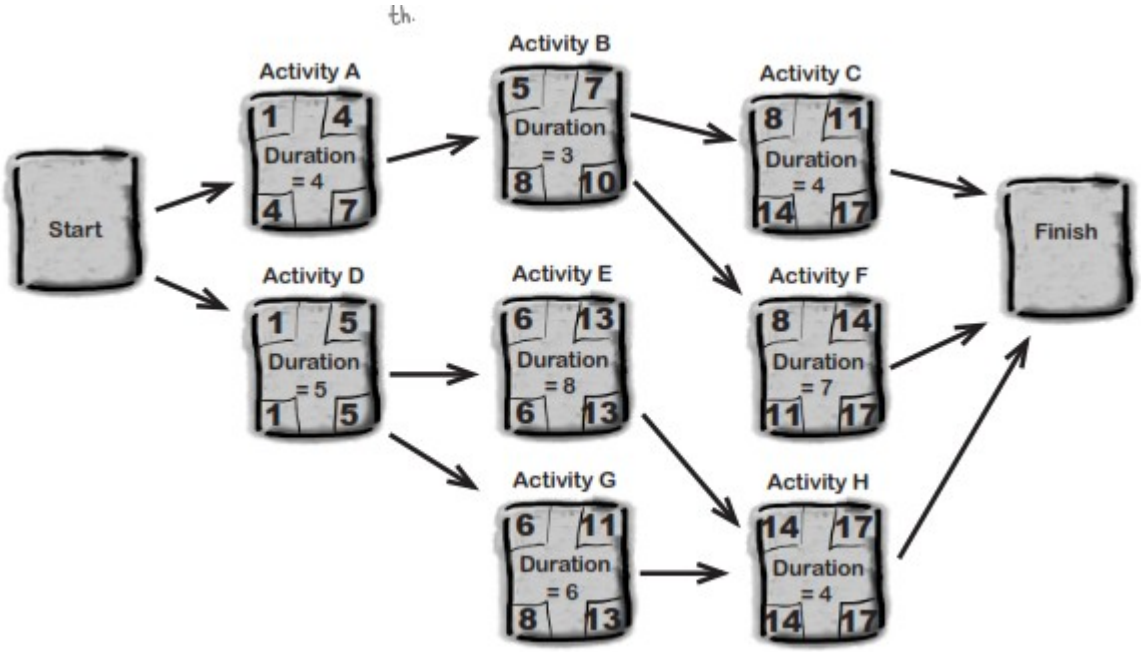


Try?—critical path,ES,LS,EF,LF

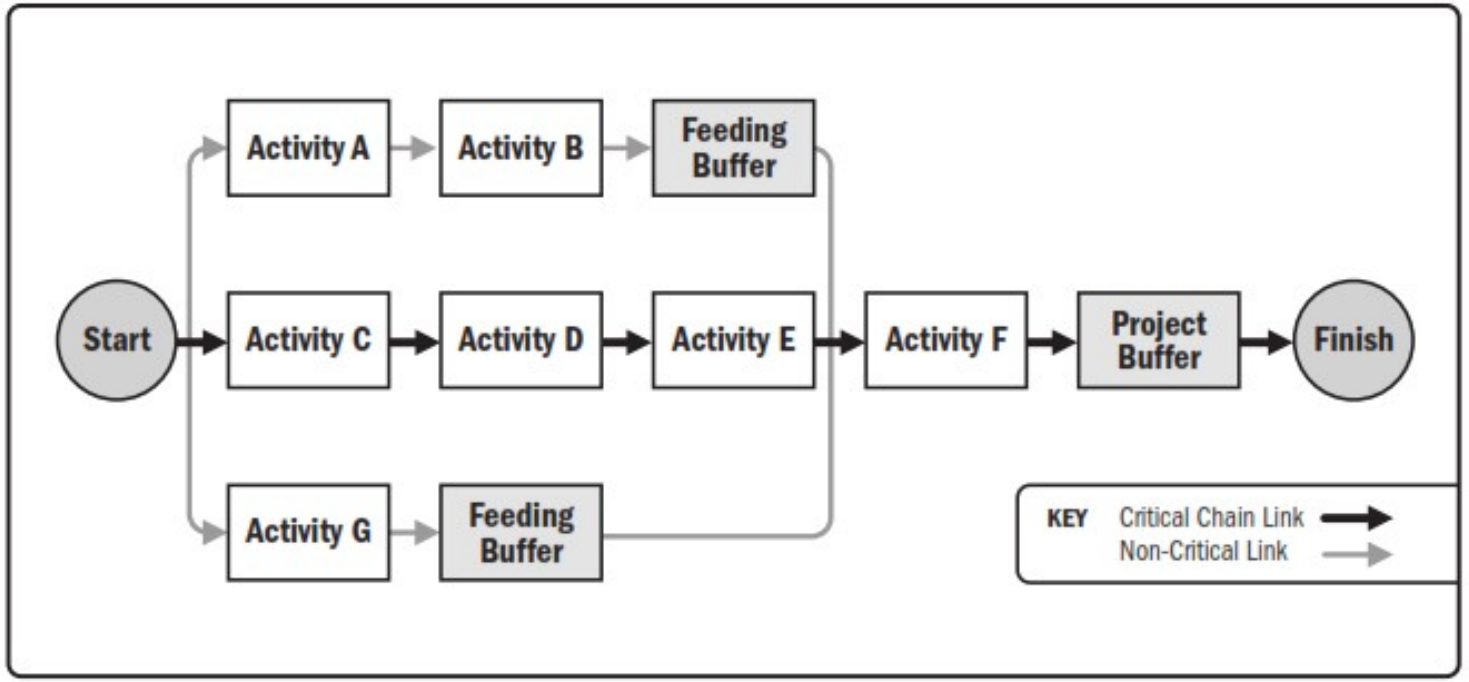


Put an asterisk (*) next to the critical path.



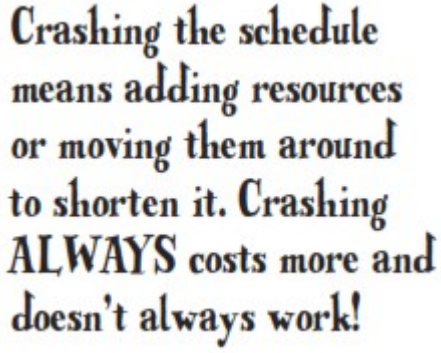


Buffer


Activity A
Activity B
Feeding Buffer
Start
Activity C
Activity D
Activity E
Activity F
Project Buffer
Finish
Activity G
Feeding Buffer
KEY
Critical Chain Link
Non-Critical Link

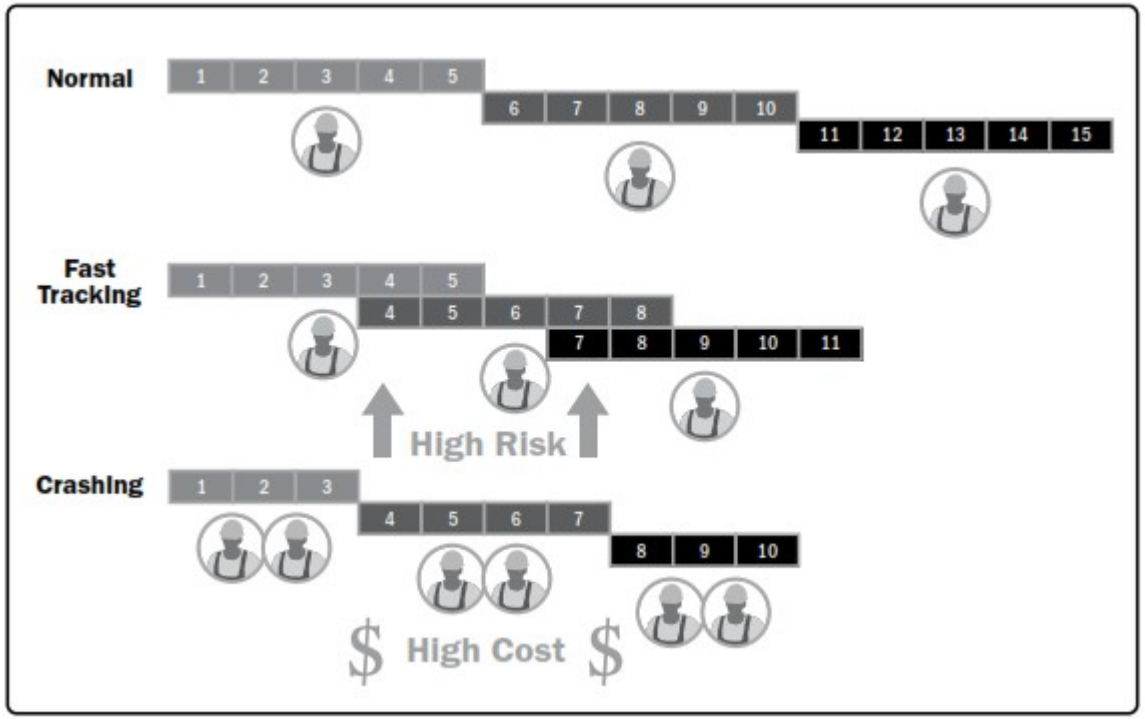
Crash the schedule

- There are two important **schedule compression techniques that you can use to** bring in your project's milestone dates…but each has its own cost. When you absolutely have to meet the date and you are running behind, you can sometimes find ways to do activities more quickly by adding more resources to critical path tasks. That's called **crashing.**



Fast-tracking the project

- Another schedule compression technique is called **fast-tracking.**Sometimes you've got two activities planned to occur in sequence, but you can actually do them at the same time. On a software project, you might do both your UAT testing and your functional testing at the same time, for example. This is pretty risky, though. There's a good chance you will need to redo some of the work you have done concurrently.

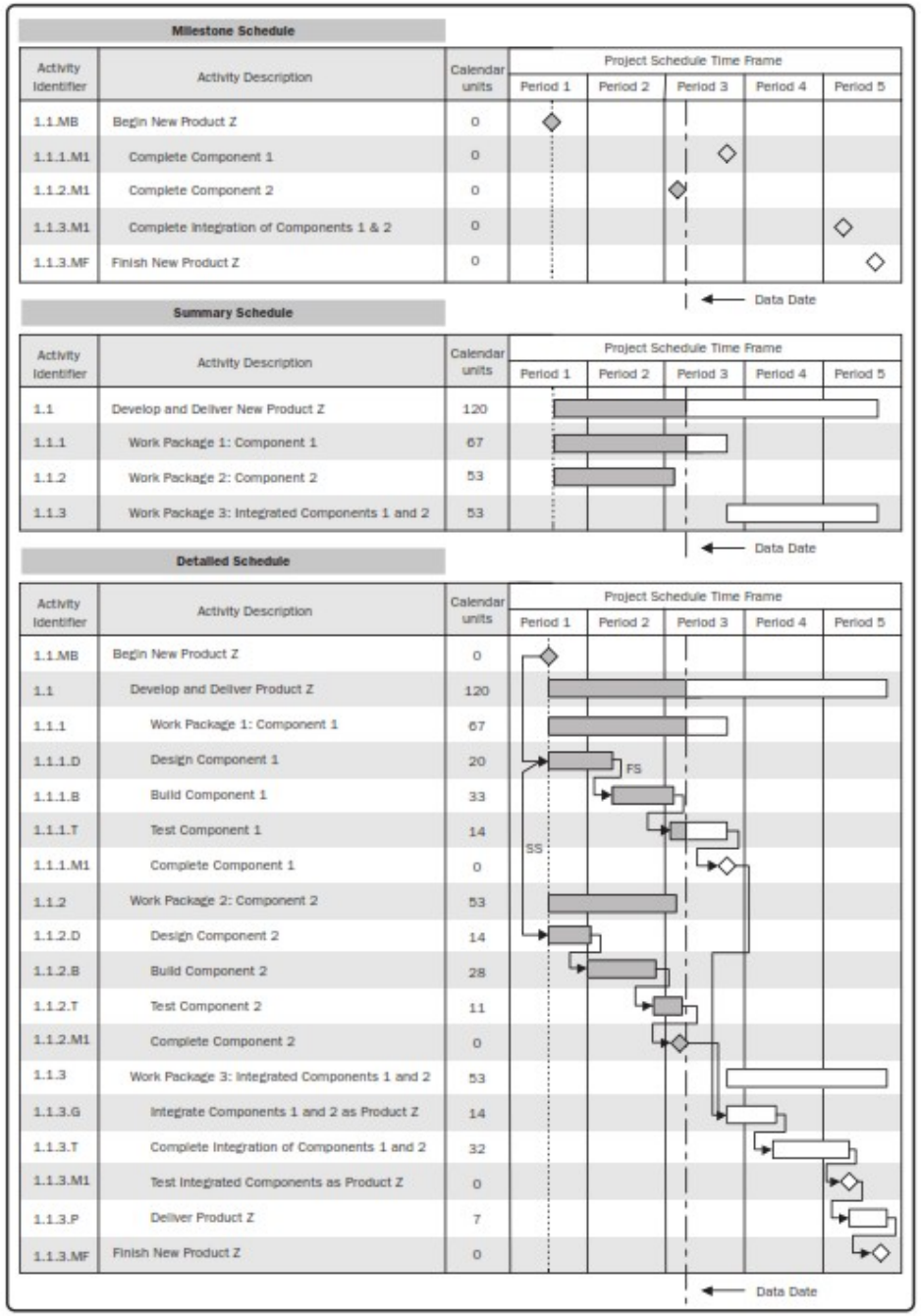


Crashing and fast-tracking are SCHEDULE COMPRESSION tools.

Sample Outpu

Milestone Schedule

Activity Identifier	Activity Description	Calendar units
1.1.MB	Begin New Product Z	0
1.1.1.M1	Complete Component 1	0
1.1.2.M1	Complete Component 2	0
1.1.3.M1	Complete Integration of Components 1 & 2	0
1.1.3.MF	Finish New Product Z	0



Summary Schedule

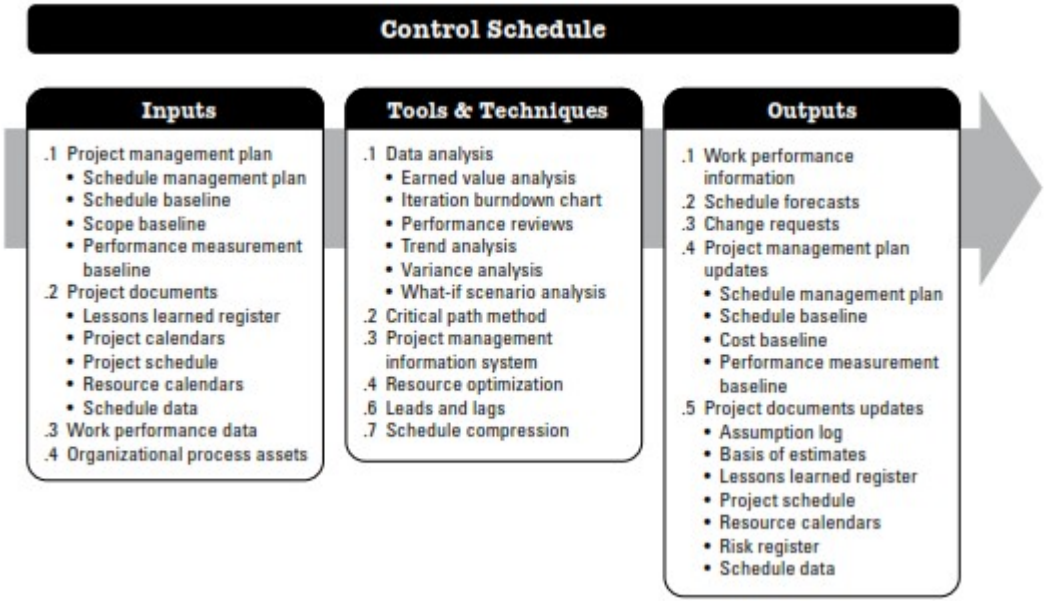
Activity Identifier	Activity Description	Calendar units
1.1	Develop and Deliver New Product Z	120
1.1.1	Work Package 1: Component 1	67
1.1.2	Work Package 2: Component 2	53
1.1.3	Work Package 3: Integrated Components 1 and 2	53

Detailed Schedule

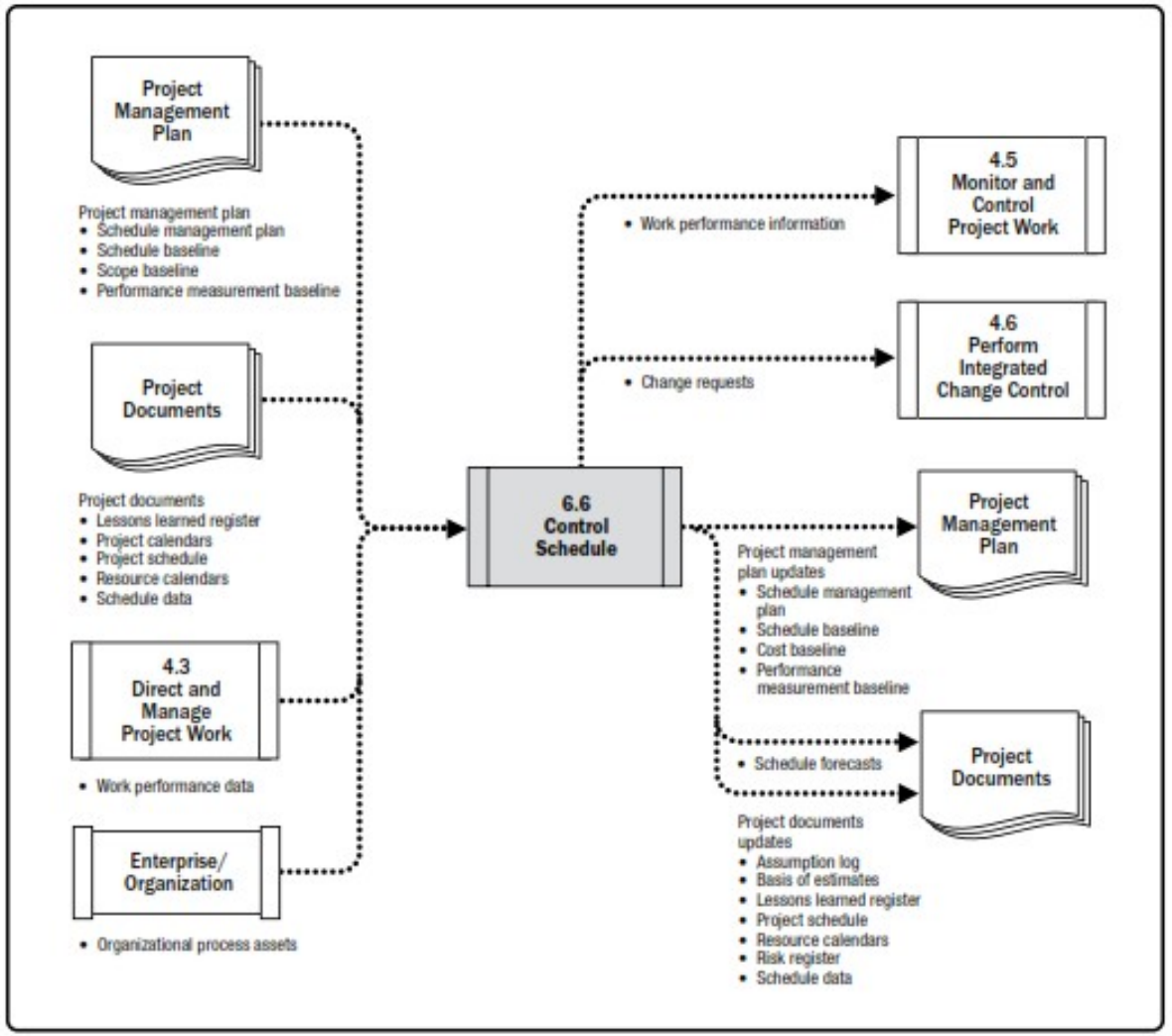
Activity Identifier	Activity Description	Calendar units
1.1.MB	Begin New Product Z	0
1.1	Develop and Deliver Product Z	120
1.1.1	Work Package 1: Component 1	67
1.1.1.D	Design Component 1	20
1.1.1.B	Build Component 1	33
1.1.1.T	Test Component 1	14
1.1.1.M1	Complete Component 1	0
1.1.2	Work Package 2: Component 2	53
1.1.2.D	Design Component 2	14
1.1.2.B	Build Component 2	28
1.1.2.T	Test Component 2	11
1.1.2.M1	Complete Component 2	0
1.1.3	Work Package 3: Integrated Components 1 and 2	53
1.1.3.G	Integrate Components 1 and 2 as Product Z	14
1.1.3.T	Complete Integration of Components 1 and 2	32
1.1.3.M1	Test Integrated Components as Product Z	0
1.1.3.P	Deliver Product Z	7
1.1.3.MF	Finish New Product Z	0

Control Schedule

- As the project work is happening, you can always discover new information that makes you re-evaluate your plan, and use the **Control Schedule process to make** the changes. The inputs to Control Schedule cover the various ways you can discover that information. The outputs are the changes themselves.

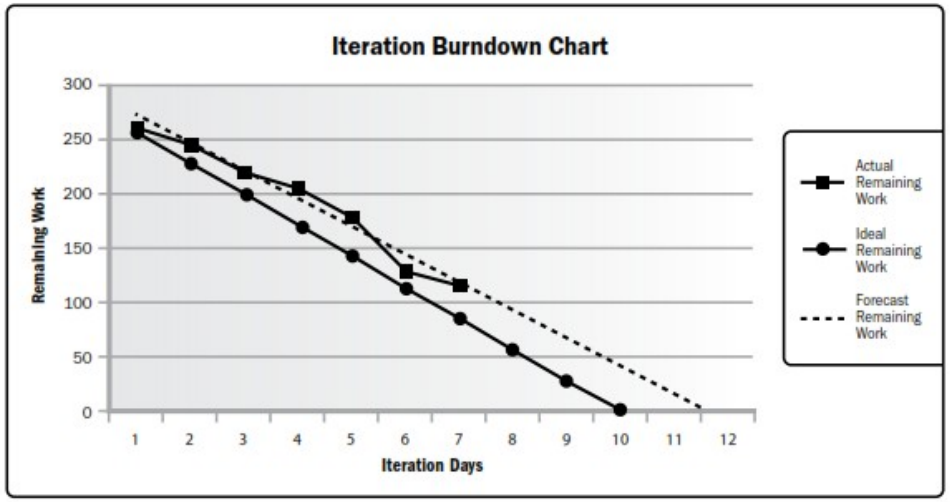


Data Flow


Project Management Plan
Project management plan
• Schedule management plan
• Schedule baseline
• Scope baseline
• Performance measurement baseline
Project Documents
Project documents
• Lessons learned register
• Project calendars
• Project schedule
• Resource calendars
• Schedule data
4.3 Direct and Manage Project Work
• Work performance data
Enterprise/ Organization
• Organizational process assets
6.6 Control Schedule
• Work performance information
4.5 Monitor and Control Project Work
• Change requests
4.6 Perform Integrated Change Control
Project management plan updates
• Schedule management plan
• Schedule baseline
• Cost baseline
• Performance measurement baseline
Project Management Plan
• Schedule forecasts
Project documents updates
• Assumption log
• Basis of estimates
• Lessons learned register
• Project schedule
• Resource calendars
• Risk register
• Schedule data
Project Documents

Data analysis tools

- **Earned value analysis.-**Schedule performance measurements such as schedule variance (SV) and schedule performance index (SPI) are used to assess the magnitude of variation to the original schedule baseline.
- **Iteration burn down chart-** This chart tracks the work that remains to be completed in the iteration backlog. It is used to analyze the variance with respect to an ideal burn down based on the work committed from ite



Data analysis

- **Performance reviews-** Performance reviews measure, compare, and analyze schedule performance against the schedule baseline such as actual start and finish dates, percent complete, and remaining duration for work in progress.
- **Trend analysis**-examines project performance over time to determine whether performance is improving or deteriorating. Graphical analysis techniques are valuable for understanding performance to date and for comparing to future performance goals in the form of completion dates.
- **Variance analysis**-looks at variances in planned versus actual start and finish dates, planned versus actual durations, and variances in float. Part of variance analysis is determining the cause and degree of variance relative to the schedule baseline ,estimating the implications of those variances for future work to completion, and deciding whether corrective or preventive action is required.
- **What-if scenario analysis**-is used to assess the various scenarios guided by the output from the Project Risk Management processes to bring the schedule model into alignment with the project management plan and approved baseline.

Control Schedule

