A Step-by-Step Approach for Planning Your Small Project

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Planning for a small project is difficult. The PMBOK® Guide (PMI, 1996) is an impressive document, which thoroughly discusses a generalized approach to planning and managing a project. The PMBOK® approach is appropriate for large projects. However, project planning using the PMBOK® approach takes a long time, sometimes months. Because of this long time, some project managers of small projects are inclined to skip the planning process altogether to get to the "real" part of the project.

Another problem with typical project plans is that there is no allowance for increases in duration or cost of each task. This lack of built-in schedule and cost contingencies leads to overruns in the project schedule and budget.

One could ask, "What is the minimum level of planning required for a small project?" In response to this question, I have developed a seven step approach that I believe answers this question. In addition to the usual schedule planning methodology, it creates schedule and budget contingencies for the project, protecting against schedule and cost overruns.

I call these seven steps The 7 Steps to Project Success™. Each step has a chart associated with it. The charts associated with each step are:

1. Project Success Chart™
2. Work Breakdown Structure
3. Task Assignment Matrix
4. Task duration table
5. Project network diagram
6. Gantt (bar) chart schedule
7. Project budget chart

To illustrate these steps, I will use a simple small project, making a birthday cake for my daughter's birthday, as an example.

Step 1 – Project Success Chart™

The *Project Success Chart*™, shown in Exhibit 1, lists the factors vital to the success of the project – the project objective, the project deliverable(s), and the project success criteria. The project objective is what will be achieved by when. In our example project, the project objective is "Bake a cake in time for my daughter's birthday party." The project deliverable(s) are what will be delivered by when. In this case, our project deliverable is one 2-layer chocolate cake with Pokemon decorations, in time for the birthday party.

The project success criteria is what will meet or exceed the expectations of each stakeholder. The first step is to list all of the stakeholders. In this case, they consist of my daughter, her parents, and the birthday party guests. The expectations of my daughter are that the cake be chocolate, with Pokemon decorations, and that it be on time for the party.

The expectations of her parents are that the cake be a reasonable cost, and that it be available on time. The expectations of the guests are that the cake be available in sufficient quantity, that it taste good, and that it be available in time.

The advantage of the Project Success Chart™ is that the elements of the project that enable its success can be communicated to the project team members in a very short period of time.

Project Objective (what will be achieved by when)

- Bake a cake in time for my daughter's birthday party.

Project Deliverables (what will be delivered by when)

- One 2-layer chocolate cake with Pokemon decorations, in time for the birthday party.

Success Criteria (what will meet or exceed the expectation of each stakeholder)

Stakeholders	Success Criteria
Daughter	Chocolate cake, Pokemon decorations, on time.
Parents	Reasonable cost, on time.
Birthday party guests	Sufficient quantity, taste, on time.

Exhibit 1. Project Success Chart™

Step 2 – Work Breakdown Structure

The *Work Breakdown Structure*, shown in Exhibit 2, is one way of organizing all of the tasks in the project. The method used is to break the project objective (in this case, the birthday cake) into *sub-objectives*. For each sub-objective, I list the tasks necessary to achieve the sub-objective. In this case, the Make Cake sub-objective consists of 1) Look in cake recipe book, 2) Measure/mix cake ingredients, 3) Cool cake, and 4) Bake cake. Notice that the tasks do not have to be listed in the correct time sequence. The important thing is to not miss a task necessary for the achievement of the sub-objective.

The Make Frosting sub-objective consists of 1) Look in frosting recipe book, and 2) Measure/mix frosting ingredients. The Purchase Ingredients sub-objective consists of 1) Drive to store, 2) Drive back from store, and 3) Buy decorations. Notice again that the tasks are not necessarily listed in the correct time sequence.

In many projects, there is an *integration function*. In this case, we must put the cake, frosting, and decorations together. I will call this the Perform Integration sub-objective, consisting of 1) Put decorations on cake, and 2) Slather frosting on cake.

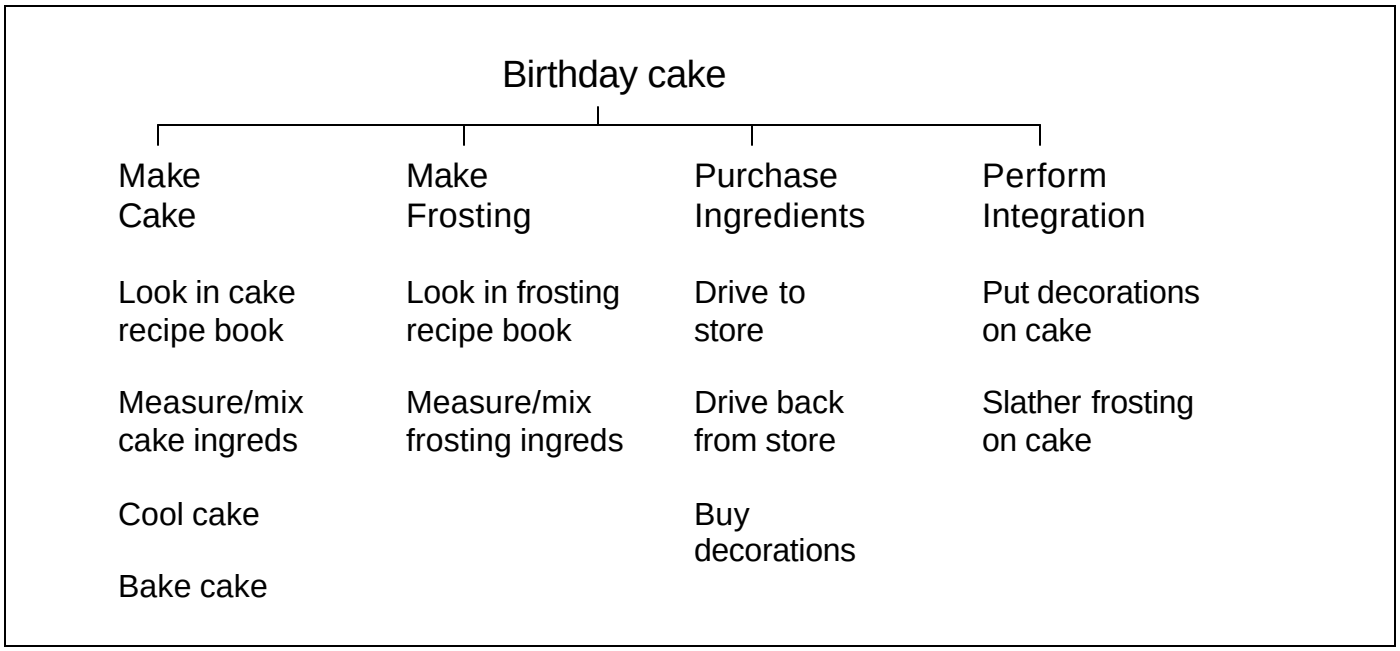

Exhibit 2. Work Breakdown Structure (WBS)

Step 3 – Task Assignment Matrix

The *Task Assignment Matrix*, shown in Exhibit 3, lists the tasks and the task owners. In our case, we assign the cake making tasks to Dad, the frosting and integration tasks to Mom, and the purchase ingredients tasks to Grandpa. Thinking Grandpa might need some help with selecting the Pokemon decorations, we assign our son to help Grandpa with the Buy decorations task. Also, Dad is available to help Mom with the integration tasks. And, of course, we need to get the approval for the decorations and their location on the cake from our daughter.

Task	Task Owner	Support	Inform	Approval
Look in cake recipe book	Dad			
Measure/mix cake ingreds	Dad			
Cool cake	Dad			
Bake cake	Dad			
Look in frosting recipe book	Mom			
Measure/mix frosting ingreds	Mom			
Drive to store	Grandpa			
Drive back from store	Grandpa			
Buy decorations	Grandpa	Son		
Put decorations on cake	Mom	Dad		Daughter
Slather frosting on cake	Mom	Dad		

Exhibit 3. Task Assignment Matrix

Step 4 – Task Duration Table

The *Task Duration Table*, shown in Exhibit 4, lists three estimates for each task – optimistic, most likely, and pessimistic. The optimistic values usually have a probability of occurring 10-20% of the time, the most likely values 50% of the time, and the pessimistic values about 80-90% of the time. These percentages can be varied depending on the schedule criticality of the project end date.

At this point you may wonder what we going to do with all of these estimates. I will address this in the next two sections.

Task	Optimistic	Most likely	Pessimistic	Actual
Look in frosting recipe book	20	30	60	
Measure/mix frosting ingredients	10	20	40	
Look in cake recipe book	20	30	60	
Measure/mix cake ingredients	10	20	30	
Bake cake	40	50	60	
Cool cake	30	60	90	
Drive to store	10	20	30	
Buy decorations	10	20	40	
Drive back from store	10	20	30	
Slather frosting on cake	5	10	20	
Put decorations on cake	20	30	40	

Exhibit 4. Task Duration Table (in minutes)

Step 5 – Project Network Diagram

The *Project Network Diagram*, shown in Exhibit 5, shows the logical flow of tasks in the project. After starting the cake project, we can either first look in the frosting recipe book, look in the cake recipe book, or drive to the store to buy the decorations. From our Task Assignment Matrix, we can see that we can do all of these tasks simultaneously, because we have assigned different resources to each of these tasks. Even if we have fewer resources, however, we have established that there are at least three paths of tasks available in our project.

After we look in the frosting recipe book, we can measure/mix the frosting ingredients. We are then ready to slather the frosting on the cake. However, we have to wait for the cake to be baked and cooled before we do this task.

After we look in the cake recipe book, we can measure/mix the cake ingredients, bake and cool the cake. The cake is then ready for the frosting.

After Grandpa drives to the store, buys the Pokemon decorations (with my son's help), and drives back from the store, we can put the decorations on the cake. However, we have to wait for the frosted cake before we put the decorations on it.

After we complete all of these tasks in these three parallel paths, the cake is complete and ready for the birthday party.

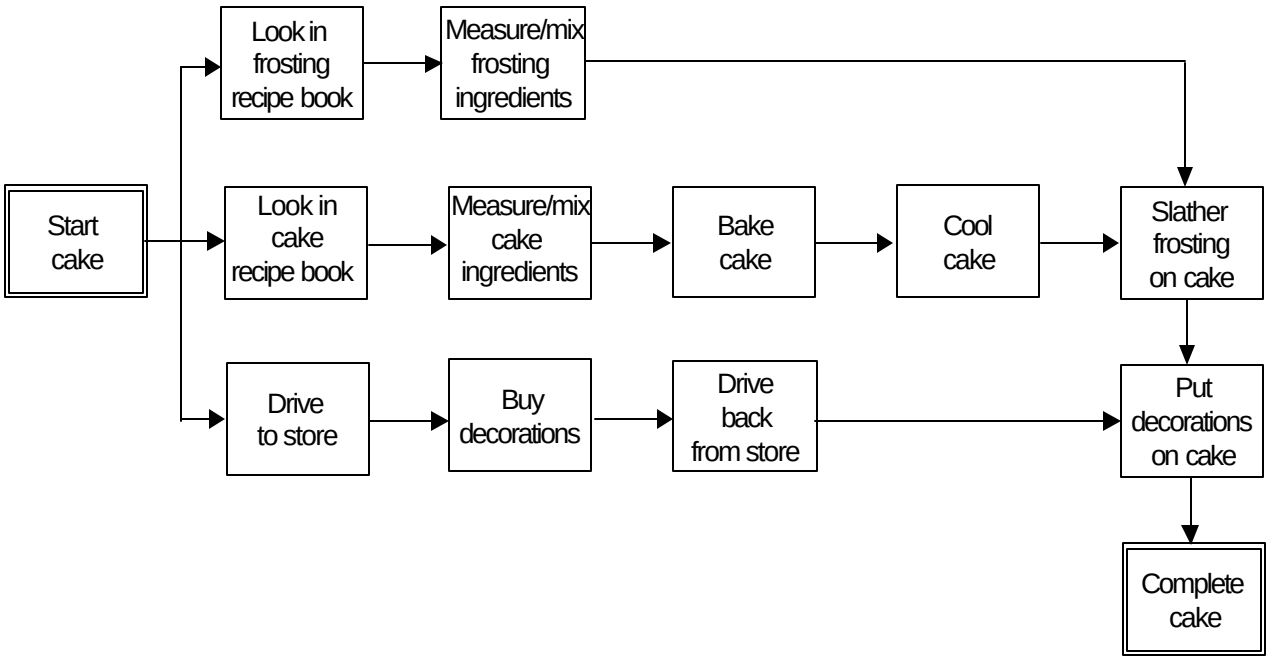

Exhibit 5. Project Network Diagram

The Critical Path is the longest path of the project. To determine the Critical Path, we combine the results above with our Task Duration Table from Step 4. From the Task Duration Table, we use the *most likely estimates* of task duration to determine the longest path in the project, or Critical Path. This path is shown in Exhibit 6 as the shaded tasks – Look in cake recipe book, Measure/mix cake ingredients, Bake cake, Cool cake, Slather frosting on cake, and Put decorations on cake. The parallel paths to the Critical Path are called feeding paths, because they feed into the Critical Path. We have two feeding paths in our project – 1) Look in frosting recipe book, and Measure/mix frosting ingredients, and 2) Drive to store, Buy decorations, and Drive back from store.

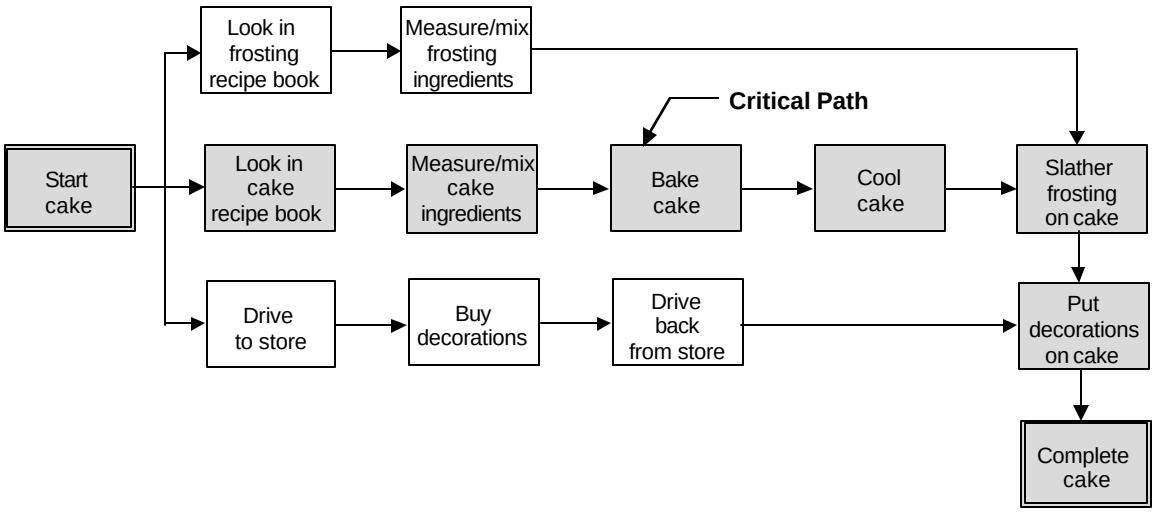

Exhibit 6. Project Network Diagram with Critical Path

Step 6 – Gantt (Bar) Chart Schedule

We would like to use the information in our Task Duration Table from Step 4 to determine a *contingency* to protect the project due date from schedule overruns. Goldratt (Goldratt, 1997) has proposed a simple method of calculating this contingency, which he terms a project buffer. This buffer is placed at the end of the Critical Path to protect against overruns in the duration of the tasks on the Critical Path. (We assume that the feeding paths have sufficient leeway, or schedule float, to allow for schedule overruns in the feeding tasks.)

Listing only the Critical Path tasks, as shown in Exhibit 7, we see that the pessimistic estimates for the Critical Path tasks total to 300 minutes, and the most likely estimates total to 200 minutes. Goldratt's suggestion is that we take half of the difference between the total of the pessimistic and most likely estimates as the project buffer, which in this case would be 50 minutes.

Critical Path Task	Optimistic	Most likely	Pessimistic	Actual
Look in cake recipe book	20	30	60	
Measure/mix cake ingreds	10	20	30	
Bake cake	40	50	60	
Cool cake	30	60	90	
Slather frosting on cake	5	10	20	
Put decorations on cake	20	30	40	
Totals		200	300	

Exhibit 7. Critical Path Tasks

We can then construct the Gantt (bar) chart for our project, including the 50 minute project buffer. The completed Gantt chart, shown in Exhibit 8, indicates that if we start the birthday cake project by 8 am, we should have it ready for the birthday party scheduled for 12:30 pm in the afternoon.

ID	Task Name
1	**Birthday Cake Project**
2	Start cake
3	Look in frosting recipe book.
4	Measure/mix frosting ingredients
5	Look in cake recipe book.
6	Measure/mix cake ingredients
7	Bake cake
8	Cool cake
9	Drive to store
10	Buy decorations
11	Drive back from store
12	Slather frosting on cake
13	Put decorations on cake
14	Project buffer
15	Complete cake

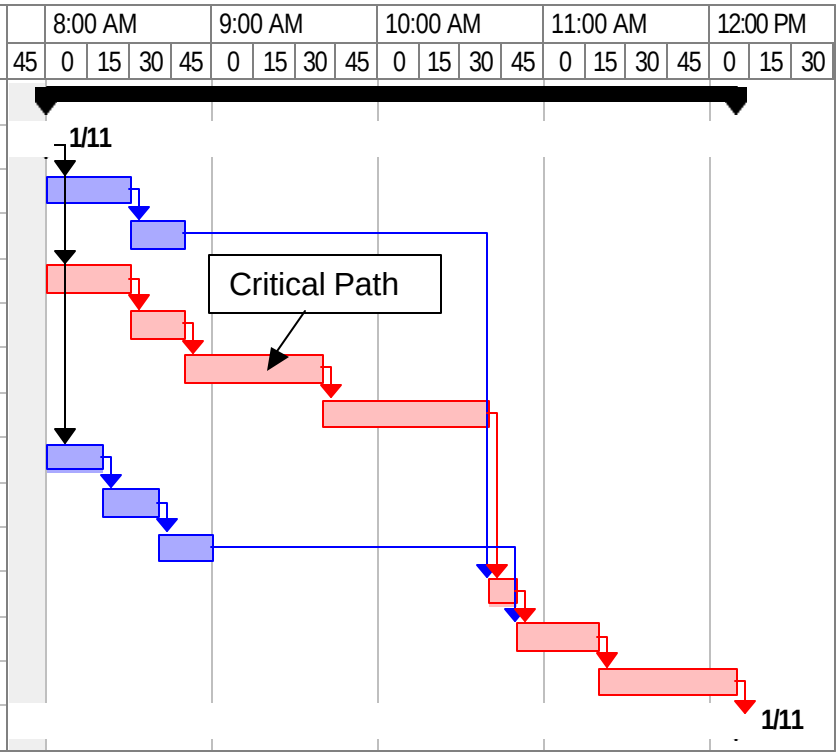

Exhibit 8. Gantt (bar) Chart Schedule

Step 7 – Project Budget Chart

We would like to calculate the budget for the project to ensure that it meets the "reasonable cost" success criteria specified in the Project Success Chart™ by the parents. As shown in Exhibit 9, cost estimates for each task are listed in terms of optimistic, most likely, and pessimistic. Again, the optimistic values usually have a probability of occurring 10-20% of the time, the most likely values 50% of the time, and the pessimistic values about 80-90% of the time.

We then calculate the budget based on the most likely cost values plus a budget contingency. The contingency is computed using the Goldratt approximation of 50% of the difference between the pessimistic values and the most likely values. In our project, the most likely cost estimates total to $9.00, and the pessimistic estimates total to $16.00. Taking half of the difference between the pessimistic estimate and the most likely estimates gives us a budget contingency of $3.50. Adding this budget contingency to the most likely total of $9.00 gives us a budget of $12.50. We can then use this budget value to determine if this is a "reasonable cost" according to the parents' success criteria.

Task	Optimistic	Most likely	Pessimistic	Actual
Look in frosting recipe book	0	0	0	
Measure/mix frosting ingredients	.50	1.00	2.00	
Look in cake recipe book	0	0	0	
Measure/mix cake ingredients	1.00	2.00	3.00	
Bake cake	.25	.50	1.00	
Cool cake	0	0	0	
Drive to store	.50	.75	1.00	
Buy decorations	2.00	4.00	8.00	
Drive back from store	.50	.75	1.00	
Slather frosting on cake	0	0	0	
Put decorations on cake	0	0	0	
Totals	4.75	9.00	16.00	

Budget contingency = 0.50 x (Pessimistic total – Most likely total)
= 0.50 x ($16.00 – $9.00) = $3.50

Budget = Most likely total + Budget contingency
= $9.00 + $3.50 = $12.50

Exhibit 9. Project Budget Chart (in dollars)

Conclusions

For small projects, the PMBOK® approach can be overwhelming. Project managers of small projects need a simpler process for planning their projects. The step-by-step approach I have described will enable them to produce faster project plans, and it will help protect against project schedule and cost overruns.

References

A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 1996, Project Management Institute, Newtown Square, PA.

Goldratt, Eliyahu M., *Critical Chain*, 1997, The North River Press, Great Barrington, MA.