Project and Program Cost Analysis

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Executive Summary

The purpose of this project was to create an easy and efficient way for a user to analyze the costs of different projects within a program. Last summer I was a financial analyst for my internship. Each week I had the repetitive task of entering cost information and updating graphs and creating very simple projection scenarios. These user forms will enable a user in a similar situation to quickly create new project templates, edit projects, enter data, view different possible cost projections for the year, and view a summary of all the projects in a single program.

Create a Project

The first user form will quickly create a project spreadsheet. The spreadsheet will include the project name and budget and an initial cost projection based on the budget. Each project spreadsheet will also include a graph to quickly view total actual costs as well as current projected total costs.

Edit a Project

The second user form edits the name or budget of a project. This is useful if the project budget changes during the year, or if the user entered the project name or budget incorrectly.

Enter Cost Data

Once the project spreadsheet is set up, the user can enter and update cost information as frequently as needed. This user form is set up so the user can quickly enter cost data for all the projects and edit any mistakes.

Create Cost Projections

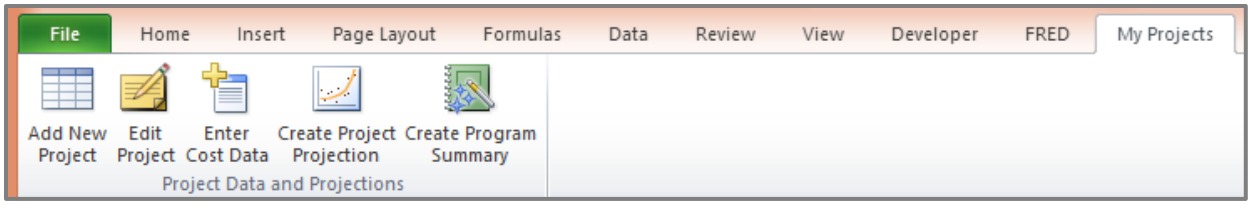
Next the user can create cost projections. I created six different ways of creating projections, based on the amount of information available to the user and to give the user a view of best case and worst case scenarios. These methods include using the average monthly cost information, the highest monthly cost information, the lowest monthly cost information, the previous month's cost information, a straight line projection through the budget, and a final option that let the user enter cost estimates for each future month.

Summarize Projects

Finally the user can create a summary of all the projects in the workbook. This summary sheet will include the names of the projects, actual and projected cost information, and a graph. I have found that summary graphs like this are useful for management reviews.

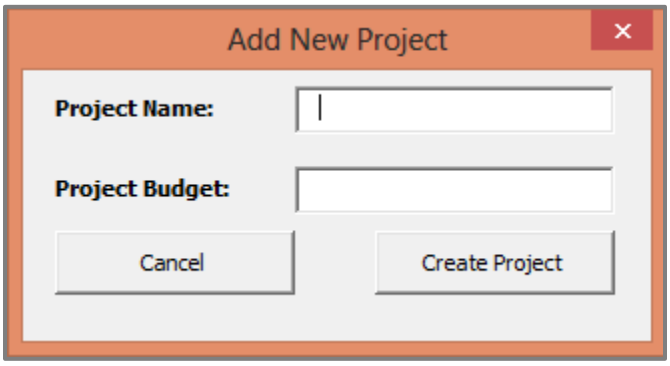
Implementation

My project enables the user to analyze the costs of multiple projects within a program in a given year. Specifically, the user can create new project spreadsheets, edit the project information, enter and update cost information, create simple cost projections, and create a program summary spreadsheet. The user can start from a blank workbook or from a workbook with notes and other information. The buttons to begin each of these tasks can be found under the "My Projects" tab on the ribbon as shown below:



Creating a New Project

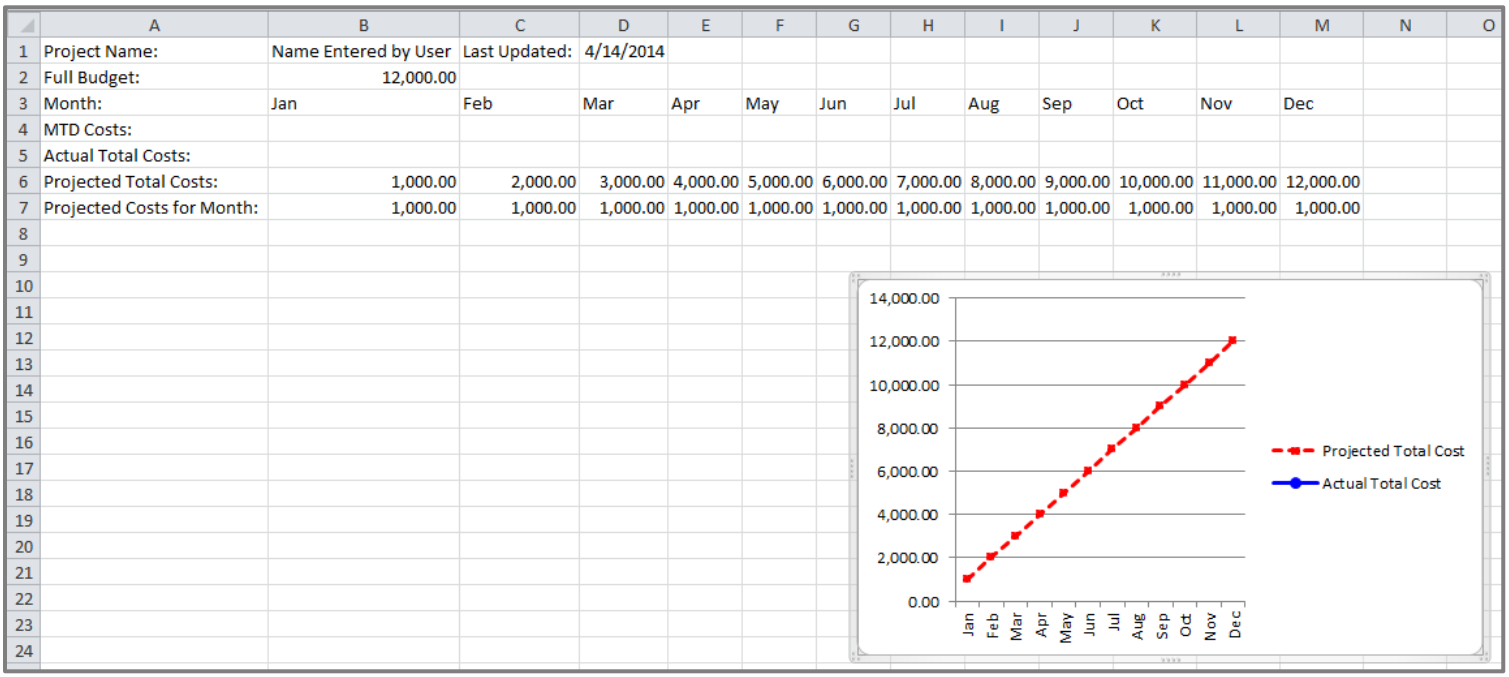
The user can create a new project spreadsheet by clicking the "Add New Project" button. The following user form will appear:



The purpose of this form is to provide a very simple way to create a new project spreadsheet. If the user clicks "Cancel," the form will close regardless of anything in either of the text boxes. However, when the user clicks "Create Project," a lot happens.

What happens when you create a new project

When the user clicks “Create Project,” a new spreadsheet is added after the current last sheet in the workbook. The name of this worksheet is the project name entered by the user. The spreadsheet is filled out in the following way:

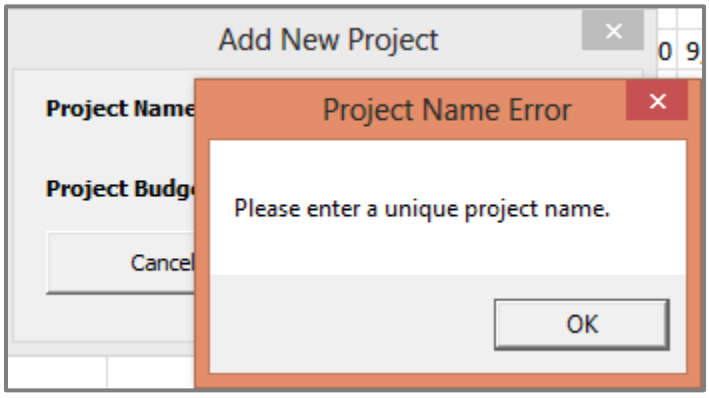


	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Project Name:	Name Entered by User	Last Updated:	4/14/2014									
2	Full Budget:	12,000.00											
3	Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4	MTD Costs:												
5	Actual Total Costs:												
6	Projected Total Costs:	1,000.00	2,000.00	3,000.00	4,000.00	5,000.00	6,000.00	7,000.00	8,000.00	9,000.00	10,000.00	11,000.00	12,000.00
7	Projected Costs for Month:	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00

1. Column A contains the labels for the data on the spread sheet
2. Cell B1 contains the project name, and B2 contains the budget entered by the user. The format for the budget is “#,##0.00”
3. Cell D1 shows that the project was last updated the day it was created.
4. Rows 6 and 7 show an initial cost projection for this project. This initial projection assumes that (the budget)/12 will be spent each month. “Projected Total Costs” is always just the running total of the projected costs for the individual months.
5. “MTD Costs” will show the current Month-to-Date costs for the project for each month and “Actual Total Costs” will be a running total of the MTD costs.
6. A graph is created comparing actual and projected total costs. When the project is first created, there are no actual costs.

Possible errors

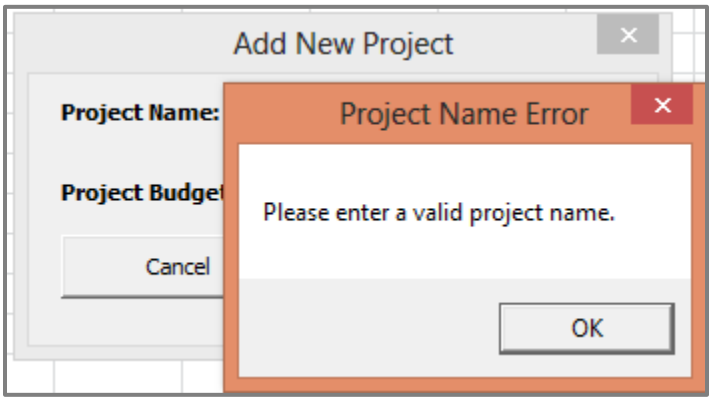
There are a few errors that might occur when a user tries to create a new project. First, the project name might not be unique. If the project name has already been used for another project, the following message box will appear:



Another possible error is that the project name will not be valid. The following are not valid for a project name:

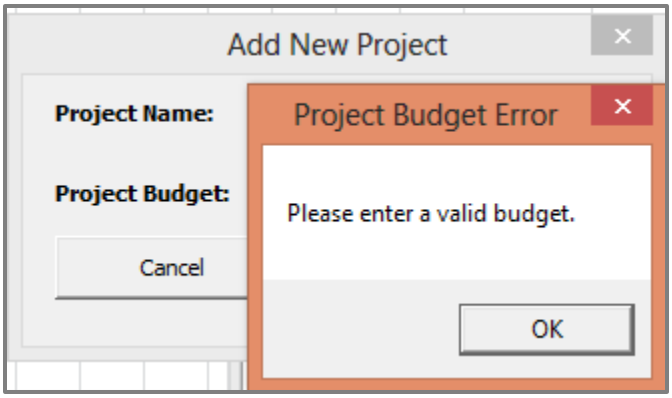
1. The characters : \ / ? * [ ]
2. A blank project name
3. A project name that is more than 31 characters

If one of these errors occurs, the user will see the following error message:



A blank spreadsheet might popup in the background, but it will be deleted after the message box is closed.

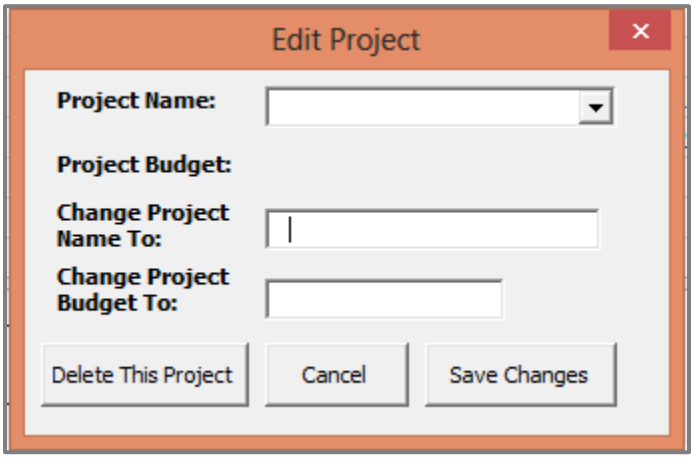
The budget entered by the user can be a number with or without decimals, commas, and a $, but it cannot contain other characters, and it cannot be a negative number. In the example above, the budget was $12,000.00. The user could have written any of the following: $12000; 12,000; 12000.00; $12,000.00; etc. However, if the user had written “apples” or “400*3” or left the budget blank, then the following error message would appear:



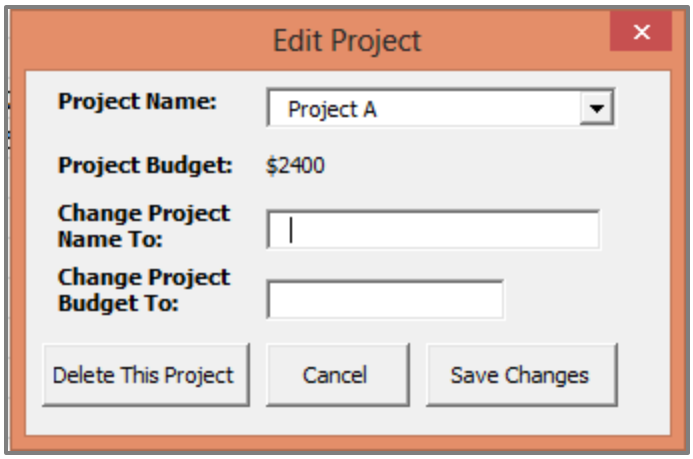
Finally, it is important to note that cell A1 on every project sheet says “Project Name:”. The rest of the tasks identify projects by looking for this cell. The user should not change this cell, or create any other worksheets that say “Project Name:” in cell A1. Aside from this, the user is free to create any other worksheets in the workbook containing notes or other information.

Editing a Current Project

The next form will enable a user to edit a project name, a project budget, or delete a project from the workbook. The “Edit Project” button will bring up the following user form:



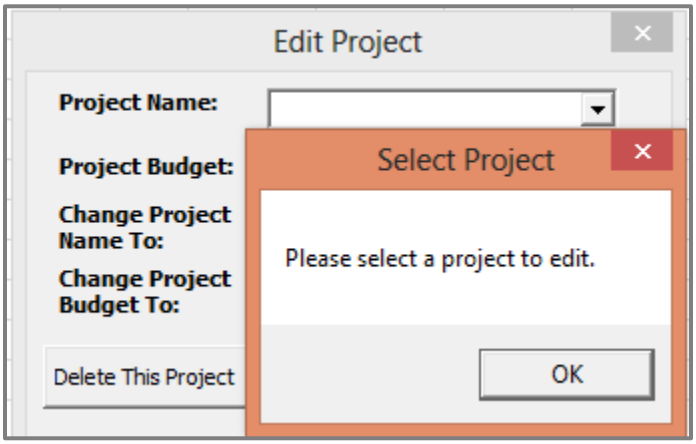
If the user is not currently on a project spreadsheet, the form will be blank, but if the user is currently view a project spreadsheet, the “Project Name” and “Project Budget” fields will be appropriately filled in as follows:



Once the user selects a project from the combo list, that project spreadsheet will be activated. If the user changes the project in the list, the new project will be activated and anything written in either of the text boxes will be erased. This is to help prevent the user from making mistakes.

What happens when you edit a project

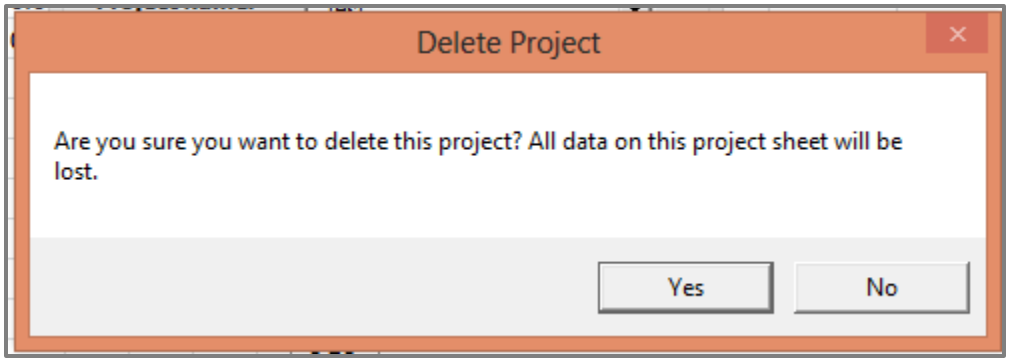
When the user clicks "Save Changes," if either the "Change Project Name To" or "Change Project Budget To" text boxes are blank, the project name or budget will not be changed. If both are blank, neither will be changed. However, if either of the text boxes is filled in, but a project is not selected from the combo box, then when the user clicks "Save Changes" the following message box will appear:



If a project has been selected and either a new, valid name or a new, valid budget (or both) has been entered into the text boxes, then when the user clicks "Save Changes" cells B1 and the spreadsheet name will be changed to the new name, cell B2 will be changed to the new budget, and cell D1 will show the date of the edit. The current projection information, however, will not be changed. This is because later in the year the budget might change due to more informative projections, and the user probably won't want all the current projections to be lost when the budget information is updated.

If the user clicks “Cancel” the form will close regardless of what is in any of the text boxes.

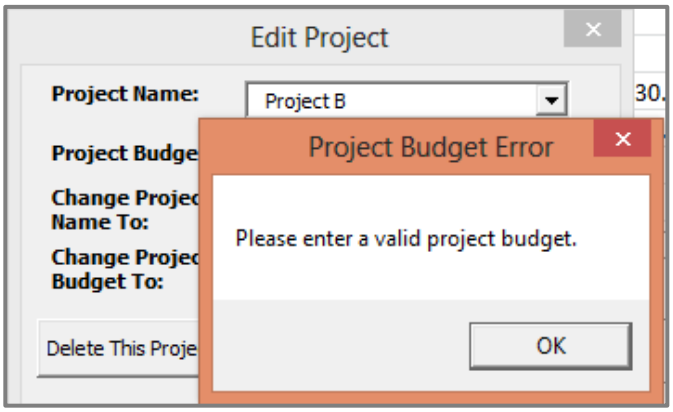
If the user clicks “ Delete This Project” and a project has not been selected, a message box similar to the one above will appear telling the user to “Please select a project to delete.” If a project is select, the following message will appear before the project sheet is deleted:

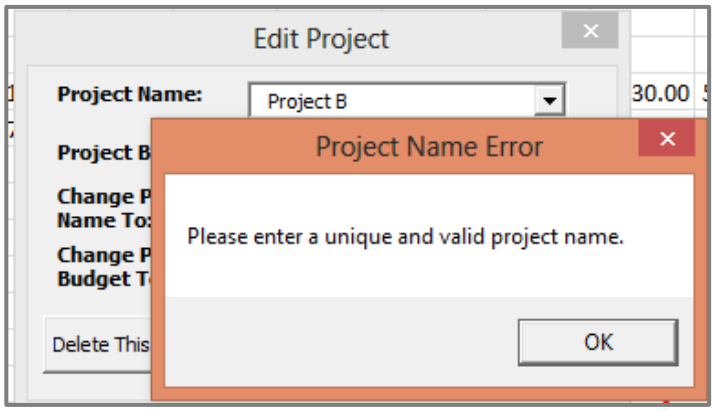


If the user selects “No,” the project will not be deleted and the “Edit Project” form will stay open so the user can continue editing the project. If the user selects “Yes,” the form will close and the project spreadsheet will be deleted.

Possible errors

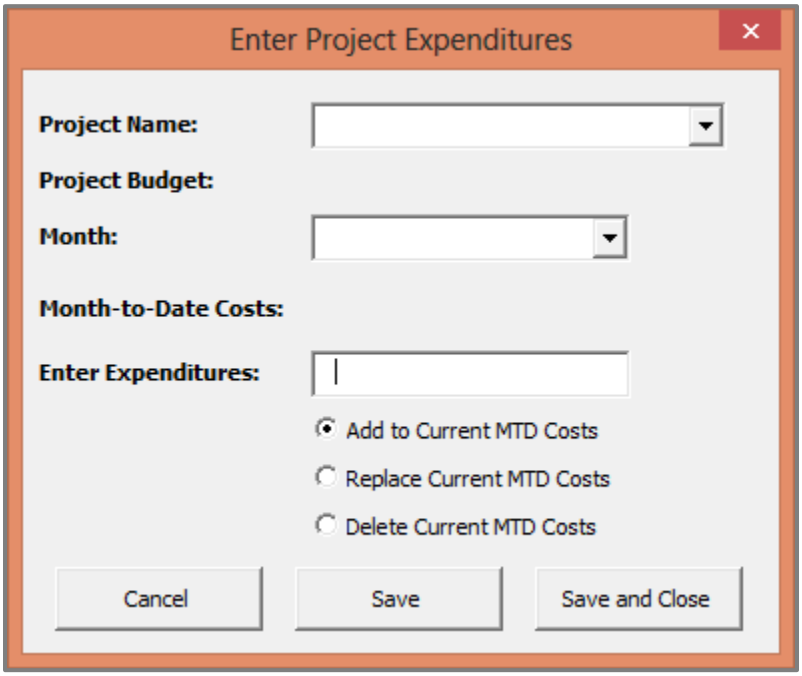
Similar to when a project is created, if the user tries to change the project name or budget to something invalid (special characters, a name that is already used, a negative budget, etc.), one of the following two error messages will pop up:





Updating Cost Information

Now that the project is set up, the user can enter actual cost information. The user might do this once a month, once a week, or more often. Also, the user might need to delete costs if they were entered in error or in the wrong month. To accommodate these needs, when the user clicks "Enter Cost Data," the following user form will appear:



If the user is currently viewing a project, the project name will be selected in the combo box and the project budget will display. The user will then select a month, and the current "Month-to-Date Costs" will also display (if MTD costs are blank or $0, $0 will appear):

If the user selects a month before selecting a project, the user will be prompted to select a project. This message box is identical to the one shown in the next section. If a month has been selected and the user selects a different project, the currently selected month will not change.

As usual, clicking "Cancel" will close the form regardless of anything selected or entered.

"Save" vs. "Save and Close"

Because the user might want to enter cost information for many projects at once, the user can choose "Save" or "Save and Close" to update the information on the spreadsheet. If "Save and Close" is selected, the form will close. If "Save" is selected:

- The form will not close
- The "Enter Expenditures" text box will be cleared

- The “Add” option will be re-selected
- The selected month will not change

Also, when the project name combo box is changed the month combo box will not change and the “Enter Expenditures” box will be cleared. These features will make it easier for the user to update cost information for all the projects more efficiently.

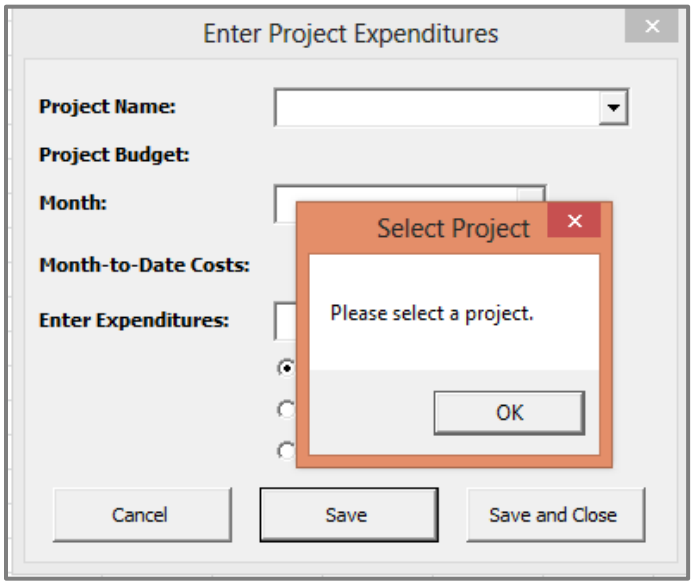
Here are some other notes about “Save” and “Save and Close:”

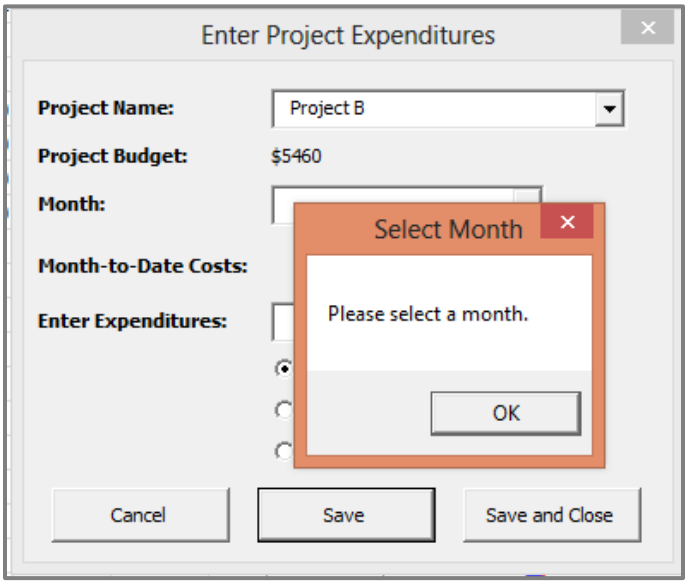
“Save”

- If no project is selected, the user will be prompted to select a project, other wise
- If no month is selected, the user will be prompted to select a month, otherwise
- If no cost information is entered, the user will be prompted to enter valid cost information (unless “Delete” is selected)

“Save and Close”

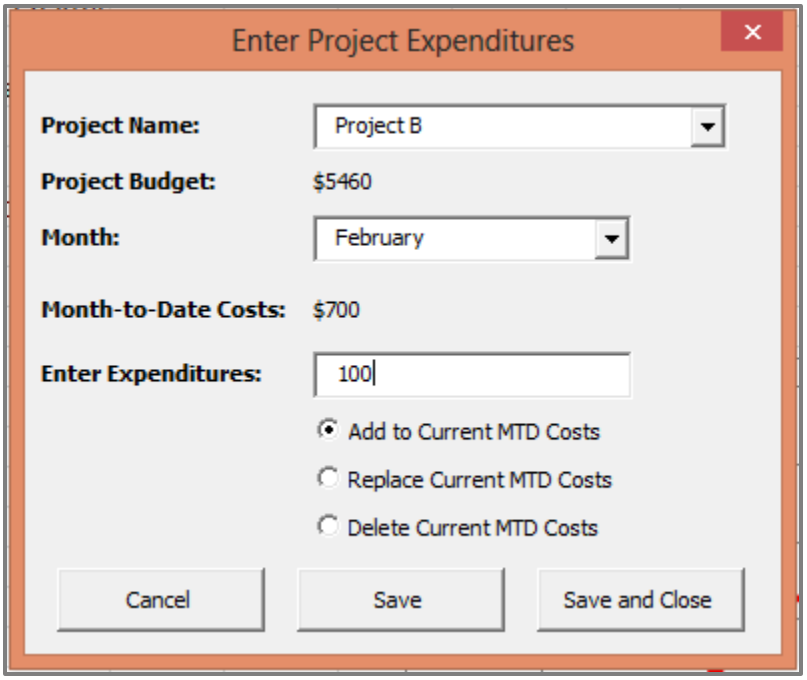
- If no cost information is entered, the form will just close (unless “Delete” is selected), otherwise
- If no project is selected, the user will be prompted to select a project, otherwise
- If no month is selected, the user will be prompted to select a month





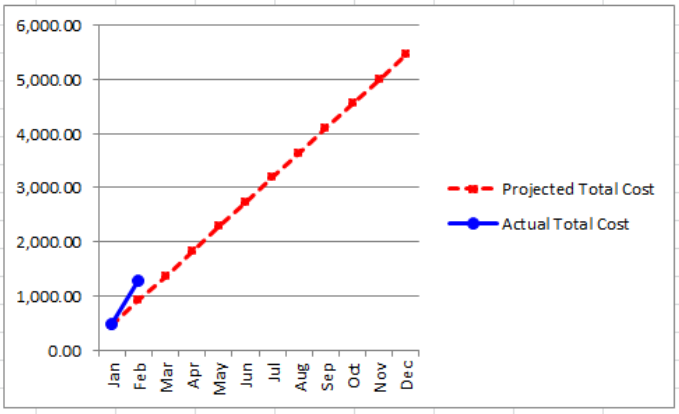
"Add", "Replace", or "Delete"

The user can choose between adding an amount to the current MTD costs, replacing an amount, or deleting the amount. In the example below, if the user entered "$100" into the form, then February MTD costs would be $800 if selected "Add" was selected, "$100" if "Replace" was selected, and blank if "Delete" was selected.



On the spreadsheet, the "Actual Total Cost" for that month will also be filled in with a running total for the year up to that month. This means the graph will also update. For example, if the user clicks "Save" or "Save and Close" on the form above, the spreadsheet would update as shown below:

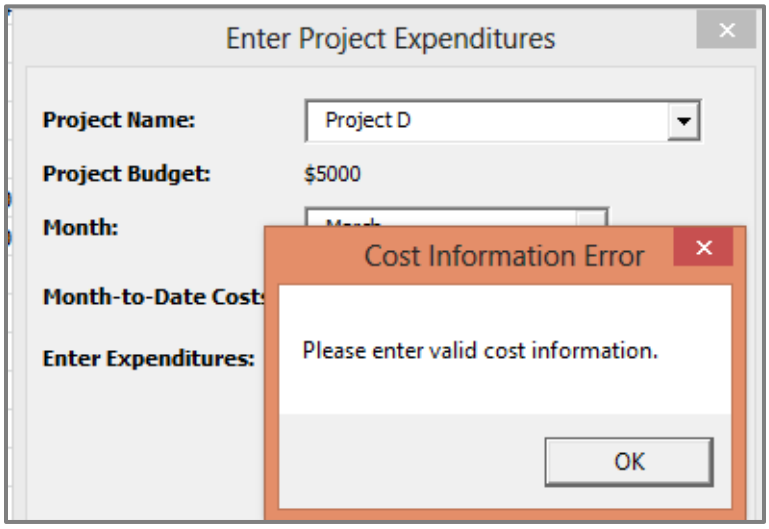
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Project Name:	Project B	Last Updated:	4/15/2014											
2	Full Budget:	5,460.00													
3	Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
4	MTD Costs:	470.00	800.00												
5	Actual Total Costs:	470.00	1,270.00												
6	Projected Total Costs:	455.00	910.00	1,365.00	1,820.00	2,275.00	2,730.00	3,185.00	3,640.00	4,095.00	4,550.00	5,005.00	5,460.00		
7	Projected Costs for Month:	455.00	455.00	455.00	455.00	455.00	455.00	455.00	455.00	455.00	455.00	455.00	455.00		



Notice that cells C4 and C5 have both updated to include the new cost information, and the graph also reflects the new total costs. Also, when the user clicks “Save” or “Save and Close,” the date will update so the user knows when they last made an update to the project. (If “Save and Close” only closed a blank form, then the date will not update.)

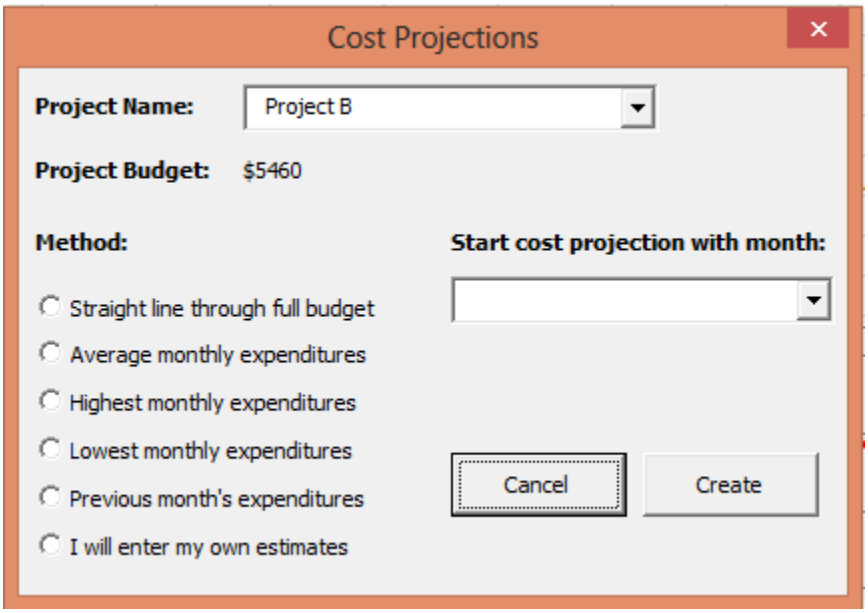
Possible errors

Aside from not selecting a project or month, another common error might be entering invalid cost information. Unlike for the budget, cost information can be negative, but other than “$” and “,” and “-” used in the right way, any non-numeric characters will return the following error when either “Save” or “Save and Close” is clicked:



Projecting Future Costs

After a few months of entering costs, the user will want to update the project cost projections. The user is given many options for how this projection will be made. When the user clicks "Create Project Projection," the following user form will pop up:

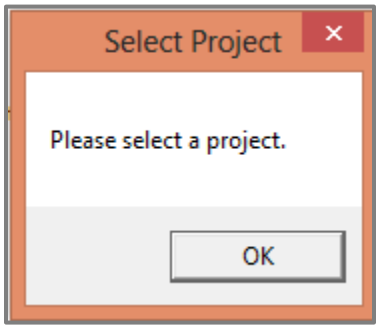


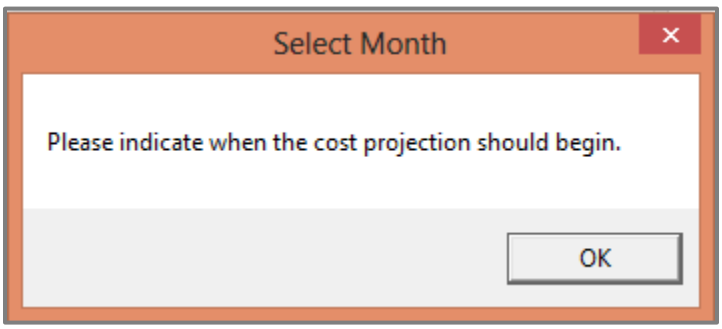
As with the previous forms, the project name and budget will show if the user is currently viewing a project spreadsheet, otherwise these fields will be blank. When the user selects a different project, that project spreadsheet will be activated and the project name and budget will show on the form. Also, as with previous forms, "Cancel" will close the form and make no changes to the spreadsheet no matter what is selected in any of the fields.

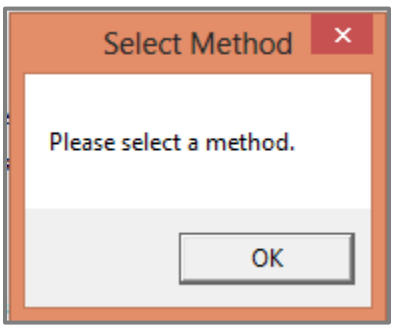
When the user clicks "Create":

- If no project is selected, the user will be prompted to select a project, otherwise
- If no month is selected, the user will be prompted to select a month, otherwise
- If no method is selected, the user will be prompted to select a method

These prompts are shown in order below:





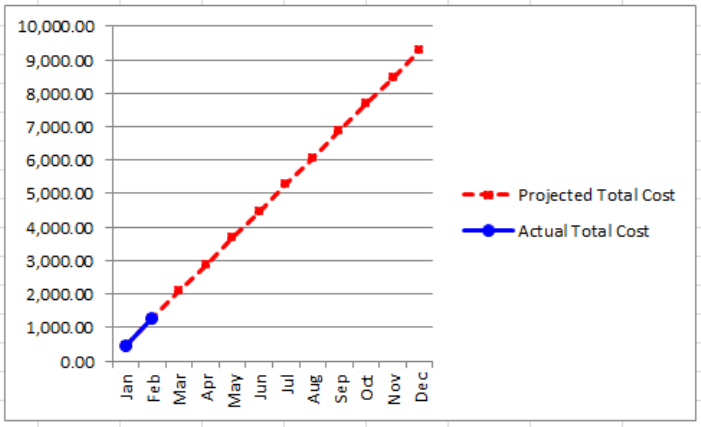


If a project, a month, and a method are all selected, then when the user clicks "Create" the form will close and the project spreadsheet will be updated. The first five methods all update the spreadsheet in the following way (The last method will be discussed later):

- Starting with the month indicated, all months up to December are updated with the monthly projection
- The monthly projections for all months before the month indicated are set equal to the actual MTD cost
- The total projected costs for each month are set to the running total of the monthly projections up to that month
- The date is updated to show the date the projection was made

For example, if the user selected "March" and "Highest monthly expenditures," then the spreadsheet would update in the following way (February's costs are the highest at $800):

Project Name:	Project B	Last Updated:	4/15/2014									
Full Budget:	5,460.00											
Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MTD Costs:	470.00	800.00										
Actual Total Costs:	470.00	1,270.00										
Projected Total Costs:	470.00	1,270.00	2,070.00	2,870.00	3,670.00	4,470.00	5,270.00	6,070.00	6,870.00	7,670.00	8,470.00	9,270.00
Projected Costs for Month:	470.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00	800.00



Notice that the graph has updated according to the projection and, for months that have already past, the projection equals the actual cost. If the user had started the forecast in February, then these lines would not match up for February. Also, if the projection had not started until April, then the projection for the month of March would have been $0 and the total would be $1,270. This is because if the user is starting

a projection with a certain month, then it is likely all previous month's costs have been entered. I will now discuss how each different projection method is calculated.

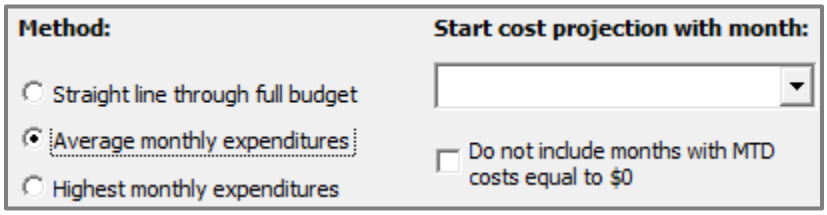
Make a straight line projection

The first option is for the user to make a straight line projection through the budget. This would be useful if the user wants to reset the projection to the initial projection, or if the user does not have very much information about what costs will actually look like, but assumes the whole budget will be used up.

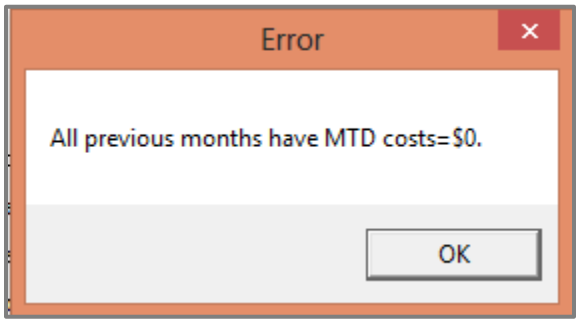
The projection is calculated by adding up all the MTD costs before the selected month, subtracting that from the budget, and dividing this remainder by the number of months remaining (starting with the selected month).

Use the average cost

If the user selects "Average monthly expenditures" then a check box will appear:



The purpose for this check box is for the user to either ignore or include months with no costs. This will be most useful if a project was initiated half way through the year, and the user wants to ignore the months with no costs. If the user checks this box, but all previous months have no costs, or costs equal to $0, the following error message will appear when the user clicks "Create":



The average monthly cost is calculated by adding up all the MTD costs for the months before the selected month and dividing this number by the total number of months. If the box is checked, both the sum of the costs and the number of months ignore any months with no costs or costs equal to $0.

When the use clicks "Create," all future monthly cost projections (beginning with the selected month) are set to this average cost.

Use the highest cost so far

The purpose of this method is to show the user a worst case estimate for the project. If all costs are as high as the most expensive month before the selected month, then this would be the outcome. All monthly projections are set to be the same as whatever the highest cost has been up to the selected month.

Use the lowest cost so far

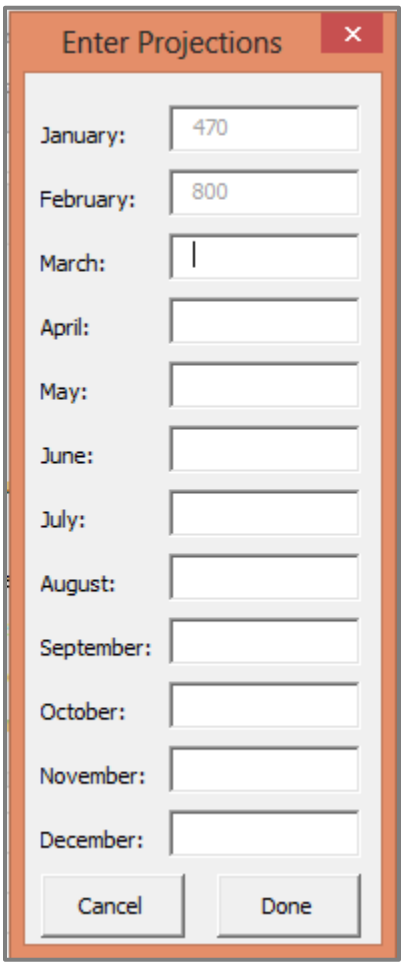
This is a best case scenario. If all months starting with the selected month have costs as low as the least expensive month, this would be the outcome. All future monthly projections are set to be the same as whatever the lowest cost has been up to the selected month.

Use the previous month's cost information

This is a simple naïve forecast. If the user does not have very much information, or if costs do not fluctuate very much, the user might assume all future months will be the same as the most recent month. All future monthly cost projections are set to be the same as the month before the selected month

Enter your own estimates

If the user selects "I will enter my own estimates" and clicks "Create" the following form will appear:



All months up to the selected month will have the MTD cost information filled in and will be disabled. Any months with no costs before the selected month will show "0".

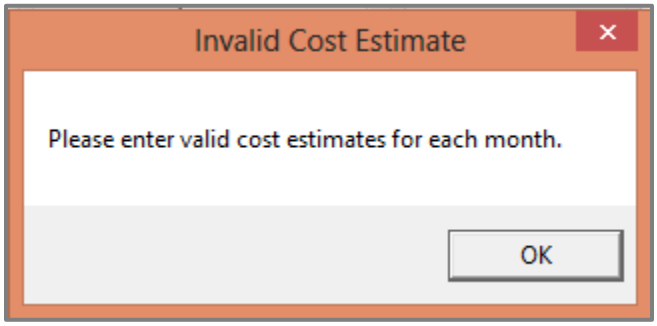
If the user cancels this form or closes it, the "Cost Projection" form will also close and the date in cell D1 will not change.

If the user chooses to keep any of the text boxes blank, the current projection information entered for that month will not change. This will be useful if the user knows of some event that might happen in a future month. For example, if all the projections are currently set at the monthly average, but the user knows there will be no costs in August, the user could fill in "0" for the August text box.

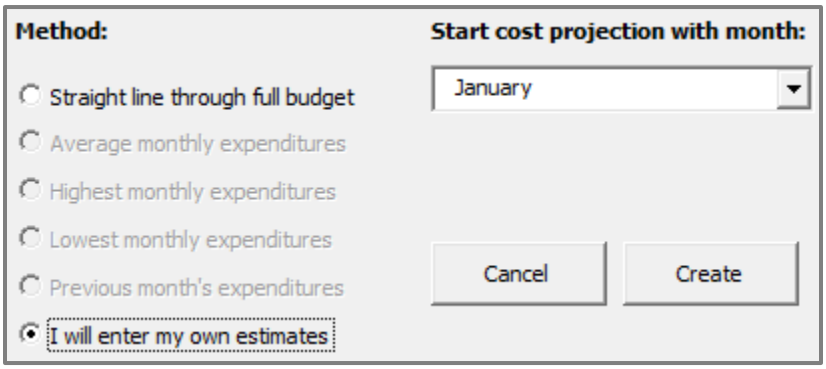
The purpose of this method is so that users with very accurate cost information for the future can enter that information.

Possible errors

As with previous user forms, if the user enters any cost estimates that are invalid, the following error message will appear:

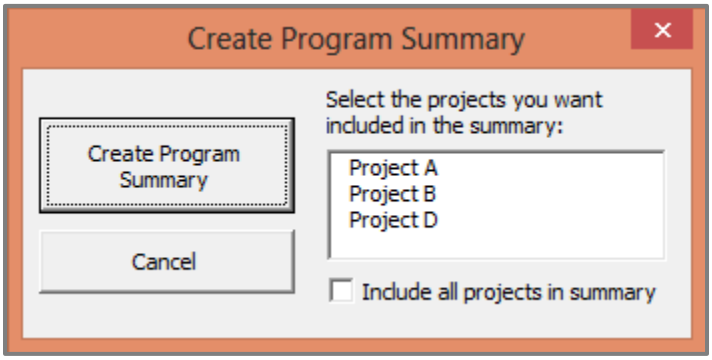


Another possible error is that if January is selected, most of the projection methods will no longer be valid. To prevent this problem, if the user selects January, all but two projection methods will become unavailable as shown below:

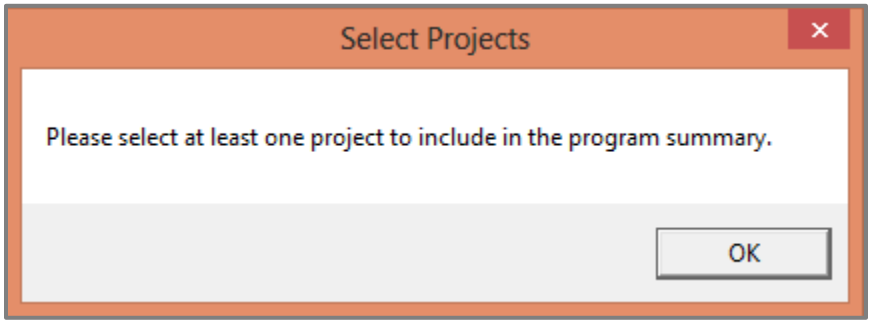


Creating a Summary

The final task the user can accomplish is creating a program summary. When the user clicks "Create Program Summary," the following user form will appear:



The user can select a few projects or all projects by checking the check box. Unchecking the box will unselect all the projects. If the user clicks “Cancel”, the form will close. When the user clicks “Create Program Summary,” if no projects are selected, the following message box will appear:



If at least one project is selected, a “Summary” spreadsheet will be created. If any other spreadsheet named “Summary” exists, it will be deleted. The summary will be added to the workbook as the very first sheet, to make it easy to find, and it will be activated.

The summary sheet will look a lot like the project sheets, as shown below:

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	Program Summary		Created:	4/15/2014									
2	Program Budget:	12,860.00											
3	Month:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4	Month to Date Costs:	970.00	1,120.00										
5	Actual Total Costs:	970.00	2,090.00										
6	Projected Total Costs:	970.00	2,382.00	2,638.00	3,729.00	4,720.00	6,051.00	7,382.00	9,272.00	10,603.00	11,534.00	12,865.00	14,196.00
7	Projected Costs for Month:	970.00	1,412.00	256.00	1,091.00	991.00	1,331.00	1,331.00	1,890.00	1,331.00	931.00	1,331.00	1,331.00
8	Projects in this summary:												
9	Project A												
10	Project B												
11	Project D												
12													
13													
14													
15													
16													
17													
18													
19													
20													
21													
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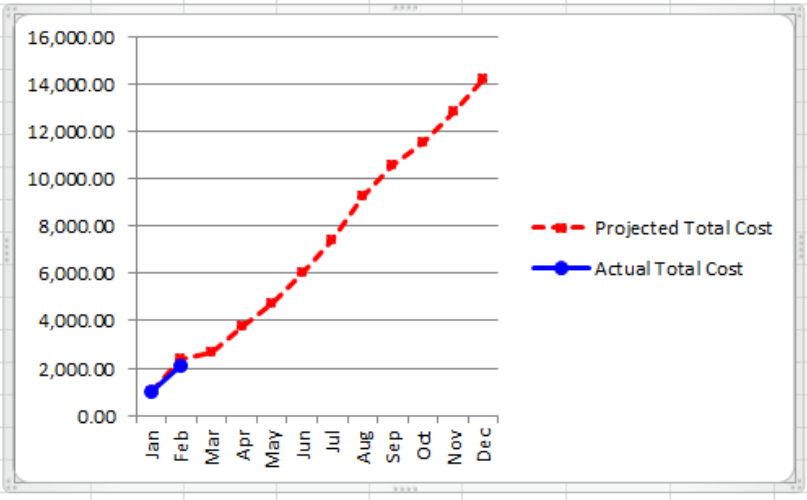
23													
24													
25													



Notice that, like the project sheets, the sheet shows the total program budget, the MTD costs, total actual costs, total projected costs, and projected monthly costs. These come from adding the information in the corresponding cells from the project sheets. The summary also lists the projects included in the summary, and shows the date the summary was created. Finally, the graph shows the actual and projected costs. The purpose of the summary is to analyze the costs for the whole program.

Discussion

These user forms should make entering and analyzing program costs more efficient, and more simple for the user. They are fully automated, and insert no formulas into any cells on any spreadsheet. In this section I will describe some of the code I used and some of the struggles I went through creating my project.

Graphs

First, I did not know how to create or format graphs in VBA before I started working on this project. I used Google, and also recorded myself making graphs to figure it out. I used the same sub procedure to make the graph for both the projects and the summary. I selected the data, the colors, the type of line, and the name of the series. Part of the code is shown here:

```
With ActiveChart.SeriesCollection(1)
   .Format.Line.Visible = msoTrue
   .Format.Line.DashStyle = msoLineSysDash
   .Format.Line.ForeColor.RGB = vbRed
   .MarkerStyle = 1
   .MarkerSize = 4
   .Format.Fill.ForeColor.RGB = vbRed
End With
```

In the end creating a graph was not very difficult, but it was something new that I taught myself how to do, and I am happy with the way it turned out.

Project Names and Cost Information

I also did a lot of work just to get project names to work right. The name had to be a valid spreadsheet name, I did not want the user to enter a name with a bunch of spaces, and at one point I could not get user names comprised of only numbers to show up in my project name combo boxes or work correctly. Here is some of the code I used to get the right project to activate when it was selected from the combo box:

```
For x = 0 To cboProjectName.ListCount - 1
  If cboProjectName.ListIndex = x Then
   For y = 1 To Sheets.Count
    If " " & Sheets(y).Cells(1, 2).Value = " " & cboProjectName.List(x) Then
     Sheets(y).Activate
    Exit For
    End If
   Next
   Exit For
  End If
 Next
```

Here is some of the code I used to make sure the user entered a valid project name:

```
Application.DisplayAlerts = False
 On Error Resume Next
 If Trim(txtNewName.Value) = "" Then
  name = ActiveSheet.Cells(1, 2).Value
 Else
  name = txtNewName
 End If
  ActiveSheet.name = name
 If Err.Number <> 0 Then
  MsgBox "Please enter a unique and valid project name.", Title:="Project Name Error"
  y = True
 End If
```

I also wanted to avoid creating errors when they user entered budget and cost information. This example is from my part of the code for my “Enter Projections” user form:

```
 If txt12.Value = "" Then
   cost(11) = ActiveSheet.Cells(7, 13).Value
 Else: cost(11) = txt12.Value + 0

  If Err.Number <> 0 Then
   MsgBox "Please enter valid cost estimates for each month.", Title:="Invalid Cost Estimate"
   Exit Sub
  End If
```

Nested For Loops and Ifs

This project involved making a lot of long for loops and nested if statements. Here is one of the for loops I made when I created the program summary:

```
b = 0
 For a = 0 To lstProjects.ListCount - 1
  If lstProjects.Selected(a) = True Then
  For x = 1 To Sheets.Count
   If Sheets(x).Cells(1, 2).Value = lstProjects.List(a) Then
    b = b + 1
   .Cells(2, 2) = Sheets("Summary").Cells(2, 2) + Sheets(x).Cells(2, 2).Value
   .Cells(2, 2).NumberFormat = "#,##0.00"
   .Cells(8 + b, 1).Value = Sheets(x).Cells(1, 2).Value
    For y = 2 To 13
     For z = 4 To 7
      If Sheets(x).Cells(z, y) <> "" Then
      .Cells(z, y) = Sheets("Summary").Cells(z, y) + Sheets(x).Cells(z, y).Value
      .Cells(z, y).NumberFormat = "#,##0.00"
      End If
     Next
    Next
    Exit For
   End If
  Next
  End If
 Next
```

I also wanted to create my projections without using any spreadsheet formulas. Here is the loop I used creating my average projection, including the if statement to check if the user wanted to include months with no costs:

```
If optAvg.Value = True And optAvg.Enabled = True Then
 total = 0
 Dim avg As Currency
 Dim months As Byte
 months = 0
 If chk0 = False Then
  For x = 1 To month - 1
   total = total + ActiveSheet.Cells(4, x + 1).Value
   months = months + 1
  Next
  avg = total / months
 Else
  For x = 1 To month - 1
   If ActiveSheet.Cells(4, x + 1).Value + 0 <> 0 Then
   total = total + ActiveSheet.Cells(4, x + 1).Value
   months = months + 1
```

```
  End If
 Next
 avg = total / months
End If
For x = month To 12
 ActiveSheet.Cells(7, x + 1).Value = avg
Next
```

I also created loops to find the minimum and maximum and total costs for the other projection methods, rather than using spreadsheet formulas. Here is one of those loops:

```
ElseIf optMin.Value = True Then
 Dim min As Currency
 min = ActiveSheet.Cells(4, 2).Value + 0
 For x = 2 To month - 1
  If ActiveSheet.Cells(4, x + 1).Value + 0 < min Then min = ActiveSheet.Cells(4, x + 1).Value + 0
 Next
 For x = month To 12
  ActiveSheet.Cells(7, x + 1).Value = min
 Next
```

Two User Forms

I also needed to figure out how to have one user form pop up with another user form, for my cost projections. I needed the second form to also have access to the month that was selected on the first Projection user form. I almost left this out because I was worried it would be complicated, but I was able to make it work exactly the way I wanted it to. This is what I did:

On my "Cost Projection" Form, I had created a variable called m that was the month selected in the combo box, and if the user had the "Enter " option selected when they clicked "Create," then:

```
ElseIf optEnter.Value = True Then
 frmEnter.Show
```

On my "Enter Estimates" form, I looked at the value of m and set each of my text boxes to hold values and be enabled depending on its value. Here is part of that code:

```
Private Sub UserForm_Initialize()

 Select Case frmProjections.m - 1
 Case 1
  txt1.Enabled = False
  txt1.Value = ActiveSheet.Cells(4, 2).Value
```

Additional Input

I got the idea of including the date the projects were updated from ShaLae Steadman after she showed me her user form, which included the date. I wrote all of the code for my project on my own, and I accomplished everything I wanted to do.

Conclusion

The user forms I created should be useful to any user wanting to analyze project cost data for different projects in a program. These forms are programmed to avoid errors and be both simple and efficient. I am really happy with some of the long for loops and the many layered nested if statements that I created for this project, as well as the creative ways I solved the many errors a user might encounter.