

**1.011 Project Evaluation**  
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**Assignment 6**  
**Cash Flow Models**

Objective: develop a spreadsheet that you can use to illustrate the costs and benefits, rate of return, cost effectiveness and other financial aspects of the major alternatives for the case you are studying for your term project. The structure could be based upon what you developed for earlier assignments, or you could do something quite different.

Analyze the level of Risk & Uncertainty in your project

- a. Identify at least 4 types of risks and uncertainties that related to your project.
- b. Discuss the ways that these problems were considered (or could have been considered) in the development of major alternatives, the evaluation of alternatives, the selection and refinement of the best alternatives, and in construction, operation and management of the project.
- c. Using your spreadsheet from Assignment 5, show how different assumptions concerning costs or revenues or other aspects of performance would affect the project evaluation.
  - d. Create at least five scenarios relevant to your project. Each scenario should have several elements related to both costs and benefits (e.g. major cost drivers, unit costs, demand, time for construction, general economic conditions, ...). Scenarios could include a base case along with cases that are, say, pessimistic, worse than expected, better than expected, and optimistic. You could choose to vary some or all of the major elements of the project when you construct these scenarios.
  - e. Show results for each scenario.
  - f. Discuss the results and identify the most critical risks and uncertainties.
  - g. Identify steps that could be taken to reduce the most critical risks and uncertainties.

Principles to keep in mind:

1. Title: have a title for the spreadsheet and for each exhibit
2. Appearance: set up the spreadsheet so that you can print exhibits for your term project
3. Control panel: have a section where it is easy to enter key variables and see key results
4. Tables: a table that shows results for various sets of inputs can be very useful to have

5. Level of detail: you do not have to be any more detailed than “Cammitibridge”; if you do not have the data that you would like, then you should estimate what seem to be reasonable numbers for costs and benefits (be sure to explain which numbers are estimates and why you believe these estimates are reasonable; if you have good numbers, be sure to show the source) - this assignment is concerned with your ability to design a spreadsheet and you will be able to get better inputs as you progress with your term projects
6. Graphs: it is often helpful to create one or more graphs to display cost, benefits, comparisons of options, or sensitivity analysis
7. Interpretation of Results: it may be useful to introduce cost effectiveness measures for some projects (e.g. \$/resident, or \$/transit trip, or some other measure that puts the numbers into context)
8. Color, borders, etc: this can make your results sparkle - but don't spend a lot of time on this until and don't let the style overwhelm the substance
9. Text: remember, you can write descriptive paragraphs in the spreadsheet
10. Detailed calculations vs. results: you may want to move the details to a part of the spreadsheet that you don't have to print or view; make some portions of your work accessible in tables and charts that are easily viewed and printed.
11. Level of precision: remember that your analysis involves many different estimates, some of which are bound to be rather imprecise. When you show results, be sure not to use too many significant figures. Spreadsheets allow you to specify the number of decimal places, and they also allow you to round off the numbers that are displayed. You can also show results in, say, \$ million or even \$ billion and thereby avoiding having to show too many significant digits.
12. In looking at the benefits of your project, you may want to show the cost effectiveness of the various ways of achieving similar benefits (is this project a good way to achieve those benefits?)

Teams: you may work together to discuss the elements of the financial analysis, but everyone should develop their own spreadsheet. (For the term project, you can select the best exhibits from any of these).

Collaboration: you may also discuss the design of the spreadsheet with others in the class; it might be useful to get different perspectives on what costs and benefits are important and how the analysis can best be presented.