# TIM105: MOT I: Homework 4: Decision Analysis

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**Midterm:** will be handed out on Thursday, 29 October, in-class; and will be due the following Tuesday, 3 November, in-class.

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**Reading:** U&E, PDD, Fourth Edition, Chapter 3-5 (Pages 33-96); and class handouts.

 “Simple it’s not, I’m afraid you’ll find, for a mind-maker-upper to make up his mind” – Dr. Seuss on Decision Making

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## Homework Problems (Due Thursday, 22 October, 2014):

1. **Research & Development.** Jackson Pharmaceuticals Inc. is considering funding a research team to cure Lyme’s disease. Bill Mackenzie, executive VP of research, must ultimately make this decision. The research program has a total price tag of $10 million (M), and there is no guarantee that it will be successful. In fact, Bill estimates only a 40% chance that they will find a cure. If the research team finds a cure, Jackson Pharmaceuticals must then decide whether they wish to produce the drug themselves or sell the license to a chemical lab for (a revenue of) $40M. If they produce the product themselves and production goes smoothly, they forecast a revenue of $60M. But refitting one of their production facilities can be troublesome. There is a 30% chance of production troubles, in which case they would earn only $20M revenue.

What should Bill McKenzie do? (**Result**: Expected Monetary Value or payoff from a successful R&D program = $9.2 M)

How do you think that the Jackson Pharmaceuticals obtained the probability values used in the analysis?

1. **Should Pharma C, Inc. invest in product development of Drug X?** If a cure can be developed for Some Horrible Disease (SHD), it would be beneficial to humankind and yield a **profit** of $500M. Initial research indicates a 25% chance that a partial compound X will be effective against SHD. However it will require an additional $25M in R&D to know for sure. Furthermore, even if the resulting compound is proven effective, an additional $25M in testing will be required to get it approved for use in humans. It is estimated that there is a 40% chance that the testing will reveal serious side effects and approval will be denied.

As SHD’s project director you are concerned with 2 principal issues. First, should you pursue the commercial development of compound X? Second, if you do pursue development, what value should you place on the project when comparing it to competing projects?

Perform a sensitivity analysis on your results.

1. **(Extra Credit) Oil Drilling problem.** Mr. Sam Houston of Texas is about to exercise his option to drill for oil on a promising parcel of land. Should he drill? If he hits a gusher there is an estimated $1M of revenue to be gained. After careful analysis of the problem, he came up with the following list of alternatives and risks:
2. Sam paid $20,000 for the drilling option
3. Sam could lower his risks if he hired a geologist to perform seismic testing ($50,000). That would give him a better indication of success and lower his risk of wasting drilling costs
4. Should he take a risk and incur $200,000 in drilling costs without a seismic evaluation to guide him?
5. Sam consulted with the oil experts. They believe Sam’s parcel has a 60% chance of having oil without the benefit of any test.
6. It has also been the experts’ experience that if seismic tests are positive for the oil, there is a 90% chance that there is “some” oil. And conversely, there is a 10% chance of failure.
7. If the seismic tests are negative, Sam could still drill but with a 10% chance of success and a 90% chance of failure.
8. Sam could decide not to drill at all.

What should Sam do?