Notes

You have seen this before. This was the pre-read for the finance vertical section in Basecamp. At that time we used this example to chat about how finance is used inside companies and the role of financial industry (“financial intermediation”). Now we have the tools to analyze the case.

To get rolling on these, begin by considering each of the alternatives separately. We can think about how they are all connected later. What is the Net Present Value? Should the project be accepted? As you consider each project, you can also contemplate: What is the Internal Rate of Return? (This one we will define and calculate in class.) What is the implication for efficiency ratios like ROIC (return on invested capital), Return on Sales, and Capital Efficiency?

This material will be the basis for our discussion in class. If people make different assumptions or come to different conclusions, that is OK. The goal of the assignment is to see NPV analysis in practice – and in practice is a messy thing. Don’t stress about getting the “right” answer.

To Do

- Focus on A and B (B has two concrete alternatives) and D. What is the NPV. You can use the alternatives that are mentioned in each to do a little sensitivity.
- If you want to do C, feel free but it is not required.
- Answers can consist of a short paragraph describing key assumptions and
stating your recommendation and then a picture of your spreadsheet calculating the NPV. (About 1 page or so per idea should be sufficient).

- The blackboard page has a template XLS you can use. Note that the basic structure of the spreadsheet is the same for each business model. This is also true more generally, spreadsheets for project analysis typically have this look and feel. The key to the format is that the analysis resembles an income statement. People tend to find income statements familiar and intuitive. This facilitates review and analysis by focusing in on the key assumptions in the project. You can build your own sheet from scratch if you prefer.

- Submit paper or PDF (and not the raw XLS sheet). Thinking carefully about what/how to succinctly show your analysis is good practice.

Tachyon Enterprises - Technology-based business models

Tachyon has developed a new robot design methodology. The process takes an existing robotic design, breaks it down, and re-engineers it. Typically, the improved design makes the robotic equipment cheaper to produce and improves speed performance. What should Tachyon do with this new skill? Below are some options with the associated cash flows.

Here are a few other assumptions

- For all these projects, the opportunity cost of capital (or WACC) for Tachyon is 8.4%.
- All the projects have a 5 year life span (just to keep things simple).
- Costs spent, to date, on this project are $10,000.
- Tax rate is 35%
- Initially, consider each problem separately. As we work through these, we can ask if/how the projects' assumptions and conclusions are related.

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1This example is based on a real company but I have changed the name and details for anonymity. I happen to be reading Robopocalypse by Daniel H. Wilson. It is the usual terrifying robots take over the world (Terminator, Matrix, etc.). Side note, Daniel Wilson has a Ph.D. from Robotics here at CMU so the book includes a few faculty as characters.
Model A - Fee-for-service:
This business model uses the re-design know-how for contract research. A company/client provides the robot design and Tachyon delivers the re-engineering. There are no additional immediate costs. Most of the costs are salaries of $110,000 per year (over years 1 to 5). Re-design demand is about 6 per year (plus or minus a few) at a price of $20,000 per design. This re-design revenue will occur in year 1 to 5. Each design takes about two months. Customers are billed at completion and pay one month after billing. There is an allocated charge of $5,000 per year related to the use of office space.

It might be possible to get this business running immediately with the implication that revenue and costs can also occur in year 0.

Model B - Manufacturing:
Design, manufacture, and marketing is a complicated and expensive undertaking. First, Tachyon needs to acquire the rights to an existing robot redesign, do some design, and then acquire manufacturing facilities. Purchasing a chip to start with will cost $100,000. Designing the factory and the design work on the chip will cost $250,000. Building the factory will cost $1,200,000. All these costs will happen up front (for simplicity say they all happen in year 0). For tax and accounting purposes they are depreciated over the five-year life of the factory (Not too important here). Sales of the new chip are expected to be $1,300,000 per year (for years 1 to 5). Gross margins are 45% (i.e., manufacturing costs are 55% of the sales revenue). There is an additional costs of depreciation and a $100,000 per year in fixed costs associated with the facility and marketing (for years 1 to 5). Working capital will require (a) 3 months of inventory; (b) Customers will pay 2 month in advance of delivery.

One alternative to fully manufacturing the chip is to outsource the manufacturing step (which apparently uses the buzzword “Fabless” – always nice to learn a new buzz word). Setting up the contract facility to specification is a cost of $400,000 (instead of the the $1,200,000 facility above). Margins will be lower at 25%. The annual fixed cost in this model is $40,000 per year (years 1 to 5).

Note I have assumed here that expected sales are constant over the five years. Reasonable? How sensitive is the analysis to changing sales conditions.
Model C - Licensing:
Licensing is a different business model to fee-for-service and manufacturing. Here, the rights to the technology are negotiated with a customer who will then do the manufacturing themselves (as they see fit). Tachyon would earn a royalty fee that would be based on sales. Here, the upfront costs include: Purchasing a robot design to start with will cost $100,000; Re-designing the chip and getting the specs ready for licensing will cost an additional $150,000; and the marketing and negotiations to get the licensing deal in place will cost $100,000.

As a starting point, consider the revenue from Model B with Tachyon earning a 10% royalty fee. Payment of the fee would lag sales by approximately six months. The fixed cost associated with managing the royalty program is $5,000 per year.

Other alternative royalty fees structures are also being considered. For example, one that included a fixed payment of $50,000 per year (years 1 to 5) and 5% of sales revenue.

Model D - Sale:
iRobot happens to be interested in acquiring the technology completely. The terms of the deal would be a simple of iRobot shares for the intellectual property. They are offering 7,000 shares of equity in the iRobot company.

The negotiations are also considering transferring two key employees along with the intellectual property.