

Design for Real Estate and Infrastructure Development (11.434, 15.428, ESD.712)

Spring 2010

Assignment: Teams Identify and Estimate Major Uncertainties for Projects

Due date: Lecture 5

Each team reports on the two most significant uncertainties affecting the success their project.

The purpose of this exercise is to focus each team on the factors it needs to consider in developing flexibility for the development and deployment of its project.

We expect that each team will divide the required research among its members, for reasons of efficiency. However, the team should assemble these parts into a single report representing its consensus. Individual team members may, at their discretion, submit their own reports or complementary contributions if they cannot agree with the team effort.

In preparing their report, the teams should address both conceptual and factual issues.

Conceptually, each team should define what it thinks are “significant uncertainties” that affect their “success”.

- First, the team needs to define the metric it will use to define “success”. A likely candidate is “profit” or, more accurately, “net present value”. But other metrics might be sales volume or market share. **Note:** To keep the class project simple, I suggest that in thinking about “success”, the team assumes that the focus is on the project and the enterprise producing it. That is, you may ignore how success might be shared between the project development team and other partners -- such as investors and builders. In short, focus on the issues of project design and development, rather than on those of negotiating contracts and deals.
- Second, the team must think about which uncertainties may most affect their chosen metric of success. These may or may not be the significant economic uncertainties. For example, the success of a renewable energy product might depend on the possibility of the enactment of a carbon tax or some other governmental action.

In thinking about uncertainties, run through this checklist:

- Technical facts concerning the project itself;
- Development costs;
- Likely overall demand for project services or facilities, including competition;
- Global economic factors, such as economic boom and busts, energy costs, etc.;
- Governmental regulations, as for safety and environmental regulation; and
- Political factors which might shape the market, for example from new environmental legislation.

Factually, the team needs to define, to the best of their ability, the (subjective) probability distribution associated with their chosen two major uncertainties. It should for each uncertainty identify the:

- shape of the distribution of outcome, for example, symmetrically bell-shaped, or skewed in a particular direction;
- plausible likely range, for example as defined by the P_5 and P_{95} , values, those with only a 5% chance of being lower or higher, which you can think of as the 90% confidence interval; and
- most likely outcome, which might be the median, the mode, or the average, depending on the shape of the distribution.

To arrive at the above estimates, the team should use data immediately accessible, as on the web or other sources available to the team. These data should be cited in detail in the team report, according to academic norms.

The team report should thus contain the following:

- Project Name;
- List of team members responsible for report;
- Definition of chosen measure of success, along with a paragraph giving the rationale for this choice;
- Identification of the two major uncertainties likely to affect the project success most significantly, along with the a paragraph for each justifying the choice; and
- The preliminary identification of the shape, range and most likely values of the uncertainties. **Note:** This section is the crux of the report. It is likely to contain such things as graphs or tables of historical records, forecasts or data from industry, scenarios from agencies or think tanks, etc – all of which should be properly cited. As some of this material is likely to be contradictory or otherwise unclear, the team needs to develop some judgment about the values it develops.

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