

Modeling Decision Processes

Chapter 4 - 1

Defining the Problem and Its Structure

A fully formed problem statement contains three key components:

- The current state of affairs
- The desired state of affairs
- A statement of the central objective(s) that distinguish the two

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Problem Definition Errors

- Failing to identify and define the problem fully may result in a great solution that does not solve the right problem
- A common error: premature focus on the set of solutions rather than the problem itself
- The decision maker may be left with a solution looking for a problem to solve

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Problem Scope

- The problem may be worth solving but the scope is beyond the available resources or time constraints
- In such cases, the scope must be reduced to a focus that allows a solution
- One method to limit the scope is to identify its breadth by asking questions about people involved, cost and magnitude

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Problem Structure

Design of problem structure is similar to design of many other entities

- What is the final appearance?
- What are the elemental details?
- What are the relationships between those elements?

Regardless of context, a problem structure can be described in terms of choices, uncertainties and objectives

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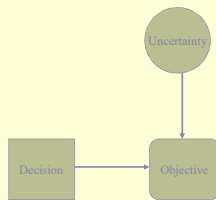
Problem Structure (cont.)

- *Choices*: there are always at least two alternatives (one is "do nothing")
- *Uncertainties*: situations beyond the direct control of the decision maker; their individual probability of occurrence is only estimable within a certain range
- *Objectives*: methods of establishing the criteria used to measure the value of the outcome

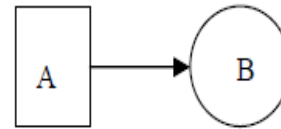
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Structuring Tools

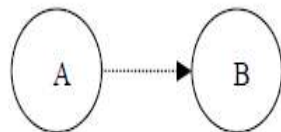
Influence diagram: a simple method of graphing the components of a decision and linking them to show the relationships between them



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Decision A is necessary to estimate probability of Event B

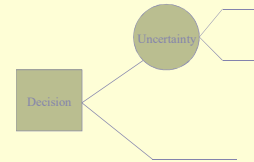


Event A outcome is relevant to probability to Event B outcome

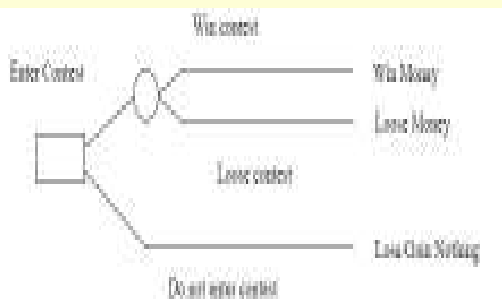
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Structuring Tools (cont.)

Decision tree: another diagram that models choices and uncertainties and can be extended to include multiple, sequential decisions



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Common Decision Structures

- **Basic Risky Decision:** decision maker takes a choice in the face of uncertainty. Success is a function of the choice and outcome.
- **Certainty:** a multiple-objective decision with little risk. Success is a function of the trade-off between objectives.
- **Sequential:** several risky decisions over time. Earlier outcomes may affect later choices.

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EXERCISE

- (a) Study a decision made in an organization you are familiar with. Describe the decision using decision models. What model did you choose and why?
- (b) Discuss the benefits and limitations of using decision models

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