Objectives and Attributes

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Most important decisions involve multiple objectives, and usually with multiple-objective decisions, you can’t have it all.

You will have to accept less achievement in terms of some objectives in order to achieve more on other objectives.

- But how much less would you accept to achieve how much more?
- The answers specify a value trade-off and indicate two consequences that are indifferent to each other.

Making the judgments about how much you would give up on one objective to achieve specific amounts on other objectives is the essence of value trade-offs.
Money

$50

$20

($20, Not hungry)

($26, Not hungry)

($25, 1/2 hungry)

($30, Hungry)

Hunger
What is a value trade-off?

“A key reason for many mistakes in making value trade-offs is that the concept of a value trade-off is frequently misunderstood. Take a very simple example. Suppose you are reasonably hungry and have $30 in your pocket. Your hunger is such that you would be indifferent between eating a hamburger and keeping $20 and not eating the hamburger and having $30. In other words, your value trade-off for the hamburger is $10. This means that you would be willing to pay up to $10 for that hamburger if you had to. However, suppose there is a convenient location where you could purchase a hamburger for $4. Now, you are willing to pay only $4 for the hamburger (and not more) and keep $26 in your pocket. Such a decision makes you better off: Having eaten a hamburger and keeping $26 is preferred to having $30 and not eaten a hamburger. Your value trade-off for the hamburger is $10, whereas the trade-off that you are willing to make given the choices available is to pay $4 for a hamburger. For this reason, in lay terminology, we refer to a value trade-off as an “even swap” (Hammond et al. 1999), as you are equally well off after an exchange based on a value trade-off is made.”
Decision Frames

- A decision frame consists of a decision maker’s set of alternatives and the objectives that the decision maker is attempting to achieve when choosing.
- The objectives can be categorized as means, fundamental and strategic objectives.
  - A *means objective* is one way to achieve another objective.
  - A *fundamental objective* is an objective that governs a decision maker’s choice in a particular decision context.
  - A *strategic objective* is one that reflects the long-term goals of a decision maker’s organizational setting; a strategic objective may be affected by many decisions in an organization.
Buying a Car

- Driving experience = passing (0-60)
- Maximize fuel efficiency (mpg) x fun
- Maximize safety (crash)
- Maximize capacity (passengers)
  - Front seats
  - Back seats
    - Diminishes
- Cargo
  - Trunk space
  - Roof rack
  - Hidden space
- Maximize comfort
  - Seat comfort
  - Environment
  - Entertainment

- Price
  - Ownership
  - Insurance
  - Maintenance
  - Fuel

- AC, GPS, Stereo, Speaker, XM radio
1. Maximize environmental comfort
   a) Cooling (Does it have AC?)
      0 - None
      1 - Manual thermo,
      2 - Auto thermo.
   b) Heating while driving
      Heated seats?
   c) Pre-heating

Means Objectives Networks

- A means objective is one way to achieve another objective.
- A means objective network is a graphical tool to connect objectives, depicting the means-ends relationships.
  - Each objective is written in the network and then the objectives are connected by arrows.
  - An arrow from objective A to objective B indicates that objective A is a means to achieving objective B.
How far do we follow the diagram?

- I want (objective A)
  - Why do I want (objective A)?
- Answer
  - Because then I will get (objective B)
- When do we reach fundamental objectives?
- When do we reach strategic objectives?
  - The control of consequences criteria tells us
Buy the best car

- Style
  - Comfort
    - Temperature
    - Entertainment
    - Passenger
  - Capacity
    - Cargo
- Price
  - Ownership
    - Insurance
  - Maintenance
    - Fuel
- Safety
  - Stepping
  - Crash Survival
    - Night
    - Front
    - Fog
  - Side
    - Roll
    - Rear
- Airbags
  - Side Airbags
  - Trunk Space
Value or Objectives Hierarchy

- Fundamental objectives are those that we actually wish to achieve in a particular decision context, as opposed to means objectives that are merely a means to attaining our fundamental objectives.
  - The hierarchy of fundamental objectives, or *value hierarchy*, can then be developed as a tree with the objectives on each branch defining in more detail what is meant by the objective above them.
  - A value hierarchy ensures that the objectives are appropriately related to the overall objective.
An Example of a Value Hierarchy

Maximize quality of Upham Brook watershed

- Improve fish habitat
  - Improve water quality
  - Restore RZ & floodplain
  - Improve land use
  - Restore naturally stable stream channel
  - Restore natural stream flow
  - Restore naturally stable stream channel
- Improve invertebrate habitat
  - Improve water quality
  - Restore RZ & floodplain
  - Improve land use
  - Restore naturally stable stream channel
  - Restore natural stream flow
  - Restore naturally stable stream channel
- Improve amphibian habitat
  - Improve land use
  - Restore RZ & floodplain
  - Improve naturally stable stream channel
  - Improve natural stream flow
  - Improve natural stream flow
- Improve mammal habitat
  - Improve land use
  - Restore RZ & floodplain
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  - Improve natural stream flow
  - Improve natural stream flow
- Improve bird habitat
  - Improve land use
  - Restore RZ & floodplain
  - Improve naturally stable stream channel
  - Improve natural stream flow
  - Improve natural stream flow
- Maximize residential value
  - Make water safe for designated usage
    - Increase access & recreation
    - Increase flood safety
  - Improve land use
  - Restore RZ & floodplain
  - Improve naturally stable stream channel
  - Improve natural stream flow
  - Improve natural stream flow
- Maximize commercial/industrial value
  - Make water safe for designated usage
    - Increase access & recreation
    - Increase flood safety
  - Improve land use
  - Restore RZ & floodplain
  - Improve naturally stable stream channel
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  - Improve natural stream flow
- Maximize quality of wildlife habitat
  - Improve water quality
  - Restore RZ & floodplain
  - Improve land use
  - Restore naturally stable stream channel
  - Restore natural stream flow
  - Restore naturally stable stream channel
- Maximize quality of human habitat
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