Structured Decision Making (SDM) Cheat Sheet

Pr → O → A → C → T → *Decide & Act*

2 Key elements of SDM:

1. Values-focused
- Objectives discussed first
- Contrasts with alternative-focused methods

2. Problem decomposition (PrOACT)
- Break problem into components, separating science from values
- Complete relevant analysis
- Recompose the parts to make a decision

Problem framing: Creates an explicit and shared understanding of the problem

Secret Formula: *"Decision Maker (**D**) is trying to do **X** to achieve **Y** over time **Z** and in place **W** considering **B**."*

D = the Decision maker(s) **X** = the type(s) of action that needs to be taken **Y** = the ultimate goal(s)

Z = the temporal extent of the decision problem **W** = the spatial extent of the decision problem

B = potential constraints (legal, financial, etc.) and important uncertainties (scientific or other)

Objectives: What the decision maker cares about and wants to achieve

Pieces of an objective = The 'wants' + direction (minimize or maximize) + attribute (the units)

Steps: **1.** Transform concerns → objectives, **2.** Structure objectives (distinguish types), **3.** Develop measurable attributes

1. *Example:* Concern = I don't have enough money for the project → Objective = minimize cost

2. Types of objectives:
- *Fundamental* (basic reason for caring about the decision)
- *Means* (intermediate objective to achieve fundamental)
- *Process* (concern for *how* the decision is made)
- *Strategic* (higher level/ agency mandate)

3. Measurable attributes: how you measure an objective (*natural*, *constructed*, or *proxy* scales)
Natural = directly measurable, *Constructed* = sliding/ relative scale, *Proxy* = correlated with objective

Alternatives: The options for the decision maker

Tips: Brainstorm, challenge assumptions and constraints, work independently then as a group, revisit objectives

Strategy table: →

Example alternative/strategy: Action 1A + Action 3C

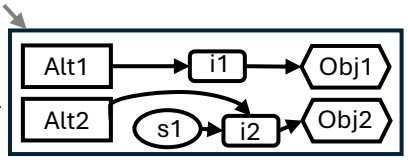
Objective 1	**Objective 2**	**…**
Action 1A	Action 1B	…
Action 2A	Action 2C	…
Action 3A	Action 3C	…

Consequences: measures alternatives (Alt) in terms of objectives (Obj)

Tools: modeling, experts, consequence tables, → influence diagrams:

s = stochastic factor (e.g., weather)

i = intermediate factor (e.g., predation)

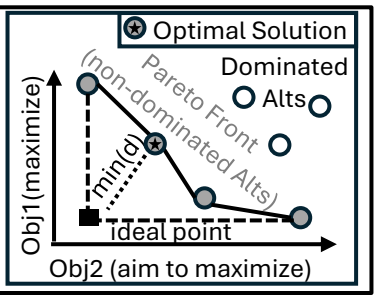


Alt	**Obj 1**	**Obj 2**
Alt 1	Obj 1 # for alt 1	Obj 2 # for alt 1
Alt 2	…	…
…	…	…

Tradeoffs: give up on one objective to make gains in another

Tips: remove irrelevant objectives (performance does not vary over Alts), remove dominated alternatives (another Alt better on all/some Objs), make even swaps (if two Objs are in the same unit → combine)

Tools: - Multi Criteria Decision Analysis (tools to weight objectives and calculate scores of alternatives)
- Pareto frontier analysis (identify dominated solutions, → best with two objectives)



*Adaptive management = special type of SDM involving learning and iterative decisions