**OBJECTIVES**

By the end of this module, you should be able to:

* Understand the importance of:
* Clearly defining the problem to be addressed
* How the decision statement guides the rest of the SDM process
* Identify the essential components of a decision statement
* Identify the primary decision impediment – What makes the decision hard?

**PROBLEM FRAMING & DEFINITION**

***Problem Framing***

* The first, and often the most difficult, step is understanding the decision
* Determines which objectives are relevant to the decision context and, later, which alternatives are available for achieving objectives
* Provides an *a priori*, explicit, and shared understanding of the problem at hand
* Sets bounds on the problem by identifying spatial, temporal, organizational, legal, and other relevant boundaries
* Decision makers often immediately jump to thinking about alternatives without first understanding the decision problem or thinking about objectives
* Alternative‐focused thinking can lead to problems being framed too narrowly and the subsequent omission of important objectives and the means of achieving those objectives

***Defining Problems as Decisions***

* Making a decision is the problem – management problems are often made more difficult (murky) when we fail to realize that the problem revolves around a decision
* Deciding between a set of alternative courses of action should be the focus of problem solving (i.e., decision making)
* **Decision Statements** should reflect values, not just technical or scientific aspects of a decision
* Values and issues may be:
* Economic
* Political
* Cultural
* Legal
* etc.

**ELEMENTS OF PROBLEM FRAMING**

1. Identify the decision maker(s)
2. Identify other key players
   * Decision implementers and stakeholders
   * Technical experts, facilitators (participation is generally more important later in the process…)
3. Consider the legal and regulatory context
4. Consider the decision structure
   * Timing, frequency, temporal and spatial scale, objectives, constraints, and actions
5. Consider the type of analysis required
6. Revise as needed
7. ***Identify the decision maker(s)***

* Who has the authority to commit to action?
* Can be a surprisingly difficult question
* Some scenarios
* Single decision‐maker
* Possibly with interested stakeholders
* Multiple decision‐makers
* Willing to work together for joint aims
* Competing with each other
* Delegated authority
* e.g., Secretary → Director→ Regional Director
* Contested authority for the decision
* Failure to identify and include all decision makers in the process will very likely lead to failure

1. ***Identify other key players***

* Decision implementers
* Will entities without decision‐making authority be responsible for implementing decisions?
* Stakeholders
* The public
* Technical advisors
* Facilitators/decision coaches

*Decision makers vs. stakeholders*

* Decision makers have the authority and resources to implement the selected action
* Decision makers have greater responsibility and accountability than stakeholders

*Who could be a stakeholder?*

* Any person or organization with a vested interest in the outcomes of a decision
* Your personal or professional decisions – examples?
* For natural resource management decisions:
* Consumers/users (e.g., hunters, anglers, hikers, boaters…)
* Public management agencies (e.g., FWS, EPA, state agencies)
* Non‐governmental organizations (e.g., The Nature Conservancy)
* Political agencies or officials (e.g., federal, state, local officials)
* Economic entities (e.g., businesses, chamber of commerce)

*Who should be a stakeholder?*

* Use Stakeholder Analysis to identify and assess the importance of including potential stakeholders in a collaborative decision process



**Figure 1.** Stakeholder analysis matrix ranks stakeholders in terms of their ability to influence a decision and the ability of the decision outcome to affect the stakeholder. Figure from Conroy and Peterson (2013).

*Conducting a stakeholder analysis*

* Step 1: Develop a list of candidate stakeholders by asking the following questions:
* What are the interest groups potentially affected by the decision?
* Which interest groups are usually involved in similar decisions and which ones are usually excluded?
* Who has the knowledge of how the system works?
* What entities (e.g., management agencies) or people (e.g., farmers) have the legal authority or resources to implement management actions or make recommendations?
* The answer to this question will help identify decision makers
* Step 2: Rank candidate stakeholders using the following 2 attributes
* The ability of the decision to affect the stakeholder
* The stakeholder’s ability to affect the decision

1. ***Consider the legal and regulatory context***

* Particularly for decisions by public agencies
* What enabling legislation confers authority for the decision?
* How do legislation or other regulations bound the decision problem?
* Objectives
* Constraints
* Set of choices

1. ***Consider the decision structure***

* **Frequency and Timing** – How often will the decision be made? When does the decision have to be made? Are other decisions linked to this one?
* **Scope** – How large, broad, complicated is the problem/decision? Single or multiple objectives? Conflicting objectives?
* **Objectives** – Roughly, what are the desired outcomes? Is there one primary objective or many?
* **Actions** – Roughly, what kinds of alternatives are being chosen from?
* **Constraints** – Legal, financial, political, ‘minimum performance.’ Perceived or real constraints?
* **Uncertainty** – What degree of uncertainty is present? Can it be ignored?

1. ***Consider the type of analysis required***

* In order to choose among alternatives, what sort of analysis will be required?
* How much detail is needed?
* What class of decision problem do you have?
* Do the data and analytical methods exist?
* Do you have access to the expertise?
* Is uncertainty a fundamental impediment?

1. ***Revise as needed***

* Problem framing is one of the most difficult steps. It can be difficult to get right the first time
* As you proceed with the decision analysis, insights may arise that cause you to rethink the nature of the decision. Be open to these insights
* The problem definition is likely to change as you proceed with development
* Adopt iterative prototyping as an approach to development of a decision analysis

**CLASSES OF DECISION PROBLEMS**

* Certain decision structures appear again and again
* Being able to recognize these classes of decision problems helps you quickly understand the structure and the tools that may be needed
* In this course, we focus on six classes of decisions
* Prediction problems
* Multiple objective problems
* Portfolio problems
* Risk problems
* Information problems
* Dynamic problems
* Most decisions are, of course, hybrids of these but it helps to recognize the basic forms
* At the problem framing stage, a decision analyst tries to recognize the class of decision

**DEVELOPING A DECISION STATEMENT**

* It’s useful, early in the process, to draft a short problem statement
* About a paragraph long
* Captures the essential outline of the problem
* Helps participants focus
* Reframes a vague task as a decision to be solved
* Answer the following questions:
* **Decision Maker** – Who will make the decision?
* **Trigger** – Why does a decision need to be made? Why does it matter?
* **Action** – What is the decision? What action needs to be taken?
* **Objectives** – In general, what is the decision maker trying to achieve?
* **Constraints** – Legal, financial, political? Are these perceived or real?
* **Frequency and Timing** – Periodicity of decision. Are other decisions linked to this one?
* **Scope** – How broad is the decision?
* **‘Class’ or type of problem** – Which of the six classes does the decision fall into? What are the impediments to making the decision?

Use the information above to complete this template: “Decision Maker (**D**), due to (**T**), is trying to do **A** to achieve **O** over time **F** and in place **S** considering **C**” where:

**D** = the Decision maker(s)

**T** = Trigger

**A** = the type(s) of action that needs to be taken

**O** = objective(s)

**F** = the temporal extent of the decision problem.

**S** = the spatial extent of the decision problem

**C** = potential constraints (legal, financial, and political) and important uncertainties (scientific or other)

**Example: Mountain lion season setting decision in western Montana (FWP Region 2) in 2014, citizen committee process (courtesy of Justin Gude, Montana Fish, Wildlife, and Parks)**

The MT Fish and Wildlife Commission is in the process of establishing the mountain lion harvest quotas and permit numbers for 2014 in MFWP Region 2.  There is no mountain lion management plan to guide the decision. There is uncertainty regarding current lion population density estimates; harvest levels, and sex and age structure of the harvest that are needed to achieve the desired outcomes; and the impact of lion predation on ungulate population dynamics, especially in areas where ungulate populations are in serious decline and recruitment levels leave populations in jeopardy. The differing expectations of lion hunters and deer/elk hunters regarding lion population density and demographic structure of the lion population are in conflict. There is also disagreement regarding the allocation of the lion harvest between residents and nonresidents, and the impact of season structure options on local businesses—as well as how the various season structure options impact lion hunt quality and public perceptions of hunter ethics.

**AVOID COMMON PITFALLS**

* Are there other perspectives that aren’t being considered?
* Are any perceived constraints imaginary?
* Are we biased by earlier actions, successes, or failures?
* Are we making any false assumptions?

If we answered “yes” to any of these, we may be incorrectly framing the problem.

**DECISION FRAMING IS HARD**

* It’s worth taking the time to get it right

“*A good solution to a well‐posed decision problem is almost always a smarter choice than an excellent solution to a poorly posed one.*” ~ Ralph Keeney

“*Never enough time to do it right… always enough time to do it over*” ~ Anon.

**REFERENCES**

Conroy MJ and JT Peterson. 2013. Decision Making in Natural Resource Management: A Structured

Adaptive Approach. Hoboken, New Jersey, USA: John Wiley and Sons, Ltd.

Howard, RA. 1966. Decision Analysis: Applied Decision Theory. In: D.B. Hertz and J. Melese (Editors),

Proceedings of the Fourth International Conference on Operational Research. Wiley‐Interscience, New York, NY, pp. 55‐71.

Keeney RL. 1996. Value‐focused thinking: A path to creative decision‐making. Cambridge,

Massachusetts, USA: Harvard University Press. 432 p.

**MODULE DEVELOPED BY:**

Angela Romito, *USFWS Southeastern Regional Office*

Jean Fitts Cochrane, *Grand Marais Consulting*

Mitch Eaton, *USGS DOI Southeast Climate Science Center*

Michael C. Runge, *USGS Patuxent Wildlife Research Center*

Suggested Citation for this Module:

Romito AM, Cochrane JF, Eaton MJ, Runge MC. 2015. Problem definition. Module 04 *in* Runge MC,

Romito AM, Breese G, Cochrane JF, Converse SJ, Eaton MJ, Larson MA, Lyons JE, Smith DR, Isham AF, eds. Introduction to Structured Decision Making, 2015 edition. U.S. Fish and Wildlife Service, National Conservation Training Center, Shepherdstown, West Virginia, USA.