

DECISION PROTOCOL

VERSION 2.0

PROBLEM CYCLE

NOTE:

The Decision Protocol is intended to be a tool to help US Forest Service decision teams work through complex business and environmental decisions. It is an administrative aide that introduces the professional to the principles of decision science, outlines useful steps, and provides sources of information and techniques for improving decision quality. The Protocol is not and should not be viewed as formal Forest Service guidance or policy. Forest Service teams are not required to use the Protocol; its recommendations are not legally binding. Members of the public or other agencies are welcome to participate in Protocol-based projects or use the Protocol or any of its concepts or parts, but their use is strictly voluntary. The Forest Service is not responsible for the consequences of applications or misuse of the Protocol outside the agency.

DESCRIPTION

PURPOSE

- * Describe context of the problem or opportunity in biological, social, economic, and other terms.
- * Articulate the reason(s) for action; describe different perspectives of problems or opportunities that should be or are proposed to be acted on.

PROCESS

- * Gather, evaluate, and integrate different views of the problem(s) or opportunity(ies).
- * Specify important measures of problem solution or success.

- * Write a problem statement and goals and objectives to guide the action design process.

PRODUCTS

- * Narrative description and a map of the area or organization including goals, issues, ongoing management activities, and sources of uncertainty.
- * Description of different problem perspectives.
- * Goals and objectives statement that describe why an action is needed and what values of measures must be achieved to successfully address it.

INITIAL ASSESSMENT QUESTIONS

Put a check beside each statement that is true about any statement of the problem or opportunity you have already developed. For each question unchecked, work through the CORE QUESTION suggested and/or describe what should be done to bring this part of the alternative set "up to grade". If you check fewer than half of the questions, work completely through the DESIGN CYCLE CORE QUESTIONS.

_____ The problem or opportunity is clearly defined. If not, go to PROBLEM Questions 6-11.

_____ The different perspectives and/or multiple facets of the problem or opportunity are completely represented. If not, go to PROBLEM Question 7.

_____ The problem is relevant to general problems, opportunities, and goals of the overall situation. If no or unsure, go to PROBLEM Questions 4-6.

_____ The problem or opportunity is defined in measures that can reliably indicate success or failure. If no, go to PROBLEM Questions 9-11.

_____ The objectives for problem solution are concrete. If no, go to PROBLEM Question 16.

_____ The objectives closely address the true cause of the problem. If no or unsure, go to PROBLEM Questions 8, 13, and 16.

_____ The data and information are useful in defining the problem and setting objectives. If not, go to PROBLEM Questions 13, 14, and 15.

CORE QUESTIONS

SITUATION DESCRIPTION

PROBLEM Question 1. What do you know about the area, organization, or situation for which this decision will be made?

Broadly describe the situation, area, and/or the organization -- physically, biologically, socially, culturally, economically, and politically. For areas, a large scale map may be a useful template.

Identify sources of information used in your descriptions.

PROBLEM SUMMARY TABLE 1. Situation Description (Problem question 1)

Situation component	Description	Information sources
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PROBLEM Question 2. What management activities are now going on or have gone on in the area or situation?

Describe any past, ongoing, or planned management activities, projects, or programs. Include activities in adjacent areas if they might be important in describing the problem in which you will be interested. Consider activities conducted or permitted by your agency, as well as other federal, state, and local agencies, and private sector individual and organizations. Planned activities include those approved but not yet implemented and those being planned for the future.

Show activities on the map, along with important landmarks, and other features that interact with these activities.

PROBLEM SUMMARY TABLE 2. Management activities (Problem question 2)

Activity status	Activity Description	Whose?
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Past

Ongoing

Approved

Planned

PROBLEM Question 3. What natural or human-caused disturbances, patterns, trends, or other uncertain events are important in this situation?

Describe how often these events have occurred or are expected to occur and what implications they have for parts of the

situation. Include:

* Natural disturbances (e.g., fires, storms, insects, and diseases) and their effects.

* Human-caused events or disturbances (e.g., economic trends, demographic shifts, labor strikes, social and political patterns, and others).

PROBLEM SUMMARY TABLE 3. Uncertain events and disturbances. (PROBLEM question 3)

Uncertain events and trends.	Frequency	Implications
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PROBLEM QUESTION 4. What goals, objectives, or strategic directions have been set for this area or organizational unit? How might these affect how you solve problems here?

Look at strategic or programmatic plans, land use plans, regional assessments, State plans, environmental protection and species recovery plans, local development plans, legal and policy requirements, and others. If appropriate, represent these on a map. Show how they set bounds on activities in the area.

PROBLEM TABLE 4. Area or unit goals and objectives (Problem question 4)

Source	Situation component	Goal/objective
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PROBLEM QUESTION 5. What are the most important problems, opportunities, or public issues that characterize this area?

Describe each problem, opportunity, and issue. Characterize each in terms of the existing and the desired condition(s).

PROBLEM SUMMARY TABLE 5. Area problems, opportunities, and public issues (PROBLEM question 5)

Area problem /opportunity/issue	Situation component	Existing condition	Desired condition
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PROBLEM ANALYSIS

Designing an action means changing something about the environment, organization, or community situation for the better. The following questions will help you be specific about (a) what you are trying to change, and (b) how you propose to change it.

PROBLEM QUESTION 6. What problem(s) or opportunity(ies) should be addressed with a new or revised management action?

(Record results of discussions for questions 6-8 in Problem Summary 6, which follows Question 8).

Describe any and all problems that seem to demand your attention in this decision. There may be multiple problems, some of which will be closely interrelated. Some may be variations of the problems you described for the entire area or unit.

Consider:

- * What needs to be changed.
- * If there is a proposed action, what the action is proposed to improve.
- * Whose problem it is. Is it your organization's job or responsibility to solve it?
- * Area or organization goals and objectives (PROBLEM Question 4)
- * Area or organization problems and opportunities (PROBLEM Question 5)

PROBLEM QUESTION 7. What different perspectives of this problem and/or opportunity are held by different stakeholders?

Describe the views of the decision maker, project proponent(s), public groups, agencies, and local and state governments.

Consider:

- * Differences in these perspectives.
- * What opposing views believe about the system in question.
- * How different views can be reconciled and integrated into the overall problem frame.

PROBLEM QUESTION 8. What is the cause(s) of this problem/opportunity?

Display graphically or in narrative the principal cause- effect relationships that explain why this problem exists. A cause-effect relationship is a sequence or network of activities, events, and situation components and measures. A component of the situation or its attributes may be influenced by activities, by other components, or events. There are usually multiple cause-effect chains in any situation; some are more likely than others to produce consequences, good or bad.

Describing cause-effect relationships has several uses. It can:

- (1) Point out possibilities for designing the action.
- (2) Reveals ambiguities, uncertainties, or knowledge gaps.
- (3) Allow the decision team to visualize how activities interact with important stress factors and other activities to produce cumulative consequences.
- (4) Help explain the problem analysis and consequence assessment to others.

PROBLEM SUMMARY TABLE 6. Problem/opportunity description. (Problem questions 6-8)

Problem /opportunity statement (Decision team) (PR-6) (PR-7)	Problem statement(s) (Stakeholder view) Stakeholders Cause of problem (PR-8)
	(PR-7)

PROBLEM QUESTION 9. What components or attributes of the situation are of most concern or offer the most opportunity for improvement?

(Record results of your discussions of PROBLEM questions 9-11 in PROBLEM Summary Table 7, after question 11)

Describe the attributes and measures that are not at their desired levels or are at risk of dropping below desired levels.

Every situation has components - biological or physical resources, organizations, societal customs, or perhaps an economic conditions. Each component has one or more attributes that describe the component and comprise its value. Changes in these attributes may constitute a loss or a gain. A problem is a diversion or possible diversion from desired levels of one or more of these attributes.

For example, elk habitat is an environmental (situation) component; the distribution of habitat types (thermal, hiding, feeding, etc.) is an attribute. A riparian area is also an environmental component; vegetation condition and stream channel condition are two of its attributes. Willow condition is a specific vegetation attribute; willow height or percent utilization of willows by livestock and wildlife within a particular time period are measures (see PROBLEM QUESTION 10 below) of the attribute willow condition.

Not everyone will have the same beliefs about what the problem is, what attributes are at issue, or how they should be measured. You will have to understand different perspectives and synthesize them into an overall statement of the

problem attributes.

PROBLEM QUESTION 10. What measures are used to characterize these attributes?

Specify measures for each problem attribute.

Attributes can be organized from general to more specific and quantified with measures. These measures act as a yardstick with which to register or predict changes in the attribute in response to natural or human influences. Value is the specific level of a measure. A consequence is the end value of a measure after an event or action has taken place. An effect is the amount of change that has or will occur in a measure --- the difference between the measure's value without the action and the same measure's value under the influence of the action.

[For each attribute from PROBLEM Question 9 record a measure in the Problem Measures Summary Table (after Question 11)].

PROBLEM QUESTION 11. What values of each measure would constitute solving the problem(s)?

* Estimate the current or status quo value of each measure. The status quo can be the current value or the future value under the status quo management action.

* Specify the desired values of each measure.

* Describe or quantify the gap between the status quo value of the measure and the desired value.

[For each measure recorded for PROBLEM Question 11, record the values in PROBLEM Measures Summary Table 7]

PROBLEM SUMMARY TABLE 7. Problem measures (Problem questions 9- 11)

Problem	Situation	Attribute	Measure	Current value of measure	Desired	Gap
	component	of component	of attribute	(PR-11)	value	
(PR-6)					of measure	
	(PR-10)	(PR-10)	(PR-11)		(PR-11)	

PROBLEM QUESTION 12. Is there a need for action to resolve this problem?

Review the current and desired values of the measures in PROBLEM Summary Table above.

Judge whether the gaps represented there accurately represent the problem.

Judge whether the gap is great enough to warrant action by your agency or anyone else. Justify and explain your judgment.

PROBLEM QUESTION 13. What evidence do you have to justify the any action? How strong is that evidence?

For each measure that describes a problem, list the information you used to evaluate it. Cite studies, articles, texts, and describe data, experts, internal communications, and other sources.

On a scale of 0 to 10, rate this body of evidence for how strongly it supports the presence of the problem you defined.

On a scale of 0 to 10, rate the problem as defined for its overall importance.

Rank the problems (for multiple problem situations) on strength of evidence and on importance. Screen out those problems that are too weakly supported, unimportant, or beyond the team's scope or authority.

Record your conclusions for each measure and your reasons for eliminating some from the overall problem statement.

For each measure (from Problem Questions 9,11) record in Problem Summary Table 8 the following: information, strength of evidence, importance of problem, and status.

PROBLEM SUMMARY TABLE 8. Need for action (Problem question 13)

Measure with action needed	Information sources	Strength of evidence	Importance of problem	Need for action confirmed (yes/no) (reasons)
(PR-11)		(0 to 10)	(0 to 10)	(PR-13)
	(PR-13)			
		(PR-13)	(PR-13)	

INFORMATION ASSESSMENT

PROBLEM QUESTION 14. What are the important gaps in knowledge that hinder your ability to understand and evaluate the problems?

Evaluate the quality, accuracy, and usefulness of the information with which you are evaluating needs and problems.

Describe the major knowledge gaps that, if filled would make you comfortable in your assessment of the problem(s). These knowledge gaps can include :

- * Inability to adequately measure the attributes.
- * Lack of data on baseline conditions at the time and geographic scale of the stated problems.

* Inadequacy of models or experts to capture the actual relationships and variability in the processes.

* Disagreement or lack of understanding about cause-effect relationships.

* Lack of understanding about natural disturbances and uncertain events that influence the problems.

* Others _____

PROBLEM QUESTION 15. What information is most needed to close these information gaps?

List the information that should be improved or collected.

Estimate what it would cost in time, money, and effort to obtain this information.

PROBLEM SUMMARY TABLE 9. Knowledge gaps (PROBLEM questions 14 &15)

Problem (Component, attribute or measure)	Knowledge gap for understanding the problem.	Information needed	Cost of information
(PR-6 through PR-10)	(PR-14)	(PR-15)	(PR-15)

OBJECTIVES SETTING

PROBLEM QUESTION 16. What are your objectives in solving this problem?

List the measures you want to change with proposed actions. See PROBLEM questions 6-10.

Specify the values (or at least direction of change from the current or status quo values) that you want to achieve with an action.

PROBLEM SUMMARY TABLE 10. Objectives for action (Problem question 16)

Measure	Target value (for desired consequence)
(PR-10)	

AUDIT QUESTIONS

GO BACK AND REANSWER THE INITIAL ASSESSMENT QUESTIONS IN THIS CYCLE. IF YOU ARE UNSATISFIED WITH ANY OF THE ANSWERS, REVISIT THE APPROPRIATE CORE QUESTIONS. SEE THE APPENDIX FOR PROCESS SUGGESTIONS.

This may be a good point to break your analysis process for collection of information and for a collaborative validation of the problem and objectives statements with stakeholders.

TEAM LEADER TIPS AND TOOLS

Following are some tips and aides for working through selected CORE QUESTIONS in each of the cycles. Not every CORE QUESTION has a tip or tool, but as the Decision Protocol matures and your experience with it grows, we hope to add to the repertoire.

Note: There are no tips or tools for PROBLEM Questions 1-5, 9-11, and 13-16.

PROBLEM Question 6. What problem(s) or opportunity(ies) should be addressed with a new or revised management action?

For helping the team (or stakeholders) define problems, ask the team to try one or more of the following:

1. Develop a round robin, independent statements of the "problem" and display these on a flip chart. Ask for anonymous statements written on note cards if that seems appropriate.
2. Describe the "best," "worst," and "most probable" consequences of not solving the problem.
3. Describe "whose" problem is being solved by the proposal.
4. State the problem or opportunity as a question.

5. State the problem as given to the group; ask the individuals for the problem as they understand it.

6. Write out a preliminary or "strawman" statement of the problem; "lasso" key words with flip chart marker and ask for elaboration.

7. State what the problem is ... and what the problem is not.

8. Draw a "mind map" of the key factors and how they interrelate. Pick out the problem from the mind map.

9. Use the journalist approach. Put the problem in terms of who, what, when, where, etc.

10. Reconstruct the problem by stating its smaller sub-problems and weaving them into a larger picture. Or, start with a general, abstract or ambiguous statement of the problem and break it down into smaller sub-problems.

11. Force-field analysis - list the forces that are worsening or sustaining an unwanted situation or restraining a goal; list those that are decreasing the problem (sustaining the goal). State the problem in terms of these forces (Doyle and Straus 1982).

12. Set up a dialectical inquiry debate. Develop a "strawman" problem statement. Assign one person or group to defend a problem statement, another to present an alternative statement. Each group lists their assumptions about the situation and attacks the other teams assumptions in a structured debate. A third group evaluates the results of the debate and synthesizes a compromise or integrated problem statement (Evans 1991).

13. State the problem in the terms of another discipline or subject area(e.g. sociological instead of a biological problems). This technique is called "lateral thinking" (de Bono 1994).

14. Think about analogies to the problem. "This problem is like a _____". Use the insight to reexamine the parts of the frame. This is called synectics (Doyle and Straus 1982).

15. Use a new metaphor to describe the way the team should look at the problem. Like a sports team? Like a surgical team? Like an assembly line team? Would another type of team see this problem differently (Russo and Schoemaker 1989)?

PROBLEM Question 7. What different perspectives of this problem and/or opportunity are held by different stakeholders?

Different stakeholders have different views about what the problems or opportunities are. Try to understand the widest possible range of problem perspectives so you can anticipate reactions and weave stakeholder needs into the design. Learn these perspectives by facilitating a representative group of stakeholders, interviewing them individually, simulate stakeholder elicitations in the decision team, perhaps with team members role playing different stakeholders.

PROBLEM Question 8. What is the cause(s) of this problem/opportunity?

The steps for cause-effect analysis are:

1. Identify major factors. Concentrate on dynamic factors such as activities or events that rise and fall and are likely to cause changes.
2. Identify cause-effect relationships. Describe the causal links between factors in a two-column cause-effect table. Causal factors go in the left column, affected factors go in the right column. Factors from the affected column can also be entered in the causal column, if they in turn influence some other factor. For example: Activity Y affects Component A, which in turn affects Component B.
3. Describe the relationships as direct or inverse. If the affected factor increases (decreases) as the causal factor increases (decreases) , the relationship is direct. If the affected factor decreases (increases) as the causal factor increases (decreases) the relationship is inverse. For example, an increase in Activity Y causes Component A (measure) to increase(direct) which in turn causes Component B's value to decrease (inverse).
4. Diagram the relationships. Use a "mind map" that is a network of cause-effect relationships. As the name implies, it "maps" out how the team or expert believes the system works. The map can be a network of circles (components or attributes), boxes (activities) connected by arrows (indicating influencing processes), with the arrows designated as direct or inverse. Multiple arrows may emanate from or lead into an activity or component. A path is a series of causal connections for a change in an attribute; any change may have multiple pathways.
5. Analyze the relationships as an integrated system. Usually some paths are clearly more influential than

others. Follow through the diagram with some simulated changes in key factors that were most mentioned in the problem prospecting. In solving a problem, you may want to look for or design activities in paths that are most influential. In avoiding adverse effects, you may consider an activity on a minor path to be of relatively minor concern. Assessing the relative strengths of these pathways is mostly a matter of expert judgment.

PROBLEM Question 12. Is there a need for action to resolve this problem?

The need describes why any action should be taken. It does not describe what or how it will be done. Need identification can suffer from errors of omission and commission. By not identifying a need, and not doing anything about it, there are consequences. By identifying a need that really does not exist, there are unnecessary costs of planning and implementing an action. Ask the team should be asked to imagine the consequences of these two types of errors.

FOR FURTHER READING

PROBLEM Question 6.

Clemen (1996): 19-39 elements of decision problems; 41-100 structuring decisions; 187-216 creativity and decision making, tools for stimulating creativity.

Dawes (1988) : 32-47 Framing consequences

deBono(1994) : 52- 70 lateral thinking technique to stimulate creativity; 85-112 structuring emotions and values

Doyle and Strauss 1982): 213-229 Tools for getting groups to structure problems.

Dunn (1981): 97-139 Structuring policy problems.

Evans(1991): 61-88 Methods for enhancing creativity

Jones(1995) : 51-82 Problem framing aids; 161-199 hypothesis testing; 201-206 devil's advocacy technique.

Kleindorfer et al. (1993) : 24-63 Review of problem finding research.

PROBLEM Question 7

Bazerman(1986) : 48-75 Review of framing effects on choice behavior; 91-11 creativity-limiting assumptions and corrections.

Russo and Schoemaker (1989): 15-63 problem framing and tools for improvement

Fisher, Ury, and Patton (1991) : 1-55 interest-based problem solving; 81-94 criteria selection

PROBLEM Question 9

Keeney and Raiffa (1993): 31-65 Structuring decision problems, objectives, and attributes; 354-435 application examples.

Keeney (1992): 1-152 Values-focused decision structures

vonWinterfeldt and Edwards (1986): 26-55 Aids for structuring problems

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Kleindorfer, P.R., H.C. Kunreuther, P.J.H. Schoemaker. 1993. Decision Sciences: An Integrative Perspective. Cambridge University Press, New York.

Russo, J. Edward and Paul J.H. Schoemaker. 1989. Decision Traps: The Ten Barriers to Brilliant Decision-Making and How to Overcome Them. Simon and Schuster, New York. 280 pp.

von Winterfeldt, Detlof and Ward Edwards. 1986. Decision Analysis and Behavioral Research. Cambridge Univ. Press. Cambridge G.B. 604 pp.