

## US Fish and Wildlife Service | Why Structured Decision Making \_part 2\_

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What is it that makes decisions hard? Well sometimes we don't even know all of the possible actions or the number of actions that we have are huge. Sometimes the objectives that we have are very complex, oftentimes they're in dispute. Different stakeholders have different kinds of objectives and some decision maker somewhere has to figure out how to capture those disputed or contradictory objectives in some way that ultimately is acceptable to a bunch of different stakeholders.

Oftentimes, in the management ecological systems, many of which those of you taking the course really spend your time thinking about, the dynamics of the systems are really poorly known. They're very complex systems and we don't know a lot about how they work. And oftentimes, even knowing all of the other components, just figuring out what the optimal solution is maybe difficult. And we're going to talk in a couple of the different modules about those kinds of situations and how to deal with those kinds of situations. So there's a lot of different things that make decisions hard. And structured decision making is really most important when we're dealing with difficult decisions that we care a lot about making effectively.

So let's go back to this concept of structured decision making and define it a bit more clearly. Structured decision making is most basically a formal method for analyzing decisions by breaking those decisions into components, analyzing the components separately, and then building them back up together into a framework that we can use to actually make a recommendation. This is the smartest thing we can do based on what we know.

The process of breaking decisions down into components, it helps us to identify where the impediments are, what's making this decision hard? Is it because our objectives are so complex or contradictory? Is it because we have a lot of uncertainty about how the system works? Is it because we don't even know all the alternatives available to us? By breaking the decision down and identifying the impediments, we know where to focus our effort and what kinds of tools that we can bring to bear on dealing with those challenges in decision making.

And structured decision making, in addition to being a formal method for analyzing a decision by breaking it into these components, also provides this very wide array of analytical tools for dealing with particular impediments. What do you do when you have contradictory objectives? What do you do when

you have a lot of uncertainty? There's a lot of tools out there and we're going to give you an overview of a lot of different kinds of tools during this course.

There's two really key elements in structured decision making that I think it's important to keep in mind in general. The first is this idea of problem decomposition, which I talked about previously. And the idea here is that we break the problem into components. We recognize those components because we have the PRO acronym. We know what parts of the decision are about identifying objectives, what parts are about making predictions, and so on.

And it's key when we break the problem into components that we separate policy pieces from science pieces. What our objectives are, where we want to go, is different than science questions that are relevant. For instance, how does our system function? And so it's important to separate those policy pieces, so we can have the right kinds of people giving input into the right parts of the decision making process.

After we break the problem into components, we complete the relevant analyses and understand those components individually, deal with the impediments, for instance, uncertainty or very complex objectives. And then we recompose the parts to make a decision. So this concept of problem decomposition is really key to doing structured decision making.

Another really key component is the idea that structured decision making is values focused. So the objectives come early in the process, that's one of the very first things that we discussed. Those objectives then drive the rest of the analysis. We consider alternatives that are designed to meet those objectives. We build models to make predictions about whether or not we'll meet those objectives. So it's very much focused on where is it that we want to go.

And this is important because this is actually in contrast to our natural tendencies as human decision makers. Intuitive decision making tends to be alternative focused. Often when we're making a decision, we don't first think about where is it that we want to go, but we first think about what are all of our alternatives to getting there. And so this process, a little bit, turns our natural tendencies on their head and asks us first to focus on the objectives and the things that we care about. And we think that that's actually a very valuable process. It helps us to think more broadly. It helps us really to develop decision frameworks that are really focused on getting us where we want to be.

Think back again now to that conversation that we have about where is it that you live. Think back to the choice that you may ask yourself, was it a good decision? Now some people will say, yes, we're very, very happy in that house. Some people will say, no, we're not so happy in our house, it seems like it really wasn't the right place for us to choose.

But before you decide whether it was a good decision or not, ask yourself why you're not happy in that house now and could you have known, if you're not when you made the decision what the issues would be today. And this is an important point because what we want to do is we want to distinguish between a process that we use to make a decision versus the ultimate outcome. So for instance, if you're living in a house now which seems too small, did that you were going to have three children when you bought the house, for example? Well if you didn't know that, then maybe the decision process that you used was a good process and it was good to get you to the objectives that you had then, but today you simply have different objectives.

So we'll make a distinction between a good process for making a decision and the ultimate outcome. The ultimate outcome may depend on some unforeseeable events or it may depend on the resolution of some uncertainty that we have when we made the decision. We can control the process by which we make a decision, but we can't necessarily fully control the ultimate outcome. But what we want to do and what we believe that structured decision making will do is it'll establish a process that is expected to perform better than any other process.

So we make statements like, we think that this is the best thing we can do. Given what we now, given all of our uncertainty, this is the most likely alternative to get us to where we want to be, although there may be some unforeseen events that might lead us to regret the decision in the long term. So again, this process is developed and designed to make it most likely that we end up where we want to be.

And it's also important to say that structured decision making is really a mental discipline more than anything else. It's a commitment to a rigorous way of analyzing the decisions that we have for us. Now it doesn't necessarily require a lot of time or money, so we can scale the use of structured decision making to the problem at hand. If I'm choosing what to have for lunch, I'm probably not going to invest a lot of time in developing a very complex decision framework. But if I'm choosing how to spend millions of dollars on, say, land acquisition to hopefully preserve a number of very endangered species, it might make a lot of sense to really invest some time and money in making sure that I'm doing that as well as I

possibly can. And so the process doesn't necessarily have to be very involved, but the amount of time that we invest in it will say something about our confidence in the outcome and the ultimate recommendations that we make using this process.

Let's talk a little bit about the idea of when is structured decision making appropriate. So if we think about situations where our science is either well understood, uncertain, or actually disputed, and we also think about the situations where our objectives are either very clear or disputed, structured decision making fits in the general area where we know our objectives, at least is agreeable to agreeing on a set of objectives that are common to, say, all of the stakeholders involved in making the decision. And our science is either well understood or uncertain, but at least we can get agreement about what it is that the science says about our system and what it doesn't say, what we don't know.

If we have, for example, a situation where all of the parties will not agree on a set of objectives, then we're really in a situation where we are dealing with conflict resolution. So if we have stakeholder group A that cares about objective A and stakeholder group B that cares about objective B, and those two stakeholder groups will simply not allow the other stakeholder group's objective to be represented in the process, we're really in the situation of conflict resolution. Now if both of those stakeholder groups agree, yes, objective A and objective B both need to be in the mix and we have to figure out then how to make trade-offs between them, we can use structured decision making.

If we're not in that situation, we're really in a conflict resolution situation. We have to be able to agree on a set of objectives or a single objective in order to use structured decision making. Even if those objectives are contradictory, we can still use structured decision making as long as everyone agrees to admit those objectives into the process.

Now if our science is disputed, we don't all agree what the science says or doesn't say, then we might be in this process of joint fact finding where we go through a process of sort of agreeing on what we do know about a system, what we don't know about a system, and so on. But if we can't all agree on what the science is or is not, then we probably can't use structured decision making because we would be very challenged to build models. We can build models that include uncertainty, but we can't build models if we simply can't agree on what the science says.

It's also important to note here that the adaptive management, which has been part of the sort of conversation at the Department of the Interior for a long time is actually a special case of structured

decision making. It's a decision analytic technique that applies when our science is uncertain. And when we're making iterative decisions, so we're making, say, the same decision every year or every five years, and so we can use monitoring to reduce that uncertainty over time, and so ultimately make more effective decisions. And my colleague Mike is going to talk about adaptive management at length in the last module in this course.

So who can use structured decision making? Well, actually the instructors involved in this class have taught structured decision making to a fairly wide array of groups everywhere from kindergarten classes, grade school classes, high school students, and then, of course, the group of people that are taking this course now are professionals that are managing national resources. And I think this speaks to the idea that this process is really about common sense and it's really quite intuitive when we get into it and hopefully you'll see that as we go through the different modules in this course. It doesn't necessarily require a lot of complicated knowledge. It's really ultimately, as we said, commitment to a way of thinking about decisions.

And also, let's talk a little bit about what decisions it's good for. Sometimes the idea is held that structured decision making is only good for very complicated large scale decisions. And I think maybe that comes about because those are just the decisions or the structured decision making applications that people are aware of. But in fact, structured decision making can be used in very small decisions, say, for example, fine tuning an impoundment drawdown schedule which one person might do at their desk over the course of an hour or a day. It's also useful for, say, little decisions, maybe field office scale, maybe days to weeks are used to solve the decision, middle sized decisions, regional scale decisions that might require months of analysis, and then also these large scale national scope decisions which might require years of evaluation or analysis, say, major listing decisions might fall into this scope.

So really again, the process scales to the effort that is required to make a decision that we feel confident about. It scales to how important the decision. And it scales to how much time we have to invest in making the decision.

So the real benefits, we think, of this process is to develop decision recommendations that are more likely to achieve the objectives. And we do that by developing a process that's deliberative, it encourages us to stop and think carefully about all of the different issues that are impinging on our

decision. It's quite thorough, we try to cover all of our different bases, make sure we've captured all our objectives, make sure we've considered all of the alternatives available to us. And it's robust to uncertainty. So if we have uncertainty, we want to develop a process where at the end of that process we can say given everything we now and given everything we don't know, this seems to be the alternative action that should be most likely to get us where we want to be.

So those are characteristics of a process that is likely to lead us to getting to the best place in terms of achieving our objectives. We also care about developing decision recommendations that are more likely to be accepted by others. So we care about processes that are transparent, so we can communicate those in very easy ways to, say, interested public stakeholders, decision makers, and so on. We care about being quite explicit about what are the objectives, what are the model what form did our model take, and what could we include in our model, and what could we not include in our model. So the idea is to avoid the sort of black box decision making and that will help the decisions be more likely to be accepted by others.

We want our decisions to be documented so we can communicate with other people, and also replicable again. And again, these are all components or characteristics of decision processes that will be more likely to be accepted by others.

This is the end of Module A. And where we're going from here, a little bit of a map of what you'll see through this course, we can think of this process as sort of a three-legged stool. We first need to figure out what is our problem and that might be the ground on which that stool sits. And then the different legs of that stool might be the objectives. And we're going to talk about that, my colleague Mike is going to talk about that in Module C, the alternatives, what are the options for getting where you want to be? And I'm going to come back and talk about the alternative actions in Module D in more length.

And then we have a third leg of the stool which is the consequences. What are the predictions about how our system and our objectives ultimately might respond to choosing different alternative actions? I'm going to come back and talk about predicting consequences in Module E. And then ultimately, the analysis or the logic of choosing the smartest action given everything that we know is the sort of the logic in the analysis, the evaluation of trade-offs for the optimization step, and that we can think of as sort of the seat of this three-legged stool. And I'm going to come back and talk about that in greater length in a couple of different modules, in particular in Module G. But these concepts will pervade a

number of the other modules as well throughout this course.

And so we'll end here with Module A. We'll see you again in Module B.