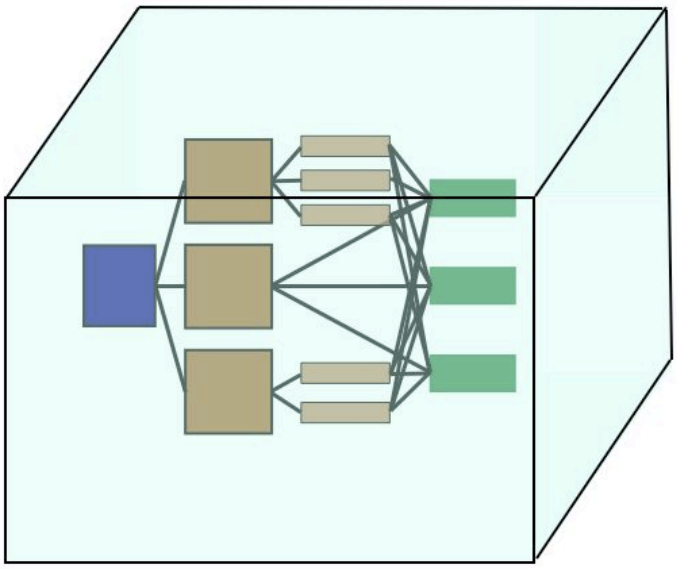
Multi-Criteria Decision Support

Integrating values and science in an interest-based approach.



The Translucent Box

In this course our objective is to give you a sense of how multi-criteria decision support accomplishes four things: it fosters interest-based dialog, sets the frame for good decision-making, prioritizes research needs and lends itself to clear, meaningful, intuitively appealing documentation.

The emphasis is on design considerations for collaboration involving multi-criteria decision support. There are three participatory exercises. We also include some next steps in making these tools your own.

Most of these materials were written by me, Carie Fox. Some, as indicated, are written and presented by Mike Kuenzi and Dick Prather.. I am grateful to Mike and Dick for all I learned working on the projects they will discuss, and for their inspired help with the design of this workshop.

In addition, as I write these materials, I am struck anew by how much Philip Murphy has taught me about decision science and about friendship.

I am a mediator, not a decision scientist–and certainly not a web tech. I like multi-criteria decision support because it furthers my goals in conflict resolution. I hope that you, too, will be inspired by its flexibility and versatility.

Welcome to the translucent box.

Overview

8:00 **Hello and Objectives**

IAP2 Framework (Dick)

8:05 **The Decision Framework**

"Let's Talk Sewer" Web Example (Mike)

Constructing a Decision Framework...not a causal diagram

Land Use example (Dick)

Vacation example in small groups

Design Principles: create/ validate

9:00 **The Weights**

The way this structures a collaborative discussion

Design Principles: Exposure

The all-important rule

Usually prompts redesign of the Decision Framework

9:15 **Ratings/Science/Data/Facts**

Start with whatever you have

Qualitative and Quantitative

Usually prompts redesign of the Decision Framework

Filling in the vacation example

9:45 **Break**

10:00 **Debrief**

10:15 **The First Run & What it Does for you**

Results of the vacation exercise

The paradox of gut wisdom and gut error (heuristics)

How this creates magic for mediators

Individual exercise: facilitation design with Multi-Criteria Decision Support

10:40 **Sensitivity analyses**

The iterative method (twitch the model and see what happens)

Bells and whistles in the software

10:50 **Iterations^3, Decisions, Reporting**

11:10 **Clackamas County Experience (Mike) Discussion**

11:30 **Land Use (WOPR) Experience (Dick) Discussion**

11:45 **Next steps for those who want to use this, general Q&A**

12:00 **Adjourn**

Let's Talk Sewage!

A case example presented and written by Mike Kuenzi

Water Environment Services (WES) is a regional public utility service provider in the southeast Portland metropolitan area of Oregon. The organization, which is part of Clackamas County, is a management and technical organization responsible for the strategic planning and daily operations of three public service districts. These include a storm water utility district, a combined storm water/sewer district that provides retail and wholesale sewer service directly to 70,000 customers (CCSD), and a wholesale wastewater treatment district that provides wastewater treatment and environmental monitoring to three incorporated cities (TriCity). The County's Board of Commissioners is the governing board of directors for all three districts and the WES staff is contracted out to the individual service districts.

The WES staff had successfully established and funded a long-term strategic wastewater plan within the TriCity District over its 30 years of existence. Its infrastructure was in good condition with adequate funding to reinvest annually in a well established asset management program. Rates had historically been fairly stable, adjusted only to meet the District's service demands from growth and to cover inflationary pressures on the operations. The WES staff had a strong professional relationship with the District advisory group that was made up of the City Managers from each of the served communities. This advisory group gave input on most operational and financial policy issues associated with the operations of the district.

The CCSD District can only be described at the other end of the spectrum. This district boundary contained the high growth area of the region, where over 1,500 homes per year had been added to its customer base. The District had seen the WES staff prepare over seven strategic infrastructure plans over the past ten years at a cost to its ratepayers of over $6 million. None of these plans had gained either political or ratepayer acceptance. The result was that the District was operating their treatment facilities at 100% of its capacity, leasing wastewater treatment services from the adjacent TriCity District, and operating at an annual financial deficit. Ratepayers had historically not supported any rate increase.

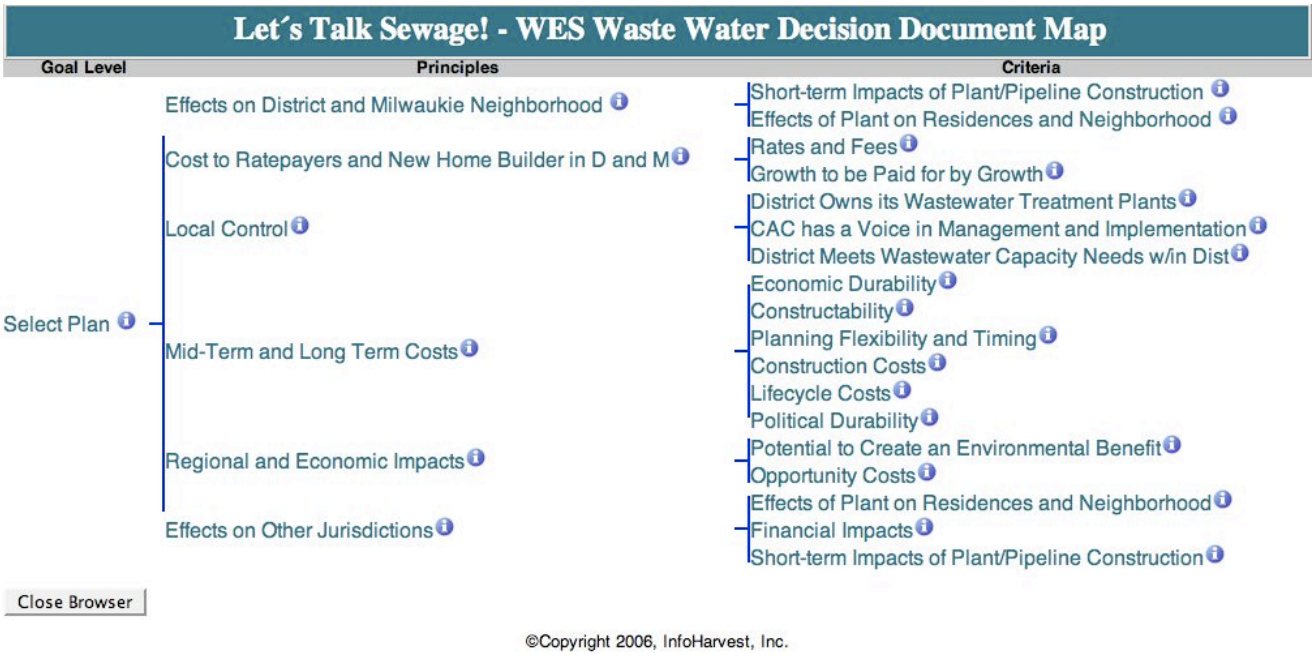
County's Goal in Decision Model Use

- Educational tool to enable our ratepayers to explore the link between their values and the result based on the established weights.
- Verify assumed community values regarding infrastructure investment

In 2005, the WES staff put forward one last attempt at a strategic plan that, on the surface, garnered the support of all of the city officials within the CCSD service district. However, a group of local citizens led by three very vocal anti-government individuals sued the District to stop the plan. Instead of adopting the recent plan that they had publicly supported, the Board of Commissioners chose instead to propose an out-of-court settlement with the three individuals, shelving the WES plan and assigning these individuals with the task of designing their own strategic plan for the District. They were given one year to do so, a free hand to establish a Citizen Advisory Committee (CAC) to help them, their choice of the remaining members of the CAC, and the hiring of their own consultant. The members of the CAC were primarily citizens of the District with little to no experience in public policy, public finance or technical background in utility service delivery.

The multi-criteria decision model was developed near the end of their process after their technical consultant had developed five long term technical options. The CAC did not accept the recommendation of their consultant and the WES team was searching for a way to support the CAC membership in moving past their inherent mistrust of the County, seek input from the District ratepayers and move toward a recommendation that could be supported by the County Board of Commissioners.

Mike will walk us through the decision framework below.



IAP2 Public Participation Spectrum

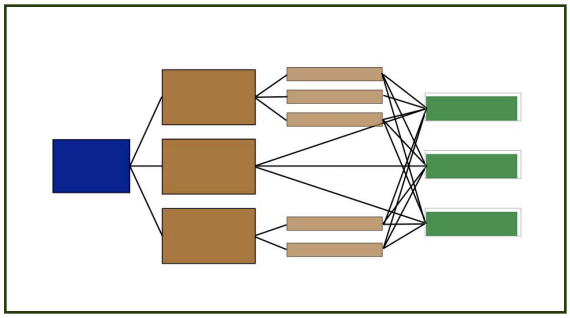
Developed by the International Association for Public Participation

INCREASING LEVEL OF PUBLIC IMPACT

INFORM	CONSULT	INVOLVE	COLLABORATE	EMPOWER
Public Participation Goal:	**Public Participation Goal:**	**Public Participation Goal:**	**Public Participation Goal:**	**Public Participation Goal:**
To provide the public with balanced and objective information to assist them in understanding the problem, alternatives, opportunities and/or solutions.	To obtain public feedback on analysis, alternatives and/or decisions.	To work directly with the public throughout the process to ensure that public concerns and aspirations are consistently understood and considered.	To partner with the public in each aspect of the decision including the development of alternatives and the identification of the preferred solution.	To place final decision-making in the hands of the public.
Promise to the Public:	**Promise to the Public:**	**Promise to the Public:**	**Promise to the Public:**	**Promise to the Public:**
We will keep you informed.	We will keep you informed, listen to and acknowledge concerns and aspirations, and provide feedback on how public input influenced the decision.	We will work with you to ensure that your concerns and aspirations are directly reflected in the alternatives developed and provide feedback on how public	We will look to you for direct advice and innovation in formulating solutions and incorporate your advice and recommendations into the decisions to the maximum extent possible.	We will implement what you decide.
Example Techniques to Consider:	**Example Techniques to Consider:**	**Example Techniques to Consider:**	**Example Techniques to Consider:**	**Example Techniques to Consider:**
•Fact sheets •Web sites •Open houses	•Public comment •Focus groups •Surveys •Public meetings	•Workshops •Deliberate polling	•Citizen Advisory Committees •Consensus-building •Participatory decision-making	•Citizen juries •Ballots •Delegated decisions

BUILDING THE DECISION FRAMEWORK

INTRODUCTION



Multi-Criteria Decision Support helps people make complex decisions to support their dreams for the future. It does that. And it does more. MCDS helps communities talk about their decision, among themselves, and to others. And perhaps even more importantly, MCDS helps people decide and then gut-check and then query and then adjust and then decide again and then figure out what new information is needed and what new information isn't needed and then adjust and gut-check some more and then step back and say "what if?" and then, at long last and with nothing hidden, to really decide.

At every level, MCDA mirrors how we make decisions naturally. And when the mirror isn't quite right, it offers the opportunity to play with the model until it gets right.

Sketching out the decision framework really helps each person to organize her thoughts, but it is also a great tool for communicating those thoughts to others. It:

- enhances traditional collaborative services such as case assessment and interest-based negotiation; creating value, building relationships and–of course–arriving at wise, informed, and durable decisions;
- provides a unique ability to engage the public in complex trade-offs through web-based experiences;
- is GIS-compatible; and
- supports thorough, clear, and accessible decision documentation.

DEVELOPING THE DECISION FRAMEWORK

Decision frameworks can be developed in group settings, through surveys, or as a product of a standard situation assessment. They can also be a product of a systems-based workshop.

Whether the initial decision framework is developed through shuttle diplomacy and then refined with one-on-one iterations, in group settings, or on the web it forms a strong basis for positive dialog.

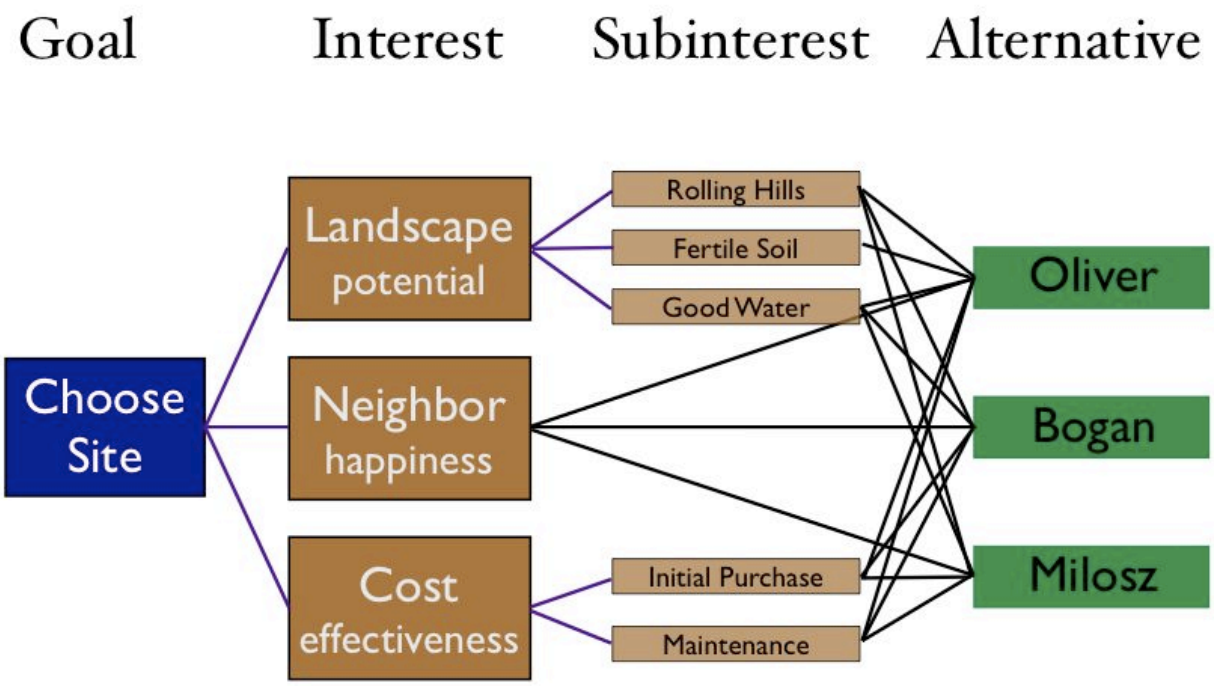
Making a decision framework is a very helpful extension of classic mediation approaches: it's just a way of organizing positions and interests in a schematic. In our convention, the goal of the decision goes on the left, the categories of interests go in the next column, more specific interests nest within the categories, and then at the very right-hand side you will find the positions (alternatives). There is a detailed example on the following page.

Of all the things you might implement from this class, I do hope you will try this schematic as a way of elucidating interests. Before using the multi-criteria schematic as a facilitator, I tended to think of the facilitation challenge to be "getting people off their positions." Thus, my job was to cajole them to relax their grip on their positions and start to understand their interests. Using this schematic, I just allow things to come up as they want to come up. The right side (positions) gets filled most readily. And once it is populated–it's OK. People can relax. They are not going to be shushed. But more importantly, they are not going to feel comfortable with that big white space in the

MEDIATOR-SPEAK: POSITIONS AND INTERESTS

A position is often expressed as the solution to a problem–the only solution. "Widen the highway!" Every position has underlying interests–the *reason* the position is advocated. In this case, interests could include safety, economic development, respect, or follow-through on previous commitments.

Choosing a Garden Site



ANATOMY OF A DECISION FRAMEWORK

The blue box represents the goal, the thing to be decided–in this case choosing a site for a public garden. The large brown boxes are interests, or criteria useful in making the choice. The interest "Landscape potential" has three subinterests. These work well for this decision, because site selection for these sites requires a trade-off among these subinterests. In another case example, these might not be the best choice.

The participants plan to hire a consultant to give them a single value for "Neighbor happiness." Though the consultant's model for evaluating "Neighbor happiness" is tremendously complicated, the participants didn't really care about the details, and don't plan to make trade-offs about the type of happinesses. Hence the absence of subinterests.

Once the decision framework is approved, the participants will need to *weigh* the interests and subinterests. In the scale they chose, they agree that "Landscape potential" matters a lot, "Neighbor happiness" matters a little, and "Cost effectiveness" is critical.

They then proceed to compare topography, soil, and water. Next, they weigh purchase price against maintenance.

Then they plug the consultant's ratings into "Neighbor happiness." They know the purchase price and have a good estimate of maintenance costs. They do a field trip and come up with some ratings for the "landscape" subinterests.

In this decision, there is a cap on maintenance costs. Milosz rates highest for all the criteria, except that maintenance costs go above the cap. This is a "rule" in the model and cannot be broken–no trading off good rich loam for high maintenance costs, unless they can find another donor. No? Then out it goes.

The participants are surprised to find that Bogan outperforms Oliver, and that the deciding factor is "Neighbor happiness." Oliver has some real problems. They yearn to lower the weight for "Neighbor happiness," but after much discussion realize that the issue cannot be ignored.

They choose Bogan.

middle. And so, inevitably, organically, and when they are ready, the interests start to be filled in.

(Of course at this point all the interest-based negotiation techniques will hold the facilitator and the parties in good stead, as the discussion becomes more rich and varied.)

INTERESTS

("Criteria" in decision science.)

Interests are simple enough; I refer to them as "big categories."

I explain "subinterests" this way:

- They are measurable (qualitatively or quantitatively).
- They help a person choose among alternatives.

A subinterest–such as "attractiveness" or "fire resiliency"–should fit into this sentence: *Alternative A is preferable to Alternative B because it rates higher for "–."*

People understand that plugging "mosaic density" or "pink siding" into that sentence does not work. No-one cares about mosaic density or pink siding in and of themselves.

Facilitator: *What is it about mosaic density that matter to you in making a decision?*

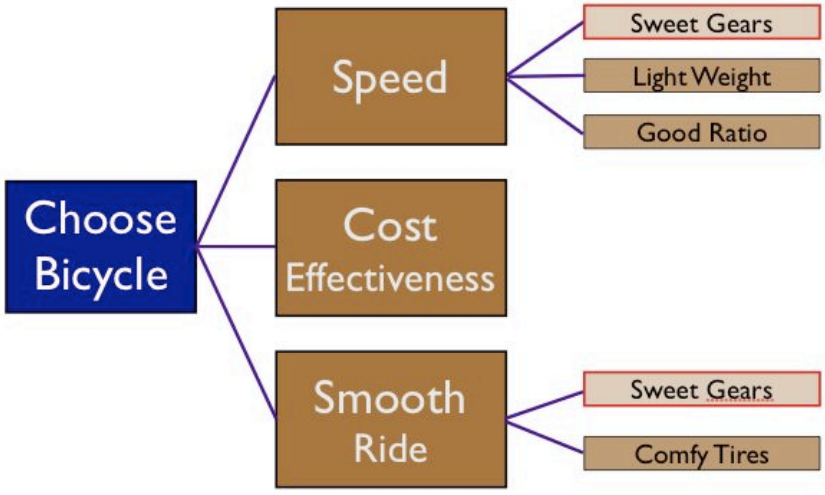
Participant: *Ecosystem resilience.*

Facilitator: *OK, let's put that down.*

Then use a model for the finicky stuff.

Here are five tips about this utterly simple approach to eliciting interests.

- One is to avoid making a causal diagram. You are not trying to analyze how the *system* works, you are trying to analyze how your *decision* works. (See text box on page 10.)
- The second tip: it's perfectly OK for "subinterests" to show up more than once. Imagine the decision is which bicycle to buy. Notice in the schematic below that "sweet gears" shows up twice That's OK.



MEDIATOR-SPEAK: SUBSTANTIVE, PROCEDURAL AND RELATIONSHIP INTERESTS

We are trained to think in terms of substantive interests–safety, cost, cleanliness, health, size, temperature.... but to be durable, a complex decision had better include procedural and relationship interests as well. Such things as timing and venues for decision-making are classic examples of procedural interests. Trust is a relationship interest that typically is a requirement for successful implementation.

- If people start piling in a lot of interests or subinterests, or chafe to create a category of sub-subinterests, they are probably starting to model the system. There can be complex models underlying the decision framework (a whole server dedicated to calculating "sweet gears,") but they should feed into a *simple* framework. Lump.
- Absolutely include qualitative and quantitative subinterests.
- Frame everything as a positive ("cost-effective").
- My favorite: check to be sure that you have substantive, procedural, and relationship interests reflected in the decision framework!

ALTERNATIVES

The development of alternatives for the decision framework is very straight-forward. Any facilitation design can be used to gather this information. The only special aspect to alternatives in multi-

Local Knowledge

In thinking about multi-criteria decision support, I am inspired by Gladwell's book *Blink*, Surowiecki's book *The Wisdom of Crowds*, and the research they reference.

Surowiecki starts his book with a narrative about Dalton, the father of statistics. He describes a typical fair event in which people guess the weight of a steer and the closest guess earns a prize. Dalton took the average of the guesses and found that it was closer to the actual weight than any single guess--no matter how expert. As we deal with more and more complex systems, systems which cannot be decomposed and studied in isolation, and as we develop techniques for collecting large numbers of native data, there is a shift in analysis of meta-data. Combine this with the hotly-debated concept that "knowledge is self-correcting" and use the internet creatively and you have the makings of a revolution in how people think about data, local knowledge and, therefore, public participation.

Check out http://earthquake.usgs.gov/eqcenter/dyfi/.

Blink is a funny book in which the author studiously avoids using the word "intuition." It's also chock-full of interesting information for mediators and decision-makers. It is a celebration of the integrative processes in our brain that are largely unconscious. Gladwell does a superb job of describing the refinement that people go through as they develop the power of that integration.

I think that multi-criteria decision works as a facilitation tool because it supports the "self-correction" of knowledge, and it supports it in two areas we need it most: around the application of values to real-life situations, and in prioritizing research objectives.

In the "jolt" one gets from running an MCDS model, what is really happening is an invitation to improve the gestalt that Surwiecki- and Gladwell each describe. I believe humans have an innate pleasure in that kind of growth, and that it is our job as facilitators to provide the environment in which people can play and learn in a way that is self-reinforcing.

criteria decision support is the power it has in building and testing hybrids. This will be discussed on page 25.

ONE DESIGN SCENARIO

On page 21-23, I go through a checklist of questions that would help you design the development of a decision framework. Here, I'll just sketch one possibility:

Start as you would in any assessment, gathering information. (And no, one-on-one interviews are not the only assessment tool: focus groups, group interviews, and surveys are examples of other tools.) Synthesize that information and produce a first draft. I think it would be very powerful to include a draft decision framework in an assessment report, though I have not yet had the opportunity to try that.

Now share the decision framework with a small test group and be prepared for some major changes. Iterate with that group.

Shop it around among several test groups.

Validate the decision framework in workshop settings. (I don't recommend using the internet for validation, as discussed below.)

Iterate.

Eventually you will come to a place of rest: people agree about the framework and when a new group examines it, they find it good.

How can this be? How, early in conflict resolution, can people agree on a decision framework? I think it is because the decision framework is supposed to capture the full range of issues that all the stakeholders will want to take into account. People understand that. So if Julio thinks aesthetics are irrelevant in choosing which bicycle to buy, he probably will still accept that "attractiveness" is a sensible category to include in the model for others. Julio can rate that category as '0;' someone else can rate it a 10. It's cool. (But note Mike Kuenzi's opinion that are some categories that are not appropriate to include, such as the desire for "local control" in a sewer siting decision.)

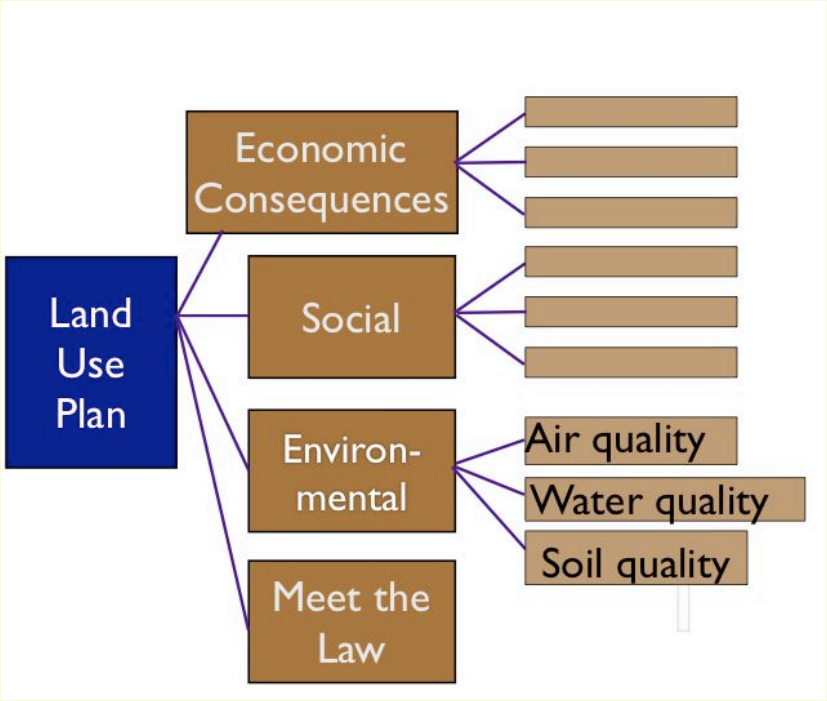
Working with large and contentious groups, one of the things I think of in assessing their collaborative capacity is their ability to imagine others' interpretations and encompass those in the discussion and even the decision. The constructive struggle to build a decision framework is a great way to develop that capacity.

VALIDATION

The important thing is to use good validation techniques. What concerns me is that the decision framework seems to be *too* compelling visually. Even really rotten decision frameworks are accepted (I have tried making increasingly rotten frameworks in hopes of provoking people, and was unsettled by how far I had to go). On the other hand, starting from scratch each time is not effective. People need a starting point. They just need to be critical about it.

One design cure is to turn a draft decision framework into a card game. The interests and "subinterests" from a draft

Beware the Causal Diagram.....



Keep the Focus on the Decision

It is very important to keep people focused on an eventual conference with the decision-maker as she attempts to choose among alternatives. If you can imagine the decision-maker saying, "well, I want alternative A because it does a better job on air quality than it does on water quality," then this decision framework is OK.

This example comes from a public lands management issue. In making public land management decisions, people do not usually trade off air and water quality–it's a system, and to protect one without the other makes little sense. The decision framework should put people in the crux of the most painful part of the decision. The part that keeps people up at night.

Focusing on the subinterests to "environmental consequences," it's useful to imagine a person whose entire focus is on the environmental issue. If he cared only about this, and he had to choose among the alternatives, what would cause him anguish? Does he genuinely struggle, for instance, in making short-term choices to protect rare habitat versus long term measures to restore natural systems? Ask that person what turns him inside out, and put that in the decision framework.

framework are made into individual cards, with additional oddball elements thrown in (people should have cards they can happily throw away) and blank cards. They then construct their own frameworks in groups. They dig deep, and a comparison of the results of different groups' work is a foundation for rich dialog.

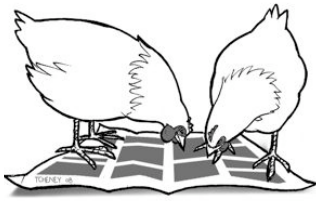
This exercise also gives people with kinesthetic learning styles a chance to engage.

APPROVE

The beauty of multi-criteria decision support is the ability to iterate among steps as well as within a step. Thus, the word "approval" should not be interpreted as "approval for all time."

Nevertheless, an interim approval is required at this point. Someone has to say whether the decision framework is ready to be filled in with weights and ratings. If the facilitator has brought the framework to a "place of rest," this should be non-controversial. If the top-down model is used, get a decision. Still, articulating the role of originator, first testers, validator(s) and approver is an important issue to be decided in advance. (How to think through those roles is described on page 22.)

Group exercise: vacation



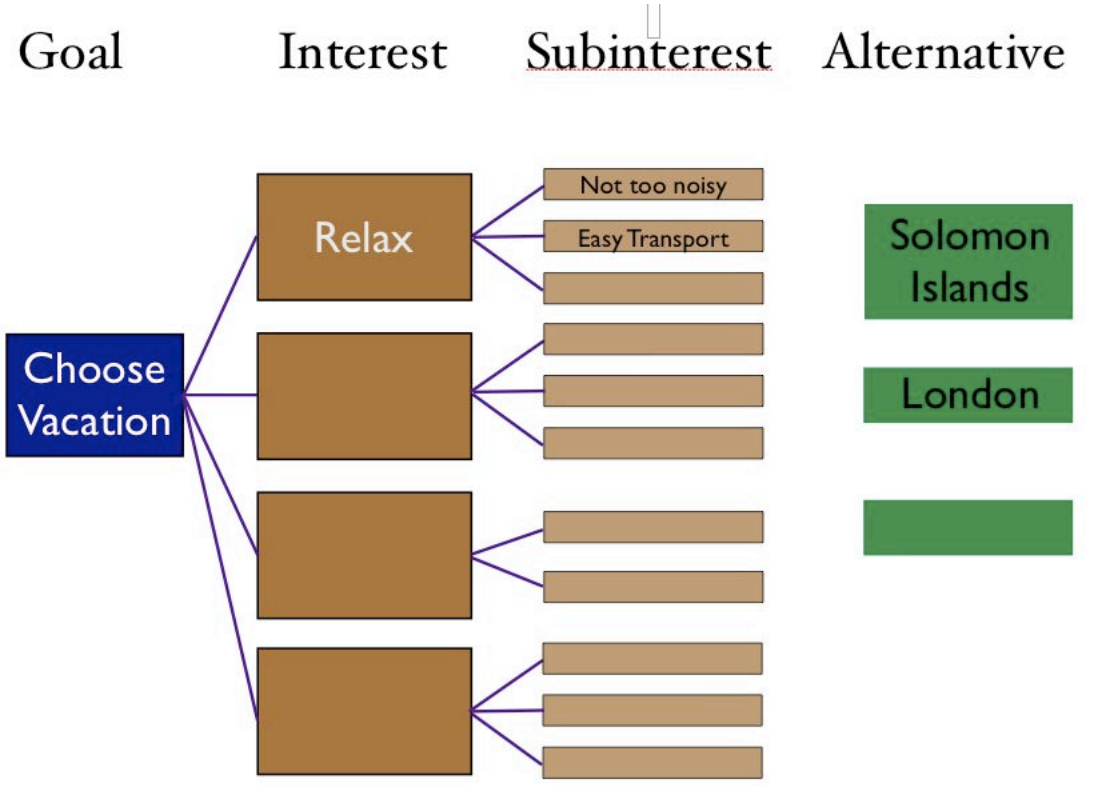
Your group of 8 or so people has $40,000 to spend on a joint vacation. The only stipulation is that you use multi-criteria decision to support (but not necessarily make) your decision. **In the first session**, introduce yourselves and work together to identify all the interests and subinterests, and see how far you can get in organizing them into a decision framework.

Each group will have large versions of the schematic below. We have filled out some of the elements in the example. Feel free to use these as a starting point—or not. By the end of the first session, you should have a complete sheet. Try to limit yourselves to the spaces provided, or else the subsequent steps will become a bit complex for the time we have.

Above *The Solomon Islands*
Right *London, including the odd building my sister built.*

In the second session, two of you will stay at your table, keeping your framework; you will be the hosts for this session. The other six disperse to various tables. If you are one of the "dispersers" you will be at a new table with two people who "stayed behind" as hosts, probably at least one person from your old group, and a few "dispersers" from other groups. Introduce yourselves.

The hosts brief the dispersers on the framework, and the entire group validates the framework. Don't change the alternatives, but play around with the interests and subinterests. As you do this, start to assign weights, then ratings. (Remember, you *rate* the alternatives for how well they accomplish each subinterest; you *weigh* or value the interests and then you weigh the subinterests.)



WORKSHEET FOR INTERESTS

(to be filled out in the second session)

Interests	Weight

Scale Suggestion:

Very Important
Moderately Imp't
So-So
Not Important

Interest	Subinterest	Weight for Subinterests

RATINGS–THEY REPRODUCE LIKE RABBITS!

Rating suggestion: Excellent, Good, Moderate, Poor (but please feel free to customize those.)

Interest	Subinterest	Rate the Alternatives			

Weights

"weights" = "values" = "policy"

After building the decision framework, the next step is to input the weights (values) OR the ratings (science, data) OR do both. For today, let's assume you chose to start the weights first. Perhaps the experts are off scribbling their thoughts on the backs of envelopes and are going to meet with you next week.

Again, one of the benefits of multi-criteria decision support has to do with the schematic, long before any fancy calculations occur. Just as the diagram helps people to distinguish between positions and interests, it also helps them to separate policy and science. ("Science" is used very very broadly here to include, for instance, a rating for the aesthetic quality of a sound wall.)

Simply put, the objective at this stage is to provide a weight for each of the interests and subinterests in the decision framework. Weigh the interests first, as a set (beauty, trust, low impact). Then within each interest–such as "builds trust"–weigh the applicable subinterests as a set, giving relative weight to "fosters ease of communication," "verifiable" and "encourages face-to-face interaction." (When it comes time to actually measure the way an alternative meets that last subinterest, they may find themselves having to come up with a better definition!)

When you ask people to weigh the interests and subinterests, keep them focused on the fact that they are working on a decision, not a science project. The real question is *when you decide among alternatives, how much weight do you find yourself giving to this interest?*

GATHERING THE WEIGHTS

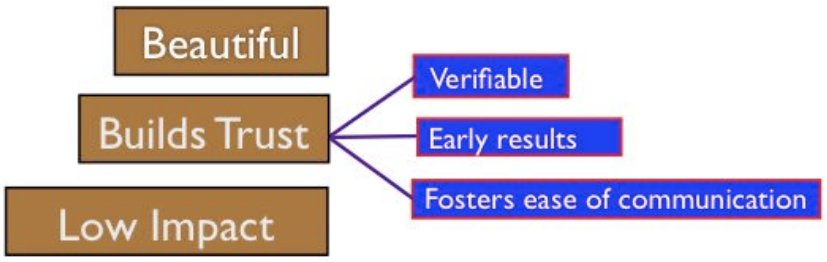
Let's assume you created the decision framework in part so that you could gather values. Ideally, you have worked with the community to develop the framework. At this point, you could conduct workshops with paper versions of the framework and ask people to "fill in the blanks." You could use the internet in the style of the "Let's Talk Sewer" internet site. You could sit down with the decision-maker and work with her one-on-one. Or you could use focus groups to elicit values. There are almost as many options as there are facilitation techniques.

There is also a choice to set up the model so that people can input their values and play with the model *without* ever gathering their data. The "play" requires that you have a complete, running model, including the ratings. This design approach is discussed on page 19.

> *Rules Rule*
> For the most part, interests and subinterests are meant to be compared and traded off. But some are not negotiable–such as environmental standards or budget limits. MCDS tracks and communicates the sideboards very effectively.

THE ALL-IMPORTANT RULE

If the decision is about buying a car, and one of the interests is having the car fit in the garage, then "fitting in the garage" is a *rule*. That means it can't be traded off against other interests such as increasing one's social status or gas efficiency. Might a creative group think about redesigning the garage or buying a shrinking car? Yes. But often it is important to identify the sideboards and give people a sense of security that this process preserves important standards: quality, budget ceilings,



endangered species limitations, access for people with disabilities.

With multi-criteria decision support, one only does trade-offs on that which can be traded off.

EXPOSURE

The beauty–and perhaps the downfall–of multi-criteria decision support is how transparent it makes the weights in a decision process. In this phase, I see mediation skills eclipsing decision science perspectives. Facilitators are trained to honor a group's wisdom about where and how they can/should be transparent about their values.

In a set of British Columbia mediations concerning hydroelectric relicensing, in which 21 out of 22 hydroelectric relicensing projects reached a consensus decision, the mediation team did not expose individuals' weights. They developed a shared model, and they used joint fact-finding to do the ratings. But each person input his or her own weights and received the results privately. The resulting private "jolt" created a mediatable moment for the group as a whole. (This is discussed further in the section on running the model, p. 18.)

Another design approach is to run the model for each person, publicize the weights, then discuss.

In Australia, a citizen jury was used. The weights were shared. And then the group discussed and modified their weights, with significant change and coalescing around a more common assessment of weights. I was impressed until I saw that the "citizen jury" of 13 was made up of 7 people from the same agency! However, their delphi-like approach, and the intriguing use of graphics, are worth study.

What I cannot recommend is averaging the weights gathered from many people. This makes as much sense to me–less sense–as averaging the estimates of wetland acreage. It accomplishes nothing for group communication. It does not result in a wise decision in any way that I can recognize. Finally, in my estimation it violates people's values.

Nevertheless, highly respected decision scientists do this. Logical Decisions, an excellent multi-criteria decision software, uses it extensively. The tool links with key pad polling. There are some intriguing opportunities to do iterations in real time with large groups... but for me that would not include averaging.

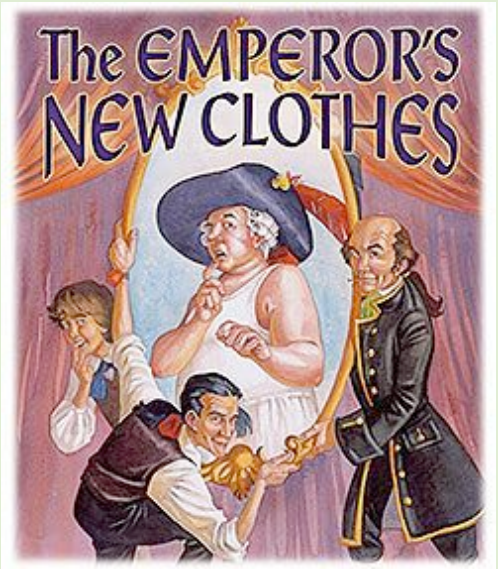
In Greece, a very large multi-modal transportation facility was sighted using a decision model on the internet. The actual decision was made by the model, which makes me uncomfortable to begin

Our mode of governance is such that a small number of people are entrusted with difficult trade-offs while the public is asked uni-dimensional questions ("yes, I like Mom, and yes, I like apple pie, and yes, I like salmon, and yes, I like cheap electricity").

As long as the decision-maker has to deal with trade-offs, while the general public only has to address uni-dimensional questions, both groups are put in a losing situation. The public is not empowered, while the decision-maker is unable to reveal the dynamics which drive his decision: how many vehicular deaths he is willing to trade for a certain savings; why jails end up in low-income neighborhoods; whether sea lions or salmon will be protected. From a systems perspective, as long as the public is insulated from difficult decisions, articulating the real basis of decisions is a losing proposition.

Because it reveals the basis of decision-making, MCDS only exacerbates the situation. Fortunately, as well as pushing dissonance in the existing system, MCDS offers a way of moving into a more promising dynamic: involve the public in the trade-offs. Research in the last decade suggests that the public is entirely suited to making difficult decisions, and making them very well. The problem is a logistical one: the sheer difficulty of involving people in complex trade-offs. With MCDS, there is a tool for involving the public and representatives–*together*–in trade-offs, which means they can both afford to approach genuine decision-making in a translucent way.

Image http://www.wrensnestonline.com/blog/category/cruel-games/



with (this is discussed in the text box on page 27), but that the decision was made by averaging the values makes me downright nervous.

We have some research about averaging ratings, but I do not know of research about averaging weights.

ADJUSTING THE DECISION FRAMEWORK

One of the advantages of using a workshop or focus group setting for gathering values is the opportunity to note the stress spots in the decision framework. Remember, the question is: *when you decide among these alternatives, how much weight do you find yourself giving to this interest?* When people start putting in real weights–really imagining themselves choosing a sound barrier based on aesthetics and cost-effectiveness–they will start to feel a dissonance. "Wait a minute, that's not really right for me. What about fairness?"

There's a lot of reorganization that may happen at this stage. This may or may not make a large difference to the mathematics of the model, but it can make a huge difference to the communicability of the model and, of course, to the relevance and resonance of your outreach efforts.

In other words, the skinky, slightly uncomfortable, squirmy not-quite-right feeling that may happen at this point is absolutely golden for the collaborative process. And it gives the facilitator a great chance to model the respect and adaptability of the approach!

And, of course, the weights are not set in stone. As people learn through this process, their weights will change.

Ratings

"ratings" = "science" = "data"

In a decision framework, weights tell us how much an

interest or subinterest matters. *Ratings* tell us how well an alternative accomplishes a subinterest. In filling in the ratings, you will go through the decision framework, look at each alternative, and say "hmmm, this bicycle scores 'sweetest' for sweet gears" or "this bicycle scores 32 lbs for weight."

USE WHAT YOU HAVE

If you want to take the best advantage of multi-criteria decision support, **start with whatever off-the cuff ratings you have.** There is nothing wrong with starting with a range if you have to. Run the model with those ratings, and test it.

One of the most exciting benefits of multi-criteria decision support is its ability to effectively, neutrally and transparently inform research priorities. The usual pace of decision-making is to gather data, gather more data, *then* engage in the decision. To take full advantage of multi-criteria decision support, force yourself–really, really do–to reverse the order. Run the model EARLY.

The reasons for this will become clear once you have read the section on running the model and sensitivity analysis. I hope. (It *is* complicated, but oh, so valuable!)

In practice, this could be as simple as asking the people in the room for the top likely number of wetland acreage on the site and the lower limit of probable wetland acreage, and inputting the range.

QUALITATIVE AND QUANTITATIVE RATINGS

Any subinterest can be rated quantitatively, even attractiveness. And any subinterest can be rated qualitatively, even wetland acreage. The rating for the latter could be "lots/medium/few" and that might be just the right level of specificity for a particular management decision.

When people start early on in the decision, they immediately want to go deeper on the things they already know best. –Philip Murphy

INTERESTING RATING SCALES

The first thing you will have to do is figure out the nomenclature for your ratings. You could just use a numbering system or a general "high/medium/low" throughout. Philip Murphy, CEO of InfoHarvest and creator of the multi-criteria decision software "Criterion Decision Plus," recommends using more inspiring scales to remind people what they are focusing on. So, for "attractiveness" you would use "beautiful/moderately attractive/I'd rather look at fungal growth." For "economical" you could use "expensive/moderately expensive/inexpensive." (Comparably, with the weights, "attractiveness in a bicycle makes my heart soar"/"attractiveness doesn't much matter to me"/"attractiveness is irrelevant to me" would be more interesting than the usual Lickert scale.)

SHAKE OUT THE FRAMEWORK

When people fill in the ratings, there likely will be more changes to the framework. If you have facilitated this kind of planning discussion using standard methods, you have experienced this: when people start to figure out how to measure the things that matter to them, they often discover unintended ambiguity in their initial naming of subinterests.

Now is the treasured opportunity for your collaborators to go deeper in their shared learning. It is a time for clarity about terms and assumptions. In the "Let's Talk Sewer" example, if local control is an interest, and one of the subinterests initially defined was ownership, now the group has to struggle with rating "ownership." And "ownership" of a sewer plant is indeed a complex issue. Joe may still think the issue of "local control" is irrelevant to the decision, and he should still give it a very low *weight*, but now, because of the deeper discussion about the meaning of "ownership" and how one might rate it, he at least understands what Tricia means by the word. Hopefully, Tricia's understanding is deeper at this point as well.

As this discussion unfolds, there will be changes to the structure of the decision framework. That is excellent.

HANDLING UNCERTAINTY

Multi-criteria decision support handles uncertainty beautifully. All the software described on page -- handles uncertainty to a great level of sophistication, and (usually) with marvelous graphic representation and tracking.

AGREE ON THE RATINGS

As you saw in the discussion on weights, coming up with a single set of values for the model is not necessarily an objective. For ratings, I think that one set (albeit one set with ranges and uncertainties) is essential. You will want to give people the option of playing with the ratings as described in the next two sections, but I would recommend basing that on one rating set.

How, then, to come to agreement on the ratings? Any of the rich and rapidly evolving joint fact-finding techniques would nest into this approach. There is a unique synergy between multi-criteria decision support and other fact-finding techniques because of the ability to prioritize research needs. Other than that, the facilitation design for the fact-finding would not be inherently different from other collaborative processes.

ANALYSIS AND OUTREACH

As Dick illustrates in his discussion of land use applications, it is vital that the MCDS used for outreach also be used for analysis. We tried to shoe-horn MCDS onto a planning process that was very far along. That is not impossible, but it sure makes things more challenging.

Starting with MCDS from the beginning obviously is preferable! But the most important principle is that the decision framework has to straddle outreach and analysis. To use the framework solely for outreach/collaboration objectives and then to put it aside for the analysis is (a) a sad waste of a wonderful resource and (b) "disingenuous to the public" (to use Dick's apt term).

DOCUMENTATION

The ease of documentation of discussions, assumptions, and data sources is a great benefit of the multi-criteria decision approach, whether you use an Excel spreadsheet or one of the software programs developed specifically for this approach. At a minimum, every rating should have a note about the data source.

Run the Model

Once you have the framework, the weights, the ratings in their coarse form, and the alternatives, it is time to run the model. Running the model lets you:

- Engage people in a very compelling way;
- Surprise people and explore the dissonance between their favored alternatives and the interests they care about the most ("the jolt");
- Explore unintended consequences;
- Perform a sensitivity analysis and prioritize research objectives; and, of course
- Refine the framework.

The sensitivity analysis, touched on in the discussion of ratings, is explained further in the following section, page 21. The refinement of the framework is part of the discussion on iteration and play on page 24. The engagement and the exploration of unintended consequences are the vital gifts to collaboration that depend largely on the jolt; hence the jolt is the dominant theme for this section.

THE OUTPUT

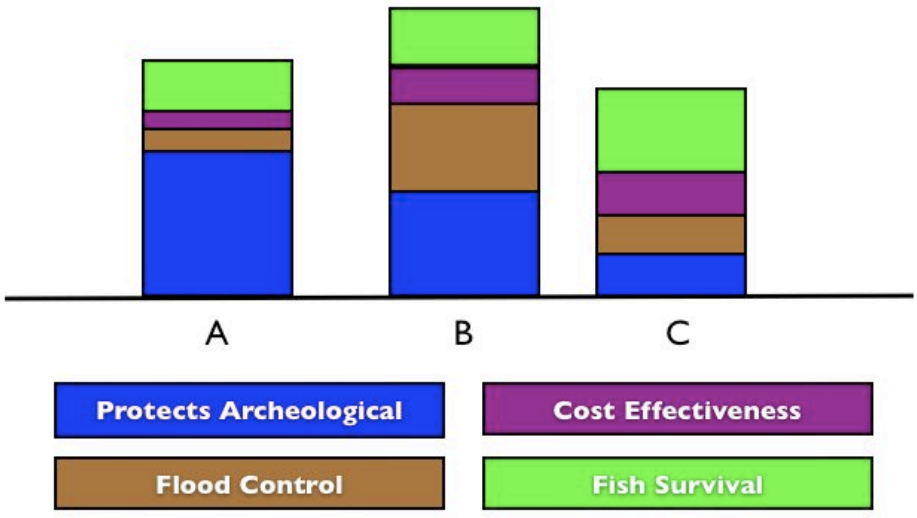
There are several ways to display the output from running the model. The graph will show which alternative, based on the decision framework, the ratings, and a set of values, does the best job of meeting the participant's needs.

The stacks in the graph reflect the interests and how they influenced the result. Each stack reflects the interaction between the weights and the rating, offering a chance to untangle the interactions between weights and ratings. Let's say that for Paula Participant, protecting archeological resources was the most important interest in a hydroelectric relicensing decision. But she did care somewhat about fish survival, flood control, and cost.

Alternative A rates the best for protecting archeological resources, so Paula has always advocated most strongly for alternative A. Logically enough, she *weighs* "protects archeological resources" very highly in the model. She weighs fish survival, flood control, and cost as low but not negligible. She is therefore very surprised that *for her weights*, Alternative A comes in second. How could this happen?

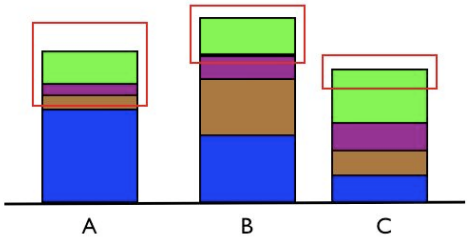
The problem may be that while Alternative A is the best for protecting archeological resources, it is not the best by much. Or, it may that the uncertainty around "protects archeological resources" swamps the incremental benefit. Let's say that alternative B is a close second for archeological resources and it is MUCH better for fish survival, flood control, and cost. Alternative B is truer to the rich complexity of Paula's desires.

She will be able to visualize that when she sees the way the interplay between weights and ratings is broken down by interest (color) in the stacked bar graph.



This figure illustrates the Paula narrative

It is also possible to show the role of uncertainty graphically, as can be seen in the luridly-colored example below. The red boxes show the range of uncertainty. In this case, it sure looks like these folks could benefit from better data.



MECHANICS OF RUNNING THE MODEL

In a workshop setting, being able to run the model in real time is ideal–but difficult. Building a decision framework with a robust ratings set, collecting weights in the morning, allowing for a very long lunch (lunch plus another agenda item, etc.) and then showing the results of the model is one way to approach the logistical difficulties of inputting the data.

Because of the beauty of the jolt, and because I have qualms about averaging weights, I would want to design this workshop in such a way that individuals were able to see how their weights played out in the decision, and I would want that moment to be introspective rather than exposed. However, there is wonderful latitude for design and technical innovation here.

Another way to allow people to experience how their values are expressed in a particular management context is through the internet. This requires a robust, validated decision framework and an authoritative set of ratings–something better than the ratings in the "Let's Talk Sewer" example. Anyone can then log onto the site and test their values in a real-life context.

Inviting people onto such a website and then recording and analyzing their values is such a rich opportunity for understanding and dialog. (To see an example of the kinds of analysis one might conduct, see http://www.infoharvest.com/ihroot/infoharv/dc/CcWES/CCWESWW.asp.)

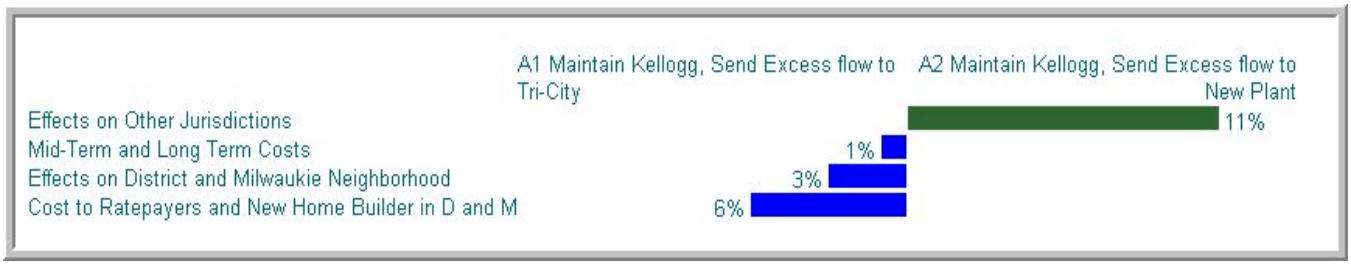
But it *is* complicated. Office of Management and Budget restrictions on conducting surveys would have to be taken into consideration for federal projects. The use of multi-criteria decision support as a "survey" tool is relatively untested and not a little frightening to statisticians. For instance, our invitation to people to "play" with their weights seems extremely peculiar to most pollsters, whose impulse is to limit change in the survey instrument.

The idea of creating a weight-inputting "game" *without* collecting public data came to me in the long, dark nights when we were coming to the decision not to use multi-criteria decision support in Dick's land use example (p. 29). Eventually, we scrapped the whole thing, but at one point we thought about posting the framework and inviting people to input their weights solely as a learning tool. I am more and more intrigued by this idea: to create a computer game that pulls people into the full complexity of the decision, giving them the opportunity to calibrate their values against a real-life issue of interest to them. Someday...

As well as workshops and internet sites there are many other design approaches that might be very effective. These two are the most immediate, and that has a certain appeal.

THE JOLT

It is not uncommon for people to experience a "jolt" when they see the results for their own



Head to Head Comparison: this graph compares the two top alternatives based on one person's weights--why did the new plant come out ahead? It looks like the combination of high value and high rating for "effects on other jurisdictions" carried the day. Tri-City did well for the next three interests, but not well enough. Decomposing the results is part of the calibration and shared learning.

Jimmying the results

When people play with their weights, do they jimmy the result? Based on our experience, it appears that they do not. Neighbors of a sewer plant might have been expected to rate all characteristics except for "neighborhood impacts" at zero–but they could not bring themselves to do that, even when weighing anonymously. They still gave weight to cost-efficiency and fairness to rural ratepayers. In our experience, there is a remarkable civility and empathy in the way that people make their weights. (See page 27.)

weights. Here is my hypothesis about the jolt:

People cannot hold the information required to make even a simple decision in their active memory. This is partly because "even a simple decision" is, in fact, quite complex. When we have information overload we are hard-wired to take short-cuts ("heuristics"). The short-cuts are useful but flawed. The more complex the issue, the more flawed the decision is likely to be and the less likely it is that our solution will satisfy our interests.

In addition, we are hard-wired to have unrealistic confidence in our decisions. We do not see the heuristic when it happens, and we believe in the results more than we should after it happens.

How many times have we, as mediators, experienced situations where a party's positions did not further even their own interests? Ego, personality and miscommunication can sometimes account for that, but I believe the heuristic + overconfidence hardwiring is very powerful.

The first run of the model--in particular its graphics-- create a dissonance between the heuristics and the person's much more deliberate MCDS process–deliberate and self-transparent. The dissonance often revolves around unintended consequences. As a mediator, I prize this moment above any other. It shines a light on that place where positions and interests conflict and when it does so, it creates opportunity for more open dialog. It leads to better decisions.

The effectiveness of this moment relates to narrative mediation or psychology, in which we work with people to help them "loosen up their story." The jolt–and I think perhaps most especially the private jolt–is a wonderful tool in narrative mediation. People move from a single, limited story to a more fluid narrative that allows for change and the creation of capacity.

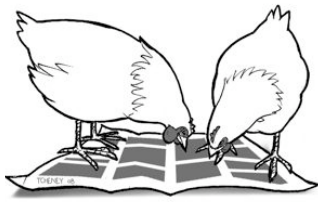
CARIE FOX, J.D., M.S.

Carie is a private practitioner living in Oregon and loving being a mediator, facilitator, and trainer. She has extensive experience in NEPA policy, having facilitated the development of an award-winning cumulative and indirect impacts guidance and two transportation-related NEPA MOUs, as well as several large-scale NEPA projects.

Her inspiration comes from mediation classics, improvisational theatre, decision science, and motley gems from related disciplines such as organizational development, anthropology, and cognitive science.

www.foxmediation.com

Carie and a "Let's Talk Sewage" Council Member at the Kellogg Plant.



Individual Exercise: design principles

On the following page, please take a look at Table 1, which presents one way a facilitator could organize his thoughts as he approaches a large-scale multi-criteria decision process.

Working individually, pick an issue that you think would benefit from multi-criteria decision support, and imagine that you are designing a public outreach and collaboration system for that process. Go over the questions below. Add to them. Then start to make notes on the table.

When we report out, I'll be asking you for feedback on these questions and on the layout of this chart.

Sensitivity Analysis

Sensitivity to weights tells you how sensitive a decision is to changes in people's values. If the values were to change, would the management decision change? Sometimes, a group just has to argue about values differences even if they don't matter to the management decision. But in the main, it would be helpful to focus one's collaborative efforts on the weights that drive a given decision.

Multi-criteria decision support can identify those critical weights in the context of the particular decision goal.

Likewise, *sensitivity to ratings* tells what science matters for a particular decision. In one framework with a given set of weights, mapping wetlands very precisely could make a difference to the management decision. In another, using a coarse filter such as a National Wetlands Inventory map would be sufficient. In the latter case, it may be that spending money on identifying fisher den sites or mass transit impacts on land use patterns would be much more important in helping to distinguish among alternatives.

continued on page 23

Some Questions to ask in Approaching Design Elements

What is the aspect of MCDS you wish to address (decision framework development, weights, ratings, the jolt etc.)?

What population or populations do you wish to involve?

How many people in each population, roughly speaking?

Where does the involvement lie on the IAP2 spectrum for that population?

Is this a one-time interaction or will there be repeat contacts?

Will you have group activities or will people contribute/play privately? Synchronous or asynchronous participation?

Is the population you are designing for an affinity group or soup to nuts?

Do you wish the work to be exposed (transparent) or private?

What is the budget?

At what stage will you involve them (develop first solid draft, improve straw proposal, validate, approve)?

What are your **Collaboration Objectives?**

Table 1. A Worksheet for thinking through large-scale facilitation design

	who originates	who pre-tests	who validates	who approves
Develop Decision Framework				
Input Weights				
Input Ratings				
Rethink framework				
Experience & Feedback Running the Model				
Prioritize Research, Dialog				
Refine Framework (and run, run, run the model)				
Refine Weights (and run, run, run the model)				
Refine Ratings (and run, run, run the model)				
Decide (NOT necessarily with model)				
Report				

cont'd from page 21

It is very, very difficult for people to perform sensitivity analyses in their head. The tendency, rather, is to keep studying whatever we already know best, or whatever is most interesting academically, or whatever is most controversial–not whatever is most *useful* or most cost-effective.

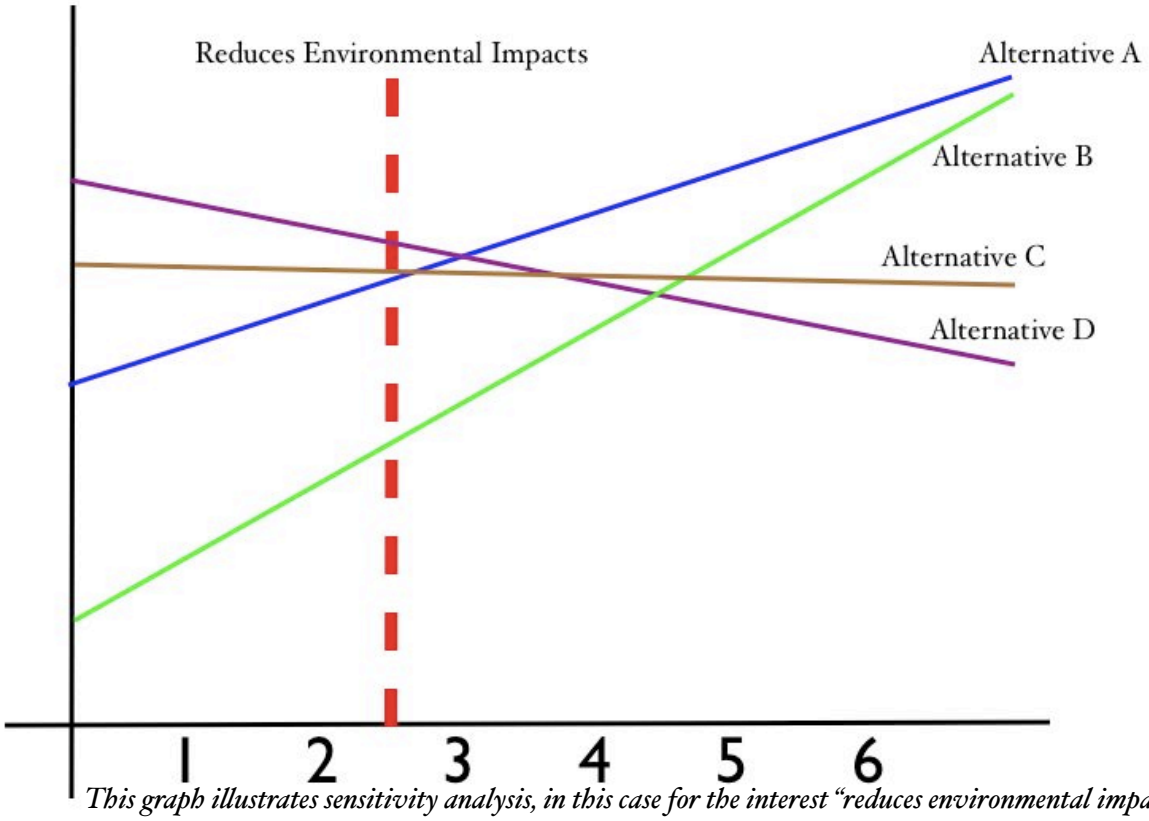
If multi-criteria decision support only did the calculations of sensitivity, in a black-box type of way, it would not be of much help to the facilitator. Fortunately, multi-criteria decision does help people develop their own gestalt for what matters in a decision. It can do this in two ways.

The very-effective, if crude, approach is to let people input different ratings (or weights) and see what happens to the model. If there is a raging debate about wetlands acreage, then put in the high rating. Run the model. Put in the low value and run it again. If the same alternative comes out ahead both times, then some other aspect of the model is more worthy of research. People understand this, and they particularly appreciate being able to play with the model themselves and test their hypotheses about what matters to the decision.

The high-tech approach to sensitivity analysis can be expressed in tabular form, with evaluations of the drivers of a particular decision, or in the following initially inscrutable, but extremely valuable graphs.

The graph below depicts the decision's sensitivity to the weight given for the interest "reduces environmental impacts." In initial conversations, George assigned a weight of 2.5 to this interest. When the model was run with that weight (and all the others), Alternative D was the best alternative.

If Julia and Heidi gave that interest a weight of 1, they are welcome to argue with George philosophically over lunch, but the difference won't matter to the discussion. Why? Move the red bar to



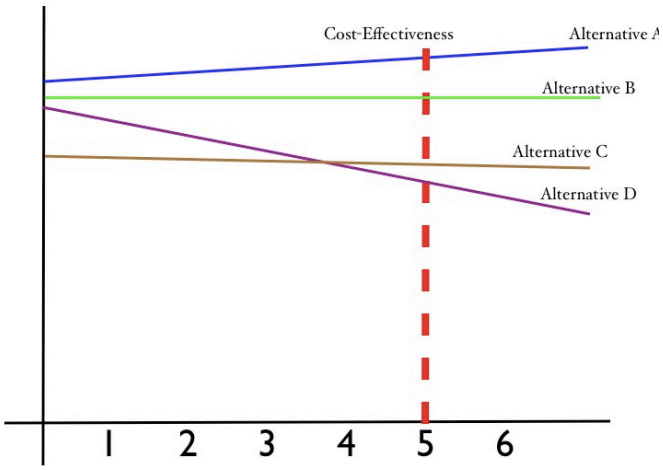
This graph illustrates sensitivity analysis, in this case for the interest "reduces environmental impacts."

the left, and Alternative D's position in the panoply of alternatives does not change.

However, George, and his more extreme sisters to the left do have a live issue with Sophia, who gives this interest a weight of 3.5. Given that weight (and with all the other elements of the model left constant), Alternative A comes out ahead.

So, yes, for this group, for this interest, the decision is sensitive to the difference in George's and Sophia's weights.

Here's an illustration of how the interest "cost-effective" pans out and why it is not a particularly live issue for this situation:



Iterations (Play)

ITERATION IN MCDS

Depending on the complexity of the decision and the position on the IAP2 Spectrum, numerous iterations of the decision framework may be necessary before the framework comes to a "place of rest" (in the collaborative model) or a place of approval (in the top-down model).

Once weights are input, you likely will want to adjust the decision framework, as you will when you refine how ratings are measured. (I would be more skeptical about changing the decision framework on the basis of the ratings *results*.)

When you run the model, as I described, people will experience a jolt. Much of that is about their own internal experience of testing their values in the complexity of a real-life decision. But the tension between expected outcome and actual results goes both ways– it could be because there is something missing in the model.

That moment justifies the use of multi-criteria decision support. If communities have been arguing for decades about an issue, they build a framework, they work through the weights, they agree on joint fact-finding, and then after running the model they realize that there has been something vital missing from the dialog the entire time–that is golden.

Thus, after running the model, it is perfectly

At the last ECR Conference I had the pleasure of facilitating with the talented mediator Dave Ceppos. That workshop was about the use of humor in conflict resolution; later we also designed a workshop about the role of creativity in conflict resolution. These workshops focused a great deal on the concept of *play* and were a celebration of the skill and élan required in a "well-played conflict."

With that as a preamble, I confess that beyond the ability to handle massive quantities of data in an intuitively accessible way, beyond the documentation and prioritization of research objectives, opening people's stories, and the empowerment of larger numbers of people... the real reason I love geeky old multi-criteria decision is that it supports play.

It is just another recipe for play-dough (http://foxmediation.com/htmls/playdough.htm), though perhaps without play-dough's kinesthetic virtues.

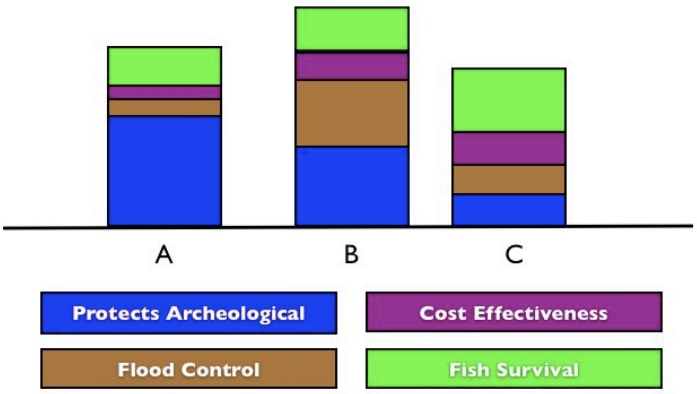
appropriate to refine the decision framework.

Each of these changes should be well-documented and explained.

Another possible set of iterative loops has to do with the information from the sensitivity analysis for the ratings. Assuming the first run was made with coarse data, this is the time for additional investment in research. (During that time, it would behoove the outreach team to take the analysis of sensitivity to weights and design an ongoing public dialog on the values that really drive the decision.)

As Mike Kuenzi so wisely reminded me, one of the key questions in iteration is when to STOP. The answer to the question "when do we stop fiddling with the decision framework" is a design issue that would best be qualitatively described at the outset of the process. But in reality, the description might be quantitative: *a budget.*

The answer about when to stop researching is always difficult, but less so when armed with sensitivity decision. (Essentially, the choice to continue to do research is just another multi-criteria analysis, so it might make sense as a design element to agree to use a small decision framework to support this decision! One could balance budget, certainty, public by-in, opportunity costs...)



HYBRID ALTERNATIVES

Once a group looks at the results, individually or collectively, the ability to think more creatively about solutions is opened up. This is particularly true because of the ability to decompose the results and analyze, visually and mathematically, which combinations of weights and ratings are the drivers--often the surprises, the source of the jolt.

That is when it makes absolute sense to talk about hybrids. Let's look at the Paula participant example again. This was the case where Alternative A did best for archeological resources, but not well enough as compared to Alternative B.

Notice, too, that Alternative C has a lot of the same dynamics for the fish advocate. It does best of all for fish, but unless the fish advocate *really* downplays flood control and the other interests (which interestingly he is unlikely to do, even privately, as discussed earlier), Alternative B comes out ahead. (Yes, the illegible green box says "fish survival.")

At this point it makes great sense to see if the strong points of the alternatives can be combined. In planning, we always do this based on the ratings, but multi-criteria decision support lets groups do this based on the intersection of weights and ratings. Beautiful.

> [T]he main advantage of an MCDA model [is] its ability to combine data and judgments into an overall ordering of the options. However, it does not purport to provide 'the right answer.' Rather, its purpose is to serve as an aid to thinking, enabling the [team] to explore the consequences of differences of opinion and imprecision in scores and weights, helping participants to develop a shared understanding of the key issues, generate a sense of common purpose, and gain a degree of commitment to the way forward. So, social purposes are served by the technical model, which can then be discarded as [the team] formulates its recommendations to the Government.
>
> *Larry Simon, of Catalyze LTd.*
> *www.Catalyze.com*

Decisions

There are so many ways to think about the usefulness of multi-criteria decision support in making decisions. At one end of the spectrum a group could imagine it as an arbitrator and agree to be bound by the results. This might work best in a team or single organization. At the other end of the spectrum, the decision framework is used to help organize, sort, and play with the material until the group realizes it is ready to let go.

Discomfort with the decision framework is probably not a good reason to change course. The discomfort is a sign there is a hard discussion that needs to happen, and it is a great gift of multi-criteria decision support.

Disappointment is a really poor reason to abandon the approach. Strangely, I have not had groups attempt to drop the model because they disliked the jolt. They seem to be very ready for the challenge and the learning of the jolt.

I think the time to let the framework go is when it suddenly seems unnecessary, boring, besides the point. I don't know what goes into this moment, though I would opine that:

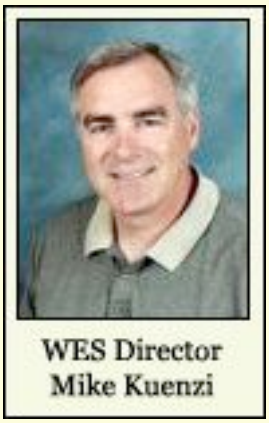
- it tends to come very late in the process, as the group readies itself to make a decision;
- though people may have a hard time holding the complexity of a decision in their head at the outset, I think they do learn with the help of the model. Perhaps it is accurate to say that they refine their heuristics, and that those calibrated heuristics have nuance that cannot be captured in a manageable decision framework.
- the transparency of an actual multi-criteria decision may be just a little too much.

It reminds me of that moment when Mom lets go of the bike and you sort of notice but you don't wobble. *Whee!* For a long while Mom helped you go further than you could possibly have accomplished on your own, and then suddenly, surprisingly, if she kept helping you she would hold you back.

We don't mean to imply by this that decisions never gets made with the model. The important principle is to let the shift happens when and as it needs to happen. It's the collaboration goal that is eminent, not the tool.

Reporting

When I worked on the "Let's Talk Sewer" project with the Citizen's Advisory Council, I reported to the Board of County Commissioners on the results of the internet "discovery survey." Since they are a 3-member board, one has to speak with them one-on-one or call a public meeting. Thus, I did the same briefing three times. It was a very powerful experience for me. I felt that the structure of the decision framework, and the logic of the reporting, created an ideal foundation for a briefing.



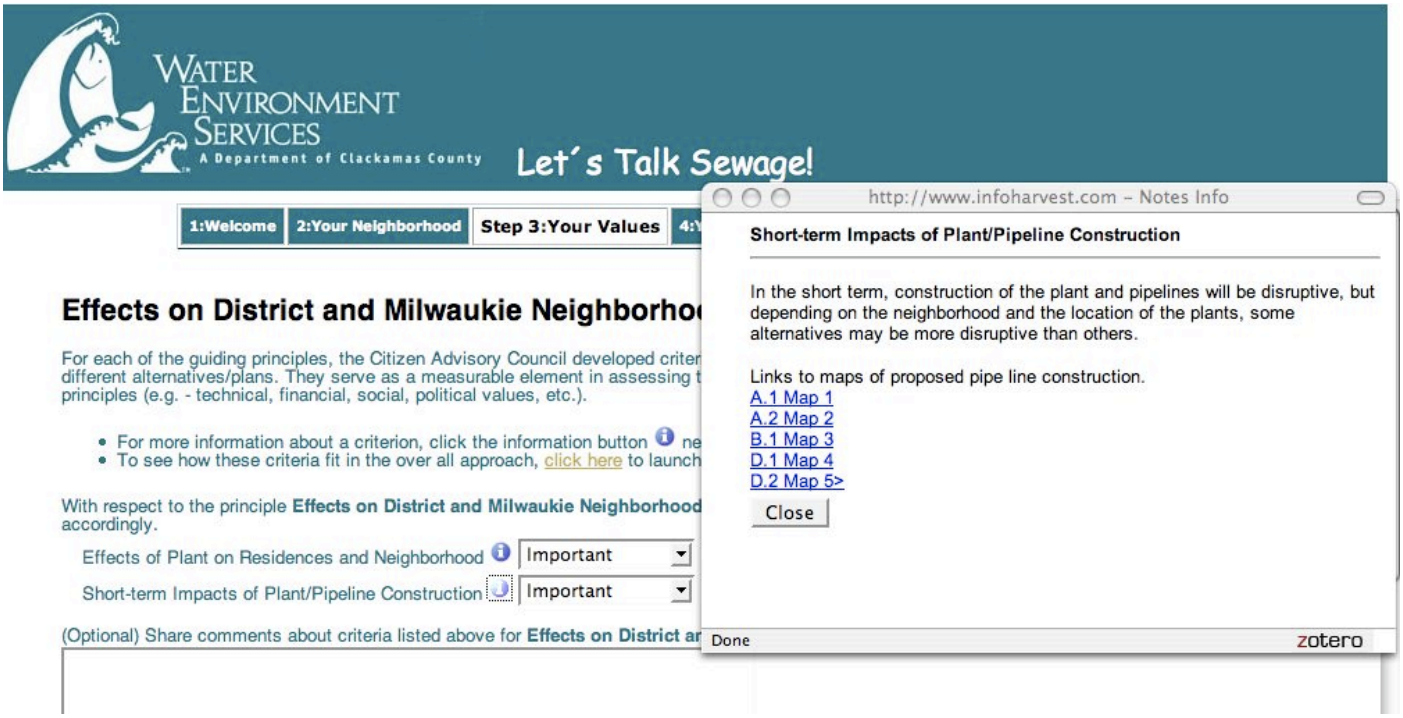
WES Director
Mike Kuenzi

Michael Kuenzi

currently serves as director for Clackamas County Oregon where he is responsible for operations and strategic business planning for three sanitary and storm water service districts. Mr. Kuenzi has over 25 years experience in environmental and sanitary engineering spanning both public and private sectors. He holds a BS in Civil Engineering from Cal State Sacramento, MS in Environmental Engineering from the University of Washington, and a MBA from Pepperdine University.

In a long-term process, beginning with gathering values in the scoping phase and ending with publication of the decision framework and its ratings and weights, I can think of no more transparent and *clear* way to communicate how a complex decision is made (or gotten ready to be made). For members of the public who have followed the decision-making from the development of the framework through weighing and rating, this provides provides unparalleled insight into the decision.

There's another aspect of informing the public that is worth



mentioning: the decision framework itself provides a very handy way of organizing information. In the screen shot from "Let's Talk Sewage" above, you will see some little blue "i" buttons. Yes, we have improved on the graphics since, but that "i" button is pretty nifty. When a person clicks on it, they can get more information about that topic. At the first level, they read a definition--say of "short term impacts due to construction." If they want to keep going deeper, they could finally access the engineering diagrams for the pipe. Thus, the decision framework becomes like a dewey decimal system (though more common-sensical) for the reams of information one usually slaps somewhere in a static website. The feedback on that feature was very positive.

When people experience the "jolt," it may be because their values are being calibrated, it may be because the decision framework needs improvement, or it may be that the ratings are not right. The sensitivity analysis will tell you whether a difference in the ratings will matter to the decision, but it will not tell you whether the ratings are valid.

In the "Let's Talk Sewer!" example most of the ratings were very coarse. When a person had an online "jolt," we very much wanted them to look under the hood at the ratings and lodge their opinions about those. That part of our design was poor, however, and we really did not succeed in our goal. However in workshop settings and on a more elegant web design we see multi-criteria decision support as an ideal way to expose and test the ratings against people's intuitive sense of a situation. When it gets to the point where we can express the results on a landscape, marrying with Geographic Information Systems, I think we will have just about reached paradise in terms of letting people "squeeze the tomato" before buying.

As mentioned in the section on ratings, the graphic output on multi-criteria decision software conveys information about uncertainty very well.

But perhaps the most interesting type of reporting is about values. In the example below, the bottom chart shows the demographic most associated with "local control" and the top one is of neighbors of "old stinky" who are expected to care less about local control so long as the treatment site comes out. And, in fact, few "downwinders" rated local control as most important. But look how few rated it as "not important!"

In fact, the community is not as divided as they have been

Principles/Importance Scale	Most Important	Very Important	Important	Less Important	Not Important	SDev	Total
Local Control	7	20	35	22	12	27.54	**96**
Effects on District and Milwaukie Neighborhood	53	28	13	0	2	21.64	**96**
Cost to Ratepayers and New Home Builder in D and M	9	32	38	14	3	23.47	**96**
Effects on Other Jurisdictions	1	17	49	22	7	21.04	**96**
Mid-Term and Long Term Costs	12	24	53	5	2	21.22	**96**
Regional, Environmental and Economic Impacts	29	37	23	3	4	25.32	**96**

Table 32: Frequency of Values for Survey Takers Resident in Milwaukie

Principles/Importance Scale	Most Important	Very Important	Important	Less Important	Not Important	SDev	Total
Local Control	28	65	50	23	13	27.91	**179**
Effects on District and Milwaukie Neighborhood	17	44	76	31	11	25.31	**179**
Cost to Ratepayers and New Home Builder in the District and Milwaukie	57	54	44	21	3	26.68	**179**
Effects on Other Jurisdictions	2	16	83	56	22	21.49	**179**
Mid-Term and Long Term Costs	40	64	63	10	2	22.7	**179**
Regional, Environmental and Economic Impacts	49	48	54	20	8	28.24	**179**

Table 33: Frequency of Values for Survey Takers Resident in the District

Using Multi-Criteria Decision Analysis (MCDA) in a Land use Plan

Dick Prather

Revising the Bureau of Land Management's land use plans in Western Oregon presented a challenge with numerous and conflicting values.

- Western Oregon has some of the most productive forest land in the world. BLM manage about 2,500,000 acres out of about 25,000,000 acres in Western Oregon...BLM ownership is scattered and resembles a checkerboard.
- The Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act (O&C Act) is the legal authority that provides primary direction to the BLM for managing most of the lands it administers in western Oregon. The O&C Act state that the lands are to be managed "for permanent forest production, and the timber thereon shall be sold, cut, and removed in conformity with the principal of sustained yield for the purpose of providing a permanent source of timber supply, protecting watersheds, regulating stream flow, and contributing to the economic stability of local communities and industries, and providing recreational facilities" (43 U.S.C. §1181a).
- Western Oregon is also the home for many species listed under the Endangered Species Act. The northern spotted owl is the one of the species. It prefers to live in the

old growth forest. The marbled murrelet is another species that live at sea but nests in large trees within 50 miles of the Pacific Ocean. There are numerous species of anadramous fish that reproduce in the rivers of Western Oregon. Section 7 of the Endangered Species Act (ESA) requires federal agencies to use their legal authorities to promote the conservation purposes of the act. This section also requires federal agencies to consult with the United States Fish and Wildlife Service or the National Marine Fisheries Service to ensure that actions they authorize, fund, or carry out will not jeopardize species listed as threatened or endangered under the ESA or cause destruction or adverse modification to designated critical habitat for such species. Critical habitat is defined, in part, as geographic areas occupied by the species that contain the physical or biological features essential to the conservation of a species listed under the act and that may need special management or protection.

- Forest lands in Western Oregon provide drinking water many of the communities in Western Oregon. BLM administer lands in most of these watersheds.
- While there is no law that protects old growth forests this has become an emotionally charged topic in Western Oregon.

In revising land use plans BLM must follow the National Environmental Policy Act and BLM's own planning regulations. Preparing a resource management plan involves a series of explicit steps.

BLM believed that MCDS could be used to help make this complex decision. We also thought that a web based MCDS would help the public understand the complexity of the decision and provide a forum to capture the public's values around the various issues. BLM began building a framework for the MCDA to be used for the Draft Resource Management Plan and Environmental Impact Statement. Had we begun at the scoping stage of the NEPA process, our experience likely would have been much more successful.

BLM had some noble goals for MCDS. The problem was the goals were divergent. The Decision Makers wanted to use MCDS to aid in making decisions and they also want to use MCDS to help the public understand the decision process. These goals have a different focus. The Steering Committee can only make a decision based on the information in the draft Resource Management Plan/Environmental Impact Statement. Therefore the MCDA must relate to no more then what is in the Resource Management Plan/ Environmental Impact Statement. (See discussion about integrating MCDS and analysis on page --.)

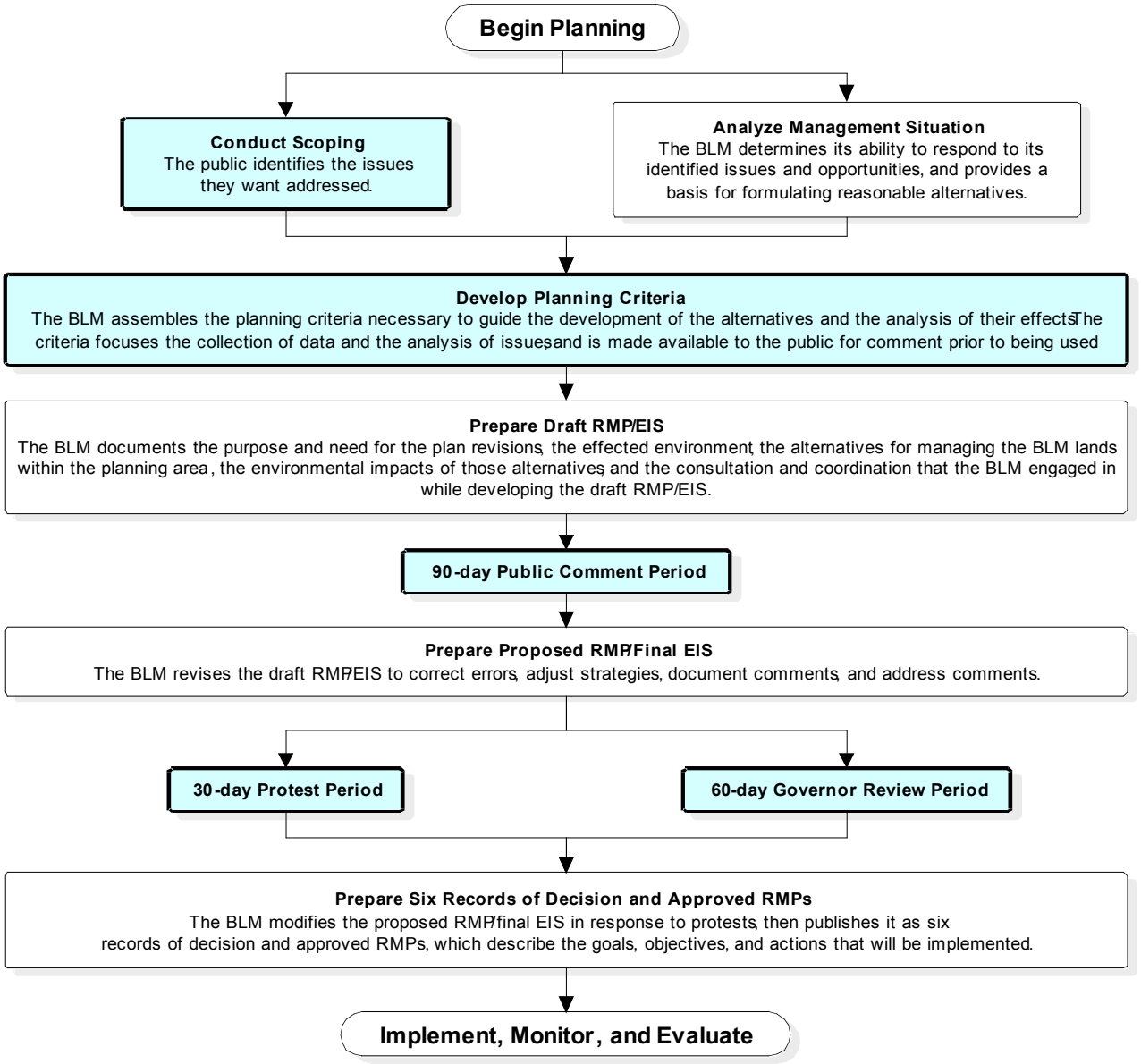
The public's view is much broader then the Resource Management Plan/Environmental Impact Statement. The public has many points of view in fact. They take a more global view which says in making decisions we need to consider impact on global markets or climate change. Another segment has a myopic view; I value nature and don't want to see any clearcuts.

We want the public to have wrestle with these different values. The fear is the public will wrestle with these conflicting values at a philosophical level and not at the data level of the Resource Management Plan/ Environmental Impact Statement. This does not help the BLM in making a decision based on the Resource Management Plan and Environmental Impact Statement or the public understand why a decision is being

Environmental decision making typically concerns several stakeholders with conflicting views. Multi-criteria decision analysis provides transparent ways to elicit and communicate individual preferences. When the stakeholders clearly understand each other's views, a consensus can be reached more easily. Computer software provides a substantial enhancement to support participatory decision making processes, for example, in the preference elicitation and in the analysis of the results

Participatory multi-criteria decision analysis with Web-HIPRE: a case of lake regulation policy by Jyri Mustajoki a, Raimo P. HamaHiinen a,, Mika Marttunen, in a Reprinted from Environmental Modeling & Software, 19

made. It fuels the larger debate that the BLM cannot listen to in the Draft Environmental Impact Statement and Resource Management Plan.



The decision makers are focused on using the facts, data and analysis as criteria in the Resource Management Plan and Environmental Impact Statement to make the decision. The Value and Interest Based Explorer (VIBE) is focused by values and interest that resonate with the public but which are open to different interpretations. What adds more complications is that because of our timing, the Resource Management Plan and Environmental Impact Statement don't use many of the values and interests exactly in the way they are characterized in the VIBE. If this is to work for everyone, we need to define values and interest in terms of what is analyzed in the Resource Management Plan and Environmental Impact

Statement early in the process. Forcing fact, data and analysis to the public value and interests is being disingenuous to the public and the BLM.

It would have been better to use MCDS at the very start of the plan revision to help identify values and interests to be considered in the Environmental Impact Statement. Doing this would allow the public to follow how there input was used in making the decision.

***Above**: The interests from the "VIBE" (the Values and Interest-Based Explorer, so dubbed by the inimitable mediator Gregg Walker, as they looked on a prototype for an internet-based MCDS. The weights were picked at random.*

Dick Prather is a 1968 graduate of Northern Arizona University School of Forestry in Flagstaff, Arizona. He is a 36 year veteran of the BLM. He is currently Project Manager for Western Oregon Plan Revisions. He was the team leader for the Final SIES for Survey and Manage in 2001 and For 20 years he was Field Manager in the Salem District. He was the Chair of the Oregon and Washington BLM GIS Field Users Group for many years. He has previously worked in Coeur d'Alene, Idaho and Coos Bay, Oregon.

NEXT STEPS AND SOME CARIE NOSTALGIA FOR HER LAST FIVE YEARS OF MCDS

I was turned on to multi-criteria decision support in a class much like this one, which ECR offered five years ago. I loved it. I was immediately intrigued by the ability to reach beyond "surrogates" and wanted to jump to web applications. (Our classic mediation design with thirty people at the table has some inherent biases that worry me.)

The problem, as with so many mediation trainings, is how to go from fascination to competence. The excellent instructors assured us that "all this could be done in Excel," but they had training in economics. I was a soil scientist. Excel itself scares me still.

I hunted a long time. There are good conceptual books about decision science that every mediator should read. (Google "Raiffa.") There are overly technical course materials available on the web that seem to come out of business schools. And there are a great many military applications that tend to be quite technical. Not helpful.

Two things helped: downloading trial versions of decision software and their documentation (see links below), and (through his trial version of Criterion Decision Plus) finding Philip Murphy. I live in Portland; Philip lives in Seattle; so I shlepped up to Portland and hired Philip to give me a tutorial. As I left, I was walking on air. We started putting together trainings and presentations in which people were remarkably tolerant of the fact that we were imagining things we hadn't tested--a stage we are past now, thank goodness, though still with much to learn.

Today, there is *much* more in the literature that is on point for environmental conflict resolution, though I would recommend a skeptical eye as this field is in the teenager stage. If you are a mediator, remember you mediation principles first and apply the tools research in that matrix, not the other way around. There are exceptions to this rule, but sometimes decision scientists' notion of good process is scary. When you search, though, use the string "multi-criteria decision analysis." I don't like "analysis" because it has a very black-boxy feel, but it is the real term.

Find an academic where you live and buy her lunch; cultivate the relationship. Decision scientists are usually eager for grist, and you are the provider of real-life grist, so there should be a natural synergy in the relationship.

When you get the trial versions, use it for real-life decisions, even silly ones. *DO* the model.

Finally, if you have any questions, please do call me: 503 231 6557. *Carie Fox*

SOFTWARE OPTIONS

http://www.catalyze.co.uk/products

This is the Cadillac: beautiful outputs, wonderful supporting documents, and the movers and shakers are friendly, good at explaining things, and very, very knowledgeable. I think they have a great sense of process. The one thing that I just don't like is their use of "cost" and "benefit." Technically, that doesn't make a difference, but the terminology of cost and benefit is a real turn-off for many stakeholders. (I haven't tested their new version, so apologize if this is a mischaracterization.)

http://www.infoharvest.com

This is Philip Murphy's software. It's due for an upgrage, but I still love it. The documentation is clear, and the graphic output is superb--not exactly artistic, but rich and compelling.

http://www.decisionlens.com

Apparently this is by Saffy, a guru. Oriented towards the BIGGGGGGGGG decisions.

http://www.expertchoice.com

Here's one I didn't find very attractive "make your choice from start to finish in 3 minutes." OK, that's a business market.

http://logicaldecisions.com/

This software supports keypad polling.

http://www.thefreelibrary.com/Multicriteria+decision+making+on+selection+of+decision+analysis...-a0149213906

has a decision model for choosing MCDA software and a more comprehensive list of software options.