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Communicating analytic results: A tutorial for decision consultants

Jeffrey Keisler
University of Massachusetts Boston, jeff.keisler@umb.edu

Patrick Noonan
Emory University

COMMUNICATING ANALYTIC RESULTS: A TUTORIAL FOR DECISION CONSULTANTS

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Jeffrey M. Keisler
Associate Prof., Management Science & Information Systems Department
College of Management, University of Massachusetts Boston
100 Morrissey Boulevard, Boston, MA 02125
jeff.keisler@umb.edu

Patrick S. Noonan
Associate Prof. in the Practice of Decision & Information Analysis
Emory University, Goizueta Business School
Atlanta, GA 30322
patrick.noonan@bus.emory.edu

ABSTRACT

Good analysis alone may not achieve the goals of decision analysis (DA) engagements. Good communication of the results of that analysis can help stakeholders understand, accept, and implement the recommended course of action. Practitioners can use decision analytic principles when considering the decision of how to communicate results themselves. From this perspective, we consider a range of questions to ask in preparing for communication with the client and other stakeholders. We review standard communication practices in DA engagements. The standard practice can be improved by drawing on insights from other areas of management practice. Decision analysis has both technical and organizational features, and we discuss ways to deal with the conceptual and expressive challenges this presents. This pragmatic tutorial provides a starting point for decision analysts to develop both technical communication skills and organizational communication skills.

Keywords: Communication of decision analysis insights, Modeling, Analysis, Decision analysis, Decision consulting

1. INTRODUCTION

This tutorial has two targets: the reader who is familiar with the mathematics, structures and techniques of Decision Analysis (DA), but who perhaps is not as experienced in DA consulting, and also more experienced decision analysts who would benefit from a compilation and integration of the relevant literatures and practices. The aim is to provide some guidance – frameworks, but not a standard recipe – for thinking about presenting DA results. The goal here is to empower a reader to prepare effective interactions with decision stakeholders.[1]

The way in which results are communicated matters, because it affects what the decision makers and other actors - the various "clients" of an analyst's work - will do with those results. If the analyst isn't careful, they could be poorly applied, misapplied or not applied at all. Without action by a client, real-world value is rarely created, no matter how brilliant the analytical work!

Some specific approaches to DA[2] are already tied to, and in some cases integrated with, specific methods of communication.

- The consulting approach most closely associated with SDG and Stanford University (Howard 1988) aims to ensure quality in an organization's decision process through the use of the **DA cycle**, the **decision quality framework**, and the **decision dialogue process**.
- The **Smart Organization** approach (Matheson 1999) grew out of the SDG model, and it focuses more on building organizations than on facilitating individual decisions. With its "turbo" real-time decision modeling and embedded decision analytic processes, there may be no formal presentation of DA results at all, i.e. the distinction between analysis and communication may not be sharp.
- **Value focused thinking** (Keeney 1992) tends to be an interactive process of discovery that often leaves decision makers with a clearer sense of their mission, in addition to a set of alternatives that have been evaluated.
- The **decision conferencing approach** (Phillips 2007) is led by an analyst who both applies decision analytic tools (usually including an emphasis on values) and facilitates a group process.
- **Vest-pocket decision analysis** (Brown 1987, 2009) positions the analyst as an aide to a specific individual, often within a political context and with a client-analyst relationship that extends beyond one decision.

These specific methodologies are not turn-key approaches, so they, too, require the analyst to make decisions about the communication. Of course, many decision analysis projects do not come with default communication processes, so the analyst usually begins with a blank piece of paper. Further, there is also much knowledge about effective communication that is not specific to decision analysis. In this tutorial we review and discuss the relevant issues of all

these points, although we will not duplicate all that one could learn in a dedicated course on presentation and persuasion.

The plan for this tutorial is to start simply and generically, and develop more subtleties and complexities:

- In section 2 we review some common-sense principles, tied to some key principles of decision analysis that already should be familiar to the reader.
- In section 3 we describe the wide range of questions to address in designing a communication plan.
- In section 4 we walk through a generic presentation outline for communication of the final results. This is a general-purpose template that often would work as-is, but also serves as a good starting point for customization and specialization.
- In section 5 we draw some insights from non-DA literatures on professional communication and organizational change.
- In section 6 we address a few challenges more specific to communicating DA-related work.
- Lastly, in section 7 we summarize and provide suggestions on how analysts may integrate into practice the range of knowledge, considerations and alternatives involved in communication.

2. THE DECISION TO COMMUNICATE EFFECTIVELY

Communication is not a crank to be turned mindlessly, but a decision problem of its own. As we will see, there are many alternatives to consider. The analyst's choices constitute the design of a **communication plan**.

If we apply some of the wisdom from the DA field, however, an analyst should start with the question (Keeney 2004), "Is the communication plan a 'decision worth thinking about'?" In some cases the answer is, "No," either because the consequences of the choice of communication are small, or because the right communication design is obvious. The underlying decision problem may indeed be worth thinking about, meriting a comprehensive effort, even when the communication plan is not.

In ideal cases, the client is infinitely patient, unshakably invested in the problem, fully committed to finding the highest quality solutions, flexible about the process, and unwavering in confidence in the analyst's work. In such cases, tight outlines or rambling jumbles may lead to the same outcome. Usually, however, efficiency and effectiveness of communication design do matter.

When the stakes are material and the design choices non-obvious, the analyst should apply careful thought to the communication plan. As with the underlying decisions themselves, most communication decisions don't require a full, formal analysis. They may be resolved adequately by what Keeney (2004) calls "clear thinking consistent with decision analysis". Much of that clear thinking arises from integrating a small number of core DA principles that provide the underlying structure for this tutorial:

- The quality of a decision is only as strong as the quality of its elements.
- In a multi-stage problem, work back from the endpoints, i.e., use backward induction.
- The purpose of decision analysis is to "facilitate a high-quality conversation." (Howard 1988)
- Value-focused thinking usually creates more value than alternative-focused thinking (Keeney 1992).

Decision Quality

According to Howard (1988), there are six elements of decision quality that the DA process should aim to ensure: Framing, alternatives, information, values, logic (or logical synthesis of the previous elements), and commitment. These elements are also relevant in thinking about our decision of how to communicate. We wish to:

- frame the decision on how to communicate results;
- choose from a rich set of feasible alternative communication plans;
- incorporate practically-obtainable information about the context in which communication is occurring;
- be clear about the goals of communication;
- logically design our plan to best achieve these goals, given everything we know about the situation; and
- proactively implement the strategy making sure all participants understand and are committed to fulfilling their responsibilities in it.

Beginning with the End in Mind

Good quantitative analysis alone does not usually produce good decisions, because rarely does the analyst control all the resources required to decide and take action. Decision makers and other players who influence the decision must assimilate the results of the analysis and integrate it with their knowledge of the situation, if they are to be prepared to take action.

This suggests a simple definition of "effective" communication: communication that positively affects the clients' actions. The potential endpoints resulting from decisions about communication are the actions (or inactions) of others, who must be informed, persuaded and motivated. To choose a communication plan we must envision the desired end state: who knows, believes and *does* what.

Decision Making as Conversation

Ron Howard (1988) tells us that the purpose of decision analysis is to "facilitate a high-quality conversation."

The analysis process itself invokes clear terminology for describing the different elements of a decision, it requires clear expression of beliefs and preferences, and it forces consistent treatment of various considerations within a common language.

However, if decision analysis is intended to facilitate a conversation, effective communication of results should ensure that concerns and knowledge are shared sufficiently for actors to move on to the next stage. This not only suggests myriad questions we ought to consider with any conversation – Who is involved? What are their expectations and biases? What do they understand? What is their natural language?, and so on – but also shifts the focus from teaching to learning, i.e., from analysts "telling" to decision makers engaging as active participants in a process. We need to address both language and participation.

Value-Focused Thinking

Ralph Keeney suggests shifting the balance of effort, away from ranking alternatives toward thinking hard about objectives: Rather than focusing on "Which options are available?" and "Which one is best?" we should be thinking "What would be ideal?" and "How can we make that a reality?"

As it is with the analysis itself, so it should be with the communication of that analysis. This is simply a call to proactivity over reactivity. There's no reason to leave to chance or to others, say, the timing, agenda, content and audience for meetings at which results are presented.

Rather than accepting artificial constraints and incumbent approaches to communication, we should not only be analyzing but also selecting, and even creating, the answers to these fundamental design questions, as well as creating the very opportunities to raise them:

- Who… are the participants in the conversation?
- Why… do they need this conversation?
- What… of the vast amount of material should be the core content?
- When… should the conversation(s) take place?

- Where… should the conversation(s) take place?
- How… should the communication be delivered, i.e. what languages, media and formats would best facilitate the desired conversation?

3. QUESTIONS TO CONSIDER IN DESIGNING A COMMUNICATION PLAN

Although those familiar DA principles root our communication planning in common sense, what may be less obvious is how to implement them. Here we elaborate on these organizing questions. Reflecting on their answers often informs an effective design process, although sometimes there are complications and issues quite specific to DA.

Before thinking about how to communicate results to audiences, first consider the presenter's locus of control. Control is greater and execution will be smoother if the communication plan is incorporated into the overall project plan from the very start. In other words, to be more proactive and value-focused (less reactive and alternative-focused), it is best if we address these questions early!

Framing the Need for a Communication Plan: "Who?" and "Why?"

Audiences (meaning listeners, discussants or report readers, depending on the communication format) are engaged to different degrees and in different ways. What are their reasons for being there? Why are they interested in the decision?

The answers will vary. For example, some are concerned about the outcome for their organization, others are doing their job, some worry about the impact on them personally, and others want to be prepared for their involvement in downstream implementation. The presentation should address the audience's interests and facilitate their aid in making the decision a success.

Therefore it is essential to consider goals – of the project as a whole, and of the communication phase in support of the project. This starts by thinking hard about (and to the extent possible, selecting) the audience, the direct participants in the conversation.

"Who?"

First the analyst needs to discover (and to some extent shape) the composition of the audience. This "who" depends on who needs to be kept informed, and who else may wish to be, as well as who needs to inform, discuss, process, visibly lead, or otherwise be involved in the conversation. Therefore presentations might be made to a large, diverse audience or to more targeted groups.

This decision node has many alternatives, because the potential audiences for communication could be any combination of decision makers, the decision makers' overseers/staff, resource holders, other gate keepers, stakeholders, implementers, champions/skeptics/saboteurs, outside observers, supervisors, impacted outsiders, the general public, regulators, procedural watchdogs, employees, suppliers, customers, and competing advocates.

In addition, as we will discuss later, the audience may come from a particular industry or sector with its own unique features, such as culture, terminology, specialized tools, skill levels, interests. The analyst must anticipate such differences across each business sector, branch of the government or military, non-governmental organization, profession (medical, legal, public health), international location, or individual.

"Why?"

Atop the list of subsequent questions should be, "Why does this conversation need to take place? What does it need to accomplish?" A customer-focused answer might be, "Whatever pleases the person who writes the checks for the project." A more client-focused answer would be, "Whatever is in the best interest of the client." Many situations must balance these two positions.

For the audience perspective, we ask: Why are they interested? What do they want to take place? For example, do individuals want to learn? (Usually.) Do they want to learn DA concepts? (Maybe.) Do they want to check the analysis? (Sometimes.) Do they want to feel respected and heard? (Almost certainly.)

For result-oriented questions, the answer may vary for different audience components. Do they want change? (It depends.) Do they want the analyst's specific recommendation to be implemented? (It depends.) Do they want to help implement it? (It depends.)

The analyst often has a say in this matter, too, so analysts would be well-served to ask these same questions of themselves. In some situations, the analyst's interest is merely to give the recommendation and fulfill a contractual obligation. The client will take away insights and do what they will: "Here's your payment, thank you very much."

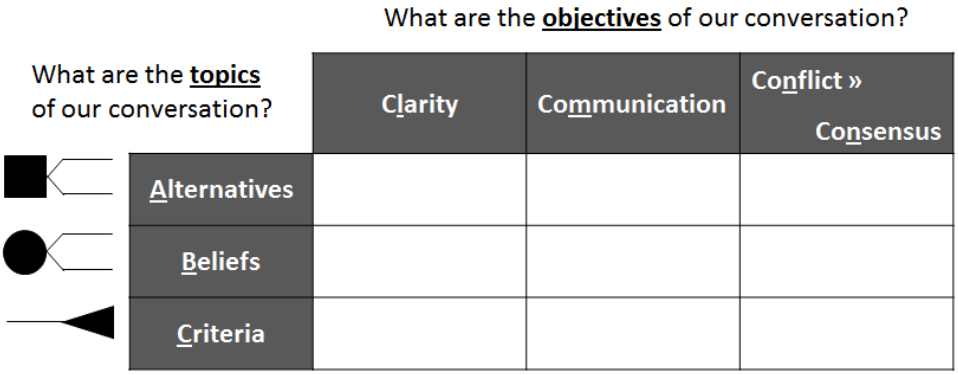
The "why" connects back to the "who." For a presentation to achieve its intended results, who among the players needs to do what, and what will it take to get them to do it? Who must be persuaded, in order for the desired result to take place? Who must be placated or made comfortable? Who needs to begin working constructively with whom?

Choosing the Core Content: From a vast set of possibilities, "What?"

We have found that our Focus Grid (Keisler 1992) can serve as a guide not only for a decision analysis *per se*, but also for prioritizing which content areas should be included, and which

might be omitted, from a communication plan (Figure 1). This 3x3 grid posits that the analyst can direct information flows toward the most critical combinations of organizational needs (the horizontal dimension) and problem characteristics (vertical).

FIGURE 1: The Focus Grid for analytic conversations



The horizontal dimension groups questions about the conversation objectives into three categories:

- **Clarity**. What's going on in this situation? Do we know what we want, and what we believe? Can we each articulate the major issues? Can we visualize how the issues fit together? Do we understand and trust the analysis, documents, models, facts?
- **Communication**. Do we have sufficient background to explain, champion or defend points of view? To exchange perspectives constructively? To back up a decision using analysis? Do we even share a common language for having a conversation about the situation?
- **Constructive conflict to consensus and change**. Do we understand the main differences in perspective? Have we been able to find areas of common understanding? Have we checked for disconfirming evidence? Are we ready to move to agreement, approval and action?

To illustrate, imagine the well-known wildcatter oil drilling decision (e.g., Raiffa, 1968) involving a syndicate with several experts and several stakeholders.

- A conversation focused on *clarity* would detail the information already collected, assessments conducted and computations used to calculate the probability distributions over payoffs, ensuring that these are precise enough to support the decision.

- A conversation aimed at *communication* might ensure that the decision makers understand the analytic results as well as their assumptions and limitations, e.g., that oil prices are assumed to be constant in real dollars over the life of the well, that the worst case outcome would be bad enough to bankrupt the company, or that the drilling of the well will be contracted-out to a local drilling company.

- A conversation aimed at generating *consensus* and/or *conflict* might try to surface and then reconcile stakeholders' differing attitudes toward value issues such as risk and environmental concerns, or differing beliefs about, say, future oil prices, or even about the viability of different specific drilling and testing locations within a given parcel.

Not all aspects of a decision really matter to the audience's needs. Again we can draw on the Focus Grid, this time on the vertical dimension, which groups questions (such as those listed below) by decision elements:

- **Alternatives**. What decisions are to be made, and what alternatives exist, are they well-defined, should we create more of them?
- **Beliefs**. What can we say about the uncertainties of the problem, and possible outcomes? How do we know? How much uncertainty is there? How much risk?
- **Criteria**. What are the objectives, and the metrics used for comparing decision strategies? What are we trying to accomplish? How much risk can we tolerate?

After identifying which cells of the grid are most important to the conversation, it is easier to focus on preparing the material that will be most useful.

What to emphasize? Distinguishing foreground and background material

With this clearer sense of the audience's wants and needs, the analyst can select the content to bring to the conversation, and which aspects to feature. Here, as elsewhere, there are choices to make, tailored to the who/why answers.

If the primary purpose is persuasion, the content should showcase recommendations, with the appropriate amount of logic and evidence to support them. The analyst should formulate the logical argument and evidentiary support from beginning to end, and be ready to discuss any aspect of it, even if it is not appropriate to present all of it. Concise summaries usually work better as core content, with support relegated to appendix sections. (Overwhelming people with data is a beginner's mistake; what can be left out or tucked away depends on audience needs and capability.)

Likewise, even if the primary purpose is more informational and intended to induce "aha!" moments in the audience, it needs to make sure the "so what?" insights are clear, and not obscured by the analysis and data.

Further, there may be ethical and legal considerations about the scope of the content: Some data and conclusions must be shared on those grounds. The audience may be entitled to know some of what the analyst discovers, and the analyst may be obligated to disclose certain results. Transparency is often a key to project success, and sometimes it is not even optional!

Orchestrating the Conversation: "When?" "Where?" and "How?"

Having established what needs to be communicated to whom, and why, and how thoroughly, the analyst can decide how to engineer the right setting for the conversation. This means answering the interconnected questions of when communication takes place, where it should occur, and how it should be structured.

"When?"

The "when" decisions include the frequency, timing and duration of the conversations. Once again, this decision node has many branches.

Appropriate timing and frequency depend on the cadence of the DA project: When will the analyst need input or feedback, and when will the analyst have useful insights to present? The end of the analysis process is only one of those times.

The duration of any communications can range from none (a written report) to one or more days (strategic decisions with major impact on the audience). The length should be consistent with:

- the size of the project,
- the stakes of the decision,
- the quantity of content (including the amount of necessary technical detail),
- the level of controversy,
- the extent of new concepts,
- the desired amount of interactivity, and
- the time constraints and expectations of the audience.

"Where?"

Surprisingly, even the "where" question – the venue of a conversation – is an important design variable.

Tied to the "who" question is the question of "How many?" A larger audience is appropriate when input from members of the audience would help to uncover or resolve important issues that may not have been articulated in the analysis. A series of smaller audience presentations is more appropriate when different aspects of the decision merit the time and attention of different people (although this should not be used as an excuse to try to sweep conflicts under the carpet). Whatever size, audience also can be chosen to be more or less diverse with respect to interests, capabilities or other characteristics, depending on what issues need discussion.

If much interaction is needed, the audience should be small enough to accommodate that need. For example, it may be desirable to have a discussion around a large table or a perimeter of tables, so everyone can face everyone else. If the group is small enough, the analyst should even consider foregoing the use of projection and have everyone work from printed sets of slides.

Another possible venue is nowhere/everywhere. That is, sometimes a written report is most appropriate at a given stage. This permits everyone to read and contemplate the work, although this is very unidirectional: analyst to audience. Introverts (people who understand by reflection) respond well to advance copies, whereas extroverts (who understand by interaction) do not.

At the other extreme, some projects require open, public communication. These communications often take place in larger venues and tend to be very impersonal and unidirectional. Here the communication plan might be simple summary handouts, web access to original slides, and appropriate means for audience members to submit questions and get answers.

"How?"

Finally, consider the "how" decisions: What medium, language, and style are best?

The first issue is the choice of medium, i.e., conversation without collaterals, slide presentations, or written reports. The first option is usually impractical for DA work, and the remaining two are not mutually exclusive. Some general principles to consider include:

- Consider consciously what will be left behind after the analysis (and why), and err on the side of incorporating the DA material in a format that is familiar to the audience, e.g., a business case in the client company's standard style.
- Memories are not as good as we like to think. Our intimate command of every detail will fade as we lose constant connection with the project. Therefore, we should document thoroughly and carefully![3]

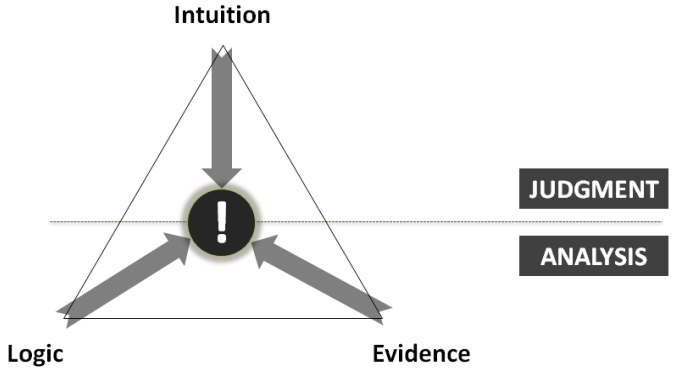
Written reports, electronic communications and well-documented analytical models are important part of the plan. Slide presentations can be very effective – or quite horrendous. The misuse of the most common slide software is well known (Tufte 2003) and stems largely from letting the software drive the communication, rather than the other way around. A clear story line and good slide design (both discussed further in Section 5) make it possible for even a slide-based presentation to serve as a self-guiding, narrative leave-behind. On the other hand, a poorly crafted deck degrades into disconnected fragments when the additional words from the live presentation are absent, or fade in memory.

In either medium, the analyst must consider how to communicate the details in a way that connects with the audience. For a specific audience and problem, what will be necessary to coalesce the case for action inside the decision maker's head?

In general, the proper mix of judgment, theory and data is different for each decision, and will be filled in with different insights as decision makers triangulate from multiple channels, as in Figure 2 (Noonan 2012):

- If the audience has little "gut" feel for the problem, or their **intuition** is generally incorrect, the communication may draw more heavily on examples, stories and anecdotes for illustration, and to strengthen their *judgment* about the problem.
- When the impediment is lack of clarity, or skepticism about the facts (e.g. estimates of costs or frequencies of occurrences), the communication may lean more heavily on empirical **evidence**, i.e., data, to strengthen their command of the *facts* of the problem.
- When the audience is less clear about principles, or when data are less available, the communication might spend more time clarifying theoretical concepts (e.g. the assumptions and the **logic** that leads from those assumptions to conclusions), to strengthen their *reasoning* about the problem.

FIGURE 2: Sources of Insight



Similarly, the analyst should develop an appropriate cognitive strategy, and present insights in multiple ways to accommodate audience members with different information processing styles, for example:

- **Visual**. Graphics may be useful for senior managers and conceptual thinkers.
- **Verbal**. Scenarios can tell a story, or provide concrete examples, or make an emotional connection.
- **Numerical**. By nature of their training, most engineers and financial staff are comfortable with math and probability, but they may be skeptical of subjective probability. With other roles, it is hit or miss as to who knows math or probability.

How best to *conduct* presentations depends not only on the format of the meeting, but also the groundwork laid before the event. Decision analysts can lay foundation for a successful presentation by educating participants with earlier meetings, "progress review" presentations, or written materials provided in advance. If the audience arrives familiar with the language, icons and templates of DA, then the conversation can be much more efficient.

In addition, as with any meetings, some attendees can be briefed or asked to read preliminary information from the project so that the meeting can quickly proceed to substantive discussion and action items. Audience members can also have clear responsibilities going into a meeting, e.g., they could highlight potentially missing information, or they could be there primarily to learn. In some situations, some of the client members of the audience might even have responsibility for delivering pieces of the presentation.

Finally, the analyst, too, should come fully prepared, which usually means rehearsal! This could be as simple as thorough review of the slides or as elaborate as a real-time presentation to a simulated audience.

4. A GENERIC OUTLINE FOR ORGANIZING PRESENTATION CONTENT

The tangible and deliverable end-product of the communication plan is a report, either slide-based or with a written narrative. This section is most directly suited to the final presentation of results and insights after the analysis is done, rather than interim discussions. Of course, much of this advice could be applied to types of analysis other than DA.

The selected content needs to be shaped. Effective communicators tell a story (Weisman 2003), rather than simply list facts. A story has a clear point.[4] The final decision tree provides a natural structure for this narrative, but it is by no means the only possible story structure.

The structure of such reports varies, of course, but a generic template can be a useful "quick start" (Figure 3).

Figure 3 Generic Presentation Outline

Section	Key Audience Questions	Objectives of Conversation
Frame & Scope	"Why are we here?" *or* "Why are we reading this?"	Motivate the audience, remind them of the issues, clarify boundaries of discussion
Agenda	"What are the major pieces of the presentation or report?"	Help the audience understand the overall structure of the conversation
Recommendations	"What should we do?"	Summarize conclusions and actions
Primary basis for the Recommendation	"Why do we believe this?" *or* "How should we do this?"	Explain rationale for recommendations (logic & evidence), clarify action steps
Further discussion of data & analysis, as needed	"What about Issue A? How did you do analysis B? What assumptions go into C?"	Provide additional levels of detail needed for understanding and acceptance
Next Steps	"What now?"	Discuss next steps for audience/analyst Open for additional questions
Appendix	"What else?"	Use back-up slides to document detailed assumptions, analyses and technical points, for as-needed discussion

Frame & Scope

While the analyst knows the whole project history, the audience probably does not, so a good presentation does not start cold. It's important to set the stage for and motivate the discussion.

A first step is to establish the scope: Explain what is to be decided and why, and what is *not* to be decided. It is common to use a **decision hierarchy** diagram, a triangle divided into three levels.

- The top level contains decisions that are treated as **policy decisions**, i.e., already made and not to be addressed in the current analysis.
- The bottom level contains **downstream decisions** or tactics that are premature to address. It will be assumed that correct choices will be made about them when their time comes.
- The middle level represents the **strategic decisions** for which choices are to be made now.

It is often useful to summarize and frame the situation in a more qualitative way, by giving the context and quickly moving the audience from general to specific:

- What is the general *situation*?
- What is the *complication* that triggered the need for change?
- What is the key *question* to be answered?

Agenda

Preview the top-level structure of the presentation. There is a lot that the audience must follow. With a roadmap, they can concentrate on understanding the content, not guessing where it is going. Let them know the points at which terms and concepts will be introduced and when various questions will be addressed. (Periodically returning to an agenda slide – or placing the agenda on a separate easel – can help keep the audience oriented as the presentation unfolds.)

Recommendations

Depending on the audience, it may be best to step directly into the conclusions and recommendations rather than slowly build up the case for them. This “answer first” or “inductive” structure is different from the point-by-point, process-driven explanation one analyst might give another analyst.

There are times when the analyst might adopt an “answer last” or “deductive” approach. When the news is bad or quite surprising, it can be best for audience members to connect the dots and reach a conclusion on their own, before the analyst must explicitly state it. Likewise, when a client sponsor starts with a very strong incumbent plan, the project can be most effective by facilitating “aha” moments, when they themselves conclude that something else would be better.

Primary basis for the recommendation

The next step is to explain why this strategy was recommended: What logic and evidence are behind it?

This may begin with describing the alternatives that were considered. When there is a large number of concurrent decisions to coordinate, strategy tables are a standard way to convey the alternative strategies (thematically-coherent sets of choices). Audience members usually understand these tables quickly. Showing the measures associated with each alternative connects them back to the recommendation. These can be shown in a "buildup" slide that overlays the numbers on the original tree (which has no numbers). It's possible to show endpoint values at the same time, provided the tree is simple enough that this will clarify more than confuse.

Pushing to the next level of support, audience members may want to gain more confidence in the scores, which can help in getting acceptance and guiding implementation. Also, if there is anything missing from the analysis, this can be an opportunity to address or correct it. Here, the analyst may describe uncertainties, attributes and other parameters used in the analysis.

Caution: It is often tempting to share the story of the journey here: "First I looked at this, then I calculated this quantity, then I learned this…" This should be resisted in almost all situations. In fact, senior decision makers are rarely interested in this process. They want to know the answer, and to understand why they should accept it. The support should include only as much process information as necessary for the audience to get oriented to the problem and approach, and find credibility in the analysis and the analyst. Usually, a quick review of the major phases of the work suffices.

Further discussion of data and analysis

The audience is likely to want more detail on some points of analysis, out of simple curiosity or a need for assurance of its technical soundness. Although it is important to have materials ready to provide a deeper level of detail to support the analysis, much of it may not appear in this section! Be ready to answer questions about it, but don't answer those questions *preemptively,* i.e., to pack the main presentation with exhaustive detail, rather than just presenting it as needed. It is appropriate to share some taste of the work performed, with the bulk of the details waiting in a well-organized Appendix section, ready to answer specific questions that may arise.

Some of the items that may appear partly in the body, but more thoroughly in the Appendix, include:

Key assessments of uncertainties and utility functions

This information may be presented as: A list of definitions; density functions or tables for one dimensional probability judgments; and probability trees for conditional judgments; graphs of single attribute utility functions and bar (or similar) charts for weights of multi-attribute utility functions; text of the rationales for judgments should be prepared as well.

The rationales and pedigrees for judgments (e.g., likelihood of a gusher) drive their acceptance, and these should also be recorded and prepared in text form. The methods used also may be of interest, and the analyst should simply be prepared to talk about them. In some cases, a written protocol or primer has been prepared as part of the assessment process, and this could supplement a spoken description.

All descriptions should match the sophistication of the audience. For an unsophisticated audience, a probability wheel might be a useful prop, while audience members who are familiar with various approaches may want to know that, for example, the Extended Swanson-Megill approximation (Keefer & Bodily, 1983) was used in eliciting probabilities.

Computations

Conceptual models are usually implemented in spreadsheets or other software; assessment data are entered into this computational model. The model's logical structure is encoded in its formulas, to generate the output values used for the decision and analysis.

Again, it's tempting for a modeler to share every detail of every model. A better plan is to have everything ready, but to only show what the audience asks for, or what is needed to answer specific questions about the source of results. In some settings, it may be useful to show a slide of calculations simplified to the level that audience members could verify the logic using a calculator. On the other hand, in other settings it could be useful to get the audience to interact "live" with the model itself.

Sensitivity

What could change the decision? Which estimates need further refinement? Which internal disagreements are material? Inquisitive audience members want to know.

Visual devices such *tornado charts* show how the values of particular alternatives vary as input parameter values are varied, e.g., quantity, cost and price.

The *risk profile* or *probability density function* over the value of an alternative illustrates its level of risk, and provides a platform for discussing the upside and downside possibilities. The risk and upside for several alternatives can be compared at once with a graph of their *cumulative probability distribution*, as below. Many decision makers conceptually understand these risk

profiles – densities may be more visually familiar than CDFs while cumulative probability is easier to explain mathematically than probability density – although the analyst should not count on their facility with technical details.

Finally, DA produces calculations that are useful for generating additional insight about why the course of action is recommended. Value of information, certainty equivalent and risk premium calculations fall in this category. These should be introduced only as needed, because they may require a lot of explanation.

Textbook decision analysis generates some results that may not be necessary for formulating a recommendation, but nonetheless can enrich understanding of the benefits for various courses of action. Of course, any other insights generated during the effort could also be shared at this point. The presenter should exercise judgment about proper placement – body or appendix – for items such as:

Value of information

Expected value of perfect information (EVPI) is the maximum that the decision maker should be willing to pay for a test, experiment or anything else that would reveal a specific piece of information prior to the decision. Expected value of sample information (EVSI) describes what the decision maker should be willing to pay for the information that is realistically available. If the audience understands the concept of expected value, it is not difficult to just state that expected value with additional information prior to the point of decision is higher than without it. (Note: The value of information about multiple uncertainties is not necessarily additive, but a decision maker's intuition might cause them to believe so!)

***Certainty equivalent* (CE)**

The model says the decision maker should be indifferent between this monetary value and an uncertain prospect. This concept is intuitively appealing and can wrap up everything critical in one familiar number, but less sophisticated audiences can get confused between CE and expected value (EV). The distinction is easier to include in a final presentation if it had been discussed and developed earlier in the conversation, to allow it time to soak in.

Risk premium

This is the difference between the certainty equivalent and the expected value for a given prospect. This is a good summary of just how much risk there is in a given situation, considering the decision maker's tolerance for risk. This, too, can be confusing to less sophisticated audiences, in which case it is one of those quantities the analyst can calculate but needn't present. Indeed, even the word "risk," which has so many everyday uses and loaded interpretations, should be used very carefully.

Value added

It is common to show the increase in expected value (or CE) of the recommended strategy from the "momentum" strategy, i.e. the incumbent action (or inaction) that likely would have been selected before the decision analysis. This can be very useful in creating buy-in and excitement, so it increases prospects for successful implementation, as well as interest in the continued use of decision analysis.

Creating this insight requires advance planning. It helps to define the momentum strategy early in the project so that it is credible. It also requires humility. Smith & Winkler (2006) describe a winner's curse effect, in which the top-ranked alternative is partly so-ranked because it happens to be the alternative that benefits most from any imperfections in the analysis.

Next steps

Before the presentation is done, there should be a return to explicit discussion of what comes next. There may be specific steps, e.g., meetings to translate the strategies to tasks, or assigning of responsibility to those tasks. There may be minor or major questions to revisit. A client organization may want to ensure that the lessons learned during the analysis are disseminated in other parts of the organization. They may want to a comprehensive implementation plan, or merely the initial discussion of how that plan should be developed, and by whom.

This also may include, or transition to, a specified time for questions and discussion.

These next steps will vary with the nature of the engagement, but failing to discuss what actions ought to follow is a pitfall that can lead even the best recommendations to be forgotten before they are used.

Backup slides and other Appendix items

Here lies the technical detail, references and other documentation. Some of this material should be crafted into "backup slides." These important points would bog down the story line but need to be ready as-needed if questions arise, and in the same professional form and format as the main slides.

A good Appendix has good internal organization, is ready to access quickly in a live presentation, is cross-referenced and, if it is substantial, comes equipped with its own table of contents.

Leaving behind a report

Written reports, electronic communications and analytical models exist long after presentations are done. Certainly, much of the back material for the presentation can be saved in a written

report, appendix or a set of spreadsheets that can be referenced in the future. These can serve not just as guidance, clarification and justification for the decision just analyzed, but also as a knowledge repository that can improve future decisions or ease future analyses. In written form, the analyst can be more comprehensive, and might even choose a different sequence to tell the story, i.e. use an "answer last" story line. There is a too wide range of possible formats and contents to review here. Two good practices are to consider consciously what will be left behind after the analysis (and why), and to err on the side of incorporating the DA material in a format that is familiar to the audience, e.g., a business case for in the client company's standard style. Another important lesson from practitioners is that our memories are not as good as we like to think, and that one's intimate command of every detail will fade as ones loses constant connection with the project. This implies that we should document thoroughly and carefully.

5. INSIGHTS FROM OTHER PROFESSIONAL COMMUNICATION LITERATURES

Many of the issues an analyst must consider in communicating DA results are not at all specific to decision analysis, but rather are general issues of presentation, persuasion and organizational change. Those rich literatures provide some frameworks and lessons that are especially useful in a DA setting. We shall be brief in this section, and refer the reader to some useful background material.

Structured Problem Solving and the Pyramid Principle

Decision makers care about making the right decision, but they usually don't care about the details of analysis apart from trusting that it is right. Before a presentation, it's difficult to anticipate which parts of the logic and evidence will be the most contentious, and which will be readily accepted. It's also impossible to know how long the key audience members will even stay in the room – a senior executive, for example, could be called away at any moment. The story structure should facilitate a contingent flow and conversation, and get to the point quickly.

The Pyramid Principle (Minto 2002), which is employed with only slight variations across all major management consulting firms, addresses these concerns. By default, this approach starts a persuasive story with the highest level of the logical argument – usually, the conclusion or recommendation. The story line then works down to more detail as necessary, layer by layer, to support each point with the logic and evidence to make it convincing.

The Pyramid approach works equally well for structuring a written document as with a slide-based presentation. However, it is especially useful for organizing a live, interaction presentation. The analyst would not automatically present everything that has been calculated, only what is necessary to support the case. If the audience (decision maker) accepts the

argument, it may be sufficient to stop there, not wade deeper into the analysis, and instead proceed to the next steps and action items. If the audience needs to understand why, then the presentation goes to the next level – but only on those logical planks that are in question.

A prepared presentation would not go all the way to the bottom possible level, but should go down to the level that the presenter anticipates the audience will need to go to accept the argument. The analyst should then keep supporting material ready if the audience needs further support for the points, e.g., credentials of experts, intermediate calculations, detailed definitions.

As it appears across consulting practice, the Pyramid approach usually comes with a recommended process for *developing* a communication, which also may be useful to a decision analyst:

1. **Construct the logic pyramid**. Thoroughly test the logical reasoning of the recommendation.
2. **Develop a slide budget.** Determine roughly how many slides belong in the main flow of the story.
3. **Create a story board**. Turn the logic pyramid into a story line. Literally sketch the story board, using only one major point per slide, which should be roughly drawn at this time. The slides become the girders and beams of the argument.
4. **Craft the slides**. The main point of each slide should appear in an "action lead," a single complete thought appearing at the top of each slide. The rest of the slide below should provide either the detailed logic or the appropriate evidence (analysis or data) to support that lead.
5. **Test the story line**. Line up the slides so that only their leads are visible. Someone merely reading across the leads should be able to understand completely the flow of the argument.

Slidecraft

Presentations using Microsoft PowerPoint or similar software packages are ubiquitous. This is a two-edged sword. To make it a useful tool for fleshing out and supporting our logical story line, rather than a dangerous weapon in the communication process, we should recognize that it is not necessary to use default formats. The interested reader can consult one of the many books on designing effective electronic presentations (e.g. Atkinson 2005, Kosslyn 2007, Zelazny 2000).

Slides can take many shapes depending on the detailed content being communicated, but some features are frequently mentioned as common "goofs" (Noonan 2012):

- No page numbers
- Generic, information-free leads (e.g. a topic word vs. an action lead)
- Bullet points are incomplete thoughts, merely cryptic, shorthand prompts for speaker
- Incomplete slides get the audience L.O.S.T.(= Lots of Off-Slide Talk)
- Incorrect number of key ideas on a slide (i.e. none at all, or too many)
- Key idea buried at bottom of slide
- Unsupported assertions
- Poor information hygiene (e.g. no axis labels, units, legend, sources)
- Failure to indicate if an analysis is “illustrative” or “preliminary”
- Too much clutter (including color) or PowerPoint junk

Some of the various referenced literature and practice of management consulting also offers helpful advice for *delivering* a slide presentation. One key idea is the technique of “clearing a slide”:

1. Display a slide, and take a quick look at it.
2. Pause.
3. Look at one audience member.
4. Tell that one person what’s on the slide.
5. Paraphrase it, that is, don’t read the entire slide to him or her.
6. Discuss the main insights from the slide.

This “one person, one thought” approach helps a presenter

- focus on, connect with, and read the audience,
- avoid the most common retreat avenue (looking at the slides),
- reduce nervous scanning of the entire room, and
- reduce run-ons and non-words.

Answering questions

Questions are an important and often essential part of the communication process, not necessarily an indication of a story line or weak slide craft. Skilled management consultants in any field recommend concerted preparation for a “Q&A” period. List (List 2001) provides advice for the responder, including:

- Retain control:
    - Create a short list of key messages in advance.
    - Keep the list in front of you.
- Practice your answers:

    - Anticipate what the toughest questions might be.
    - Anticipate what questions you'd like to be asked, to reinforce your key messages, and look for appropriate ways to inject those answers.
- Learn how to hit curve balls:
    - Ask for a restatement of a confusing question
    - Gently correct a question that contains a factual error
    - Positively reframe a negative question.
- Get comfortable with many ways of saying, "I don't know", for example:
    - "We don't have all the data yet…"
    - "I will get back to you on that…"
    - "That's not my field; I'll consult the right person and report back…"
    - "That question is outside the scope of our work/this phase…"

Finally, practiced presenters are aware of the body language of their audience. For example, as American writer and teacher Henry Haskins reminds us, "The time to stop talking is when the other person nods his head affirmatively but says nothing."[5]

Change Communication

Usually our communication is intended to facilitate a decision. Decisions always cause something to change. A substantial literature in organizational behavior and theory has emerged regarding how to communicate about change. Much of this is synthesized in the *ADKAR* framework (Hiatt 2006), an acronym for the five stages of change readiness. A good communication plan assesses and possibly creates a suitable level of readiness at each stage, before moving on to the next stages.

1. **Awareness** …of why the change is needed,
2. **Desire** … to support and participate in the change,
3. **Knowledge** … of how to change,
4. **Ability** … to implement new skills and behaviors, and
5. **Reinforcement** … to sustain the change.

Strategy Communication

There is an entire profession of corporate communications focused on reaching various audiences *after* decisions have been made. The Balanced Scorecard or BSC (Kaplan & Norton, 1996) is one approach that has been vetted for this purpose. BSC produces performance reports in terms of objectives, measures and targets. Definitions can be refined to produce

personalized scorecards showing how success will be monitored from specific perspectives. BSC incorporates considerations that may or may not be purely profit-focused, depending on the application, and that are not always natural to express in purely financial terms. It can be useful for informing various stakeholders about the decision in a way they will find relevant to their concerns.

BSC shares conceptual linkages and similarities with DA and is rather flexible, and so may be especially suitable for communicating DA-driven strategies. The various measures and structures of a BSC serve as raw materials for a comprehensive plan to manage message streams for ongoing communication in terms of which BSC information at which levels (strategy or execution) goes through which channels (rich or lean) to which audiences. The accounting-type language and reporting structure provides a feedback circuit for ongoing implementation of the strategy. (Norton & Coffey, 2007).

6. SPECIALIZED ISSUES AND APPROACHES FOR DA COMMUNICATIONS

In addition to the general challenges and prescriptions discussed in the previous section, decision analysts confront some more specialized issues, arising from the need to have a high-quality conversation about ideas that are intrinsically analytical, usually quantitative, specialized, complex, and often abstract, all the while using generally-unfamiliar concepts and terminology.

At the same time, audiences may have limited depth of DA-relevant training, ranging from:

1. Math-phobic
2. Know some math… but not probability
3. Know some probability… but not DA
4. Know some DA… but not the full complement (e.g. probability distributions, conditional probabilities… but not utilities or risk profiles)

The analyst should be sensitive to this aspect of the audience, and can set the pace and mathematical level appropriately. In addition, in the DA literature we find several themes that can help an analyst tackle these special issues.

Making an Explicit Distinction of Model World vs. Real World

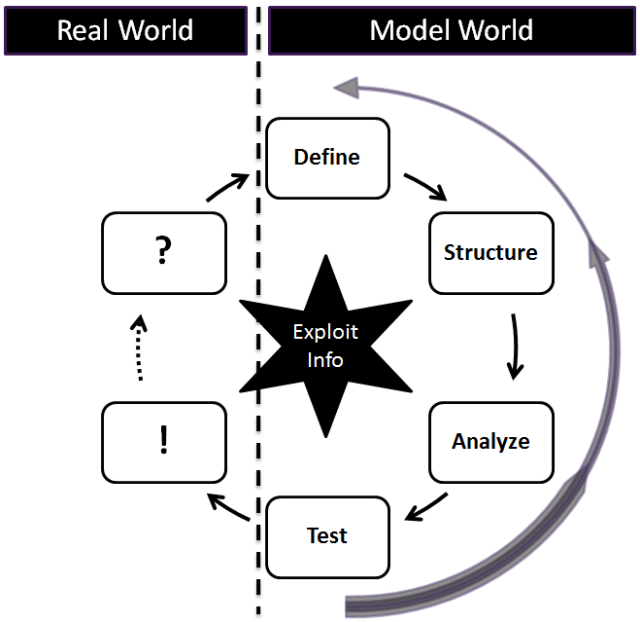
It's commonly argued (Powell 2004) that modelers have to first transition from the real world into a model (formulate), perform analysis within the model, and finally reconnect the analysis back to the real world (interpret and apply). Some depict the general problem solving process (Figure 4), starting with recognizing the need for change ("?"), through the modeling steps, and

back to insight and action ("!"), as an endless loop linking real and model worlds, with feedback and iteration built into the process, and information incorporated throughout (Noonan 2012).

Decision analysts may take for granted their ability to move comfortably between these worlds, and should pay special attention to getting the audience comfortable with both transitions, i.e., formulation and interpretation. [6]

Further, ideas and language that make perfect sense within the model world may be overly abstract and sound irrelevant or artificial to an audience confined to the real world, so they must be chosen carefully. Real world stories with a narrative may help ease the communication at both transitions.

FIGURE 4: The Analysis Process Links Two Worlds



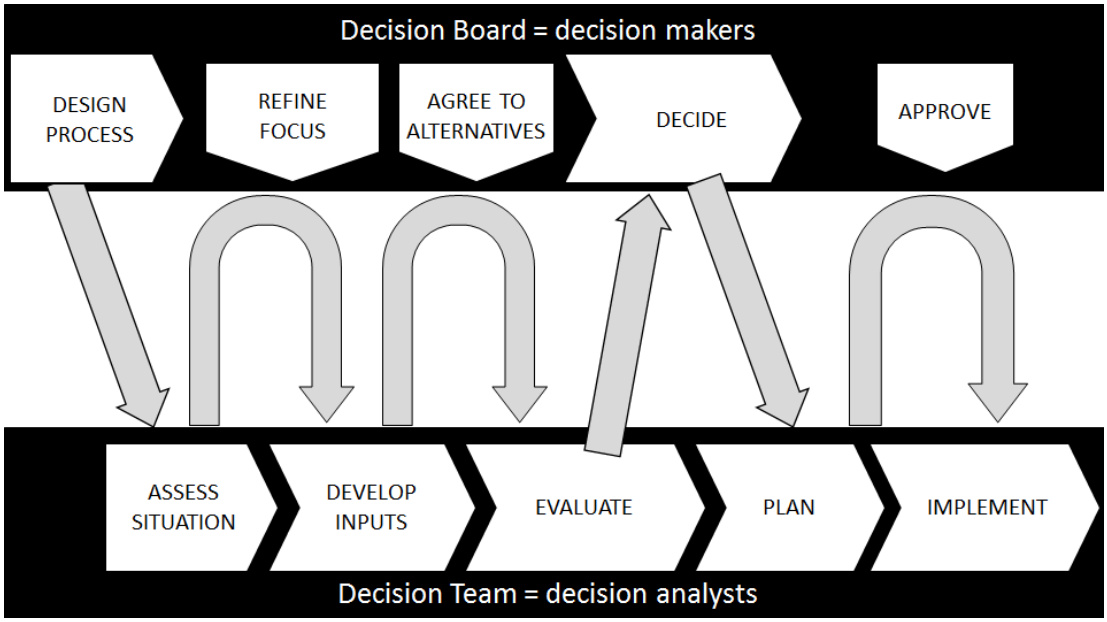
Managing a Complex Decision Making Process

As mentioned previously, communication can take place at many points in an engagement, not just at the end. Issues of problem formulation, important digressions about surprising findings in the model world, and possible interpretations can be addressed along the way.

For example, consider the Dialogue Decision Process (Figure 5, adapted from Spetzler, 2007), or DDP. This is also known as the "snake process" because the chart of meeting plans snakes up and down between analysts and decision makers as time goes forward. The DDP explicitly determines project meetings at the outset for the major points of communication. The DA

project leaders, sponsors and champions construct a "decision board" responsible for overseeing the project, making the final decisions and implementing. They also form a "decision team" responsible for executing the project, performing assessments, modeling and other key tasks. At interim working meetings, facilitated by project leaders, the decision team presents current results, and the decision board discusses and makes decisions.

FIGURE 5: The Dialogue Decision (Snake) Process



The details of the DDP can vary slightly, depending on the scope of the project. At minimum, there are meetings between the decision team and the decision board scheduled for the major phases of the project: framing, alternatives, analysis and connection (Barabba 1995). The form of material presented at each is fairly standard, e.g., tornado charts are often shown to help refine the focus, strategy tables are presented at the alternatives meeting, while cumulative distributions are presented at the decision meeting. Skinner (Skinner 2009) details templates for deliverables at different project phases within this type of process.

The Challenges of Language

In general, it's best to avoid jargon (model-world-speak) in presentations. But with DA, there are technical points that are necessary to have a "structured discussion." New terms need to be defined clearly for the logical thread to be complete, which requires some effort. This investment can pay off more toward building a long-term capability than in one-off decisions.

We do have some choices of terminology. There is traditional, standard decision analytic terminology, with terms such as utility, expected value, certainty equivalent, attribute and so on. Recently, some potentially more user-friendly terms have been proposed. Ron Howard (2004) has provided a precise set of definitions for prospect, influence, u-value and other terms, with the idea that those who understand these terms can have a better structured conversation. Rex Brown (2004) has suggested still other terms, while Hammond et al. (1998) recommend the PROACT framework. Other terms exist as well. We must balance teaching (or creating) new terms with using old ones that aren't as rich for expressing DA results.

An additional language challenge is the existence of what linguists call "false friends": pairs of words in two languages that appear to be the same or similar, but have very different meaning. The DA lexicon includes "risk," "option," "values," "utility," and other words that have everyday uses with different meanings, so our audiences may only appear to follow our thoughts.[7]

Worse, our audiences may have been exposed to yet other languages and possibly related concepts – for example from economics, finance or the Analytic Hierarchy Process – that could cause them confusion when presented with DA ideas. The presenter must not only explain the language, but verify that message-sent equals message-received.

The Opportunities of Visual Language

In addition to words, DA has a rich vocabulary of graphical representations that efficiently express concepts key to understanding the reasons behind a recommendation.

With any graphics, we consider the needs of the audience. Those who process information visually will appreciate graphics. With more detailed graphics, there's a risk of confusing the audience with clutter, so it's important to keep in mind which points are to be conveyed. It helps if the audience is familiar with the type of graphic shown – the presenter can spend time explaining how to read graphics, but this should be kept to a minimum.

Standard DA graphics, discussed already, illustrate the structure of a decision model, e.g., decision trees, influence diagrams, value hierarchies, and strategy tables.

Other DA graphics may provide more detail to present some of the project results, as discussed in section four. Most common are: cumulative distributions, tornado charts, and Pareto frontiers (for portfolio decisions).

Other adaptations of standard business graphics are not universal but are common in DA. Most can be created with standard spreadsheet programs and are in a format familiar to managerial audiences. These include: bar charts, line graphs, dashboards, 2x2 or larger grids & matrices, and various financial-type reports.

More idiosyncratic graphics may be used if they have currency within the client organization. Metaphors (Felli 2006) are useful for facilitating both discussion and insight. Other images may be created by someone clever and become archetypes with local nicknames, e.g. decision rings (Bordley 2002). If these arise organically, that's good, but otherwise they will likely just make the presentation more complicated.

Presentation of Quantitative Information

Quantitative methods produce large amounts of information that can overwhelm or confuse the audience. Edward Tufte's work (1983) is a useful resource, providing a great many examples and concepts for presenting quantitative information.

This work is largely driven by three ideas:

- minimize clutter
- think about the idea you wish to convey, and
- make sure the visuals support it.

Decision trees, for example, could suppress numbers (e.g., only show utilities and not certainty equivalents) or use a small number of significant digits. Where there is a great deal of symmetry, there is redundant detail in decision trees, and influence diagrams combined with skeleton decision trees (i.e. tree diagrams that suppress redundant branches) would communicate as well or better than full decision trees.

Tufte also reminds us to manage the "data/ink ratio," which means to push non-informative detail to the background (or off the page altogether), and to avoid adding irrelevant "chart junk" that would distract the audience. Our objective is to make their cognitive task as easy as possible, so as to concentrate their attention and judgment on the important content issues.

Similarly, Zelazny (2001) reminds us to be careful in choosing the type of chart to summarize information. This start with asking the question, "What is the comparison being made?" The type of comparison drives the type of chart; if the analyst is not clear what comparison is being made, perhaps the data do not have a clear point and do not belong in the presentation.

Readers of this tutorial may also find value in several other books from the management literature focused on communicating numerical information (Few 2004, Koomey 2004, Tufte 2003).

Mental Models and Communication of Risk and Uncertainty

There has been a great deal of research on risk communication and on mental models. Here we can only provide a very short summary of some of the key findings, along with some references and a discussion of its relevance to DA practice.

Some DA efforts directly involve risk, or may evoke emotions similar to those that risk does. Because risk – in the sense of "negative outcomes" – can bring fear, risk communication involves feelings as well as facts. On the feeling side, communication involves identifying those who are affected, understanding their concerns, building trust, showing empathy, and being open and accessible through various channels (Sandman 2007).

On the factual side, there is research about how effectively various forms of presentation convey certain types of information. Morgan and others (Morgan 1990, Vrecko et al., 2009) have studied and written about how to communicate uncertainty. Their findings apply to specific devices often used in DA, e.g. ranges, cumulative distributions and probability density functions. For example, they found that cumulative density functions are confusing if there is no explanation of their meaning; individuals who view them are able to make good estimates of relative likelihoods of different levels of performance, but poor estimates of mean performance. They suggest depictions for two- and multi-dimensional uncertainty, and emphasize that the presentation approach should depend on the audience.

Other research shows that use of qualitative terms such as "likely" do a very poor job of communicating probabilities, but this is more a reason to use the quantification found in DA than a potential pitfall of doing so (Newman 1967 is a good early reference for this thread of research).

Another important concept, mental models (Morgan 2001), is useful when the audience is diverse and unsophisticated with respect to the problem domain. In the mental models approach to risk communication, the analyst first constructs expert models representing best judgment based on valid data and analysis about the properties of the risk. Then, using interviews, analysts characterize the mental models that various stakeholders hold about how the world works in general, and about the risk in particular. Finally, a risk communication strategy builds on and modifies the audience's mental models so that they can incorporate the relevant expert knowledge.

7. CONCLUSION: DEVELOPING THE RIGHT COMMUNICATION PLAN

We have described a variety of ways to manage the connection between decision problems, consulting engagements and possible communication strategies. There is no definitive formula supported by the literature about what to do. In many cases, just considering the right issues will lead practitioners to obvious ways of adapting to the needs of their situations. But it is a decision problem: "What are the objectives of this engagement, and what communication strategy – which combination of choices across the many design variables – would work best in

achieving them?" A useful way to pull together the considerations we have addressed is to go through a **pre-engagement inventory**:

- What type of decision is being analyzed, and therefore what technical methods will be used, and what type of results will be generated and available as the raw material for the communication strategy?
    - Simple decision involving, at most, decision trees with expected value calculations
    - Strategy involving decisions to be coordinated across functions
    - Policy involving establishment of rules and objectives for future decisions
    - Portfolio involving competition for resources
    - Some other possibility with its own features that the analyst can articulate
- For what purpose has the DA engagement been initiated, and therefore what of the possible results (and other information) must be assimilated by the people involved?
    - Information
    - Recommendation
    - Process facilitation
    - Justification
    - Capability building
- Who is involved, and what do they bring into the process in terms of expectations, knowledge and abilities, and therefore, what specific methods for sharing information will be most effective?
- What will happen at each stage of the process in support of the overall project needs, and therefore how does the overall communication plan get implemented at specific meetings?
    - Kickoff
    - Modeling
    - Preliminary results
    - Final results
    - Decision
    - After the decision

Developing a communication strategy then involves fleshing out the results of this inventory and making use of the best practices for its elements as appropriate. The planned interactions should be consistent with project and organizational constraints, i.e., if you need a lot of time and attention from people who aren't likely to give them, either plan for less or obtain more of their availability.

While presentations and communication strategy in DA and elsewhere is more art than science, we still do well to think before we choose that strategy.

Final thoughts

Presentation and communication of DA results is an important factor in achieving the purposes of an engagement and adding value in practice. Although there are standard scripts that may be used without thinking much about how to present, adapting the communication to the needs of various audiences and the specifics of the problems can lead to more productive and more successful meetings and projects.

Analysts should be familiar with all the basic DA tools and have general presentation skills. In planning for communication and presentation, they should consider several questions: Who is the audience? What are the objectives for the project as a whole? What are the constraints of the presentation? What are what the objectives for the communication in support of the project?

All that's left is to match the tactics to best meet the demands of the situation, to give audiences the material they need to fulfill their part in meeting the project objectives, to make sure the communication helps the project meet the client's objectives, and then to effectively deliver the communication.

With years of practice, one may learn the art and internalize various approaches. This tutorial offers some simple steps and principles for those who can't wait so long.

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[1] Throughout this tutorial, we refer to many of the more common, widely applied tools and frameworks of decision analysis – such as decision trees, value hierarchies, influence diagrams, strategy tables and tornado diagrams – without individual references. Some of the best sources for more explanation and instruction on these and other standard DA methodologies include Howard, 1988, Keeney, 1992, Matheson & Matheson, 1999, Clemen & Reilly, 2001, and Skinner, 2009.

[2] All of these approaches are from a single school of thought in that they build on the same mathematical foundations of decision theory, they use many of the same assessment techniques and they produce equivalent numerical results. They differ in the methods by which they engage organizations and stakeholders.

[3] This may include having someone take notes during the presentation meetings themselves. These notes can become part of the leave-behinds for all participants, or merely part of the analyst's project archive.

[4] Not all stories have a content point, of course; some are intended to be attention-grabbing, entertaining, or memorable (McKee 2003).

[5] Although care must be taken to discern whether the other person has actually just fallen asleep.

[6] In fact, for some audiences, it may even be helpful to explicitly address these transitions, e.g. "Now we're moving from the problem as you described it to how we described it for analysis," and, "Now we're moving back from what we figured out in the model to what it means in the real world."

[7] This can work in reverse, as well: A potentially large pitfall for the analyst is the *mis*use of the client's language. What a company calls "risk" may not be the DA concept. Worse, a consultant can lose credibility by abusing the client's technical terms, e.g. "Phase 2 Trial or whatever". It's okay to try to adopt the client's language, but it's not good to pretend to have much more expertise in their area than you actually have.