Making evidence-based organizational decisions in an uncertain world☆

Denise M. Rousseau

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EVIDENCE-BASED ORGANIZATIONAL DECISIONS IN AN UNCERTAIN WORLD

> *Make everything as simple as possible, but not simpler.*—Albert Einstein

This article deals with decision making practices that work. Based on decades of decision research, it is a primer on how to make better organizational decisions. Professionals are often familiar with the well-established research on cognitive biases in individual judgment (e.g., the tendency to seek information that confirms existing beliefs and rely on easily available information), expertly described in Daniel Kahneman's *Thinking Fast and Slow*. That research focuses on the biases of non-experts making simulated decisions—and indicates how difficult it is for individuals to reduce their own biases. Organizational decisions are somewhat different. They take place in a social setting where participants can hold different information, and under the right circumstances, can act in ways that actually help de-bias organizational decisions. The focus of this article is on decision making practices that can reduce errors in judgment, improve the quality of information

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considered, and better suit the challenging environments in which organizational decisions are made.

In support of the movement toward more evidence-based practice (EBP) in management, I lay out the what, why and how of making good organizational decisions—using processes scientific research shows increase the odds of success. The need for a better informed approach to decisions in organizations is straightforward: The best available management research suggests that around half of organizational decisions fail to achieve their goals. This failure is tied to managers who rush to judgment, impose their preferred solutions, fail to confront the politics behind decisions, ignore uncertainty, downplay risks, and discourage search for alternatives. At the same time, contemporary organizations have many notable successes. NASA put a man on the moon. Smallpox has been eradicated. Farmers in third world countries use cellphones to obtain crop prices. Half of organizational decisions may well succeed, and science shows some reasons why.

This article aims to promote better organizational decisions by offering evidence-based insights to improve decision quality. I describe how scientific evidence can inform organizational decision making. In doing so, I specify how to make successful organizational decisions through use of de-biasing practices and appropriate decision processes.

This article develops three key ideas. Organizational decisions are similar to and yet different from individual decisions in ways that introduce new biases and at the same time can compensate for them. Limitations to human judgment and biases in organizational decisions can be offset by six evidence-based practices useful for de-biasing decisions . These de-biasing practices underpin three decision processes well-managed organizations can master.

ORGANIZATIONAL DECISIONS ARE SIMILAR TO BUT DIFFERENT FROM OTHER DECISIONS

Human beings have cognitive limits that introduce error into judgments and decisions. Organizations by virtue of their structuring and the environments in which they operate tend to introduce their own peculiar decision challenges. Thus organizational decisions can differ from personal decisions and from the professional decisions many practitioners make

(Table 1). Organizational decision makers work with and through others. Unlike many clinical psychologists and accountants, managers do not practice solo. Not only responsible for their own decisions, managers are also accountable for the decisions others make, a responsibility associated with gaps in both information and understanding that increase uncertainty.

All judgments and decisions are affected by the roles people play. Ask physicians whether they prefer to focus their efforts on treatment or disease prevention, let us say for diabetes or asthma, and they are likely to express different preferences when asked about their patients or their grandchildren. Organizations place people in multiple roles simultaneously. The veteran teacher, nurse or engineer who is also a department fewer head has different information and beliefs than the new teacher, nurse or engineer just starting out. Organizational decision makers tend to pay attention to certain information because it fits their role and avoid other information if it seems irrelevant or exposes them to risk. The manager who says, "Don't tell me about the problem because then I'll have to deal with it," is trying to manage her accountability. People with different organizational roles have different interests and information, one reason for creating task forces made up of people from varied backgrounds.

Organizational decision makers face considerable uncertainty and complexity in making decisions. Managers often do not get timely feedback on the outcomes of their decisions, unlike the surgeon who makes post-surgery rounds to find out how patients are doing. Organizational decisions often have lots of stakeholders, inside and outside the organization, prompting a tendency for managers to avoid paying attention to those on whom less information is available or to work around those who make a decision more complicated. Organizational decision makers can face highly dynamic situations. Missing information and difficulty interpreting data are common in dynamic environments, making appropriate courses of action hard to determine. In contrast, an accountant is likely to know what information is needed to close the books and where to find it. Last, organizational decision makers often face a diverse array of decisions made concurrently. Not surprisingly then, there tend to be fewer frameworks, checklists and decision supports to guide organizational decisions than found in professions like nursing

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Table 1   Organizational decisions differ from individual decisions

Qualities	Organizational decision makers (managers, teams, work groups)	Individual decision makers (homelife, private professional practice)
Nature of work	Work with and through others	Personal choices/solo practitioners
Political influences	Strong political pressures can block or constrain decisions	Some but fewer political pressures
Accountability	Accountable for decisions by self and others	Accountable for own decisions
Decision types	Make many kinds of decisions, often concurrently	Make fewer kinds of decisions
Stakeholder diversity	Many stakeholders affect and affected by decisions	Fewer stakeholders affect and affected by decisions
Levels of uncertainty	Greater uncertainty due to missing information, difficulty interpreting situations, and environmental change	Uncertainty can vary, often low to moderate
Decision supports	Typically few decision supports and protocols	Professionals often have decision supports and protocols (e.g., checklists)

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and medicine or engineering and accountancy. For all these reasons, organizational decisions differ in important ways from personal decisions and the decisions many professionals make.

ORGANIZATIONAL PRACTICES CAN REPAIR DECISION BIASES

The second key idea is that using appropriate organizational decision practices helps overcome both well-established individual biases and biases peculiar to organizations. Research demonstrates a variety of cognitive and organizational repairs that can help reduce the effects of biases. One repair suggested by a study from the University of Chicago applies to the multilingual—thinking in a foreign language! A native English speaker who speaks Korean as a second language is likely to be more deliberate in his thinking in Korean and less affected by emotion than he is when thinking in his native tongue. But organizations do not need to hire linguists to de-bias how decision makers think. Populating labs, teams and committees with people from different backgrounds can help do that. Working in diverse groups prompts more deliberate thinking in organizations by exposing people to information that challenges existing beliefs.

Although it is very difficult for individuals to reduce their *own* biases despite careful training and personal effort, making decisions in a social setting can reduce bias and in turn improve decision quality. The basic idea is this: *it's easier to recognize biases in other people than in ourselves.* A common individual bias is valuing one's own personal experience over relevant organizational data or scientific findings. People typically use less objective information in making individual decisions than they think they do and base many judgments on unquestioned personal beliefs and assumptions. The manager who favors candidates who went to the same university as he did may not recognize the reason for his preference. However, making the hiring decision in a group using de-biasing practices can surface and overcome that manager's biased assumptions.

Six organizational biases have been shown to lead to failed decisions. Each comes with targeted repairs known to be effective (Table 2). These repairs reflect findings from the work of many scholars including Chip Heath, Richard Larrick, Paul Nutt, and others. These repairs are synergistic and work together to improve organizational decisions.

Solving the Wrong Problem → Start with Search and Get the Right Decision Frame

No shortcuts are apparent for taking time at the outset of the decision process.—Paul C. Nutt

Organizational decisions arise from problems, opportunities or crises, and pretty much in that order. None of these may be well defined. At the outset of a decision, it is critical to figure out the "decision frame," that is, the decision maker's conception of the problem to solve, or the opportunity or crisis to address. A good start begins with asking questions—*lots of questions*. Asking questions kicks off the deliberate search for both information and understanding (not the same thing!), gathering intelligence to understand the need, opportunity or crisis. Active search informs the rest of the decision process, making it easier to figure out how best to make the decision and the actions to take in implementing it.

In contrast, shortcuts taken at the start often translate into frustration and failure later. Stopping the search process too soon can lead to solving the wrong problem, settling on a decision frame before really understanding the situation. Questioning and search can come to an abrupt halt when managers impose their own take on a problem. The executive who begins a meeting extolling the virtues of bold action can skew the discussion that follows. The situation is no different than the police arresting their first suspect without looking for further evidence of who else might have done the crime. Imposing an idea generally leads to worse decisions than first taking the time to make sense of the underlying problem. Uncertainty can seem intolerable. Even responsible managers often assume away uncertainty, acting as if the expected results of a decision are clear and guaranteed. In a rush to make things concrete, the search for relevant information can be suppressed and uncertainty glossed over. The resultant lack of information and insight leads to solving the wrong problem or pursuing a questionable opportunity with limited results.

Table 2 Organizational repairs for better decisions

Organizational biases	Repairs
1. Solving the wrong problem *(Idea-led not problem-driven)*	Taking time at the start to ask diagnostic questions Engage in active search processes
2. Ignoring politics *(Sponsor biases, pet projects)*	Addressing the politics of the decision Legitimate a de-biased decision focus
3. Considering just one option *(Pet project, gut feeling)*	Entertaining multiple options
4. Focusing on a single outcome *(Narrow view of success)*	Using several outcomes of decision success and effectiveness
5. Narrow interests dominate *(Stakeholders ignored)*	Broaden the kinds of stakeholders considered and involved
6. Relying on easily available information *(Stories and "hippos")*	Broadening sources of information to include scientific evidence, organizational data, expert judgment and stakeholder concerns

Search can also be short-circuited when the people involved think so much alike that they fail to recognize important aspects of the problem. As we will discuss below, attention to the many stakeholders a decision might have can help broaden problem conceptualization and avoid the decision frame becoming too concrete or narrow too soon.

Deliberate search helps maintain an open mind, permitting a discovery process to unfold. This critical initial phase shapes everything that happens later. Search can clarify the nature of the decision, what needs to be improved, what results are wanted, the support needed, and the stakeholders affected. At the start, its often better to be unsure about the problem rather than superconfident. The key idea here is that uncertainty is inevitable in typical organizational decisions and the start of a decision is the place to begin managing it. Uncertainty is inherent in organizational decisions and best confronted early. Managers typically prefer to focus on concrete evidence and distance themselves from information that raises doubt. Instead, it is better to manage the uncertainty or even try to reduce it—by gathering facts or waiting for more information.

There is no shortcut to a thoughtful start to the decision process, regardless of urgency or the resources poured into a problem. Spending more time assessing the problem means less time required to solve it. In tighter-time frames, rehearsals during slow periods can help build decision making capacity (example, flight crews facing bad weather ahead). Or decision makers can buy time, as in the case of a cockpit crew who goes into a holding pattern until they have figured out how to solve a problem. If time really cannot be bought, the decision may require simpler rules that take critical action and avoid harms. And the question to be asked later is "why did we wait so long to prepare for this decision?"

Pretending It's Not Political → Address the Politics and There's Always Politics

Where fear is present, wisdom cannot be.—Lacantius

Organizations are political places. When subordinates and consultants are reluctant to challenge how their bosses or clients frame a decision, politics are at work. Politics refers to explicit or implicit use of personal power and resources to influence others. Organizational politics can be a positive practice when integrative goals are attained, or a negative practice when personal or local interests take precedence.

Politics cannot be ignored in making a good decision. Politics can be overt or subtle, known by all or invisible. Negative politics can take many forms: Pushing a leader's pet project, ignoring sensitive information, involving some stakeholders while ignoring others are some examples. Positive politics entail being aware of a decision's social implications such as how different interest groups interpret and prioritize issues. Negative politics and good decision making do not go together. Good decisions are made in psychologically safe settings where political interests can be addressed directly. Attention to politics is part of a good start to the decision process by raising issues regarding the framing of the decision. The initial formulation of the problem may reflect the decision sponsor's information limits, biases and interests. Is the sponsor blaming someone else for the problem? What else might be going on?

Negative politics can sometimes be turned into positive. The natural self-interest of a few may be given undue influence. Selective fact reading to serve the interests of a powerful few contributed to both the Challenger disaster and Enron. One way to address political issues is to broaden attention early to the concerns of additional stakeholders, including implementers, users, and others ultimately affected by the decision. The folks in the room where the decision is being made, literally or figuratively, will inevitably bring their own biases. But appeals to broader interests and superordinate goals, or arguments regarding pushback from stakeholders, can prompt the decision to be framed in a more legitimate way. Taking time to develop and legitimate the decision's frame broadens the problem conceptualization and ultimately helps generate more options and better choices.

Politics reflects the moral component of decision making, affecting the interests attended to in making a decision. Negative politics can disproportionately impose the costs of paying high executive compensation upon lower level employees via paycuts. Or, it can kick the can down the road, leaving a decision's unresolved problems to somebody else. Positive politics can broaden a decision's appeal and distribute its benefits and costs in a principled fashion, as in the case where costs are shared and start at the top. Politics skews the information sought in search and in evaluating alternatives. As such a high quality decision process addresses politics upfront and subsequently as needed. And, if politics discourage agreement on a decision, some of the best outcomes can result from using field tests or experiments to evaluate the effects of competing approaches or resolve disputes regarding likely outcomes.

Considering Just One Alternative → Generate Several Distinct Alternatives

The preference for a "quick fix" is motivated by pragmatics and by fear.—Paul C. Nutt

A key predictor of decision success is whether more than one alternative is considered. In decisions where managers impose their views regarding a preferred solution, the search for alternatives is cut short. "One and done" is not enough. Considering only a single alternative ignores relevant information. Such a quick fix can seem timely and efficient, but outcomes tend to be poorer. Where only one alternative is considered, discussion of this (non) choice become conflated with support for its expected results. If a single alternative emerges early, like a preferred IT solution or adoption of a leader's pet idea, it can remain unchanged as the search process shuts down, resulting in little new information regarding the problem or possible solutions.

Identifying multiple alternatives leads to gathering more information regarding possible differences in results. Doing so also can expand the array of criteria or success indicators considered, addressing another bias discussed below. One pitfall with multiple options is the tendency to fall back on intuition rather than analysis in trying to quickly weigh the

alternatives. But analysis, by which I mean systematic attention to each alternative's pros and cons, is important to improving the odds of success. An added benefit, evaluating multiple alternatives side by side can reduce the reliance on self-interest on the part of decision makers and expands their consideration of other stakeholders.

Use Only One Criteria of Success → Use Multiple Criteria

"Not everything that can be counted counts, and not everything that counts can be counted."—Albert Einstein

The odds of decision success are greater when decision makers consider multiple criteria or outcomes. Decision makers often consider only one criterion of success or decision effectiveness. Short-term outcomes, particularly financial ones, tend to grab more attention than longer-term qualitative outcomes. We need to ask what different things should this decision *really* accomplish? Having several criteria in mind informs the search process and deepens the evaluation of alternatives. Importantly, the concerns of more than one interest group are better represented when multiple criteria are used. Consideration of both multiple criteria and several alternatives makes a decision more complex but increases its likelihood of success. Complexity means that an analysis of pros and cons is needed in order to make the decision—not just gut feel. Consider the decision whether to outsource an organization's training activities, build in-house training capabilities, or hybrids of the two. When simultaneously considering several alternatives such as these, decision makers are less likely to fall back on intuition and more likely to deliberate on the relative advantages and disadvantages of each, resulting in more thoughtful consideration of costs and benefits.

Interests of a Few Dominate While Other Stakeholders Are Ignored → Reflect the Broad Array of Stakeholders

"What would the best organization in the world do?"—Paul O'Neill

Actively seeking information regarding the concerns of multiple stakeholders helps improve decision outcomes through better understanding of both the problem and issues of implementation. For example, considering the opinions of users, like clients and customers, is associated with better outcomes than relying solely on the opinions of sponsors and decision participants. Decisions also can have broad reaches and some stakeholders ultimately affected by a decision may not initially come to mind. The people making the decision may not share the same views of a decision's stakeholders. Thus it may help to map the potential array of internal (employees, departments, the board) and external stakeholders (users, regulators, communities). To prompt ethical decisions that reflected broad stakeholder concerns, Paul O'Neill, former CEO of Alcoa, regularly asked the question "what would the best company in the world do?"

A broad stakeholder frame in conceptualizing the problem contributes to increased quality of information search and identification of important criteria for evaluating alternatives. It can also aid implementation by identifying conflicts and helping to develop more integrative solutions. For example, the hiring of a new university HR director was at first seen as an issue related only to the concerns of non-academic staff, since academic department heads handled faculty recruitment and performance management. After talking with deans, faculty and other administrators at the department-level, the selection team realized there was another angle to hiring the kind of HR director needed, one that affected staff and faculty collaborations in entrepreneurial activities. Since various stakeholders interpreted the position's needs from their own perspectives, the task force re-examined its initial take on the decision, ultimately reframing it as a search for an HR professional with broader industry experience supporting teams.

Attending to a decision's multiple stakeholders provides the opportunity to anticipate how the decision's benefits and costs might be appropriately distributed. It raises important questions regarding who benefits, who is harmed, and what other outcomes might be possible. Since the real interests of stakeholders often differ from the stated objectives of a decision, there are two issues. One is the implementation challenges associated with ignoring end users. This classic problem is found in philanthropy where the donor's notion of how to solve a problem may conflict with the community's values or priorities. Stakeholders can hold very different mental models of both the problem and appropriate action, which can be important information not readily available at the outset of the decision process. The second issue is that uneven allocation of benefits and harms across stakeholders raises moral concerns. Stakeholder interests sometimes may need to be balanced across several decisions when they cannot be addressed in a single decision.

Relying on Easily Available Information → Use Several Types of Information and Appraise Quality

"What would I really like to know?"—An evidence-based practitioner

Reliance on easily available information means being swayed by the salient opinion of the decision's sponsor, a manager's own experiences or the intuitions of the folks in the room, without attention to other sources of relevant information. The aim of EBP is systematic use of the best available information from multiple sources in order to improve decision outcomes. The bias of easily available information can be reduced by searching for different kinds of relevant evidence, and then appraising how good it is (its reliability, validity, consistency and relevance) in helping make the decision. Two key ideas here are: (1) using relevant high-quality evidence tends to lead to better decisions than relying on easily available information, and (2) quality evidence comes in several different forms.

Consider the case of a small non-profit OwnHome with ten employees whose mission is to help inner-city residents build

the financial stability to support homeownership. The social workers employed by OwnHome had high turnover, complaining of being stretched too thinly. The executive director first attributed the turnover problem to bad hires made by the previous director. As turnover continued among their replacements, she recognized that there was more to the problem. At an all-staff retreat, issues surfaced regarding the executive director's failure to structure strategy implementation, resulting in a lack of critical resources and supports for helping clients. At the retreat, organization members developed a plan to get a better understanding regarding effective strategy implementation and alliance building. The plan called for some members to talk with faculty at a local university, some to search the local library data bases for relevant research articles, and others to benchmark other local nonprofits. Three weeks later, they pooled their information. They noted areas of agreement across the evidence they had found, in particular, the need to focus on key activities that ensured the flow of important resources. As a result, they developed a set of success criteria and possible alternative approaches. Finally, they decided on a strategy of building alliances with local organizations in order to help clients gain and keep stable employment, manage their personal finances, and access credit. Having a specific framework that all staff understood provided a roadmap both the director and staff could follow in their day to day activities. Periodic meetings monitored progress in alliance building and plans were updated as the organization learned what worked. In this example, multiple sources of evidence were important to problem recognition, sensemaking, developing an action plan, and its execution.

Reliance on easily available information is often reflected in the sway that tradition (past practices) and authority (powerful people) have on the decision frame and alternatives considered. At first, HomeOwn's executive director thought the problem was with the staff, not recognizing how her own day-to-day focus on fire fighting kept her from overseeing strategy implementation. In many organizations, easily available information takes the form of personal experience, stories, and what we in EBP have come to call "hippos," that is, the highest-paid person's opinion. Generally speaking where available information is ambiguous, organizational decision makers fall back on their own subjective judgment as did the executive director of HomeOwn—at first. Subjective judgment means intuitive inferences, hunches and guesses where the readily available opinions of others, sponsors, participants, experts or end users are interpreted without making an effort to evaluate how trustworthy or unbiased that information might be. Reliance on subjective judgment, guesses and intuition has been found to coincide with lots of confidence and wishful thinking, less effective than analysis of information from multiple sources. So in general, lots of confidence is not necessarily a good thing where decisions are concerned.

The antidote to over-reliance on readily available information is an active search process such as HomeOwn engaged in, gathering pertinent information from multiple sources. Sources include scientific evidence relevant to the problem to be solved (e.g., on-line search for research on strategy implementation); organizational data if they can be found (e.g., in company records) or created (e.g., social workers sharing experiences at the staff retreat); expert judgment (e.g., faculty specializing in strategy implementation); and of course stakeholder concerns as people who affect or are affected by the decision (in this example, the social workers provide both organizational and stakeholder data). A key question to ask in the search for relevant evidence is *what would you like to know*? It is easy to overlook what is missing because our minds fill in the missing information with hunches that seem like facts. Broadening the knowledge base applied to a decision permits testing taken-for granted assumptions. It also can raise awareness on the part of the decision maker about how much uncertainty a decision may really involve. In the case of HomeOwn, the decision makers learned from faculty, literature searches, and local contacts that strategy implementation in their small organization might need to be fleshed out little by little in order to learn by doing what works and what does not.

All evidence used in decision making needs to be evaluated for quality. We do not take HIPPOs at face value. Nor do we assume that because a scientific study makes a claim that its claim is actually true. A critical mindset is the essence of evidence-based decision making and attention to *quality* evidence is key to making good decisions. Information can overwhelm attention, so it makes sense to identify what information is worth paying attention to. Judgment can be valuable where the individuals involved have years of experience with a specific domain or technical problem and have had the opportunity get feedback on their judgment's accuracy and effectiveness. Think of the engineer who has twenty years of experience building bridges. Expert judgment stems from recognizing patterns held in memory from training and prior experience, one reason why 10,000 h of practice is a rule of thumb for becoming an expert. Expert opinion tends to be less reliable where the domain is broad, success harder to judge, and personal experience limited. Here think of the manager involved in two organizational change projects over the past five years. Where opportunities to practice and get accurate feedback are limited, expertise is much more difficult to acquire from experience alone.

The quality of organizational data depends on how well they suit the purpose for which they are used. If it is to spot a crisis, data need to be timely—so efforts to get informed early reports pay off. If it is to provide insight into a performance problem, data needs to provide context—incidence, scope, changes over time and comparisons with others to understand magnitude and trends. If it is information about stakeholder concerns, data need to be representative and sufficiently rich to be interpretable.

The quality of scientific data depend on the nature of the question asked. If it is a question of cause-effect (what works?), controls are needed like comparison groups and before/after measures. If it is a question about how different groups might respond to a new program, a cross-sectional survey can provide good information (how might they react?). In general, the highest quality scientific evidence is found in systematic reviews or meta-analyses, where information from a large number of studies can help cancel out the biases of single studies.

An added benefit exists from using multiple sources of information. Arguments based on experience or personal values can seem tainted by self-interest and make other

participants and stakeholders wary. In contrast, using scientific evidence, organizational data and stakeholder perspectives, especially from users, can appear more objective and less value-laden, raising the odds of success and acceptance of the decision.

All good decisions ignore some evidence, but the point is to pay attention to evidence more systematically so that available quality evidence is used.

IMPLICATIONS

Organizational decisions have better odds of success if the above six de-biasing processes are used. These processes are synergistic and work well together. In combination they help organizational decision makers do something humans often find tough to do: confront and manage incomplete information, ambiguity, and uncertainty. To be uncertain means to be unsure because some pertinent conditions are unknown. Managers typically prefer to focus on concrete evidence and distance themselves from information that raises doubt. Using organizational practices that surface biases and overcome them provides a repair. A manager's own self-serving biases can lead him or her to avoid using such de-biasing processes, so it is good to build them into a routine that participants can practice. In doing so, the organization can become a more psychologically safe place for people to make mindful decisions that work.

Responding appropriately to inevitable uncertainties is an important capacity in contemporary organizations. The de-biasing practices described here build this capability by helping decision makers approach organizational problems with an open mind, be politically aware, identify appropriate goals and options, and search for and appraise relevant evidence. Using the set of six practices can promote positive politics in an organization by helping make decisions more integrative. Such practices help employees feel psychological safe, and in turn, improve their ability to constructively de-bias each other. These six practices can be used as a standalone to improve decision quality. But if your appetite is wetted for evidence-based decision processes, consider now taking this capability to the next level.

DECISION PROCESSES MATTER: THREE EVIDENCE-BASED DECISION PROCESSES

"Our Age of Anxiety is, in great part, the result of trying to do today's job with yesterday's tools and yesterday's concepts."—Marshall McLuhan

The third key idea is that decision processes matter and different processes are suited for different kinds of decisions. In conventional decision making, a decision process often is a set of actions that begins with identification of an issue or need and results in an action. In more complex decision making, a process can be an iterative "feedback on the go," as decision makers take action in order to learn what happens and act again based on those results. In this section we discuss deciding how to decide. This meta-capability involves learning the decision processes appropriate

for different kinds of decisions and then identifying the kind of the decision to be made.

Why do decision processes matter? Organizational decision makers often cannot rely on results to know if they have made a "good" decision. Results can take months or years to materialize. In the meantime, decision makers change jobs and even organizations. This lack of feedback makes learning what works difficult. It makes it difficult for managers and other organizational decision makers to learn from experience alone. Contrast this was the expertise acquired over time by a virtuoso violinist or a veteran accountant well-versed in the tax code, each of whom gets regular feedback on their performance. The absence of feedback regarding many organizational decisions is one reason why experienced managers are not always *better* managers.

Fortunately, research by Frank Yates, Paul Nutt, Karl Weick and Kathy Sutcliffe among others shows that the process behind a decision provides a reasonable indicator of the likely quality of its outcomes. Decision process refers to the steps used in making a decision. Using the right process is important in order to make good use of the information in hand or otherwise accessible, and the information that could be created through action and experimentation.

I will describe three evidence-based decision processes that correspond to three commonplace decision situations. There are large bodies of scientific research for each decision process. Developing the capacity to use the right decision process appropriately is part of making good decisions (Table 3):

Routine decisions — characterized by stability and clear cause-effect understanding. The repeated conditions characterizing these decisions permit effective practices to be identified and improved on over time (e.g., how best to hire new call center employees or conduct regular staff meetings for effective communication and team building).

Non-routine decisions — complicated situations for which no one has full information, but the information exists somewhere. For these decisions where decision makers lack critical information, a well-structured decision process can be conducted by involving knowledgeable others in evidence gathering and appraisal, developing alternatives, etc (e.g., whether to implement a new educational program or relocate a facility).

Truly novel decisions — where critical information required by the decision does not exist because historical evidence is irrelevant. For decisions made under truly novel conditions, evidence must be generated by action, learning and experimentation (e.g., designing home health devices for the elderly living alone; starting a business in an emerging market).

These three kinds of decisions cover a wide variety of organizational problems, opportunities and crises. Although they do not cover every possible decision, many other decisions are actually combinations of these three types.

An example of a multi-type decision is the Canadian health system's implementation of the then-new nurse practitioner (NP) role. This decision included all three types of decision process. Since the United States had implemented NPs a few years before, a fair amount of technical information was available allowing routine and non-routine decision making. At the same time, the day-to-day implications of this new role were unknown until a task force working with the first cohort of

Table 3   Three kinds of evidence-based decision processes

Processes	Routine	Non-routine	Novel
Uncertainty	Known knowns *Technical rationality—information is in hand*	Known Unknowns *Missing information can be found and tests can be run*	Unknown Unknown *No historical information exists so must learn through action*
Exemplars	Onboarding checklist Loan guidelines Protocol for managing staff meetings	Administrative team addresses office re-location Task force manages organizational restructuring	Army peacekeeping in Haiti Police-community relationship building Board investigates strategic actions regarding climate change
Key actions Follow appropriate decision process	Understand how work is done Identify key practices using all evidence sources Build protocol (formal or mental) with user input & share via training Periodically evaluate/update/ redesign	Identify need or opportunity Diagnose problem to solve Address politics & stakeholders Search/generate alternatives Evaluate alternatives Develop plan Execute Assess & feedback	Novel conditions: Scenario building. Run multiple small simultaneous experiments. Act on best outcome, evaluate, learn. (Action learning cycle.) Use After Action Reviews to sustain learning Novel event: Quick improvisation, revise actions in response to feedback until acceptable result reached
Success themes	*Agile Not Rigid* *No good evidence → no guideline*	*Positive politics → psychological safety & decision quality* *Reflection → Gains*	*Experiment/Improvise/Learn*

Act → Check → Learn → Act → . . . .
Learning
Master each process to improve decision outcomes
Periodically evaluate and update protocol. Train people to understand its principles so they can adapt or edit it appropriately
Revisit some decisions periodically. Then, reflect upon and share learnings
Cause/effect only understood after the fact, if ever. Advance practice in improvisation and using AARs improves capacity to learn by doing

Canadian NPs began experimenting with the new mode of practice, the learning by doing characteristic of novel situations. As this example suggests, by understanding how these three distinct decision processes work, we build capacity to better manage many different decisions.

Uncertainty takes several different forms. Uncertainty can be foreseeable or unforeseeable. It is foreseeable uncertainty that we cannot know what next year's gas prices will be. But it is unforseeable uncertainty what, where, and when the next influenza pandemic will be. Uncertainty can be technical or procedural in that the decision maker lacks understanding of how to make something happen (no clear cause-effect connections), for example, how to go about building a patient information database that serves the needs of physician services, the billing department, and medical researchers. Uncertainty may be political (ambiguous goals and tenuous relationships) in that no clear course of action is known that all key stakeholders will accept, as in the case of a police department seeking better community relations. Uncertainty can be due to environmental change, which may vary from somewhat predictable to totally unpredictable. Environmental change can involve physical, economic, technological and broader social forces, sometimes in combination, as exemplified by the multi-faceted nature of climate change. Developing the skills to confront uncertainty is important to making good organizational decisions. People can have strong feelings about uncertainty, and may become avoidant or curious. Experience with alternative decision processes can make dealing with uncertainty easier by helping decision makers respond constructively to the particular uncertainty they face.

"Knowns" refer to domain knowledge available to decision makers. For example, knowns can be technical, where the situation is well-understood, like how to post an internal position. Or knowns can be political, where interests and differences among parties are well-established, as in some labor-management disputes. In either case, use of domain knowledge can improve the quality of the decision. In contrast, in problems with many "unknowns," critical information does not exist and has to be created, as in the case of responses to hacking or exploring business opportunities in an emerging market. Unknowns are addressed through learning by doing and experimentation.

ROUTINE DECISIONS INVOLVING KNOWN KNOWNS

"Ask whether checklists are used; if the answer is no or not forthcoming, choose a different hospital."—Gerd Gigernezer

Routine decisions involve situations where the causal connections are clear: If you do A, you will get B. These decisions often entail pulling appropriate responses out of memory. If you

are calling a meeting, you probably have a mental script of what to do: Send a scheduling email, book a room, and lay out an agenda. Since routine decisions are based on past information, one concern from an evidence-based practice perspective is overlooking ways to improve. Am I really using an effective way of organizing and running a meeting? Three important reasons for routinizing repeat decisions are to get good results more consistently, find ways of improving results, and to free up time to make decisions that are not routine better.

A key aspect of making effective routine decisions is to gather facts on how the decision is currently being made, evaluate its outcomes, and then redesign the process periodically to get good outcomes more consistently. Since Frederick Taylor, we have known that to improve a process you first have to standardize it. If you run every meeting in an ad hoc way you really cannot know what works best. How exactly the routine is to be established can vary considerably depending on user experience and the situations decision makers face in applying the routine. The decision could be made using a mental checklist or script the decision maker follows or a physical checklist, protocol or even an algorithm.

A variety of evidence sources help in creating effective routines or decision protocols. For managerial decisions, we first need to find out what managers actually are doing. We find out what is typically done, what is inconsistently done and what important factors are in danger of being overlooked. Next, organizational data on outcomes of these decisions can provide a baseline that we hope to improve upon by creating a decision protocol. It is important to avoid oversimplification and overstandardization. Although clear technical rationality might be needed in a cockpit, it can be too rigid for stipulating how to give performance feedback to employees or how to onboard and socialize new employees with very different kinds of education and experience. The goal is to create a routinized decision protocol that is agile where it needs to be. It is important that decision makers understand the principles behind the protocol or can go off script if the situation suggests the need to. Implementation depends on the right balance between standardization and use of practitioner judgment.

An organization that gives considerable attention to routinization of decisions is the US Army. It does so since turnover is inherent as missions can last from a day to a year, involving different people who rotate through. Turnover characterizes many organizations but unless it is recognized as a prevailing condition, organizations often make little effort to develop good decision routines. Importantly, senior leaders need to act as visible role models in the development and effective use of routines. To use routine protocols effectively, high performing decision makers should actually review or even rehearse the protocols and procedures in slow times in order to refresh their memory and become familiar with important aspects of their task (e.g., where equipment is located, whom to notify). Planning for the tasks performed in emergencies allows these tasks to be completed faster, offering a cushion of time to accomplish the essentials. Periodically, users should review and evaluate decision routines or protocols for their continued effectiveness and make improvements as needed.

Accessibility is a big issue in using decision routines or protocols. Can a protocol really be followed effectively from

memory? Military aviation inaugurated use of written checklists when the B-17 was adopted since this plane was too complex to fly by relying on a pilot's memory alone. Where memory is overburdened or inconsistencies in performance have serious consequences, decision protocols need to be written and easily accessible (e.g., available on both iPad and hard copy). Another key reason for using decision protocols is to free up time and cognitive effort where it is truly needed: in making decisions that are not routine, which take special effort to make them well.

NON-ROUTINE DECISIONS WITH KNOWN UNKNOWNS

Accepting ambiguity is a powerful motivator to confront and then deal with troubling issues.—Paul C. Nutt

Non-routine decisions are the kind of decision for which managers typically are trained in business and other professional schools. Decision analysis is the overarching framework schools teach for making important decisions nonroutine decisions. But many recommended processes for non-routine decisions (e.g. multidimensional approaches) go largely unused. In this context, I recommend what the body of evidence supports in making non-routine decisions: the use of the six de-biasing practices described above.

Non-routine decisions involve situations new to the decision makers for which relevant evidence exists but is not in hand. In these decisions, the critical information needed must first be identified. To do so necessitates the first course of action in non-routine decisions: Understanding the problem or opportunity that motivates the decision. Search and discovery processes are essential in comprehend the problem or opportunity in order to identify the most appropriate decision frame (practice #1). The political implications of the problem or opportunity need to be addressed, including who benefits, who is harmed, whose support is needed, and ways of making the decision an integrative one (practice #2). Multiple alternatives should be generated (practice #3) and evaluated on important goals and success criteria (practice #4). All serious alternatives should be considered simultaneously in order to provide fair and balanced weighing of their pros and cons. Decision makers then choose the best option. If there remain contested issues regarding alternatives, it can help to run a field test or experiment and assess its results. It is important to identify the stakeholders relevant to the decision (practice #5) and involve them in the decision process where possible to better formulate an appropriate decision frame and understand how to implement alternatives in ways that can meet stakeholder needs. Throughout this process, the four sources of evidence (practice #6) should be considered in order to assess what is known and what needs to be known in order to make an effective decision. The next step is developing an implementation plan and then monitoring its progress, adjusting the plan based on feedback as needed.

An additional way to improve non-routine decision making is to conduct periodic after action reviews (AARs). AARs can revisit a recent set of decisions in order to evaluate their effectiveness, helping decision makers reflect on the

processes they used, assumptions made, and the implications for future decisions. Four questions are asked: (1) what did we set out to do? (2) What actually happened? (3) Why did it happen? (4) What are we going to do next time? Following up decisions with opportunities for reflection can lead to better decisions.

NOVEL DECISIONS INVOLVING UNKNOWN UNKNOWNS

"No battle plan survives the first hour."—Anonymous

Novel decisions involve new or emergent conditions for which prior experience and historical knowledge provide little useful insight. These novel decisions can involve technical uncertainty where effective procedures are not yet established for a newly recognized problem, like how to help elderly people with health problems live on their own, or how to deal with hacking into an organization's website. Or, novel decisions can involve market uncertainty or emerging technology, like how best to use social media to reach out to a non-profit's donor population. They also can involve political uncertainty where no plausible solutions are known that are endorsed by key parties, such as how to deal with community—police relationships in the aftermath of a contested civilian shooting by an officer.

Novel situations involve considerable ambiguity, in the cues that signal the problem or in the options available to respond. Cues can be so vague or confusing that the problem cannot be identified. The refugee crisis in the Middle East and Africa is in part a function of multi-year effects of drought displacing farming peoples who headed to cities in search of resources, a problem not recognized at its start over 30 years ago. Or if the problem is understood, it still may be unclear what to do. An illustration of this was the 1989 United 232 crash landing in Sioux City, Iowa, where all flight controls were lost when hydraulic cables were severed following catastrophic engine failure. In a classic case of technical uncertainty, the crew had to figure out how to control the plane under conditions that had never occurred before—a true unknown unknown. Working together with a flight trainer who happened to be on board, the crew tried a variety of experiments until a solution emerged using alternative thrusts of the two remaining engines in order to steer. In such complex situations, solutions may not generalize to other problems but the process used does.

I want to differentiate two kinds of unknown unknowns. The first is complex situations where the unknowns reflect new kinds of conditions and events, whose underlying order can ultimately be understood. The second are chaotic situations where there may be more unknowables.

Effectively facing the first, a complex unknown unknown situation necessitates sensemaking and learning by doing. Identifying small concrete actions that probe and potentially alter the environment can help organizations achieve their goals despite high uncertainty. Consider how the movement promoting land rights for indigenous people managed the political uncertainty it faced. Its leaders noted that palm oil plantations worldwide have encroached on native lands, threaten traditional ways of life and undermine both

economic and social well-being. Advocates hit on the idea of having indigenous people from three continents tour Europe and meet with representatives of the European Union. By garnering press attention and making visible the faces of people affected by EU policies, the result was a dialing back of subsidies and supports for palm oil production. Incremental activities that produce visible results in complex situations have been called "small wins." A counter example where decision makers did not learn from exploratory experiences, the Occupy movement failed to successfully identify a corporate target upon which to focus its efforts in the aftermath of the 2008 crisis.

Another example of addressing truly novel unknown unknowns is peacekeeping, a task that militaries around the world increasingly perform. In the 1990s, the US Army began systematic efforts to learn how to undertake this emergent activity. A host of challenges became obvious. In the aftermath of a coup in Haiti, the US Army needed to develop and carry out proper rules of engagement with a civilian population and deal with unrest, terrorism and cultural differences all while trying to understand what could be achieved realistically. A large portion of the Army's approach to learning how to keep the peace was the AAR. At the end of an activity, at the end of day, upon completion of a mission or a project, the above four questions were asked. The reflection process that results serves several functions including sensemaking, data verification and feedback both on results and on ways to improve task process. (N.B. This reflection needs to be carefully timed and managed since too many simultaneous experiences jeopardize thoughtful deliberation.)

In the second case, chaotic situations where an event or crisis precipitates decision making, these "wild cards," can call for a somewhat different sort of response. Sudden unexpected external events with immense consequences for the future, like 9/11 or the collapse of worldwide financial markets in 2008, often entail unfolding events that make learning more difficult. Such decision situations require resilience, that is, a muddling through process supported by experimentation, quick scenario building, acting and then reflecting. Though wild cards are unknowable, the processes whereby truly novel decisions can be effectively made in response do have a pattern, which can be the focus of practice.

Consider how Gene Kranz, the flight director of Apollo 13, regularly conducted "fire drills" for his staff, simulated crisis situations under the observation of trained instructors. When the oxygen tank on Apollo 13 malfunctioned, his team was able to ultimately improvise a fix that allowed the crew to survive and come home. In crisis situations, where multiple decisions must be made in an evolving situation, it appears best to train people in a mix of slow training under thoughtful conditions combined with more rapid training under realistic conditions—the basis of effective disaster training. The little decisions that ultimately may resolve a crisis can take the form of experiments.

Other novel decisions precipitated by an event like the 2008 global financial crisis unfold over time and have diverse outcomes. The learning processes in support of novel decisions require information gathering and adjustment *after* surprising events occur, since advance planning is impossible. Learning can take the form of small trials and

experiments, as in the case of the strategies that ultimately led to effective treatments for AIDS. There is often no room for following just one plan at a time, and multiple scenarios and small experiments might be needed to explore what works. By allowing these tests to be independent, a failed experiment does not burn down the house. A high rate of failure is not necessarily bad for exploration.

Note that improvisations need not be limited to crisis situations. Improvisations can be a good way to probe novel situations, like emerging markets, to see what might work. Web-based product marketing, for example, frequently involves small variations in pricing, or the display and bundling of products in order to see what customers are most likely to buy. In truly novel situations, it is important to resist simplifying one's understanding of the problem in order to keep updating as evidence changes. Unexpected events constitute information and accelerating feedback via improvisation can make their detection earlier. The key idea is to treat uncertainty as something to work with in order to stimulate new ways of acting and understanding.

CAVEATS

The decision situations I describe here differ from real-time dynamic decisions where multiple interdependent decisions are made as in the case of operating a submarine or nuclear power plant. Alternative decision processes may be needed in such cases.

CONCLUSIONS

It is possible for human beings to become more effective dealing with complexity and uncertainty by virtue of the ways decisions are made in organizations. By regularly using the six de-biasing practices, the quality of organizational decisions can get better. And by expanding the repertoire of decision processes used in our organizations, we can deploy both our knowledge and agility in an uncertain world. My hope is that readers will regularly ask themselves certain important questions about how decisions are made in their own organizations. Are we spending enough time understanding the issues at the outset of our decision making? Do we use diverse forms of good quality evidence? Do we generate enough alternatives? Are stakeholders effectively included and considered? How well do we learn from experiments and our past decisions? When we have good evidence of what works, do we standardize enough? Effectively addressing these questions builds the capacity to make better decisions and manage well in uncertain times.

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Denise M. Rousseau is H.J. Heinz II University Professor at Carnegie Mellon in the Heinz College of Public Policy, Information and Management and the Tepper School of Business. Former Academy of Management president and *Journal of Organizational Behavior* editor-in-chief, Rousseau's research addresses positive organizational practices and employee well-being. Two-time winner of AOM's Terry book award, her most recent book is *Evidence-Based Management* with Eric Barends (Kogan Page). (Heinz School of Public Policy and Management & Tepper School of Business, Carnegie Mellon University, Pittsburgh, PA 15232, USA. E-mail: DENISE@CMU.EDU).