The Operation Was a Success but the Patient Died: Aider Priorities Influence Decision Aid Usefulness

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The usefulness of quantitative decision aid is often impaired and its usage impeded by the misaligned priorities of analysts and the middlemen who employ them. Analysts’ professional orientation may dispose them to attend to analytic processes more than to deciders’ needs and to stick with outdated practices. As a result, their analyses may be technically sound but disregard key knowledge, make unrealistic assumptions, or answer the wrong questions. Middlemen’s financial or other conflicts of interest exacerbate such defects. Deciders may have to take more control of analyses (and analysts) and, for example, bypass middlemen.

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Above all, do no harm” (Hippocrates). Consider the following incidents: A $4 million probabilistic risk assessment indicated that a reactor was one of the safest in the US; the regulator found it unacceptably dangerous and put it on a watch list. A car company, acting on an operations research transportation study, closed down three parts depots; it had to reopen them when the remaining depots proved incapable of handling demand. A UN study found a negligible chance that a country could illegally build nuclear weapons undetected and undeterred; Israel disagreed and bombed an Iraqi reactor. Decision analyses appeared to favor three candidate nuclear waste sites to be short listed for further study by the US Department of Energy; the secretary of energy picked a different three and was publicly criticized for disregarding award-winning analysis (US Department of Energy 1986b).

These are real cases in which quantitative decision aid (QDA), as used, conflicted with the decider’s judgment and embarrassed the aider. Having some insider knowledge—but not as the aider—I believe the QDA was at fault in each case. The aider had priorities different from the decider’s. Such cases are not unusual.

My views on what limits the effectiveness and use of QDA are based on four decades as a practicing decision analyst and recently as a consultant on decision methodology to senior executives. These executives have included the head of nuclear reactor regulation at the US Nuclear Regulatory Commission (NRC), two heads of the US Department of Energy’s (DOE’s) office of radioactive waste management, an assistant secretary of defense, and a president of Ford Motor Company.

The Nature of Decision Aiding
QDA covers a variety of modeling tools, such as mathematical optimization, data-based operations research (OR), and decision analysis (DA) (my specialty). QDA may explicitly identify a preferred option for the decider or contribute to just a part of the decider’s choice, for example, by quantifying uncertainty.

Deciders are responsible for taking a position on a choice, either by committing resources or by making a recommendation for which they are accountable. More than one decider may be associated with a decision: a junior manager proposes a business
investment for the company president to approve; a bureaucrat proposes legislation for Congress to pass or not. A hierarchy of deciders may decide some major issues. Deciders may serve constituencies other than themselves, but I focus on the role of deciders, because they normally determine QDA usage.

Deciders may apply QDA themselves, but they typically rely on specialized analysts. These, together with any middlemen who engage them (such as in-house staff groups), constitute the decision aiders. Aiders’ interests are usually distinct from deciders’, which affects and often hinders aid effectiveness. Deciders’ interests may also differ from those of their nominal constituency and may not be commendable. (For example, directors of Enron Corporation enrich themselves at shareholder expense, and congressmen legislate with reelection rather than public service in mind.)

Decision Aid Does Not Always Aid Decisions

Perfect DA (or any other decision aid), if it were possible, could always select the ideal option for any choice in the light of the decider’s knowledge and values. However, this does not mean that we can rely on any DA to improve on the decider’s unaided judgment, that is, to come closer to the ideal. I disagree with colleagues who appear to interpret divergence between aided and unaided choices as discrediting the latter (von Winterfeldt and Edwards 1986, Politzer 1991).

A political scientist I know evaluated choices made by Israeli generals in the 1967 Six Days War by comparing them (unfavorably) with his own DA of the same choices, based 20 years later on what he knew of the generals’ knowledge at the time. Surely I do not need to persuade you that no Israeli citizen in his right mind would put more faith in the military decisions of a remote scholar (even one with hindsight) than of a seasoned general on the spot? DA might enhance a general’s judgment but not replace it.

A Disappointing Record

QDA, especially OR, was credited with doing much to win World War II. People believed that QDA could go on to better the welfare of all mankind. Public and private organizations began using QDA extensively and often trusted it enough to overrule decider judgment. Even though QDA tools have improved greatly in scope and quality, they have had only modest practical success since then and sometimes have done harm. In the 1980s, a National Academy of Sciences committee on risk analysis and decision making found that little of QDA’s potential was being realized (Simon 1988). I see no evidence of much change since then.

In fact, some authorities have cautioned against reliance on QDA (Moore 1973, Majone and Quade 1980, House 1988). In a fictional anecdote, a leading decision scientist is asked if he is using QDA on a personal dilemma. He replies, “Certainly not. This is a real decision!” This story is widely retold among decision aiders, suggesting that even they have had nagging doubts about the usefulness of QDA, at least as practiced.

There are certainly many QDA success stories (recognized by the annual Edelman Awards). These successes appear to be largely for problems that unaided humans find most difficult (such as optimization over complex options typifying much traditional OR). Demonstrated success elsewhere is sparser.

In the DA variant of QDA, where options are often few and clear-cut, many success stories are also reported (Corner and Kirkwood 1991, Keefer et al. 2004, Clemen and Kwit 2001). However, the actual deciders (as opposed to middlemen) have not often acknowledged publicly that their actions were enhanced. General Motors and other companies, who had been in the vanguard of DA supporters, have since backed off (Lieberman 2002). Harvard Business School, the cradle of DA, no longer makes it an MBA requirement.

Some people whose opinions deserve credence have relayed serious skepticism about DA practice to me directly. They include James March, Daniel Kahneman, and Herbert Simon (noted descriptive decision theorists, two of them Nobel laureates); senior policy advisors to governments of the US, Italy, Russia, England, and Israel; Jackson Grayson (1960, 1973), DA pioneer and later head of the US Federal Price Control Board, and Stephen Watson (1992), decision analyst, coauthor of a DA text (Watson and Buede 1987) and later the principal of Henley Management College. Watson recently wrote to me, “A reason for non-use of DA is the general flight
from analysis… much of modern management writing talks about intuition and management craft, rather than analysis… intuition is always necessary—and may be better in the end than extensive analysis.”

The Aider Priority Effect Illustrated

The reason that decision aid, and DA in particular, has not been more successful is largely, I believe, because aiders’ interests and deciders’ interests often do not coincide.

The World War II success was probably because the aiders had no conflict of interest with either deciders (for example, generals) or their constituency (the public). All were at mortal risk and motivated to do whatever it took to defeat the enemy. As the wartime pressure to make sound choices receded, aiders could permit themselves the luxury of attending to analytic sophistication and professional standing at the expense of usefulness. As a result, they did not always meet essential aid requirements, such as addressing the decider’s real problem, drawing on all available knowledge, and adapting the decision tool to human cognition.

Aider priority is by no means the only impediment to aid success. For example, the state of the art of decision aiding or aider (or decider) training, or available resources may be inadequate. However, we can expect these deficiencies to be remedied in the normal course of a maturing art.

A Causal Framework

A look at causal influences may help us understand how aider priorities can impair decision-aid success and what can be done about it. I propose a particular causal scheme to serve as the organizing framework for my argument (Figure 1). Certain controllable factors (box 1), such as choice of aider, influence measures of aid success (box 5), such as decider adoption. Intervening between controllables and success are aider priorities (box 2), such as professional standing, essential aid requirements (box 3), such as sound input, and aid usefulness (box 4), such as sound choice. Uncontrollable factors (box 0), such as type of problem and certain controllables, such as resources applied (1e), do not affect aider priorities, but do affect how aider priorities affect aid essentials.

A Risk Assessment Illustration

A real example may make this causal network clearer. Risk assessment (assigning probabilities to hazards) is an important element of QDA (generally incorporated

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![Figure 1: Controllable features of decision aiding practice (1) can distort the decision aider’s priorities (2), which can hurt critical aspects of aid performance (3). This influences the aid’s usefulness (4) and thus how much deciders use it (5). Some uncontrollable factors (0) affect these causal links.](image-url)
Informally into decision making). The US Nuclear Regulatory Commission (NRC) requires reactor operators to carry out extensive assessments of accident risks (US Nuclear Regulatory Commission 1990), on which NRC can base its safety decisions. NRC specifies use of a method called probabilistic risk assessment (PRA), although the method is narrower than that name suggests. Nuclear power is the major application of PRA, which has cost the industry hundreds of millions of dollars.

One reactor operator spent $4 million on PRA to evaluate its reactor’s risk to help an NRC regional administrator decide if the reactor was acceptably safe and, if not, what safety measures to require. The decision aid, in effect, consisted of the regulatee (reactor operator), as middleman, together with PRA consultants that it hired.

Although the resulting risk assessment was highly optimistic, the decider (administrator) judged the reactor to be unacceptably dangerous. At Decision Science Consortium, Inc. (DSC) we explored how this mismatch could arise and concluded that the PRA was critically flawed. However, it contained much valuable information, which we integrated into a revised risk assessment (Brown and Ulvila 1988). It confirmed the decider’s original unfavorable evaluation. Accordingly, he put the reactor on a cautionary watch list and required a $30 million safety backfit.

This case illustrates how aider priorities can impair QDA success through causal linkages (Figure 1).

Aider Priorities Influence Decision Aid Usefulness and Use

The PRA exercise was clearly unsuccessful, because the decider did not use it (Figure 1, 5a). In fact, it failed all aid essentials except acceptable modeling (3c). It is true that the tool was adopted, indeed required, by the nuclear establishment (5b). However, this very requirement caused the decider not to use any QDA, because it produced results he considered unsound (4a).

Influence of Aider Priorities on Aid Essentials

I believe that the PRA failed to meet critical requirements because of intrinsic flaws in PRA generally as an aid to risk management. It has, however, been adopted as standard risk-assessment procedure because of the priorities of the risk-assessment community as a whole as well as of the priorities of the aiders (Figure 1, 2) directly involved.

For example, the analysis did not address the right question (3a), which was to assess accident risk from any cause. The PRA analysts addressed only internal risks (such as accidents caused by hardware failures), which are generally well documented, and they ignored more elusive external risks (such as earthquakes), which are not. (“We don’t have the data,” they explained.)

Similarly, they based inputs to the PRA only on documented knowledge (3b, 3d), even for those risks that they did address. (For example, component reliability was based only on historical or experimental data.) They ignored relevant soft data and informed decider judgment, which drew on observations of poor safety culture in the reactor, a number of recent near misses at the plant, and unfavorable NRC inspection reports. Insistence on hard facts may be fine for assessing a stable process (such as component reliability), not a unique accident.

The output of the analysis was not in a usable form (3e). The decider needed a personal probability of accident that he could adopt as his own to make a decision; not the “expected frequency” produced by a traditional PRA, which has no clear meaning to a decider (Brown 2002).

The intellectual orientation of the analysts (2a) was mainly responsible, I believe, for these failings. Like the originators of PRA in the 1970s, they were primarily engineers, who were steeped in a culture that made them uncomfortable making assessments that could not be backed up with hard facts that could produce “objective” probabilities. Professional standing (2b) had much the same effect.

The middlemen’s (regulatees’) economic interest (2c) also accounted for aid defects. In particular, they needed the regulator to accept the reactor as safe. This favors a risk assessment that disregards some risks (3b), which, in this case, were a major part of realistic uncertainty about an accident. The output of the analysis could still have been useful if the decider had understood what it really meant (for example, what knowledge it excluded), in which case he could have adjusted the results accordingly. The middleman had no interest in making this clear (3f).
The analysts’ economic interest was to satisfy their client, the regulatee, and therefore to adopt his priorities.

**Controllable Influences on Aider Priorities**
The aider priorities (Figure 1, 2) implicated in these aid defects induced action (or inaction) from the aider, decider, or regulatory institution.

The institutional setting (1a) had the middleman pay for and direct the risk assessment. He was therefore under little pressure to give priority to the regulator’s interests (2d) and could indulge his economic interest (2c) by downplaying reactor risk.

The employment of aiders with engineering backgrounds (1b) caused much of the motivational problem. Their mind-sets, especially the analysts’, made them comfortable with PRA procedures (2a). Their professional standing (2b) could also suffer if they went counter to the entrenched PRA practice of peers who dominated the risk-assessment community (1a).

**Uncontrollable Factors**
The decision problem (Figure 1, 0a) concerned an unlikely accident, where poor decision consequences were not likely to come to light in time to produce evidence of unrealistic risk assessment. This allowed the reactor operator (2c) latitude to neglect aid essentials (3) and pursue his own agenda. (On the other hand, the risk-assessment task was complex with many interacting sources of risk. So, even moderately sound QDA might outperform an unaided decider and thus be more useful than no aid at all.)

This decider was well trained (Ob) and quite capable of making sound decisions unaided. He therefore stood to gain little from decision aid. However, he also had a good grasp of decision-aiding methods and their limitations, which helped him to make the most of an aid. For example, he knew not to replace his judgment with a flawed PRA, which mitigated its ineffectiveness (4a). Moreover, he was capable of using the considerable relevant information in the PRA for other decisions (for example, on reactor design).

The regulatory setup (0c) was such that the aider was not very dependent on the decider’s goodwill, which again made it easier to disregard the decider’s interests (2d) and indulge its own. Moreover, the government bureaucracy had a remote constituency (the general public), which lessened pressure on the decider to produce sound decisions (4a) and therefore to use effective aid.

If a QDA paradigm more appropriate than PRA had been standard risk-assessment practice (0d), aider priority (2) would have had less influence on aid effectiveness (4a), because aiders would have had less discretion to indulge their own priorities.

**Omitted Influences**
I could have disaggregated the causal framework (Figure 1) into more factors, which I have limited to the most significant. For example, I have not discussed aid features (3), such as burden and cost, that influence usefulness but are not essential. In this case, the PRA tool was burdensome and costly, but that was not a fatal flaw, and it did not deter deciders from having the PRA done.

**Generalization to Other Cases**
The aider-priority effect appears in different forms in a wide variety of applications, which I can document from my own experience. However, because each case may demonstrate more than one causal linkage, tidy exposition is difficult. Somewhat arbitrarily, I have grouped the following cases according to some salient feature: first by aid defect and then by aider priority.

**Critical Aid Defects Due to Aider Priority**
Aid essentials (3) are often lacking due to one or more inappropriate aider priorities (2).

**Wrong Question**
Decision aiders are often inclined to address a problem that is more tractable than the real one, because it is intellectually less frustrating (2a). (It is like looking for your keys under the street lamp where the light is good, instead of in the shadows where you lost them.) However, analyzing the wrong question (3a) can still be useful if the mismatch is small, clearly disclosed, and properly taken into account, as in the above risk-assessment case.
Overlooked Knowledge

There are usually many approaches to making a judgment, each drawing on different knowledge. The most common and serious aid flaw may be relying on just one approach and neglecting others that would elicit additional information. I believe that aiders shy away from plural evaluations largely to protect their professional standings (2b). They avoid risking embarrassing discrepancies between the approaches, even when useful additional methods are readily available.

When US submarine commanders decide when to fire a torpedo, they follow guidance from the Naval Underwater Systems Center, which instructs them to pick one range estimate among several. An analysis of data from a past submarine warfare exercise (which recorded the true ranges) showed that plural range estimates based on all target-sensing data available on board would have comfortably outperformed the commander’s single-pass estimates (Bromage et al. 1983).

Non-DA QDA, such as PRA, is generally data bound. When most of the relevant knowledge is documented (for example, on machine reliability), ignoring undocumented knowledge may not do much harm. However, when virtually the only knowledge is undocumented judgment (for example, on human error), the issue is more serious. Aiders often fall back on some tractable but unrealistic assumption (such as zero probability of a human error). They would have assessed negligible risk of a Chernobyl meltdown, because the managerial failures that caused the accident were undocumented.

For reasons of professional standing (2b), aiders often avoid acknowledging unpredicted possibilities. They feel vulnerable to peer criticism if they cannot authoritatively back up model input. “There are more things in heaven and earth, Horatio, than are dreamt of in your philosophy” (Shakespeare, *Hamlet* I, v, 166).

Environmental regulations require the assessment of a probability of radioactive release over 10,000 years from a nuclear repository due to human intrusion. I reviewed a DOE risk assessment that identified only one intrusion scenario, mining for minerals. The analysts assessed its probability as 0.1 percent, which they equated to the probability of any human intrusion, thus treating any other intrusion scenario as impossible. (Other analysts include other intrusion scenarios, such as digging up waste to recycle, but they too do not address “unknown unknowns.”)

I argued that it would be more reasonable to make some probability judgment, however general (for example, “quite likely” human intrusion over 10,000 years). Any specific probability would be difficult to defend, but exactly zero is clearly untenable. DOE analysts dismissed my position as unscientific.

So, I proposed (unconvincingly) the following imaginary scenario. Ten thousand years ago an Indian tribe was deciding whether to bury its ancestors’ bones 20 feet underground. Tribal regulation required that the probability of human intrusion over the next 10,000 years be assessed. The PRA high priest proposed only one scenario, an enemy tribe desecrating the site, assigned it 0.1 percent probability, and reported this percentage as the probability of any human intrusion. The site was called Manhattan. Hindsight notwithstanding, this tale should prompt us to take account of unspecified scenarios somehow.

Statistical estimation is a form of QDA dangerously prone to distortion from aider priorities. Sample estimates are commonly reported with a small margin of error (say, plus or minus five percent), which accounts for only random fluctuations. The actual discrepancy between estimate and reality is typically several times larger, because it includes other more serious sources of error, such as mismeasuring sample units and sampling the wrong population (Brown 1969). Understating estimation error serves survey researchers’ economic interest (2c); they would lose business if they appraised error realistically.

In the 1948 US presidential elections, the media prematurely trumpeted that Dewey had beaten Truman because pollsters had sampled only people with telephones. Nevertheless, election forecasting has been one of the most accurate applications of statistical estimation. Because the true answer will become known at election time, pollsters are motivated to make their best estimate accurate. However, they still have an interest in exaggerating its accuracy.

During the 1973 national energy crisis, the US Federal Energy Administration (FEA) was deciding on a conservation policy. A prominent survey company sampled residential fuel consumption by asking householders if they were installing extra insulation as the government urged. About two-thirds claimed...
that they did, which the surveyors reported as their best estimate. A skeptical FEA asked us to check this estimate. We took a small subsample of the same households and physically inspected their insulation, which turned up substantial mismeasurement. As a result, we adjusted the conservation estimate down to less than one third.

Many social surveys report that men have on average more heterosexual relationships than women. Bar- ring noise-level approximations (for example, there are more women than men and they live longer), the average per man and per woman should logically be the same. The survey researchers ignored (or suppressed) the discrepancy; reputations might suffer (2b) if it became clear that at least one of the original estimates was seriously off. (Men exaggerate? Women minimize?)

Unsound Model Structure
In a sound model (Figure 1, 3c), the considerations modeled and their relation to each other are faithfully represented (in the light of available knowledge). This is usually not much of a problem, because analysts are usually technically competent and appropriately motivated by intellectual orientation (2a) and professional standing (2b) to do a good job. However, their preoccupation with analytic process can lead analysts to neglect other essentials.

Unsound Input
In particular, preoccupation with analytic process (2a) can lead aiders to accept unsound input (Figure 1, 3d), even when correcting the input would be trivial. (Don’t spoil the ship for a ha’porth of tar.)

Ford UK suspected that it had too many car parts depots in the London area. A university OR group developed a state-of-the-art transportation model that indicated that three of seven depots should be eliminated. Ford trustingly closed the depots, but the results were disastrous: the four remaining depots proved totally inadequate for the demand. The OR group had greatly overestimated depot capacity, calculating it simplistically as height times length times width, ignoring unavoidable dead space. They could easily have avoided this input error by checking with any Ford stock controller. Knowing these aiders, I think that they did not give the decider’s interests (2d) enough priority to make this small effort (and may not even have thought of it).

This case is old (late 1950s), but it exemplified pitfalls that persist, in moderated form, to this day. What has changed is that deciders no longer trust QDA enough to act on it.

Inappropriate Output
“Good policy analysis calls for bad science” (Morgan 1978). Professional perfectionism (2a) often delays aid until it is no longer useful (3e). (The best is the enemy of the good.) Researchers may hold back incomplete work, even if it is adequate for policy purposes, because their peers may criticize lack of scientific rigor (2b), which may be overkill for policy purposes.

In 1990, a Democratic Congress asked the Environmental Protection Agency (EPA) to evaluate whether the 1970 Clean Air Act had been worth its cost, as an input to future environmental legislation. The aiders consisted of chemical, economic, and environmental research groups, each working on their piece of the problem. I was charged with integrating the results into an overall evaluation. The researchers developed potentially useful results but resisted providing any results until they were definitive enough to withstand peer scrutiny (2b). Before that happened, Republicans took over Congress and dropped the project.

A further problem was that the researchers were casting their findings in a scientific reporting form, whose outputs did not correspond to inputs called for by a policy-oriented integrating model (3e). The EPA, or even Congress as decider, should have been the ones to specify what research was to be done, and when and how it was to be reported (1d).

Miscommunicated Output
Even effective aid can fail to be useful if the relevant audience misunderstands its output (Figure 1, 3f). For example, a perfectly good analysis may misleadingly appear to invalidate the decider’s decision.

In 1986, the US Secretary of Energy had to recommend a portfolio of three nuclear waste sites for further study, from which Congress was to choose one. At DOE’s request, a major DA ranked candidate sites by apparent suitability at the time (US Department of Energy 1986a, Merkhofer and Keeney 1987). Two of the top three were in salt and one in tuff. The secretary picked a different three, substituting a basalt
site for a salt site. Critics accused the secretary of disregarding an award-winning DA study for political reasons. The resulting bureaucratic embarrassment to the administration was such that the DOE middleman to the DA study told me he would never use DA again (5a). (He did later participate in a DA evaluation of Canadian nuclear waste options.)

The US analysis was not a success, in that the decider appeared not to use it (5a), largely because of ineffective communication (3f). The critics had misinterpreted the critical distinction between ranking sites and picking a portfolio for screening. Methodologically, it is perfectly legitimate to rank sites quantitatively with a view to incorporating the portfolio issue later formally or informally. However, a partial DA (ranking), which the aiders had been instructed to do, played into the hands of the critics, who directed public attention to the DA results, misrepresented them, and discredited the decider (DOE).

The analysts cannot be faulted for doing a partial DA (a ranking), which is a legitimate analytic strategy, and ranking was all that they had been instructed to do. Neither the aiders nor the middleman can really be expected to have anticipated the political consequences of making the partial analysis public, which made the DA exercise useless to DOE at best.

However, the formal analysis that was completed later did contain a serious flaw that I attribute to aider priority. It extended the DA to cover the portfolio issue, but it produced the same three sites as the original ranking (Keeney 1987).

It did not account for certain knowledge (3b) that could have exonerated the secretary’s assailed decision. Regulatory guidelines require that diverse rock media be included on the short list of three, which reflects an opinion, presumably well informed, that further study was needed to determine the best medium.

This insight had probabilistic implications. If site characterization found the top-ranked salt site unacceptable, the probability that the second salt site would be acceptable would then drop, putting it below the lower-ranked basalt site, which should therefore be retained. I showed middleman management a quick-and-dirty DA reflecting this reasoning, but it was too late to repair public relations damage.

The analysts may have interpreted their task as primarily decision modeling, rather than being useful to the decider. One analyst explained that they relied on the factual and value judgments they elicited from informants. I suspect that more should have been done to make DA inputs reflect all relevant knowledge and judgment (3d). For example, alternative analyses could profitably have been merged, without adding cost. (Two half-baked approaches may be better than one three-quarters-baked approach of equal cost.) However, such plural evaluation is not yet an established part of the decision analyst’s tool kit (2b).

Sources of Aider Priority
Some inappropriate aider priorities (Figure 1, 2) stem from controllable circumstances (1).

Decider’s Interests
Aiders downgrade the priority they give to deciders’ interests (1d) if they can afford to. This is often the case if neither their financial gain nor career advancement is vulnerable to the decider’s goodwill, for example, because they work for someone else (1a).

Intellectual Orientation and Professional Standing
The form that aiders’ priorities of intellectual orientation (2a) and professional standing (2b) take is largely a question of who gets to be the aiders. Currently they are predominantly engineers and the like. However, aiders (like many of us) often believe that what is required in any situation is what they are good at. To the person with a hammer, everything is a nail.

Engineers are drawn to the quantitative modeling aspects of decision aiding, which certainly helps make the modeling sound (3c), and to judgment-free inputs. These are both comfortable for them (2a) and what they need to get standing among their equally quantitative peers (2b). Peer standing is particularly important if aiders’ advancement depends on it.

Economic Gain
He who pays the piper calls the tune. If deciders pay for their decision aid (1a), aiders have no economic reason not to be useful. In regulation, however, regulatees (middlemen) pay for the aid, so they may give higher priority to reducing cost (2c) than to serving deciders (2d) particularly if an outside body
(the government) imposes a QDA requirement and quality is poorly controlled.

A Federal Aviation Administration (FAA) staff official acting as middleman for government regulators explained to me that he had awarded a risk-assessment contract to someone else because, “Your proposal may have been better, but his was cheaper. We are required to do a risk assessment before changing flight procedures. We won’t spend more than we have to.”

Uncontrollable Factors
Factors that are not readily controlled in the short term (0) may affect the causal connection between aider priorities (2) and aid essentials (3).

If the decision task (0a) is to provide timely feedback on the outcome of particular choices, for example, on a short-term investment, aiders are likely to give high priority to effective aid (4a). With a long-term investment, on the other hand, both decider and aider may be long gone before the outcome becomes clear, so aiders have less interest in making aid useful. However, a long-term investment could have bigger stakes, which would increase the value of any aid and encourage aid adoption (5).

If deciders are already competent (0b), they stand to gain less from aid, however effective (4a), and are less likely to use it (5a). On the other hand, the better deciders understand QDA, the better they can recognize aid flaws and not be misled by them.

When institutional culture penalizes uncertainty or indecision (0c), fear of losing face (2b) may lead deciders (or other informants) to provide overconfident input for QDA (3d), or discourage their use of QDA at all (5b). If aiders are required to use inappropriate QDA methods, they are relieved of responsibility for using them and their priorities are unimportant. (The institutional culture (0c) may also make deciders reluctant to express values that they do not want to admit to, such as avoiding bureaucratic embarrassment, but these have little to do with aider priority.)

Conclusions
Poor QDA performance can be likened to an ailment calling for diagnosis, prescription, and prognosis.

Diagnosis
Aider priority is by no means the only explanation for QDA’s slow progress. Improving on human beings’ unaided judgment, honed over millennia of evolution, is challenging, whatever the aider’s priority. The methodology for modeling what deciders have in their heads and can put there and integrating it effectively into the decision process may still have a long way to go.

That said, inappropriate aider priorities can and do contribute to QDA ineffectiveness in widespread and varied circumstances. Technically trained aiders have frustratingly stable mind-sets and their priorities are difficult to correct through exhortation alone. Nothing less than total aider obsession with usefulness may be called for.

Prescription
There is much that deciders or their organizations can do to counter impediments to successful aid that misaligned aider priorities bring on. But they have to take intrusive and perhaps unwelcome action. Decision aiding is too important to be left to the decision aiders. Buyer beware!

In organizing decision-aiding resources (1a), downplaying the role of middleman can enhance decision-aid effectiveness. Doing so increases the analyst’s sensitivity to the decider’s interests (2d). Otherwise, corporate politics or professional standing encourage middlemen to keep deciders and analysts apart, which increases the risk that the analysts will ask the wrong questions (3a) or disregard deciders’ knowledge (3b). (However, a middleman may be necessary when the decider does not have the time or qualifications to manage an analyst properly.)

A good middleman has a decider mind-set, say, through having been a decider or having career prospects as one (1b). Avoid the middleman who has a vested interest in the choice. (Don’t let the fox guard the chickens.) If deciders have little choice in the matter (as in current regulation), they can at least insist on hiring and firing and thereby motivating, the analyst (1a).

It helps to engage analysts (1b) who share the decider’s goals (2a), rather than to retread old-guard analysts. A for-profit consultant who is hungry for follow-on business and is familiar with the decider’s business may be more suitable than an academic
with impressive credentials seeking tenure. Analysts are favored who are multidisciplinary and cover all major methodological issues, including tool implementation, cognitive science, and quantitative modeling, as well as having real-world experience.

The most important incentive for aiders (1c) is who reports to whom. Aiders’ careers should depend on their usefulness to deciders, and they should know that they will be evaluated on how well they serve the deciders’ interests. An independent decision-oriented reviewer, say, a retired executive with an analytic flair, could oversee the aider’s work. Aiders can be rewarded for their usefulness in other ways. Technically oriented aiders whose priority is professional standing (2b) could be motivated through the Decision Analysis Society’s practice awards. Management-bound aiders could be persuaded that successful decision aiding is a promising route to higher management.

Deciders should insist on maintaining direct, continuous, and unreserved communication with analysts (1d). If they are not part of the day-to-day development and implementation of decision tools, they may not be able to oblige analysts to do what is needed. Deciders should closely monitor aid progress, make sure it addresses the right problem, and check the plausibility of findings. The analysts can then build on the deciders’ unaided reasoning about the problems, not replace it. Deciders can make sure from provisional findings that the eventual findings would be helpful, perhaps uncovering enough wrong to redirect the analyses.

Deciders cannot effectively control decision aid without understanding what it can do and how to use it, and they rarely do. The most promising long-term way to forestall or mitigate the corruption of aider priorities (and other QDA failings) is through decision training, which may be uncontrollable (0b) in the short run. There are some excellent materials on DA theory (Watson and Buede 1987) and procedures (Clemen 1996) but little yet on the applied art. Hammond et al. (1999) have written an excellent DA starter book, and my own DA course is directed specifically at deciders (Brown 2005).

Prognosis
It may seem paradoxical that a practitioner and teacher of DA appears to be cautioning potential customers against its use. However, I am cautioning customers in its use. Publicizing QDA pitfalls due to aider priorities may improve practice, enhance the field’s credibility, expand its effective reach, and increase demand. Weeding out malpractice in decision aiding can only help the field.

QDA, properly conducted, can greatly improve decision making. If QDA does not yet help much, it is because of fixable institutional impediments, such as aider priorities. QDA includes many fine minds, and I am confident that they will develop the methodological improvements needed, especially plural evaluation, which is still in its infancy.

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