To Build or Not to Build a Road: How Do We Honor the Landscape through Thoughtful Decision Making?

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A highway has no meaning in itself; its meaning derives entirely from the two points that it connects. A road is a tribute to space. Every stretch of road has meaning in itself and invites us to stop. A highway is the triumphant devaluation of space, which thanks to it, has been reduced to a mere obstacle to human movement and a waste of time. . . . Road and highway: these are also two different conceptions of beauty. —Milan Kundera, Immortality

Every summer, my husband and I roll back the canvas roof of our small Citroen 2CV and head out to explore small towns, farming communities, forests, and parkland along beautiful, picturesque rural roads that are untraveled by most Ontarians. Leaving highways behind, we meander through landscapes that open up unique visual and olfactory experiences that enrich our days and become a staple in our store of happiest memories together.

Roads open up inimitable vistas and opportunities but, of course, they also have their costs, particularly when they take the form of large-scale highways that often infringe upon agricultural and wildlife communities or exacerbate urban stress.

What constitutes a good road? And how do we decide when it is appropriate to build a new road? As urbanist Jane Jacobs puts it, “how to accommodate transportation without destroying the related intricate and concentrated land use?—this is the question.”

Presumably, decision making in such a case ought to be driven by more than mere sentimentality. In the words of the National Research Council, “practical decision making begins by identifying the elements of a responsible and competent decision-making process.”

At the same time, it is important to recognize that complex environmental decisions—from how to tackle global climate change to planning megalopolitan settlements—often must be made in the face of scientific uncertainty. In such cases, judgment calls are made, and, therefore, we need to better understand both the nature and the significance of taken-for-granted values, attitudes, and perceptions.

I begin this paper by identifying some essential elements of what might typically be described as a “rational” process of decision making. I then proceed to describe how such a rational environmental decision procedure must reflect not only narrowly logical reasoning processes but also essential elements of moral virtue, wisdom, and, ultimately, a respect for sense of place.
FROM IDENTIFYING OBJECTIVES TO VIABLE ALTERNATIVES: THE PLACE OF VALUES

From engineering consulting firms to government- environmental impact assessments, technical models are utilized to ensure that complex problems are addressed in a comprehensive manner. Decision trees, cost-benefit analyses, and decision-making matrices that employ sensitivity analysis or analyze expected monetary value are examples of such tools.3

While each model incorporates distinct strategies, it is feasible to draw from these examples six major generic steps that are typically reflected in such models, despite their variations. These include:

1. Identify the project objectives, problem, and opportunities.
2. Identify constraints that possible solutions must respect.
3. Identify viable alternative solutions.
4. Select evaluation criteria of alternatives.
5. Evaluate alternatives and select the preferred option.
6. Monitor and adjust the strategy, as necessary, documenting lessons learned.

Like the technical models listed above as well as other similar decision-making procedures, this six-step decision-making process aspires to be rational, logical, and, thereby, comprehensive.4 Yet I would contend that genuine thoughtfulness is not necessarily achieved simply by virtue of such sequential logic.

Embedded in such apparently “objective” models are personal biases, value judgments, hidden paradigms, and different worldviews. Genuinely rational choices—those that aim for wisdom over mere technical efficiency—are made only if these taken-for-granted values and assumptions are explicitly addressed. The fact is that “value choices are often hidden in the simplifying assumptions of analytic techniques, and the assumed values may not be universally shared.”5

It is important to recognize that values and assumptions impact every phase of decision making, no matter how logical, linear, and “objective” that process appears. For instance, value judgments very much shape the first step in the decision-making process, where project objectives, problems, and opportunities are identified and bounded. The fact is, as energy scientist Amory Lovins points out, that “the answers you get depend on the questions you ask.”6

So, despite the title of this paper, it is important to note that the problem to be addressed here may not be properly scoped in the form of the engineering question whether to build a road. Rather, the problem may actually be that travel times are currently too long; or perhaps, as in the case of some First Nations communities in Northern Canada, there may be a lack of easy access. Maybe the issue may be as broadly scoped as to ask the question about how to build a healthier, more sustainable community overall. The opportunities identified may certainly include the construction of a road, but, alternatively, a preferred option may consist of improvements to public transport or rail systems instead. After all, in the words of Jane Jacobs, “The more space that is provided for cars in cities, the greater becomes the need for use of cars”—which, in an era of global climate change, is hardly a wise course of action.7 Unless one scopes the problem sufficiently broadly, productive alternatives may simply be missed.

Even if the problem has been appropriately scoped, many project managers often underestimate the impact of local communities’ core values when one moves to the second step of our “rational” decision-making process to identify possible constraints. Canadian philosopher Bruce Morito tells a story about how ecological constraints and a community’s core values had to be made transparent as part of an informed decision-making process. In an environmental management forum, a resource manager informally asked Morito why Aboriginal people were “so intransigent and stubborn when it came to negotiating the building of dams on their territory.” The manager acknowledged that ancient burial grounds would be flooded by new dams, but the communities would be compensated “more than adequately” and at “greater than market value” through the formal agreements. It seemed “unreasonable,” under these circumstances, to refuse the dams. Morito’s response was to ask him “whether he would sell his daughter into slavery for an amount that would be considered ‘more than adequate compensation’ according to the current market in slavery.”8

By providing such an analogy, Morito was able to capture how First Nations’ belonging to the land reflected a core value amongst their community that was
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Values infuse every stage of the decision-making process. For instance, in step three, identifying viable alternative solutions, it becomes important to ensure that broad and meaningful stakeholder consultation has been undertaken. An example relating to the City of Toronto’s Biosolids and Residuals Master Plan (BRMP) is a case in point. A standardized weighted/scoring decision-making model was utilized in 2004 to recommend options for bio-solid treatments that included a new fluidized bed incinerator in an existing water treatment plant. Pressured by local communities and two city councillors who opposed incineration, the city was forced by 2007 to convene a seven-member, expert peer review panel to evaluate the effectiveness of the decision making model used to develop master plan recommendations.

The panel found that there was room for improvement in the public consultation process. In fact, local residents’ concerns about incinerators were highly underestimated by consultants. Given the community’s entrenched and ultimately unwavering opposition to incinerator technologies, offering the incineration option as a “viable alternative” may have been misplaced. While some believed that, given recent technological improvements, the local community’s risk-averse attitude was unjustified, the fact is that these community-wide perceptions were not addressed and, in the end, interfered with the implementation of the master plan’s recommendations. A more thorough consultative and collaborative engagement with the community might have saved the city considerable time and money in this particular case.

Both of these examples of First Nations’ values and local communities’ prejudices against a particular technology help to remind us that when a new road is being proposed, it becomes equally important to identify core values of stakeholders. Some may feel, for instance, that protection of a unique ecosystem is simply non-negotiable and the road will, under all circumstances, be required to traverse it without negatively impacting biodiversity and wildlife populations. Making such core values transparent is essential to identifying constraints as well as viable, alternative solutions.

When it comes to selecting evaluation criteria for alternatives that have been identified, it is wise to throw the net wide to include interdisciplinary perspectives. Our calculative worldview has led to increasing specialization, and yet it is important to think holistically and comprehensively when it comes to evaluating the value of specific options. The National Research Council has it right, to my mind, when they remind us that “with the growing number, complexity and importance of environmental problems come demands to include a full range of intellectual disciplines and scholarly traditions to help define and eventually manage such problems.”

In evaluating alternatives and selecting the preferred option, again, interdisciplinary collaboration and dialogue can only be helpful to the overall decision-making process. I am reminded of the work of Greek architect-planner Constantinos A. Doxiadis, who maintained that every human settlement, at scales ranging from a single dwelling to an urbanized planet, is defined by social, cultural, economic, regulatory, technological, and ecological functions. It is only human to be motivated by our own professional interests, so a comprehensive decision-making process ensures that multiple voices, from transportation engineers to ethicists, are heard through mindful dialogue.

The core significance of such dialogue is reflected in a decision-making strategy that has been called CRM (Cockpit Resource Management, or more often, Crew Resource Management). The approach was developed following a fatal United Airlines flight
in 1978. Nearing the runway of Portland, Oregon, the pilot realized that two indicator lights for his landing gear remained off, meaning that the front wheels were not properly aligned. Preoccupied with checking light bulbs and fuses as the plane circled the airport, the pilot failed to realize that, despite the flight engineer’s repeated warnings, the plane was running out of fuel. The crash killed ten passengers and wounded twenty-four of the 189 on board. Later, the investigation revealed that the wheels had, in fact, been properly deployed and the problem was simply a faulty circuit. Had the pilot heeded his team’s advice, the crash might have been avoided.

As a result, CRM was developed, emphasizing the need for collective decision making, and such a consultative, team-based decision-making approach has recently come to be employed in places like hospitals and critical care wards. Beyond those environments, other decision makers would be well advised to heed these lessons learned.

In fact, given the situation of a proposed new road, one must not be inclined to simply give precedence to a limited group of technical “experts” who themselves are, after all, operating with their own set of deeply rooted values and assumptions. As time-consuming as an intensive consultative process may appear, it is essential to ensure that the solution is informed by comprehensive, multi-faceted understanding and consultations with an interdisciplinary expert audience.

Moreover, meaningful consultation with community members “on the ground” is essential. Such local expertise may shed light on priorities that can only be revealed on the basis of everyday lived experience of an existing landscape. Despite the time commitment required, studies show that meaningful, one-on-one consultation with community members results in more sustained buy-in of proposed solutions and ultimately ensures that a decision-making process achieves goals of social justice, equity, and participatory democracy.

Finally, there may be a need to monitor and adjust the strategy, given that “consultation” does not necessarily mean that conflicting interpretations of events will not arise. In fact, it becomes critical to devise strategies that will address attitudes and judgment calls at the root of many such conflicts. One case illustrates how such implicit value systems can shape stakeholder conflicts regarding interpretations of risk. The story begins in 1982, when the chemical giant Monsanto was asked by Health and Welfare Canada, the nation’s federal health department, to produce replacement toxicological studies for a herbicide called alachlor that had been used for some years in soy and corn farming. Scientific studies were conducted and results were submitted to the Minister, who expressed “grave concern” because of apparent “significant carcinogenic properties” of alachlor exhibited in rats. For these reasons, the decision was made to remove alachlor from the market.

However, Monsanto pursued its right to appeal the decision, and a formal review board of scientists was struck to re-examine the decision. After forty-one days of public hearings, the board recommended reinstatement of the herbicide, despite the fact that they had drawn from exactly the same scientific data that informed the government’s original recommendation. In the end, notwithstanding the review board’s endorsement of the product, the government chose to uphold its original decision, and alachlor remains unregistered for sale in Canada to this day.

Why was there such a divergence when interpreting the significance of the identical set of apparently “objective” scientific data? The case reveals how conflicting value systems, rather than scientific data, generated the controversy. As the authors note, different stakeholders “were decisively guided by different value frameworks maintained, for the most part, implicitly and without recognition by the estimators.” Specifically, the review board (and others, such as Monsanto and even farmers) employed a utilitarian value system, balancing risks with the benefits of retaining market competitiveness. On the other hand, environmentalists, mothers, and the Minister were opposed on principle to any herbicide that presented a carcinogenic risk. Balancing costs and benefits simply was not an option.

This vacillation between utilitarian value systems and deontological approaches that seek to maintain principles of right and wrong irrespective of the overall “greater good” often lies at the heart of stakeholder conflicts. For instance, cost-benefit analysis may drive an engineering firm to recommend the building or siting of a road in a way that dissects a community because ultimately such a solution will reduce costs and benefit the region overall. On the other hand, that community may feel that it is simply wrong “in princi-
pe” to threaten its holistic sense of place. Making such value systems transparent can help to ensure that the roots of the conflict are addressed in stakeholder dialogue.

Each of these cases reveals how taken-for-granted values drive decision making. Sometimes, even personal biases affect our choices. Psychologists identify a number of factors, from motivational bias (will you, as lead designer of a road, typically feel inclined to identify possible structural weaknesses and warn against using it?) to a tendency to “anchor” oneself within familiar experiences. For instance, a recent, serious budget overrun tends to incline a project manager to assess the risk of future budget overruns as being more likely simply because of the impact of these recent memories and the negative outcomes associated with such problems.

Often, it becomes important to address such biases and recognize their limitations. The story of Mann Gulch illustrates how important it is to rethink customary or habitual solutions to which we may become anchored. In 1949, a firefighting brigade was parachuted into the gulch where the Great Plains meet the Rocky Mountains. Due to changing winds, an initially small blaze eventually developed into a wall of flames two hundred feet tall and three hundred feet deep. The team leader ordered a retreat.

Realizing that the team would be unable to outrun the fire, which was now approaching at thirty miles per hour, the leader was forced to identify another solution in order to save himself. This counterintuitive technique amounted to intentionally setting the ground surrounding him on fire. As he lay flat among the cinders, the wall of flames passed him by, while thirteen other men were overtaken and killed. Besides making, whether the decision involves fighting fires or proposing new road developments.

**Paradigms of Road-Building: Beyond the Calculative Worldview**

Personal biases, societal value systems, and risk attitudes affect every stage of decision making, whether one is addressing the possibility of building a road or designing a new community. While many decisions are made utilizing the kind of “rational,” step-by-step model that we have described in the previous section, the fact is that such linear approaches assume that reason is essentially a matter of scientific, ordered calculation. But “rationality” may mean more than mere calculation.

Once again, a particular case becomes instructive. In an incident during Operation Desert Storm, when American Marines were to liberate Kuwait from Iraqi invaders, a fleet of coalition aircraft carriers were stationed twenty miles off the coast as backup for the ground troops. They were also thereby positioned in close proximity to potential Iraqi missile fire.

Lieutenant Commander Michael Riley was responsible for protecting the Allied fleet by monitoring the radar screens onboard a British destroyer. He came on duty at midnight. In the early morning, one blip on the screen began to cause him consternation even though, from all available evidence, there was no reason to doubt that the blip was simply another American A-6 fighter jet. However, Riley became increasingly concerned that it could be a Silkworm missile headed for the USS Missouri. If that ship were hit, hundreds of U.S. sailors could die. There was no clear way to figure out from the radar screen what the blip was, and because the object was moving quickly, a decision had to be made right away.

Riley gave the order to fire even though he had no rational evidence for his concern and despite the fact that if the blip really was an allied fighter jet, two innocent American pilots would die. Four hours later, the results were reported: the blip was indeed a Silkworm missile, and Riley had saved hundreds of American lives.

Why did Riley experience this reaction to a blip on a radar screen that was indistinguishable from the other blips that indicated American jets? Riley himself could not explain his anxiety, and others concluded that his decision had simply been a lucky guess. However, a cognitive psychologist decided to investigate Riley’s decision-making process and revealed that the
answer lay in the timing of the appearance of the radar blip on the screen. It had appeared eight seconds earlier than the average A-6 fighter jet. Somehow, Riley himself was unable to give a logical explanation of his fears, even though he had intuitively recognized that something was wrong.

In conclusion, Jane Jacobs reminds us that “good transportation and communication are not only among the most difficult things to achieve; they are also basic necessities.” As we move forward to design new transportation systems and more natural cities, the challenge will be to proceed with sensitivity toward taken-for-granted values that drive decision making. We should not begin the analysis by assuming that a new road is the optimal solution. Instead, we should carefully identify the true needs that are at issue and proceed carefully through an informed decision-making process. The challenge will be to make our values explicit and to collaboratively and respectfully engage in a conversation that will ensure that any intervention—road building or city building—is truly thoughtful, rather than merely technically efficient.
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NOTES

4. A similar set of procedures is described in A Guide to the Project Management Body of Knowledge (PMBOK Guide), 4th ed. (Newtown Square, PA: Project Management Institute, 2008). See p. 412, where problem definition is followed by phases such as defining evaluation criteria, rating pros and cons of alternatives, selecting the best solution, engaging stakeholders to gain acceptance and commitment, and evaluating solutions after implementation. See also Box 2-1, “Characteristics of an Ideal Decision Process According to Normative Decision Theory,” in National Research Council, Decision-Making for the Environment, p. 28, for a strikingly similar set of procedures.
9. Ibid., p. 115.
10. For an executive summary of the panel’s findings (where the author served as a member) please see http://www.toronto.ca/Wes/techservices/involved/WWS/biosolids/pdf/bmpr_pever_review_executive_summary.pdf.
14. See Lehrer, How We Decide, 253-56.
17. Ibid., p. 9.
21. See Lehrer, How We Decide, p. 285f for a full report of this incident.
23. See, for instance, the technology developed by the PERFO ground reinforcement system, described at http://www.perfo.co.uk/groundreinforcement.html.