Case study: Caribou Migration Routes

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Case (for presentation to students)

An environmental consulting firm in Alaska is hired by a natural gas utility to produce a map of a proposed pipeline through a portion of northeast Alaska in preparation for a public hearing (a hearing attended also by potential funders for the project). The company already has a pipeline route in mind but wants to assess this further within the context of the physical landscape, private land ownership, and public lands data. In the end they want to choose the shortest, most direct route to minimize capital expenditures for construction and pipeline efficiency. Geophysical, environmental, political, social, economic and regulatory factors often come into play when refining the best route.

A GIS analyst within the consulting firm is assigned to this project and proceeds to gather all pertinent data including existing topographic maps (DEMs), potential landslides, land use, land cover, geologic fault, soils, roads, railways, streams, station points, resident locations, administrative boundaries (including land ownership), vegetation, regulatory data, and subsurface seismic data.

The project involves consideration of the following variables:
  - ❖ shortest distance from source to market;
  - ❖ slope of terrain;
  - ❖ number of stream, road, and railroad crossings;
  - ❖ substrate (rocks, soils, etc., associated with burial);
  - ❖ existing laws and regulations (e.g., proximity to wetlands, costs associated with right-of-way, etc.)
  - ❖ proximity to population centers;
  - ❖ use of existing utility corridors; and
  - ❖ vegetation (removal of trees needed?)

The analyst plans to use these variables within a multi-step raster and network analysis involving the calculation of cost surfaces, distance surfaces, and direction surfaces in combination with source points, station points and destination points in defining an optimum pipeline route.

The analyst also has access to caribou migration routes throughout the region from the U.S. Fish and Wildlife Service (Figure 1). Although the proposed path of the pipeline itself will not fall within wildlife refuges, the migration corridors for this important species move beyond the reach of refuges. In fact the analyst's found these migration routes to intersect the proposed pipeline at several points.
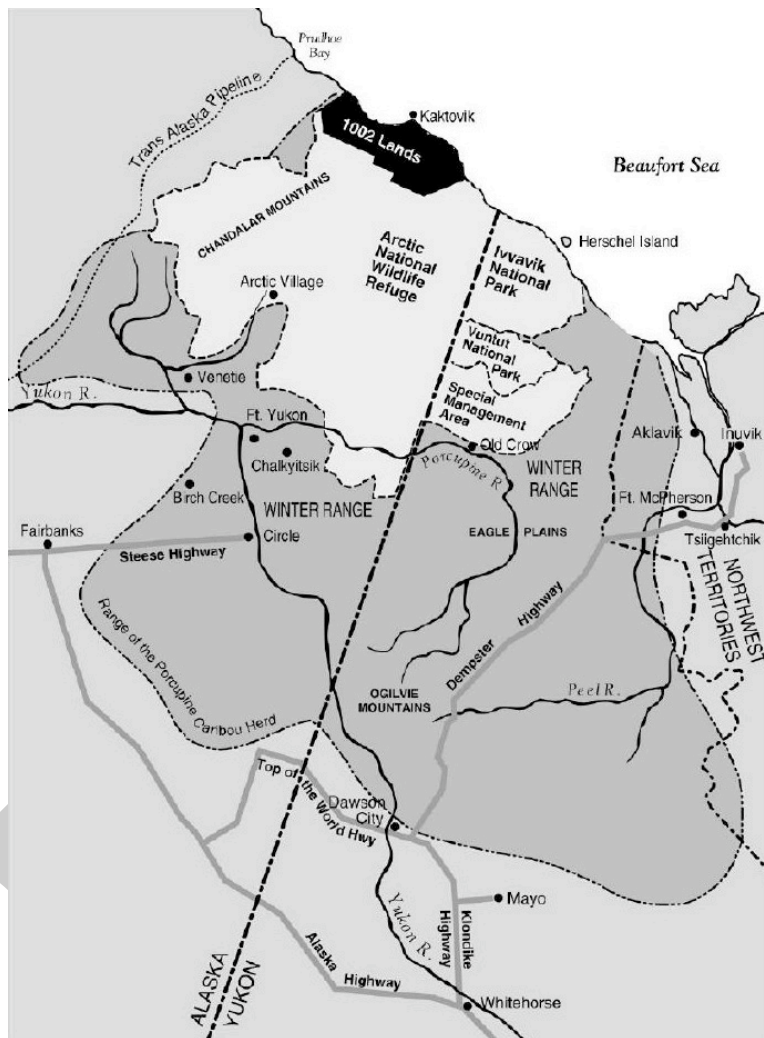
Fig. 1. Example of a winter range map for porcupine caribou in eastern Alaska and western Yukon Territory (Journey North Caribou, 2002, as obtained by the Porcupine Caribou Management Board of the Canadian Yukon). Note the location of the Trans Alaska Pipeline.

The analyst brings this finding to the attention of her supervisor. For reasons unknown to the GISP, the supervisor instructs her to remove the caribou migration routes from any maps prepared for the public hearing.

Sources

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Resources for teachers

Suggested discussion points

1. Which of the GISCI Rules of Conduct pertain to this case?

2. What obligations does the GIS analyst have to society, to employers and funders, to colleagues and the profession, and to individuals in society?

3. Even though the GIS analyst is not a designated decision maker, should she ask the supervisor why the caribou migration layer is to be omitted, and further, argue the case for why it should not?

4. What practical alternative solutions might the GIS analyst suggest? What should the GIS analyst say, and how should she say it in order to "survive" within the company, while still maintaining ethical principles?

5. What guidelines are available to GIS analysts and other professionals for ethical dissent? View and discuss one example from the IEEE at http://www.ieee.org/web/aboutus/ethics/dissent.xml.

Relevant GISCI Rule of Conduct

Section I, Number 12: "We, speaking in our professional capacity, shall not knowingly make false statements of material fact, nor shall we omit material facts."

Further resources

Web

For additional discussion, see the case study study resources on ethical dissent and whistleblowing authored by Chuck Huff and available at http://www.computingcases.org/case_materials/hughes/support_docs/whistleblowing/whistleblowing_contents.html.

Terms of use

Guidelines for Engineers Dissenting on Ethical Grounds

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Approved by the IEEE Ethics Committee 11 November 1996

Revised 3 December 2002

Introduction

 The goal of these guidelines is to provide general advice to engineers, including engineering managers, who find themselves in conflicts with management over matters with ethical implications. Much of this advice is pertinent to more general conflicts within organizations. For example, it is not unusual in technical organizations for there to be hard fought battles regarding purely technical decisions that do not necessarily have any ethical implications--but do have impacts on the probabilities of success of products. The assumption here is that the engineer's objective is to prevent some serious harm, while minimizing career damage.

Many ethics related disputes are caused by attempts to satisfy irreconcilable constraints. For example, suppose it is impossible to test a product adequately in time to meet a delivery date. Missing the delivery date constitutes a highly visible failure, with clearly defined penalties. There may be no obvious indication that an important set of tests has been omitted, even if this leads to a substantial increase in the probability of a life threatening system failure. Under such conditions, there is a temptation to meet the deadline by skipping or shortening the tests. Such decisions might or might not be in accordance with company policy. If not, then an engineer or manager objecting on ethical grounds usually has an easier, but usually not easy, problem. The chances of resolving the problem within the organization may be quite good. If the decision is consistent with the views of upper management, then the problem is far more serious for the dissenter. The following guidelines, based on the experiences of many people, are designed to maximize the chances of a favorable outcome for the ethically concerned manager or engineer.

1. Establish a clear technical foundation

One should check out the alleged facts and technical arguments as thoroughly as possible. If feasible, get the advice of colleagues that you respect. Carefully consider counter-arguments made by others. A good way to ensure that you understand someone else's position is to restate it to the satisfaction of that person. At any stage, if convinced that the other person's arguments are valid, do not hesitate to change your position accordingly.

This does NOT mean that you must be able to validate your position with near mathematical certainty. This is seldom possible in the real world. In most engineering work, we must operate with incomplete information and make reasonable engineering judgments. For example, the engineers in the Challenger case could not PROVE that a launch would lead to a disaster. But, in such a situation it was sufficient to show that the likelihood of failure of the O-ring joints was clearly too great with respect to established safety standards. The burden was on the other side to justify the launch--a burden that was not met.

2. Keep your arguments on a high professional plane, as impersonal and objective as possible, avoiding extraneous issues and emotional outbursts

For example, do not mix personal grievances into an argument about whether further testing is necessary for some critical subsystem. Keep calm and avoid impugning the motives of an opponent. (Of course, there might be a situation in which the central issue is that an incompetent person has been given critical responsibilities. In that case, it may be necessary to attack that person's qualifications. But this should be done without malice.) Try to structure the situation so that accepting your position will involve as little embarrassment as possible to those being asked to change a decision. For example, you might be able to allow a manager to take credit for realizing that a course reversal was

called for. Avoid overstating your case. Your credibility can be seriously undermined by exaggerated, invalid figures--even on matters not central to the main issue.

If the matter turns into a serious conflict, efforts will be made to portray you as some sort of crackpot. Avoid behavior that could be used to support such an attack. In both written and oral arguments be cool, clear, concise and accurate. At all times behave as a competent, ethical professional.

3. Try to catch problems early, and keep the argument at the lowest managerial level possible

Calling attention to a problem at an early stage makes a satisfactory solution much more likely. As time goes on, personal commitments to a particular course of action become deeper, and making changes becomes increasingly expensive. It is always less costly to resolve the dispute at the lowest organizational level possible. Move up the chain of command only when it is clear that this is necessary.

4. Before going out on a limb, make sure that the issue is sufficiently important

If a situation reaches the point where further protest may be costly, consider whether the stakes are sufficiently high. For example, if the issue involves only financial risks for the employer, then, if managers are acting unreasonably, it is probably not worth risking your career.

5. Use organizational dispute resolution mechanisms

Good organizations have procedures, not always formal, for resolving disputes. After having exhausted informal efforts to persuade your manager, then you must consider using these mechanisms. Since this will almost certainly damage relations with your manager, this step should be taken only after a careful review along the lines discussed in guidelines 1 and 2. If you have an ally higher up in the management chain, you might appeal to that person for advice and possibly to intervene as a mediator.

If your organization lacks such a dispute resolution procedure, consider championing the creation of one. This could be invaluable in minimizing future problems.

6. Keep records and collect paper

As soon as you realize that you are getting into a situation that may become serious, you should initiate a log, recording, with times and dates, the various steps that you take (e.g., conversations, email messages, etc.) Keep copies of pertinent documents or computer files at home, or in the office of a trusted friend--to guard against the possibility of a sudden discharge and sealing off of your office. But be careful not to violate any laws!

7. Resigning

If efforts to resolve the conflict within your organization fail, then a decision must be made as to whether to go further. It should be realized that there would almost certainly be a significant personal cost involved if you proceed. It is very unlikely that you would be able to remain with the organization, unless your job is governmental in nature, protected by civil service regulations or the like. One obvious choice is to resign. The advantages are: (1) This adds credibility to your position--makes it obvious you are a serious person. (2) Arguments that you are being disloyal to your employer are disarmed. (3) Since you are likely to be fired, resigning may look better on your record.

The drawbacks are: (1) Once you are gone, it may be easier for the organization to ignore the issues you raised, as others in the organization may be unwilling to carry on the fight. (2) The right to dissent from within the organization may be one of the points you wish to make. (3) You might thereby lose pension rights, unemployment compensation, and the right to sue for improper discharge.

It would be wise to consult an attorney before making this decision.

8. Anonymity

In some situations, engineers may see serious harm being done within their organizations, but recognize that publicly calling attention to it may cause personal repercussions beyond what they are willing to accept. It might be possible to report the problem anonymously to others who may be able to take action, e.g. a regulatory agency, a member of government or a reporter. One problem is that an anonymous report may not be taken seriously. Providing enough information to make the report more credible may make it easy for the organization to identify its source. Being

exposed as a purveyor of an anonymous report may be even more damaging to the engineer than the effect of openly making the report would have been. A reporter might distort the facts to make the case more "newsworthy". Nevertheless, this route is sometimes taken in preference to doing nothing at all. In such a case, one should be particularly careful not to malign any individuals and one should convey in the message means for verifying the claims made.

9. Outside Resources

If, after the failure of internal conflict resolution measures, you decide to take the matter outside the organization, whether or not you decide to resign, care must be taken in choosing where to go. In many cases, an obvious place is a cognizant regulatory or law enforcement agency. Other possibilities include members of governments (from one's own district or state, or the head of a relevant committee), or public interest organizations. Of course some combination of these might be chosen. Although it is usually not a good idea to take one's case directly to the news media, they generally become involved eventually, usually in reporting actions taken by whatever entity the engineer has contacted. One must take special pains to be accurate and clear when dealing with journalists so as to minimize sensationalism and distortion. When given a choice among media organizations, choose those with reputations for fairness and accuracy.

It would be useful to engage an attorney to advise on the many legal aspects of the situation. But in considering their advice, one must take into account the tendency of attorneys to discourage any acts accompanied by legal risks.

Conclusions

Following the above guidelines will often lead to a satisfactory resolution of the problem at issue. However the situations treated here are inherently difficult. No tactics or strategies can guarantee a happy outcome. It takes courage and dedication to risk one's job, or even career, on ethical grounds. Many who have done so have suffered severe consequences, at least in the short run. It is not uncommon for the engineer's position to prevail, while the engineer is fired. Sometimes, the immediate battle is lost, but the result of the battle is that fewer such bad decisions are made in the future. Finally, one should also consider the personal consequences of yielding on a matter of principle when the result may be severe harm to others. This can cause a lifelong loss of self-esteem.

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