Appendix H: Assessing Responsibility: Technical Expertise and Managers

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Appendix Contents:

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References used in this section:

    American Society of Mechanical Engineers Code of Ethics:
    http://courses.cs.vt.edu/~cs3604/lib/WorldCodes/ASME.html

    Ethics Committee of the Institute of Electrical and Electronics Engineers Code of Ethics, Dec.
    2002: http://www.ieee.org/web/aboutus/ethics/dissent.xml

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Engineers and Managers
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Work in a Hierarchical Organization

Most engineers work in business firms or government agencies where they report to others – to managers in firms and to higher level officials (the public sector equivalent of managers) in government agencies. Except in highly decentralized firms or agencies or when the resource commitments of time, money, person-hours of work, and materials are minimal, it is the managers or higher level officials – not the engineers – who have the authority to approve spending, set work assignments, determine deadlines, and decide how to handle customer or client requests for engineering services or advice. The hierarchical organization of firms and government agencies has two implications for an engineer: 1) an engineer is expected to follow the manager's instructions relating to spending, work assignments, deadlines, and dealing with customers or clients, and 2) an engineer who has strong doubts about the feasibility, environmental impact, or safety of a design, production process, product, or project has to be able to express them in ways that the manager or higher official will understand and find persuasive enough to change the instructions in ways suggested by the engineer's analysis.

Business firms and government agencies adopt hierarchical structures because they are useful. Hierarchical organization is a very effective way of coordinating the activities of many people because it concentrates decisions about major commitments to a relatively small group of leaders who then instruct others about what to do. At the same time, however, using hierarchical organization has some features that can create serious problems. Most importantly, hierarchy permits separation between possession of technical knowledge relevant to ensuring safe and efficient operation and possession of authority to commit organizational resources to a particular course of conduct. The separation will be greatest when the manager concerned was not trained as an engineer; a manager who was an engineer earlier in her or his career has better appreciation of the technical knowledge and is generally (but occasionally not) conversant with the current state of engineering knowledge. An engineer dealing with manager trained in engineering will have an easier time conveying technical concerns and rationales; the most effective engineers are those who can also convey those concerns and rationales to managers without any engineering background.

In any work group people can slack off or channel energy to their own affairs rather than the job at hand. Even though we often think of hierarchical organizations as involving closer supervision, there are many opportunities for employees at all levels to do their jobs or use their positions in ways that serve their own personal interests rather than the company's or government agency's interests. For example, an engineer who reports to a non-engineer manager can loaf until a deadline looms and then quickly put something together that will impress that manager even if it is poor engineering work. A manager, whether trained as an engineer or having an M.B.A., can allow purchasing decisions to be determined by bribes rather than choosing the best product for the purpose at hand. Employees at any level can release psychological tension by verbal abuse of coworkers, though managers have greater scope for this kind of activity since verbal abuse of a hierarchical superior carries more risk of getting fired than verbal abuse of an equal or subordinate.

Most of the workplace tensions and difficulties caused by a manager's lack of technical knowledge or abuse of authority over other employees have no effect on clients, customers, or the general public. The design is adequate even if not the best possible; the physical goods produced work as expected; the production process operates without incident. This is why society generally leaves firms and agencies to work out their internal problems on their own. Societies can do this because there are ample sources of pressures on firms and agencies to work well. When economic conditions are good and there are other jobs available, people unhappy with the internal functioning of their firm or agency are likely to quit for other jobs, taking their training and experience with them. A business firm unable to handle internal problems that slow down delivery or customer service will lose sales to competitors who can deliver well and on time. Though most government agencies do not have to compete for customers, persistent and serious internal dysfunctions will be noticed by outsiders and can trigger loss of the public, legislative, or political leadership respect that an agency needs to protect its budget and assignments from bureaucratic rivals.

Most of the time, engineers and managers work well together and agree that the designs, facilities, production processes, or products they create are safe and effective. Yet, there are times when engineers disagree with their managers over matters affecting the health and safety of fellow employees, of persons who live near a factory, power generator, or other facility, or of the general public. In these situations, engineers will face a conflict between engineering ethics and the norms of firm or agency behavior. All engineering codes of ethics stipulate that engineers have a special duty to use their knowledge and skill to protect the health and safety of the public. The internal rules of business firms and government agencies stipulate that managers have a special obligation to protect the financial well-being and public reputation of the firm or agency. Addressing safety concerns may require allocations of time and resources that firm or agency managers do not believe they have, particularly if improving safety sufficiently requires re-doing or un-doing expensive design or construction work. When time is short and money is tight, managers are under considerable pressure to take shortcuts.

Engineering codes of ethics specify than an engineer should always start by trying to resolve a safety disagreement within the firm or agency where he or she works. Internal settlement might mean that the engineer persuades her or his immediate manager, or that manager's superior, that the danger is real and serious and the manager issues instructions and allocates resources needed to modify designs, fabrication of objects, or running of facilities to avoid the danger. Internal settlement might also mean that a manager (or, more likely, another engineer) persuades the worried engineer that the danger is not serious or is prevented or minimized by some other feature of the design, installation, or operating routines that the worried engineer did not consider when estimating the danger.

The Ethics Committee of the Institute of Electrical and Electronics Engineers (IEEE), one of the largest professional associations in the world with some 365,000 members in 150 countries, has issued a set of guidelines suggesting how engineers who have serious doubts about the safety or environmental consequences of some firm or agency activity should go about raising their concerns with management. The guidelines are a supplement to, not a part of, the IEEE Code of Ethics, but do provide useful advice for engineers preparing to express concerns to their managers. The most recent version, issued in December 2002, is available at on the internet [1] and makes four main points about how to raise concerns effectively:

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[1] at http://www.ieee.org/web/aboutus/ethics/dissent.xml

1. "Establish a clear technical foundation."

This means engineers should explain as clearly as possible the engineering reasons why there is good reason to be concerned about the design, plan, or proposed activity and back that conclusion with the best available technical knowledge.

2. "Keep your arguments on a high professional plane, as impersonal and objective as possible."

No matter how strongly an engineer feels about the matter, prudence and courtesy to others requires avoiding any language that the manager could interpret as insulting or as calling his or her competence and good faith into question. Thus, engineers should be careful to criticize to project, not the person or persons who proposed or approved it.

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

This suggestion derives from the well-known fact that the earlier a problem is noticed, the easier it is to fix. Some people's egos may be strongly attached to the current form of the design or proposal, but the less organizational time and resources have been committed, the easier it is to get managers to authorize changes.

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

Notice that this guideline refers to "going out on a limb," that is, raising a point that an engineer knows others in the company or agency are reluctant to hear or handle. An early suggestion for an inexpensive change is not going to put an engineer out on a limb; waiting until later or having to suggest an expensive remedy is much more likely to do so. Because firms and organizations as a whole, and even teams or other work groups within the same organization, vary considerably in their receptivity to suggestions, engineers have to know their organization or workgroup well to be able to anticipate tell when they are actually out on a limb. When organizations or workgroups are resistant, their members are likely to regard anyone raising questions, no matter how early, as a pain. Yet, an engineer can keep their respect if concerns relate to significant matters and are presented in the objective and impersonal way suggested by guideline #2.

Expressing Concerns outside the Organization

When a disagreement cannot be solved internally because neither the engineer nor the manager or managers persuade the other, engineers may think about "going public" by bringing the potential danger to the attention of persons outside the employing firm or agency. Engineering codes of ethics provide very limited guidance in these situations. For instance, Paragraph 1 of the IEEE Code of Ethics enjoins engineers

> to accept responsibility in making decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment.

Engineers all agree that this paragraph means an engineer has a duty to warn managers or higher officials about choices that would create unsafe or environmentally hazardous conditions. There is less agreement about whether it establishes an obligation to "go public" if managers or higher officials ignore the warnings.

Paragraph 9 of the IEEE Code contributes to the uncertainty by enjoining engineers

> to avoid injuring others, their property, reputation, or employment by false or malicious action.

It would be easy for an angry manager or higher official to use this against an engineer who went public, by claiming that the public disclosure was based on false information or malicious desire to harm the company's or agency's public reputation.

The IEEE Ethics Committee is aware of the dilemmas facing "whistle blowers" (as employees who go public with their concerns are popularly known). Its Position Paper on Ethical Conduct Awareness issued in November 2004 says:

> The Ethics and Member Conduct Committee emphasizes that IEEE is committed to being supportive of any member who acts to uphold the IEEE Code of Ethics. It recognizes that voicing concern about ethical violations could jeopardize a member's career opportunities. Nevertheless, the EMCC believes that by raising awareness of IEEE's strong stance on ethical conduct through this Position Paper, its members in industry, academia and elsewhere will be helped to carry out their professional responsibilities in a manner consistent with the highest traditions of IEEE.

The American Society of Mechanical Engineers, which has over 120,000 members in the USA and other countries also has a code of ethics[2]. It includes similar statements of obligation to promote human welfare and of duties to serve both the public and an employer in its Code of Ethics of Engineers:

> *The Fundamental Principles*
>
> Engineers uphold and advance the integrity, honor, and dignity of the Engineering profession by:
>
> I. using their knowledge and skill for the enhancement of human welfare;
> II. being honest and impartial, and serving with fidelity the public, their employers and clients;

The balance between serving the public and serving the employer may be tipped more heavily in favor of the employer in a later section of the ASME Code:

> *The Fundamental Canons*
>
> 1. Engineers shall hold paramount the safety, health and welfare of the public in the performance of their professional duties.
>
> 4. Engineers shall act in professional matters for each employer or client as faithful agents or trustees, and shall avoid conflicts of interest.

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[2]available via http://courses.cs.vt.edu/~cs3604/lib/WorldCodes/ASME.html

The usual meaning of the words "faithful agent or trustees" suggest a duty to act in the best interest of the firm or agency as the employer understands them. A manager or official upset about public discussion of internal disagreements might invoke canon 4 against an engineer who has communicated concern to anyone outside the firm or agency.

The IEEE Ethics Committee has also considered the problems of going public and developed Guidelines for Engineers Dissenting on Ethical Grounds. [3] It clearly advises engineers to follow a sequence in expressing concerns, starting within their employing organization by going first to their immediate manager or supervisor. If concerns are not resolved with that immediate superior, the guidelines then recommend using the company's or agency's own internal processes:

> 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.

The guidelines emphasize the importance of keeping good records of your communications and supervisors' reactions. The caution against violating laws is a reminder that am engineer needs to avoid actions that look like taking of company property or records, disclosing proprietary information, or making statements about others that could be interpreted as slander or libel:

> 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!

The IEEE Guidelines acknowledge that internal conflict resolution procedures may not work and advise care in choosing how to appeal to outsiders in paragraph 9:

> 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

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[3] The most recent version, adopted in December 2002, is available at http://www.ieee.org/web/aboutus/ethics/dissent.xml

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.

"Going public" is a tough choice because, as the IEEE Guidelines acknowledge, it is difficult to remain in the firm or agency afterward. Some people deal with that by resigning their position before going public. This is a serious action requiring careful consideration, particularly for engineers who have dependents. As the Guidelines note in paragraph 7:

> 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.

Someone unable to resign might consider making an anonymous report to a regulatory agency, a law enforcement agency, or a reporter. Yet this also has problems, as noted in paragraph 8:

> 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 [anonymous report enough information to enable the recipient to verify] the claims made.

Whistleblowers are usually isolated within their employing firm or agency, and many find that "going public" effectively ends their professional careers because other firms and agencies are reluctant to employ them. Yet, whistleblowers do have supporters. One of the larger and more prominent organizations involved is the Government Accountability Project, a private association based in the USA. On its homepage [4] it describes itself as "a 30-year-old nonprofit public interest group that promotes government and corporate accountability by advancing occupational free speech, defending whistleblowers, and empowering citizen activists."

Public opinion may or may not support whistleblowers. In Western democracies they are typically viewed positively, particularly if the company or agency is a large one and the conflict can be presented as the

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[4] www.whistleblower.org

story of a brave and conscientious individual facing an uncaring colossus. A whistleblower will also have an easier time gaining and keeping support if the public's perception of the company or agency involved is already unfavorable because of past problems or incidents. Public sympathy can dissolve very quickly, however, if the whistleblower comes across as arrogant, vengeful, or unwilling to consider anyone else's views of the matter.