Chapter 5: Trust and Reliability

The public must place its trust in the reliable performance of engineers, both as individuals and as members of teams of engineers who work together.
This chapter focuses on areas of moral concern that are especially relevant to the trustworthiness of engineers:

- Honesty and dishonesty,
- Confidentiality,
- Intellectual property rights,
- Expert witnessing,
- Communicating with the public, and
- Conflicts of interest.

Introduction

Religious and secular literatures contain many injunctions to tell the truth.
For example, in *Holy Quran*:

(وَلَا تَلْبِسُوا الْحَقَّ بِالْبَاطِلِ وَتَكْتُمُوا الْحَقَّ وَأَنْتُمْ تَعْلَمُونَ) (البقرة 42)

(And do not confound the Truth with the untruth and do not keep back the Truth and you know (it)) The Cow 42

(مِنَ الْمُؤْمِنِينَ رِجَالٌ صَدَقُوا مَا عَاهَدُوا اللَّهَ عَلَيْهِ فَمِنْهُمْ مَنْ قَضَى نَحْبَهُ وَمِنْهُمْ مَنْ يَنْتَظِرُ وَمَا بَدَّلُوا تَبْدِيلًا * لِيَجْزِيَ اللَّهُ الصَّادِقِينَ بِصِدْقِهِمْ وَيُعَذِّبَ الْمُنَافِقِينَ إِنْ شَاءَ أَوْ يَتُوبَ عَلَيْهِمْ إِنَّ اللَّهَ كَانَ غَفُورًا رَحِيمًا)
الأحزاب: 23,24

(*Among the believers are men who have been sincere to the covenant they made with Allah. So, of them are who have accomplished there lifetime (by death in battle). And of them are still waiting, and in no way have they exchanged the least exchanges* 23*
That Allah may recompense the sincere ones for their sincerity, and torment the hypocrites in case he so decides, or relent towards them. Surely Allah has been ever-forgiving, ever-merciful. 24) The Allied Parties 23,24

In Hadith:
(عليكم بالصدق فإن الصدق يهدي إلى البر وإن البر يهدي إلى الجنة ... وإياكم والكذب فإن الكذب يهدي إلى الفجور وإن الفجور يهدي إلى النار ...)
"Adhere to truth, for truth leads to good deeds, and good deeds lead to paradise… and avoid falsehood, for falsehood leads to wickedness, and wickedness leads to hell …"

In Shakespeare's Hamlet, Polonius gives some advice regarding honesty to his son, Laertes, just before the son's first trip abroad from Denmark: ''this above all: to thine own self be true. And it must follow, as the night the day, thou canst not then be false to any man.''

A subsection of Canon 3 of the ASCE code requires members not to issue statements on engineering matters ''which are inspired or paid for by interested parties, unless they indicate on whose behalf the statements are made.''
A subsection of Canon 4 of the same code speaks to the matter of confidentiality, an area in which withholding information is justified. It enjoins engineers to avoid conflicts of interest and forbids them from using ''confidential information coming to them in the course of their assignments as a means of making personal profit if such action is adverse to the interests of their clients, employers, or the public.''

FORMS OF DISHONESTY

Lying

When we think of dishonesty, we usually think of lying. ''A lie is a statement believed to be false or seriously misleading, made with the intention to deceive.''

Deliberate Deception

If an engineer discusses technical matters in a manner that implies knowledge that he does not have to impress an employer or potential customer, then he is certainly engaging in deliberate deception, even if he is not lying.
Such deception can sometimes have more disastrous consequences than outright lying.

Withholding Information

If an engineer deliberately fails to discuss some of the negative aspects of a project he is promoting to his superior, he engages in serious deception even though he is not lying.
One is practicing a form of dishonesty by omission (1) if one fails to convey information that the audience would reasonably expect would not be omitted and (2) if the intent of the omission is to deceive.

Failure to Seek Out the Truth

The honest engineer is one who is committed to finding the truth, not simply avoiding dishonesty. Suppose engineer Mary suspects that some of the data she has received from the test lab are inaccurate. In using the results as they are, she is neither lying nor concealing the truth. But she may be irresponsible in using the results without inquiring further into their accuracy. Honesty in this positive sense is part of what is involved in being a responsible engineer.

The order of these first four types of misusing the truth reflects primarily the degree to which one is actively distorting the truth rather than the seriousness of the consequences of the actions.

DISHONESTY IN ENGINEERING

Dishonesty in engineering research can undermine the functions of the profession. If engineers report data falsely or omit crucial data, then other researchers cannot depend on their results. If a designer who is untruthful about the strength of materials she specifies for a building threatens

the collapse of the building, a researcher who falsifies the data reported in a professional journal threatens the collapse of the infrastructure of engineering.
Dishonesty can also undermine informed decision making. Managers as well as legislators, depend on the knowledge and judgments provided by engineers to make decisions. If these are unreliable, then the ability of those who depend on engineers to make good decisions regarding technology is undermined. To the extent that this happens, engineers have failed in their obligation to promote the public welfare.
These actions undermine the moral agency of individuals by preventing them from making decisions with free and informed consent. They also prevent engineers from promoting the public welfare.

CONFIDENTIALITY

One can misuse the truth not only by lying or otherwise distorting or withholding it but also by disclosing it in inappropriate circumstances.
Most engineers are employees of large corporations, but some, especially civil engineers, subcontract for design firms that have clients. For these engineers, there is an obligation to protect the confidentiality of the client–professional relationship, just as with lawyers and physicians.
Confidentiality would ordinarily cover both sensitive information given by the client and information gained by the professional in work paid for by the client.
An engineer can abuse client–professional confidentiality in two ways:
First, she may break confidentiality when it is not warranted.
Second, she may refuse to break confidentiality when the higher obligation to the public requires it.
The following is an example of the first type of abuse:
Jane, a civil engineer, is contracted to do a preliminary study for a new shopping mall for Greenville, California. The town already has a mall that is 20 years old. The owner of the existing mall is trying to decide whether to renovate or close the old mall. He has done a lot of business with Jane and asks her detailed questions about the new mall. Jane answers the questions.
The following is an example of the second type of abuse:
Engineer James inspects a building for a client before the client puts the building up for sale. James discovers fundamental structural defects that could pose a threat to public safety. James informs the client of these defects in the building and recommends its evacuation and repair before it is put up for sale. The client replies,
"James, I am not going to evacuate the building, and I am certainly not going to spend a lot of money on the building before I put it up for sale. Furthermore, if you reveal the information to the authorities or to any potential buyer, I am going to take whatever legal action I can against you. Not only that, but I have a lot of friends. If I pass the word around, you will lose a lot of business. The information is mine. I paid for it, and you have no right to reveal it to anyone else without my permission."
James will abuse professional confidentiality if he doesn't make public the information about the structural defects of the building.

INTELLECTUAL PROPERTY

Intellectual property is property that results from mental labor. It can be protected in several ways, including as trade secrets, patents, trademarks, and copyrights.
Trade secrets are formulas, patterns, devices, or compilations of information that are used in business to gain an advantage over competitors who do not possess the trade secrets. The formula for Coca-Cola is an example of a trade secret.

Patents are documents issued by the government that allow the owner of the patent to exclude others from making use of the patented information for 20 years from the date of filing. To obtain a patent, the invention must be new, useful, and nonobvious. As an example, the puncture-proof tire is patented.

Trademarks are words, phrases, designs, sounds, or symbols associated with goods or services. ‘‘Coca-Cola’’ is a registered trademark.

Copyrights are rights to creative products such as books, pictures, graphics, sculptures, music, movies, and computer programs. The author’s estate or heirs retain the copyright for 50 years after his or her death. Copyrights protect the expression of the ideas but not the ideas themselves. The script of Star Wars, for example, is copyrighted.

EMPLOYING THE LINE-DRAWING METHOD.

The method involves pointing out similarities and dissimilarities between the cases whose moral status is clear and the cases whose moral status is less clear.

Case 1. Tom is a young engineering graduate who designs automobile brakes for Ford. While working for Ford, he learns a lot about heat transfer and materials. After 5 years, Tom leaves Ford to take a job at General Motors. While at General Motors, Tom applies his knowledge of heat transfer and materials to design engines. Is Tom stealing Ford's intellectual property? (See Table 6.1.)

TABLE 6.1 (Case 1)

Feature	Positive	Test Case	Negative
Generic Information	Yes	X———	No
Different Application	Yes	X———	No
Information Protected as a Trade Secret	No	X———	Yes

Case 2. Tom is a young engineering graduate who designs automobile brakes for Ford. While working for the company, he learns a lot about heat transfer and materials. After 5 years, Tom leaves Ford to take a job at General Motors. While at General Motors, Tom applies his knowledge of heat transfer and materials to design brakes. Is Tom stealing Ford's intellectual property? (See Table 6.2.)

TABLE 6.2 (Case 2)

Feature	Positive	Test Case	Negative
Generic Information	Yes	X———	No
Different Application	Yes	———X	No
Information Protected as a Trade Secret	No	X———	Yes

Case 3. Tom is a young engineering graduate who designs automobile brakes for Ford. While working for Ford, Tom helps develop a new brake lining that lasts twice as long as conventional brake linings. Ford decides to keep the formula for this brake lining as a trade secret. After 5 years, Tom leaves Ford to take a job at General Motors. While at General Motors, Tom tells the company the formula for the new brake lining. Is Tom stealing Ford's intellectual property? (See Table 6.3.)

TABLE 6.3 (Case 3)

Feature	Positive	Test Case	Negative
Generic Information	Yes	———X	No
Different Application	Yes	———X	No
Information Protected as a Trade Secret	No	———X	Yes

In Case 1, Tom has not stolen Ford's intellectual property.
In Case 2, Tom has not stolen Ford's intellectual property. Why?
In Case 3, Tom has stolen Ford's intellectual property (brake design).

EXPERT WITNESSING

Engineers are sometimes hired as expert witnesses in cases that involve accidents, defective products, structural defects, and patent infringements, as well as in other areas where competent technical knowledge is required.
An expert should follow several rules.
First, she should not take a case if she does not have adequate time for a thorough investigation.
Second, she should not accept a case if she cannot do so with good conscience.
Third, the engineer should consult extensively with the lawyer so that the lawyer is as familiar as possible with the technical details of the case and can prepare the expert witness for cross-examination.
Fourth, the witness should maintain an objective and unbiased demeanor on the witness stand. This includes sticking to the questions asked and keeping an even temper, especially under cross-examination.
Fifth, the witness should always be open to new information, even during the course of the trial.

INFORMING THE PUBLIC

Some types of professional irresponsibility in handling technical information may be best described as a failure to inform those whose decisions are impaired by the absence of the information.
Recall DC10 disaster, see chapter 1, the failure to alert others to the danger resulted in massive expense and loss of life and denied passengers the ability to make an informed decision in accepting an unusual risk in flying in the aircraft.
The obligation of engineers to protect the health and safety of the public requires more than refraining from telling lies or simply refusing to withhold information.
It sometimes requires that engineers aggressively do what they can to ensure that the consumers of technology are not forced to make uninformed decisions regarding the use of that technology.

CONFLICTS OF INTEREST

John is employed as a design engineer at a small company that uses valves. In recommending product designs for his company's clients, he usually specifies valves made by a relative, even when valves made by other companies might be more appropriate. Should his company's clients discover this, they might well complain that John is involved in a conflict of interest. What does this mean?
John has betrayed the trust that his clients have placed in his professional judgment by serving his personal interest in his relative rather than the interests of his clients as he is paid to do.

Engineers shall not be influenced in their professional duties by conflicting interests.
a. Engineers shall not accept financial or other considerations, including free engineering designs, from material suppliers for specifying their product.
b. Engineers shall not accept commissions or allowances, directly or indirectly, from contractors or other parties dealing with clients or employers for the Engineer in connection with work for which the Engineer is responsible.