

Ethics and the Organizational Person: Revisiting DeGeorge

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ABSTRACT. In this paper I review the dispute over DeGeorge's analysis of the issue of the ethical responsibilities of engineers in large organizations. I argue that this issue is no different than the question of the ethical responsibilities of any other relevantly situated employee because engineers have no special duty to hold paramount the safety of the public distinct from that of others. I demonstrate how critics like Mankin, James, and Curd and May have misread and misinterpreted DeGeorge's position and his argument. I then identify a serious logical problem in DeGeorge, unnoticed by critics, but conclude by defending the spirit of DeGeorge's approach. That spirit recognizes the limitations of attempting to provide necessary and sufficient conditions in response to many questions in applied philosophy.

Since Richard DeGeorge addressed the issue of the "Ethical Responsibilities of Engineers in Large Organizations,"¹ more than ten years ago, few have agreed with his answer. In this paper, I would like to raise the issue again, and to revisit DeGeorge's view and the ensuing dispute. Analysis reveals that critics have not succeeded in demonstrating the inadequacy of his view. More importantly, a careful investigation demonstrates that critics largely misrepresent and

misunderstood DeGeorge's position, and that to a certain extent DeGeorge himself appears to have misconstrued the implications of his own view. Correctly understood, DeGeorge's analysis reflects the limitations of the role philosophy can play in providing answers to questions in applied ethics.

It is variously estimated that more than 90% of engineers in this country are under the employ of a large organization. Needless to say, the question of the ethical responsibilities of engineers is of critical concern in the field of engineering ethics. Of special interest is the attempt to determine the conditions, if any, according to which an engineer may or should engage in whistle-blowing. However, before turning directly to the particulars of this controversy, I would like to argue that the question is of much broader relevance. The most significant actors in the world today are large organizations, and not only engineers but many others, professionals and non-professionals, confront issues which require a determination of ethical responsibilities mediated by the organizational context. The issue is not merely the morality of whistle-blowing for engineers, as it were, but the morality of organizational obedience/disobedience in general.

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Do engineers have "special" obligations to the public?

The claim that the issues of organizational obedience or disobedience which confront engineers are relevantly similar to those confronting other individuals under the employ of large organizations cannot be defended as easily as merely pointing out that both groups work for large organizations. There are many who would deny that the question can be readily

generalized in this fashion. They would argue that the situation of engineers is different in important respects because engineers have "special" obligations to the public which other employees do not. One engineering code claims, for example, that engineers have a duty to hold "paramount" the health, safety and welfare of the public.² Thus, before assuming that the situation of engineers is relevantly similar to other employees, this claim must be examined.

The claim for the unique or special situation of engineers is doubly ambiguous. It is not clear what is meant by a special obligation; and it is not clear what it means to hold paramount the interests of the public. The general distinction between general and special duties is widely recognized. As W. D. Ross indicated, the duty not to harm is a general duty.³ It is a duty which is generally distributed among humans. It is a duty humans have, apparently, by virtue of being human. Special duties, are not generally distributed. For Ross, the duty to keep one's promise is a special duty. Promises are obligations created by an action of individuals. They are special in the sense that only those who have created promises have a duty to keep those promises. In what sense is this alleged duty of engineers special? None of the arguments for the existence of such a special duty of which I am aware are compelling.⁴ One argument claims that since this duty is a part of the code, engineers who join the society which has adopted this code have agreed to live by the code. At best this would constitute only a *prima facie* duty. Codes often contain all sorts of vague commitments and occasionally things which appear of questionable legal and/or ethical status. The question of the binding nature of the duty would seem to have more to do with the nature of the alleged duty than with the fact that the alleged duty appeared in the code. More to the point, even if the argument were strong, which it is not, many engineers never join a society, or may join a society which has no code, or one which may have a code not containing this particular provision. Are we to say that only those engineers in these particular societies have this paramount duty? Hence, if engineers as a class of individuals have some special obligation, it is not by virtue of codes.⁵ An alternative argument more often invoked attempts to ground the duty more directly in the profession. According to this argument, there is a tacit agreement or contract between society and the

profession. Society subsidizes engineering education and provides a few special privileges and powers (input into accrediting associations which regulate engineering education, and input into state licensing). In exchange, it is alleged, the profession has agreed to provide services to society and to serve as a watchdog or protector of the public welfare in the practice of engineering. Unfortunately, the claim of the tacit agreement amounts to no more than hand-waving. While there is no doubt that society subsidizes engineering education and so forth, society also subsidizes virtually every other aspect of education. Moreover, there is no evidence of any kind of a deal ever having been struck. What will count as a tacit contract? In what sense has the profession agreed?⁶

The only plausible interpretation of the claim that engineers have a special obligation to regard the public's health, safety, and welfare, is to claim that engineers have this obligation not by virtue of being an engineer, but *by virtue of being in a position to possess and understand information which reveals serious dangers to the public*. Other individuals may not possess this kind of information, or, if they did, would not be able to understand its significance. Consider, for example, John Stuart Mill's famous case of an individual *A* who sees another person *B* about to cross a bridge.⁷ *A* has information that this bridge will probably collapse under the weight of a man. One has a general duty, it is widely assumed, to offer assistance to those in need when one can do so without any great sacrifice or risk to oneself. Or, it is widely assumed that one has a general duty to assist in preventing another from serious harm when one can do so without great sacrifice or risk to oneself. Now if *A* has information that *B* will die or suffer serious injury by walking on the bridge, then *A* may have an obligation to inform *B* by virtue of having this information.⁸ It is a special obligation only in a very narrow sense of having information not available in general to others. But *A* has this obligation by virtue of the knowledge and by virtue of being in a position to act to prevent the danger to *B*. That obligation is not grounded in engineering. *A* would have the obligation whether she is an engineer or not. Granted, by being an engineer, she may be in a better position to know that the bridge is likely to collapse; but the special obligation does not arise directly by virtue of being an engineer.

Analogously, I would suggest that insofar as engineers have a "special" duty to protect the safety of the public, it is only special in this very simple sense that one might be in a special position to possess and comprehend the significance of information which may indicate that the public is in jeopardy. By the same token, others in the organization may have the same information and capability. To the extent that they do, these employees would also have an obligation. Hence, the question of the ethical responsibility of engineers in large organizations is not in any important respect different from the question of organizational obedience or disobedience confronting other employees who are in a position to understand the serious dangers which organizational actions might entail. Moreover, as the analysis below will suggest, responsibility may also be strongly associated with the ability to influence corporate action.

Another ambiguity remains. What does it mean to hold paramount? If the correct meaning of "special" has been captured above, then, if this obligation is paramount, it can be no more paramount for engineers than for other employees. Further, the discussion also suggests that "paramount" cannot mean that this obligation will always trump or override other obligations. Consider our friend *A* again. It is relatively uncontroversial that, given the information about the bridge, *A* may have an obligation (special?) to help *B*, provided she can do so without any grave danger to herself. However, the moment one begins to alter the case and suggest that *A* may be put in jeopardy, our intuitions dramatically shift. One may be willing to admit that we might morally expect some sacrifice to prevent the loss of the life on the bridge, but when the stakes for *A* are raised, then the obligation seems to diminish in some relationship to the heightened probability of serious harm to *A*. The situation would be different, of course, if *A* had been hired to protect citizens of the community. Police officers, firefighters, and rescue workers, for instance, may have created stronger obligations by taking oaths to protect citizens in jeopardy. But if my argument is correct thus far, engineers have not entered into any such explicit agreement, nor is there any other reason to suggest that there is a special obligation by virtue of being an engineer in the same way that a police officer may have a special duty by virtue of

taking an oath. The duty of engineers to the public is no more or less paramount than those of similarly situated employees in the organization. Moreover, there are limits to the risk we believe firefighters must take for the sake of protecting citizens. Even in those situations, holding the public interest "paramount" does not mean that firefighters, for instance, will risk everything. The weight of the duty to protect the public's health, safety and welfare must be weighed against other considerations.

Thus, again, there is no good reason to believe that engineers have any obligation to hold paramount the health, safety and welfare of the public in any sense in which this does not apply to other humans similarly positioned in an organization. For that matter, this applies to individuals whether they are situated inside or outside an organization. Hence, the question of the ethical responsibility of engineers in large organizations is immediately relevant to other employees as well.

These points about the nature and grounds of the duty of engineers to hold paramount the health, safety and welfare of the public, not only demonstrate that the situation of engineers in large organizations is not relevantly different than many other employees, but serve to undermine some lines of criticism of DeGeorge's position as well.

Undermining some lines of criticism of DeGeorge's position

In his analysis, DeGeorge attempts to stake out a middle ground. At one extreme are those who contend that engineers' only or primary responsibility is to the employer. According to this view, it is never permissible for an engineer to disobey the authority of the organization for which she is employed. This view is reflected in the early codes of ethics of the profession and still finds vigorous supporters. Advocates of this view would urge the same for other employees. At the other extreme are those who contend that the responsibility of engineers to protect the public is always or almost always sufficiently strong to override responsibilities to the organization, or even to one's self, family or friends. The duty is, as suggested in the previous section, believed to be "paramount." Engineers have a moral

responsibility, in this view, to sacrifice themselves and those with whom they are involved and engage in organizational disobedience if necessary to protect the public welfare. DeGeorge acknowledges, on the one hand, that there are moral obligations of some weight which require loyalty to the employer; he recognizes, on the other hand, that in some situations those come into conflict with other moral obligations, such as the obligation to alert the public to dangers of products or processes in which the engineer is involved. The conflict becomes sharper if, as many argue, the engineer has special obligations to protect the safety of the public or to protect the right of the public to be informed. DeGeorge's major interest is not in challenging the view that engineers have sole responsibility to their employers, but in challenging the myth of the engineer as a moral hero, a view which maintains that engineers should nearly always be expected to sacrifice their jobs, their personal well-being as well as that of their spouses and children, in acts of organizational disobedience.

DeGeorge has prompted vigorous replies. Hart T. Mankin, apparently reflecting the view that we can expect engineers to be moral heroes, charges that DeGeorge is "entirely too easy on engineers, or for that matter, anyone else who faces a moral dilemma."⁹ In "In Defense Of Whistle Blowing," Gene G. James echoes this charge and alleges there are "a number of problems with his analysis."¹⁰ In *Professional Responsibility for Harmful Actions*, Martin Curd and Larry May also take DeGeorge to task for letting engineers off the hook too easily, so to speak.¹¹ In the process of attempting to understand DeGeorge's position and the argument offered in its support, it will be helpful to consider these critics' treatment of DeGeorge. There are, I will argue, problems in DeGeorge's argument. However, weaknesses in the critics' positions are such that they do little damage to DeGeorge's position, and generally fail to adequately engage it.

Consider, for example, Mankin's complaint that DeGeorge has been too easy on engineers. It is difficult to decipher any argument, but Mankin clearly presupposes that engineers have some special duty to hold paramount the safety of the public. The most obvious strategy would be that of counter-example. One might seek to find a concrete case in which it appears that we would want to claim that an employee is morally required to blow the whistle,

and then show that according to DeGeorge's position, it would not be required. Mankin does nothing of the kind. He merely *asserts* that DeGeorge's view is too lax on grounds which appear to be nothing more than that Mankin's own view is self-evidently true. To deal with his position more sympathetically requires a good deal of effort in reconstructing possible positions. There are at least two reconstructions of Mankin's position consistent with his comments. According to one he seems to suggest that when the duty to protect the public comes into conflict with keeping one's job, of providing for one's family, of watching out for one's own well-being, that this is not a genuine moral conflict. According to this way of looking at things, there are apparently no moral duties to self, to family, to spouse, or to friends. In this view, to consider the welfare of self, family, or spouse, etc., is to consider factors which are morally irrelevant. If this is Mankin's view, it will, I believe, find few advocates. A second reconstruction is that perhaps Mankin's view is that there is a genuine moral conflict, i.e., that individuals including engineers might have moral duties to self and family. According to this view, Mankin is asserting that while these duties are moral ones, whenever they come into conflict with the duty to protect the safety of the public, whether it is likely to cause one to lose one's job or not, one is always (almost always?) obligated to blow the whistle. If this is the view, then it is clearly vulnerable to counter-example, as all absolutistic positions are. In the previous section, I have provided reasons for believing that this view is mistaken. Mankin's argument rests upon an extremely controversial assertion about the relative weights of moral duties in all situations. Does the obligation to protect the public good always outweigh other obligations? For instance, before engaging in organizational disobedience it would certainly make sense to determine whether one's act of disobedience would likely have any effect on the public good. If an action resulted in the sacrifice of one's job and a severe negative impact on one's family, and nothing was done to change the situation with respect to the public good, then one wonders whether the individual has acted morally. In fact, Mankin offers no argument at all to support this controversial presumption, and absent a strong argument to support this contention DeGeorge's position is not damaged, merely challenged.

DeGeorge's analysis

Mankin's complaint does not even address DeGeorge's analysis. Admittedly, capturing DeGeorge's view precisely is difficult, but Mankin does not make the attempt. DeGeorge's analysis occurs within the context of a discussion of the Ford Pinto case. By the mid to late 1970s, Ford had been involved in a number of civil suits involving the Pinto. Plaintiffs alleged that there was a flaw involving the design/location of the gas tank. Rather than having the gas tank placed over the rear-axle, a design which was considered and rejected, in part because of loss of trunk space, the tank was located between the bumper and rear axle. In rear-end impacts with a speed differential of 20 mph, the gas tank would be pushed up against the rear axle and punctured by two protruding bolts, allowing the gas to flow out and be easily ignited in a collision. There were also allegations that the neck of the fill-spout would break away as well, allowing gasoline to flow from an even larger opening. As a result of an accident in Indiana in 1978 in which a 1973 Ford Pinto was rear-ended by a van, Ford was charged by the State of Indiana with three counts of reckless criminal homicide. This is one of the first cases in the U.S., if not the first, in which a corporation was indicted for homicide. To establish criminal reckless homicide, the prosecution had to establish that the faulty design CAUSED the deaths (and was not merely coincidental with the deaths), that there was conscious disregard for the serious harm which might have been done as a result of the faulty design, and that this conscious disregard involved substantial deviation from acceptable standards. Ford was found not guilty.

DeGeorge argues that he does not wish to second guess the judge, who threw out as irrelevant test results which Ford possessed involving 1971 and 1972 Pintos (even though the design of the 1973 Pinto was virtually unchanged). Nor does he wish to second guess the jury in reaching the verdict on the basis of the allowable evidence (p. 3). Nonetheless, DeGeorge does claim that a fairly strong case could be made that Ford was morally wrong in producing the Pinto with this particular rear-end configuration. DeGeorge is more concerned, however, to establish his second major claim. Namely, *DeGeorge claims that the engineers did nothing wrong*. They had no moral

obligation to blow the whistle and go public, for instance. It is in this context, then, that the subject of the ethical responsibilities of engineers in large organizations is discussed. That is, the more general subject of the ethical responsibilities of engineers in large organizations is broached in an attempt to defend this specific claim.

Unfortunately, DeGeorge's argument to support this position is not immediately clear. It is presented in at least four stages, and one must work to find the unifying thread. First, DeGeorge devotes about four paragraphs to the topic on the heels of making the case that Ford acted wrongly. One reason for the difficulty in deciphering his precise meaning is that threads of the former argument are continued in these paragraphs. His basic point is that while no engineer can be asked to do what is immoral, in this case no engineer was asked to do what is immoral. DeGeorge states his position awkwardly in these passages, and this is partly responsible for the vigorous criticisms he has received. He writes that the decision to produce the Pinto was a managerial not an engineering decision. He claims (1981) that engineers:

... cannot be expected and cannot have the responsibility to second-guess managerial decisions . . . [Engineers] are responsible for bringing the facts to the attention of those who need them to make decisions. But the input of engineers is only one of many factors that go to make up managerial decisions . . . Engineers in large firms have an ethical responsibility to do their jobs as best they can, to report their observations about safety and improvement of safety to management. But they do not have obligations to insist that their perceptions or their standards be accepted (p. 5).

The meaning of this passage is too easily misread as an argument that engineers have a duty only to their employers, and that safety and the protection of the public from serious harm is of no concern.

Yet, critics have been too short with DeGeorge by not going beyond this passage either to arrive at a more complete understanding of his meaning or his argument. From this very tentative and unsatisfactory treatment, DeGeorge moves into the second stage. He claims, albeit abruptly and without argument, that engineers not only have an obligation to do their jobs well, but an obligation of loyalty to the employer. Moreover, he claims, they are required by

their professional codes to hold the safety of the public paramount. When these come into conflict, we confront the need for and justification of whistle-blowing, or of organizational disobedience. This passage is unsatisfactory for a number of reasons. For one, it is not immediately clear whether this list of relevant moral duties is intended to be exhaustive. Does one have a responsibility to one's self? Does one have a responsibility to family, whose welfare is largely dependent upon one's employment? It is clear later that DeGeorge does believe things like this are morally relevant. In discussing why an engineer may not be obligated to go public DeGeorge mentions that in situations in which going public will not successfully change things, the harm done to the whistle-blower is not offset by the good which results. There is another problem. While it may be relatively uncontroversial that one has obligations to self, employer, family, and so forth, there is a serious debate over the existence, nature and strength of the engineer's duty to protect the safety of the public. DeGeorge takes a position here, but does little to defend his view. The discussion in the first section of this paper demonstrates, however, that this view IS defensible.

Admitting obligations to protect the safety of the public, to the employer, and to do one's job well, in the third stage DeGeorge suggests a "rule of thumb." This "rule of thumb" is as follows. Engineers "and other workers in large corporations" are morally *permitted* to engage in whistle-blowing (or other acts of organizational disobedience, we might infer) "if the following conditions are met:"

- (1) If the harm that will be done by the product to the public is serious and considerable;
- (2) If they make their concerns known to their superiors; and
- (3) If getting no satisfaction from their immediate superiors, they exhaust the channels available within the corporation, including the board of directors.

For an engineer to have a *moral obligation* to go public and blow the whistle DeGeorge claims that two other conditions must be fulfilled:

- (4) The engineer must have documented evidence that would convince a reasonable, impartial observer that his/her view of the

situation is correct and the company policy wrong; and

- (5) There must be strong evidence that making the information public will in fact prevent the threatened serious harm.

After stating these, DeGeorge immediately concludes that the engineers had no moral obligation to do more than they did. His argument is apparently that since not all of these conditions were satisfied in the Pinto case, the engineers did not have an obligation to blow the whistle. This probably suggests that they had no obligation to engage in any other kind of act of organizational disobedience either. Since the engineers had no obligation to blow the whistle, and assuming they had no other recourse than to engage in such an act, it would follow that they had done nothing wrong. In this way, DeGeorge seems to wish to draw a particular conclusion after having framed more general conditions.

At this point, the discussion enters its fourth stage and focuses upon the role of engineers in large organizations in setting standards. His point relies upon an understanding of safety as acceptable risk.¹² Determining the *risk* associated with an action, procedure or product is an "objective" matter. Engineers can contribute to discussions of how design changes will affect the risks, for example. Determining risk will depend either upon historical data or scenario mode analysis.¹³ Determining the *acceptability* of the risks is quite another matter. Where is the line to be drawn between risk which is acceptable and that which is non-acceptable? This is not an objectivistic or scientific pursuit but one involving normative issues. When the issue is constrained to an arena where an individual's judgment of acceptable risk to herself effects only herself, we can and often do allow the individual to make a judgment about the level of acceptable risk she is willing to accept.¹⁴ There are normative issues here but they can more easily be ignored. In other areas, especially those involving non-voluntary risk where one individual or a group is imposing risk on others which others cannot or cannot easily avoid, there must be a more public determination of the level of risk which is acceptable. Here the normative issues often get pushed toward the center of the disputes involving safety. In many areas, this determination is made through the political process. Normative decisions

are reflected in codes, rules, ordinances, regulations, standard operating procedures and practices, custom, and laws, for example. These describe the level of acceptable risk society has judged acceptable in ways which are relatively clear and straightforward. There are also other areas in which the degree of risk which is acceptable to society is not at all clear. In many areas the level of risk which should be allowed is hotly contested.

Given this understanding of safety, it is apparent that engineers have no special expertise to determine the acceptable standards of risk for others. These determinations can not be made scientifically. Engineers may have expertise which allow them to determine the degrees of risk associated with various alternatives, but they have no expertise in determining what level of risk should be accepted.

James' criticism of DeGeorge

Having identified four stages in DeGeorge's analysis, how do they cohere? Do they cohere? What is the underlying argument, if any? These are the important questions to raise in attempting to understand DeGeorge's view. Critics, however, seem largely to focus only upon one particular aspect of the presentation or seriously misrepresent some rather obvious features of the position.

James, for instance, also argues that DeGeorge's position is too lenient with respect to the responsibilities of engineers and develops his own position in three stages.¹⁵ First, he criticizes DeGeorge's position. Secondly, he develops alternative criteria for judging when engineers are responsible. Thirdly, he lists a number of factors which are to be considered in the deliberations leading to a decision of whether to blow the whistle. Each of these needs to be considered separately.

James's criticisms focus almost exclusively upon the third stage of DeGeorge's analysis. This frontal attack, however, is unsuccessful. He first criticizes condition 1 as being too strong because it requires "defacto wrongdoing instead of extremely probable evidence of wrongdoing." There is no force to this objection. DeGeorge does nothing which would suggest that he requires *de facto* harm. He too can allow extremely probable evidence of wrongdoing. James then objects that DeGeorge uses concepts

which are vague or unexplicated. Specifically, he focuses on "harm" and "serious and considerable." This is not a significant worry. There is a large literature on the concept of harm and a fairly well understood meaning. This concept is not inordinately vague and DeGeorge cannot legitimately be criticized for not stopping his exposition of the conditions of whistle-blowing to explicate this concept. Neither does the complaint about "serious and considerable" have much substance. While these notions are not as precisely drawn as that of harm, they are not for that reason unworkable in an article of this nature. This, in total, is the substance of James' direct attack on DeGeorge.

From this, however, he moves into a second phase in which he attempts to develop an alternative position. This amounts to little more than the assertion of the following general rule:

The amount of responsibility one bears for organizational actions is dependent on the extent to which (a) one could foresee the consequences of the organizational action, and (b) one's own acts or failures to act are a cause of those consequences (James, 1984, p. 253).

Based on this statement James hastily concludes, with little further argument, that the engineers at Ford in the Pinto case had a moral responsibility to blow the whistle. Since DeGeorge had concluded that they had no such moral obligation, James apparently takes this as a demonstration of the inadequacy of the position of DeGeorge. James ignores the possibility that DeGeorge's general position may be very close to his and that the reason that there is a disagreement over this case may have to do with specific disagreements over this case. Further, James's position will not stand. Even if one accepts this general rule, it is not at all clear that the engineers would be morally obligated to engage in whistle-blowing. First of all, condition (b) would relieve the engineers of bearing much responsibility since in this case regardless of what steps they might have taken it would have had little effect on the consequences. In fact, this seems to be a part of DeGeorge's point. It is not clear, for example, that the public was convinced that the Pinto was unacceptably safe. Blowing the whistle, therefore, may have had little consequence.

But there are even more serious difficulties. Although this general rule appears on its surface to

capture an important condition for ascribing responsibility, namely, that one somehow be involved in the causal chain leading to the action, the rule ignores a number of other factors. For one, as stated, it is insensitive to the serious issues related to judgments of safety. By ignoring these, James is apparently presupposing that judgments of safety are straightforward or within the province of the expertise of the engineer. But, in situations in which the standards are not clear or settled, as DeGeorge correctly points out in the fourth stage of his argument, engineers have no moral right to substitute their judgments for what the level of acceptable risk should be. In these kinds of situations, engineers are not any better suited to make decisions concerning safety than anyone else. Some are trained to deal with assessments of risk. By virtue of understanding a design, they may understand the conditions according to which a design will cause serious injury or death. They may have a responsibility to convey to superiors assessments of risks under specified conditions, but unless there are established norms for what risk is acceptable, they cannot make safety determinations for others. The general rule is cast as if the engineer has some particular insight into safe/unsafe distinctions.

Furthermore, the general rule of responsibility suffers from the same narrowness of perspective, the same absolutistic fervor as the Mankin criticism. The general rule is insensitive to the fact that an individual may have other responsibilities. It may be true that we have a responsibility in an organization in proportion to the rule formulated by James, but this does not in any way speak to those other obligations which we may have. To determine one's actual duty one must weigh the strength of organizational responsibilities against the strength of other responsibilities. Has James forgotten that other responsibilities may also weigh stronger or weaker? James not given sufficient conditions, only a sliding scale to determine when the responsibility gets stronger or weaker. A complete picture must incorporate those other responsibilities impinging upon an individual in a large organization. Short of this, even if James can show that the responsibility is very great in light of this general rule, he has not demonstrated in a particular case that this strong responsibility outweighs other strong responsibilities.

Believing that he has demonstrated the inade-

quacy of the DeGeorge analysis, James concludes by stating a number of factors which are to be considered in the deliberation leading to a decision whether to blow the whistle. Among these are: make sure the situation is one that warrants whistle-blowing; examine your motives; verify and document your information; determine the type of wrongdoing you are reporting and to whom it should be reported; and so forth. What is most noteworthy about these is that they are not presented as either necessary or sufficient conditions. Rather, they are merely factors to take into consideration. What is one to make of these? For one thing, they create a tension with the general rule. That is, the general rule suggests that this is the sole variable in determining whether to blow the whistle. The criticism of that is that there are clearly other important considerations. Here James concedes the point, conceding the narrowness of the proposed general rule. But the implication of this is that the criticism of DeGeorge's claims about the Pinto engineers, criticisms which are already weak, are even further weakened. James based his criticism of DeGeorge's claims on this general rule. If James desires that all these factors be taken into consideration before judging the moral advisability of whistle-blowing, then the criticism of DeGeorge is clearly premature. One should reach a conclusion about the moral permissibility of whistle-blowing only after taking all of these other factors into account.

By becoming more realistic, James has removed his position even farther from one which would in a simple manner help determine the responsibilities of engineers. There is no concrete decision procedure, no set of conditions which can be applied. The effect of this is significant. Although James has titled the article "In Defense of Whistle Blowing," it is not at all clear how this position constitutes a defense of whistle-blowing. The defense amounts to nothing more than the claim that in some situations, whistle-blowing is morally legitimate, perhaps even morally obligatory. This is hardly shocking news. How can one know when whistle-blowing is permissible or obligatory? The only guidance is that one should arrive at a conclusion by taking into consideration the factors mentioned.

I do not wish to criticize that conclusion. It may be that in all honesty, one can do nothing more than to urge that when the moral responsibility becomes

great enough, then there is a responsibility to blow the whistle which may override other morally relevant considerations. Perhaps this provides some insight into the very limited role that philosophy can play. Perhaps the role is nothing greater than this. In any case, James has largely ignored DeGeorge, he has failed to offer any substantial criticism of DeGeorge, and his attempt to stake out an alternative collapses into saying that we ought to take many things into consideration.

Curd and May's views

In *Professional Responsibility for Harmful Actions*, Martin Curd and Larry May also offer criticisms of DeGeorge's view while attempting to defend what they take to be an alternative.¹⁶ Curd and May quote from the first stage of DeGeorge's analysis, a stage at which DeGeorge's position is stated in rather unrefined form. The quotation suggests that engineers are paid to do their jobs well and that while they may have a duty to report their observations about safety, they "do not have the obligation to insist that their perceptions or standards be accepted." By focusing only upon this aspect of DeGeorge, Curd and May proceed as if DeGeorge did not recognize that engineers have a responsibility to protect the safety of the public. From the second stage of DeGeorge's presentation, however, it is clear that he believes that engineers have a duty to protect the safety of the public.

Even more dramatic is the misinterpretation of DeGeorge's argument. They write:

DeGeorge has two arguments for this view. First, he says that it is too much to expect of engineers to demand that they risk their jobs for the public. Second, he argues that since engineers are not paid to make *ultimate* safety decisions, (this being the job of upper management), their contractual obligation does not require them to do anything more than to inform their supervisors about safety problems. (Curd and May, 1984, p. 25).

Neither of these arguments can be found in DeGeorge. First of all, it is clear that DeGeorge does *not* say that it is too much to expect of engineers to risk their jobs for the public. DeGeorge agrees that engineers have obligations to protect the safety of the public, and that that duty will sometimes be

sufficiently strong to demand some risk. In the third stage of his analysis, for example, when DeGeorge presents the conditions according to which whistle-blowing would be obligatory, there is no mention of an engineer's risk to himself, his family or friends. This list of conditions only insures if the engineer's job is to be put at risk that there is good reason to believe that whistle-blowing will make a difference in the world.

Curd and May then admit that DeGeorge "concedes" that whether engineers are required to risk their jobs "depends upon the situation." Curd and May agree with this idea. This concession, however, amounts to more than an admission that they have failed to identify DeGeorge's argument. It is tantamount to an admission that the position attributed to DeGeorge is misconstrued from the outset.

According to Curd and May, DeGeorge's second argument rests upon the contractual obligations of engineers. This is not the argument. The fourth stage of DeGeorge's analysis offers a clear understanding of his meaning. That is, in answer to the question of how these four stages cohere, it is apparent that the fourth stage offers a clarification of the major points in this regard. As I have explained above, DeGeorge's claim does not rest upon contractual obligations, but upon the nature of the concept of safety. Something is safe if (and only if) the risk involved is judged to be acceptable. Roughly speaking, there are two possible scenarios. In one there are clear standards for the determination of levels of acceptable risk. These levels may be expressed as industry standards, administrative agency rules and regulations, state or federally mandated standards, local construction/design codes, etc. If an engineer finds that an employer is not adhering to such a standard, and finds that the employer will not alter the course of action to remedy the problem, then if the engineer engages in whistle-blowing, this does not involve the attempt by the engineer to impose a standard of the level of acceptable risk. It involves merely calling to the attention of others that the acceptable level has been violated. This is a quite different scenario than one in which there are no clear standards.¹⁷ In situations in which there is not some degree of consensus on the degree of risk which is acceptable to society, DeGeorge is claiming that engineers have "no obligation to insist that their perceptions or their standards be accepted."

Thus, this argument is grounded in an understanding of the concept of safety, and a belief that in the Ford Pinto case the engineers were not in a situation in which the standards for rear-end impacts were sufficiently clear that they would be obligated to engage in organizational disobedience. Managers at Ford decided to produce a car with a rear-end design which was riskier than it could have been. With minimal costs, the design could have been changed or the present design made less risky. Some engineers believed that this level of risk was below the level of risk which was acceptable, but others did not. There were no federal standards during that first years of production of the Pinto in 1971, 72 and 73. Standards were the subject of intensive debate. In short, there are two important moments of this fourth stage. First, is the argument based on the nature of the concept of safety. Second, there is the claim that in this area, the standards for level of acceptable risk (safety) were unsettled and that the judgments of engineers could not confidently support the claim that the design was sub-standard — unsafe. DeGeorge's discussion also makes it clear that he believes that whistle-blowing in this case would not have had much effect in changing the design. Consumers continued to purchase Pintos which were produced in the early 1970s even after the facts of the hazards were widely known.

If Curd and May disagree, then, they must disagree either over the concept of safety which guides DeGeorge, or they disagree that the case involves an area in which the standards were unclear. It is unlikely that the debate hinges on the former. Consequently, it would appear that to the extent that Curd and May have any objection to DeGeorge at all, it would amount to nothing more than a complaint about whether there was indeed a relevant clear standard. Such a disagreement would not necessarily constitute a disagreement with DeGeorge's general position, but only a disagreement with respect to the particular judgment in this case.

Although the interpretation of DeGeorge misses the mark, it is, nonetheless, possible that the position of Curd and May is superior. If Curd and May can develop an alternative position, and present a sufficiently strong argument in its defense, then one would be compelled to adopt that view and reject DeGeorge's. What, then, is this alternative position, and what argument is offered in its defense?

Unfortunately, the answer to these simple ques-

tions is not straightforward. Their position seems to be that when engineers confront situations in which the organization is involved in behavior which is clearly a violation of safety standards, and where whistle-blowing will make a difference, then engineers have an obligation to engage in organizational disobedience. They write that "where there are risks of harm, engineers must strive assiduously to minimize negligence, both for themselves and for others within the corporation (p. 24)." If there is no alternative, they claim, this may involve whistle-blowing. The reference to "negligence" suggests a situation in which the standards for levels of acceptable risk are clear and are being violated. But, this would not appear to be in disagreement with DeGeorge. Nor is this a position with which many would disagree. To the extent to which they may endorse some other position, those other positions possess less credibility. Curd and May could be arguing, for example, that even when there are no clear standards being violated, if engineers believe the risks should be lowered then they have an obligation to reduce the risks, even an obligation to blow the whistle. This is not at all plausible without a number of other assumptions and refinements.

Although it is difficult to understand precisely what Curd and May are defending, it is easy to see that the argument employed is extremely unconvincing. The argument is developed in the context of explicating the notion of responsibility for wrongful actions. Legal notions are utilized to clarify what is taken to be the underlying moral notions. Ignoring some qualifications, briefly, a person is responsible for a harmful action in tort law if and only if the action was faulty, and the faulty action caused the harm. To speak of an action being faulty is to judge that the action has fallen below some level of acceptability. Some acts are done with intent to harm. Negligent or reckless acts do not. Negligent acts fall below the accepted standard; reckless actions substantially deviate from these standards. This legal model is, for Curd and May, a model for morally ascribing responsibility. One important issue in law and morality is the determination of the relevant standards. Legally, this often amounts to a standard of "due care," a relatively vague concept, but one which is given substance by the jury. Morally, Curd and May propose a similar standard for professional responsibility. Since professional standards may be lower than those which would be adopted by a

reasonable person, they opt for the latter. Professionals should be responsible for acting in accordance with the standards which would be adopted by a reasonable person.

However, engineers, unlike "true" professionals, usually practice in the context of large organizations. When harmful actions are committed, how is responsibility to be ascribed? The issue of the ethical responsibilities of engineers in large organizations arises again. Since organizations (corporations) are fictitious entities and cannot act unless agents act on their behalf, they argue that it makes no sense morally to ascribe responsibility to an organization (corporation) unless responsibility is also ascribed to individuals. Thus, they claim, whenever an organization (corporation) acts, at least some members of the corporation must be responsible as well. (This line of reasoning is not, of course, followed in law, nor is it very compelling. There is no time here to enter that debate.)

Given this understanding, Curd and May must always attempt to distribute responsibility for organizational behavior to some individuals. They consider a number of alternatives. One could distribute responsibility according to salaries, arguing that one's responsibility is a "cost which should reflect the financial benefits of corporate membership" (p. 23). This is rejected as a narrow legalistic approach which does not reflect morality.

A much more attractive alternative is also rejected. It is in the context of rejecting this alternative that Curd and May develop an argument for their own view. One could "base the degree of individual responsibility on the individual's degree of authority in the organization."¹⁸ Curd and May recognize that this is a position which seems to be widely accepted, but reject it. Their argument for rejection, however, is a *non sequitur*. They observe that engineers do not have much authority over corporate decisions. Given this alternative, engineers would not to any great extent be held responsible for corporate actions. Curd and May reject this conclusion. Apparently, they believe that by some *modus tollens* the principle which lead to this conclusion thereby falls. The reasoning begins in the following passage:

... On such a view engineers would, in practical terms, become mere employees and relinquish all pretensions to professional status. They would, just like other em-

ployees, merely be following orders from higher authority with no responsibility for their subsequent effects. This is something of a paradox for professional engineers. They want to be seen as independent professionals like lawyers and physicians, yet most of them are employees of large corporations. Moreover, unlike corporate lawyers, they are dispersed throughout the whole corporate structure. They do not even have their own corporate niche with authority over their own departments (p. 24).

This is a forceful argument for why, in general, engineers are not responsible for corporate actions. Curd and May recoil from that conclusion. For them the question is what can be done "to enable corporate engineers to become independent of management to the extent necessary for their integrity as professionals." The answer, we are told, is that "engineers must regard themselves as fully responsible for the results of their actions and omissions." The answer misses the point. Engineers are responsible for their actions and omissions. The point is that their actions and omissions usually have little to do with corporate actions. Consider the Challenger disaster.¹⁹ Engineers designed o-rings for the Solid Rocket Boosters segmented field joints. When it became apparent that there were problems engineers began studying the problem, at least to the degree management allowed it. Engineers urged that the launch on January 28, 1986, which resulted in the loss of the Challenger be cancelled. Engineers did not fail to attempt to make changes early. They were generally forbidden by supervisors. Engineers did not act to give Morton Thiokol's approval to launch on the evening of January 27, 1986, nor did they fail to warn. Management level individuals had authority to cause an organizational action, not engineers.

The reasoning by Curd and May appears to work like this. (1) Assuming the principle that responsibility should be ascribed according to the degree to which an individual has authority for organizational decisions, and (2) given that in large corporations engineers have virtually no authority over organizational decisions, (3) therefore, it follows that engineers should not be ascribed responsibility. (4) But, if engineers are not responsible for their actions (corporate actions?), then they are not professionals like medical physicians or lawyers. (5) Engineers should adopt strategies to enable them to become independent of management to the extent necessary to become professionals (similar to physicians and

lawyers). (6) Regarding themselves as fully responsible for results of actions and omissions would enable them to become independent of management to the extent necessary to become professionals. (7) Therefore, premise 3 should be rejected. (8) Therefore, the principle of premise 1 is incorrect.

The problems with the logic of this argument—sketch, and with ambiguities of the meaning of claims in many of the premises loom too large to require much comment. A few things, however, deserve special note. For one, as I indicated above, in premise 6, the issue is not whether engineers are responsible for their actions and omissions. The issue is that those actions and omissions are not identical with organizational actions and omissions. Nor do those actions and omissions have much impact on corporate actions and omissions. There are other serious problems. Apparently, this argument assumes that by “regarding themselves as responsible” for the effects of their actions and omissions, engineers will become independent of management. This must be taken to mean that engineers must regard themselves as responsible for corporate actions and omissions. This is like saying that by imagining that I am in Oz I escape Kansas. Or, it is like saying that by imagining myself as a free person I am no longer a slave. Whether the slave regards himself free is relatively irrelevant. Whether engineers regard themselves as responsible for the effects of corporate actions is also irrelevant except psychologically. These psychological states may interfere with the perception of reality and the willingness and ability to alter it. Slaves who believe themselves free may not clearly perceive their own situation and may be incapable to act intelligently to alter it. A similar point may apply to engineers. Engineers have little impact on corporate decisions. Why should one regard oneself as responsible for something when in fact one is not? To be responsible requires some causal connection with the wrongful harm. The causal connection between engineers and corporation decisions is usually extremely slender and frail. Why would making believe that there is a connection result in engineers becoming independent?

Consider other problems. Why would it be a good thing for engineers to have status as professionals such as physicians and lawyers? This is assumed without argument. Even physicians and lawyers situated as engineers in corporations would

not retain the kind of independent professional status Curd and May seem to desire. Further, by what leap of logic does one move from premises 1–6 to conclusion 7? Or, even if steps 1–7 are valid, what rule of inference would allow one to conclude with 8?

Rejecting this alternative for distributing responsibility is not only startling but may create a contradiction in their own overall argument. Curd and May develop the moral model of responsibility in the first parts of their essay. This principle is an integral component of the model of professional responsibility. For someone, including a professional, to be responsible it must be shown that the wrongful harm was caused by that person. To the extent that engineers have little causal connection with the corporate decision, on their own model they are not responsible. This principle is also at heart the general rule proposed by James in his abortive attack on DeGeorge.

A more careful analysis of DeGeorge's views

While DeGeorge's critics have failed to refute his position, have generally failed to adequately address it, and have failed to provide convincing reasons for adopting an alternative, it remains to more carefully articulate DeGeorge's view. How do the different stages of DeGeorge's analysis cohere? Do they cohere? What is the underlying unity of the argument?

One connection has already been suggested in the treatment of the criticisms by Curd and May. The discussion in the fourth stage serves to refine the roughly hewn statements of the first stage. The discussion of the nature of the concept of safety, the difficulty in determining standards, for instance, serves to clarify DeGeorge's view on the kinds of issues to which engineers, or any employee, might have a duty to disobey the procedures of the organization.

The second and third stages provide a larger framework within which to deal with the Pinto case. As indicated in the response to Mankin and James, the second stage identifies a number of relevant considerations beyond the duty to do one's job well, which is the only obligation identified in the first

stage. The third stage offers a rough rule of thumb to determine when the duty to protect the safety of the public is sufficiently strong to override other duties, such as the duty of obedience to the organization. The set of conditions purports to determine when whistle-blowing is morally permissible or morally obligatory. Together, two and three move the discussion to a more abstract level, but can be used to defend the particular claim that the engineers at Ford in the Pinto case had no obligation to blow the whistle. That, in brief, appears to be the manner in which these different parts work together.

The third stage, then, plays a crucial role. Oddly, critics have largely ignored the logic of this argument. James quibbled over what he took to be the vagueness of some of the important concepts in this stage, but like others accepts that DeGeorge's stated conditions yield the conclusion that the engineers at Ford did nothing wrong. Critics are disenchanted that in general these conditions will yield conclusions which do not impose sufficiently stringent requirements on engineers. All seem to have ignored the obvious weakness of DeGeorge's position. His argument is as follows:

- (1) IF conditions 1, 2, 3, 4 and 5, are satisfied, then it is morally obligatory to blow the whistle.
- (2) Either condition 4 or condition 5 is not satisfied.
- (3) Therefore, it is not morally obligatory to blow the whistle.

This conforms most closely to the text with one exception. While discussing conditions 4 and 5, DeGeorge appears to be making a case that neither condition 4 nor 5 is satisfied in the Pinto case. Premise 2 could read as "Neither conditions 4 nor 5 is satisfied," but I have rendered the claim in this way because the logic of the argument is unaffected. The fourth stage, the argument from the nature of safety, can now be construed as an attempt not only to clarify the first stage, but to lend support to premise 2. One reason that the engineers could not have good reason to believe that they possessed evidence which would convince an impartial observer that the company decision to produce the Pinto was wrong, is that there was a debate over standards. Indeed, the debate may not at all even be the kind that an impartial observer can arbitrate, unless we assume

certain normative principles are employed by the observer.

There is, however, one serious problem with interpreting DeGeorge in this way. *This argument is invalid.* Even if one accepts the conditional nature of premise 1 (if 1, 2, 3, 4 and 5 then whistle-blowing is obligatory), and even if one accepts that neither condition 4 nor 5 is satisfied, it clearly does not follow that whistle-blowing is not obligatory. (From if P then Q , and not P , one cannot deduce not Q). That is, establishing that all the conditions are not satisfied, DeGeorge cannot conclude, based on these assertions, that the engineers did not have a moral obligation to blow the whistle.

What DeGeorge seems to have momentarily overlooked is that he has asserted these only as sufficient conditions, not as necessary conditions. The implications are serious. First, even if one accepts the conditional asserted in premise 1, that together all 5 conditions are sufficient to establish that engineers have a moral obligations, that is not logically inconsistent with a number of other weaker claims. That conditional, for example, is consistent with the claim that conditions 1, 2, 3 and 5, or, conditions 1, 2, 3 and 4, establish moral obligation. Logically, therefore, a critic who might claim that condition 3, for example, is unnecessary to establish moral obligation, is not strictly speaking disagreeing with DeGeorge. A critic who wishes to claim that alternative conditions, say 5 and 7, would suffice to establish an obligation is also not in disagreement with DeGeorge's set of sufficient conditions. DeGeorge's conditional is rather unobjectionable. In cases in which all these conditions are satisfied few would believe that an employee did not have an obligation to go public. These conditions come too close to capturing those which are operative in the case of the individual in a position to prevent another individual from walking across the hazardous bridge.

In order for the argument to be valid, DeGeorge needs to assume that these are also *necessary* conditions. But to make them necessary and sufficient conditions is implausible. The moment one begins to claim that these are necessary conditions, then counter-example is easy. Suppose, for example, an engineer can satisfy conditions 1, 4 and 5. That is, the engineer knows that the harm done to the public will be serious and considerable, and that she

possesses documented evidence which will convince a reasonable impartial observer that the company policy is wrong, and making this information public will in fact prevent the threatened serious harm. But suppose, contrary to conditions 2 and/or 3, the engineer knows full well that if she goes to a superior, the documentation necessary to establish condition 4 will be destroyed and the harm will be done. The company will then be able to disavow any knowledge of the fault, etc. In cases like this, it might also be that engineers have an obligation.

There is one modification of DeGeorge's argument which might come closer to capturing his intent. DeGeorge suggests that these conditions constitute a "rule of thumb." Perhaps this means that these conditions should not be construed as necessary and sufficient, but that they are nearly always sufficient and usually necessary. The point might be that in some cases there are exceptions and some condition may not be necessary given the particular circumstances. The argument amounts to something like the claim that employees have no obligation to engage in whistle-blowing unless these conditions are satisfied, except for special circumstances.

I would suggest that this best captures the spirit of DeGeorge's essay. I would also like to suggest that this spirit represents the most healthy approach to the subject of applied ethics. Honesty calls for prudence. Philosophers should not pretend to be in a position to legislate. The appropriate role is more of a debunker or critic. Support for this prudence comes from reflection on the question with which this essay began, "What are the ethical responsibilities of engineers in large organizations?" and the ensuing dispute. It is simply intellectually dishonest to suggest or pretend that philosophers (or anyone else) can morally legislate conditions which could be applied to the myriad diverse concrete cases which arise in our complex and changing world. A perfectly good example of the problem in moral legislation, in attempting to fasten rigid rules or sets of necessary and/or sufficient conditions, can be found in the Mankin complaint against DeGeorge. Mankin's most reasonable criticism assumes that whenever the duty to protect the safety or the public comes into conflict with other duties to family or self or employer, the duty to the public ALWAYS overrides other duties. The weakness of this simplistic vision is that it fails to do justice to the many situations in which this

absolutistic solution yields morally untenable consequences. The game for a critic becomes nothing more than to conceive possible or actual cases in which adherence to this lexical ordering is repulsive. Mankin's difficulty is educational but only because it very simply illustrates the futility of attempting to become moral guides or moral legislators.

Wherever one attempts to characterize necessary and sufficient conditions in response to a question concerning something like the moral responsibilities of engineers in large organizations, one can do nothing but search for answers and inevitably end up playing the same futile game. To attempt to provide a list of necessary and sufficient conditions is tantamount to proposing moral legislation. There is a serious problem confronting any attempt to legislate, a problem recognized at least since Aristotle. Aristotle argued that legislation is fundamentally flawed because of the nature of its generality. Since legislation is general (all acts of kind K are morally/legally wrong) any legislation runs the risk of creating injustice when applied to special cases. Law requires what Aristotle called equity to make amends for the perverse consequences of applying general laws to specific special cases.²⁰ This is a notion to which one can subscribe without clinging to Aristotelean ethical theory. In English law, as a matter of fact, this notion was incorporated in a very fundamental way until the mid-19th century when principles of equity were mixed together with principles of common law.²¹ Equity, in short, was a notion which originated from the insight that the application of law will always render morally untenable outcomes in some cases. But when one attempts to formulate moral laws in general terms, laws like "all engineers in large organizations are morally obligated to do x under conditions of 1, 2 . . .," then to what will a moral agent appeal for equity when a special case arises? In law the notion of equity was the opportunity to appeal to the higher authority of morality. When one formulates general moral laws, to what higher court will one appeal when the application of these threaten to render injustice? One is left with a choice here. Either one can argue that indeed it is possible to formulate general moral laws, not principles but laws, which will not be subject to the flaw characterized by Aristotle, or one can refuse to play the game. That is to say, when one takes the first alternative, one is lead to continually attempt the

construction of moral laws to cover the area in question, say, the area of engineers in large organizations. For critics, then, the game is to conceive of counter-examples either in this possible world or the next. It is a relatively easy task to do so, unless the laws which are to be formulated are exceedingly complex and nuanced. What is left if one refuses to play this kind of a game, a game which if Aristotle is correct is doomed from the outset?

Honesty and humility remains. This is translucently apparent in both James and DeGeorge. If the reader is seeking a general moral law to over this area of life, one will be disappointed. It is unfortunate that some authors do not do more to dispel those misguided expectations. What remains, at best, are rough rules of thumb.

Notes

¹ DeGeorge (1981), pp. 1–14.

² The "Code of Ethics of Engineers" of the Engineers' Council For Professional Development (now the Accreditation Board for Engineering and Technology (ABET)) contains the following provision as the first "Fundamental Canon":

Engineers shall hold paramount the safety, health and welfare of the public in the performance of their duties.

This code is reproduced in Martin and Schinzinger (1983), p. 300.

³ Ross (1920), Chapter 2.

⁴ Examples of such arguments appear in Martin and Schinzinger (1983), p. 63 et seq. and pp. 140–144.

⁵ Martin and Schinzinger (1983) make these points as well, pp. 140–141.

⁶ This argument is also identified by Martin and Schinzinger (1983), pp. 143–144.

⁷ Mill (1988), p. 118.

⁸ Although some (like John Rawls) make a distinction between duties and obligations, I do not.

⁹ Mankin (1981), pp. 15–17.

¹⁰ In Hoffman and Moore (1984), pp. 249–260.

¹¹ Curd and May (1984).

¹² Lowrance (1976), especially Chapter 1.

¹³ Simulation is used, of course, when testing items to destruction is impractical (destroying DC-10's or power plants?). Scenario analysis hypothesizes one event and then attempts to trace the consequences which might likely ensue. Fault-tree analysis begins by hypothesizing a system failure and attempts to trace the event back to likely causes

at the component level. Failure modes and effects analysis attempts to examine the failure modes of each component. It does not focus on interrelationships between components.

¹⁴ The normative issues here are thorny but well-known. The distinction between imposing risk only upon oneself involves what many have called self-regarding actions. Imposing risk upon others involves other-regarding action. There are at least two issues. One concerns the morality of imposing risk. The other involves the issue of whether anyone has a right to interfere in someone's liberty to impose risk. The response of Classical Liberals, of course, is that while imposing a high risk of serious injury to oneself may be immoral, no one should interfere in another's self-regarding actions. Similarly, the question of the level of risk imposed on another is not merely a question of the morality of imposing a particular level or risk, but the extent to which anyone, including a morally legitimate government, has a right to interfere. It is widely agreed that the government should be allowed to interfere on the grounds of the harm principle to prevent one person from harming another. But, which level of risk is sufficiently high to pose a clear and present danger? What interference might be justified by the public harm principle?

¹⁵ In Hoffman and Moore (1984), pp. 249–260.

¹⁶ Curd and May (1984).

¹⁷ There is, of course, always a standard in some sense. Failure to exercise "due care" involves negligence in tort law.

¹⁸ Curd and May (1984), p. 23. This alternative is actually sufficiently vague to incorporate a number of different principles. "Authority" may refer to the distribution of legitimate power as referenced by some corporate organizational chart. In reality, authority may be exercised quite differently. That is, it is possible that the individuals who exercise power may not correspond to those expected by examining an organizational chart. Hence, I am assuming that authority has more to do with practices of the use of power than formal guidelines.

¹⁹ McConnell (1987); *Project Management Journal* (1987); Bell and Esch (1987); and *Report of the Presidential Commission on the Space Shuttle Challenger Accident: 1986* (1986).

²⁰ *Ethics*, Book Five, Chapter 10. "And equity is essentially just the rectification of the law, where the law has to be amplified because of the general terms in which it has to be couched. This is in fact the reason why everything is not regulated by law; it is because there are cases which no law can be framed to cover and which can only be met by special regulation."

²¹ See, for example, any of the standard texts such as Baker (1979) or Pollock and Maitland (1968).

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