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Professional Societies, Microethics, and Macroethics: Product Liability as an Ethical Issue in Engineering Design*

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Professional engineering societies impact the process of engineering design through their role in promoting engineering ethics (among other activities); professional societies also participate in debates over public policy issues regarding the development and use of technology, such as the ongoing debate over product liability reform. Product liability, a key concern to engineering designers, professional societies, and policy makers alike, is an important case study of whether professional engineering societies are successful in bridging microethical and macroethical concerns. Ethical issues include the role of product liability litigation in creating an environment wherein managers take seriously the views of engineers with safety concerns, and the relative standard of care expected of designers and users of products. While professional engineering societies favor substantial changes in the product liability system, there is little evidence that they have considered the effect that decreasing the impact of product liability would have on engineering ethics. The apparent disconnect between the posture of the professional engineering societies on product liability and their concern for protection of public health, safety, and welfare as stated in their codes of ethics undercuts the ability of the professional engineering societies to constructively contribute to a discussion of the social and ethical dimensions of engineering design.

INTRODUCTION

PROFESSIONAL ENGINEERING societies have considerable impact on the process of engineering design and the extent to which its social dimensions are appreciated, through their roles in promoting engineering education, in releasing technical standards, and in promulgating codes of ethics. In addition, professional engineering societies often lend their voice to the debate over public policy issues regarding the development and use of technology. One such debate with immediate relevance to engineering design is that over public policy with respect to product liability reform. Because it has relevance to both the engineering designer and the social responsibility of the profession, product liability is an important link between microethical and macroethical concerns in engineering.

MICROETHICS AND MACROETHICS IN ENGINEERING

A number of authors [1] have suggested that engineering ethics encompasses multiple domains. The ethicist John Ladd [2] subdivides engineering ethics into 'microethics' or 'macroethics' depending on whether the focus is on relationships between individual engineers and their clients, colleagues and employers, or on the collective social responsibility of the profession. In each case Ladd seems to be concerned with what might be called 'professional ethics,' with microethics focusing on issues for the most part internal to the profession and macroethics referring to professional responsibility in a broader, societal context.

McLean [3], an engineer, utilizes three categories in discussing engineering ethics: technical ethics, dealing with technical decisions by engineers; professional ethics, dealing with interactions among managers, engineers and employers; and social ethics, dealing with sociopolitical decisions concerning technology. McLean's notion of professional ethics is narrower than Ladd's, incorporating only those dimensions that Ladd describes as microethics. At the same time, McLean has a broader overall notion than Ladd of the spheres of ethics that are relevant to engineering for he includes both individual and societal dimensions. Another engineer, Vanderburg [4], while employing terminology similar to Ladd's, seems to neglect professional ethics entirely while distinguishing between 'microlevel' analysis of 'individual technologies or practitioners' and 'macrolevel' analysis of 'technology as a whole,' categories that track to McLean's technical and social ethics categories.

De George [5], an ethicist, distinguishes between 'ethics in engineering' and 'ethics of engineering'.

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Table 1. Microethics and macroethics in engineering

	Microethics		Macroethics	
Source	Individual	Professional		Social
Ladd (2) (1980)		professional relationships between individual professionals and other individuals who are their clients, colleagues and employers	problems confronting members of a profession as a group in their relation to society (i.e., social responsibility of professionals as a group)	
McLean (3) (1993)	technical ethics: technical decisions and judgments made by engineers	professional ethics:interactions between engineers and other groups (e.g., managers, engineers, employers)		social ethics:technology policy decisions at the societal level
Vanderburg (4) (1995)	microlevel analysis of individual technologies or practitioners			macrolevel analysis of technology as a whole
De George as reported by Roddis (5) (1993)	ethics in engineering: actions of individual engineers	ethics of engineering:the role of engineers in industry and other organizations, *professional engineering societies*, and responsibilities of the profession		

The focus of the former is on actions of individuals while the latter is concerned with both relationships internal to the profession *and* the responsibilities of the engineering profession to society. De George's notion of 'ethics of engineering' thus incorporates both Ladd's micro and macro dimensions. In addition, the 'ethics of engineering' specifically includes professional engineering societies.

As shown in Table 1, when combining these various facets of engineering ethics, an interesting pattern emerges. Three frames of reference are apparent: individual, professional and social. Combining Ladd's and Vanderburg's terminology, 'microethics' can be seen to include concern with individuals and the internal relations of the engineering profession, while 'macroethics' applies to both the collective social responsibility of the engineering profession and to societal decisions about technology.

Heretofore, most research and teaching in engineering ethics has had a micro focus either in the sense Vanderburg uses the term or the sense in which Ladd uses it. This state of affairs is lamented by Winner [6, p. 62], who is critical of the over emphasis in engineering ethics on case studies of microethical dilemmas to the exclusion of larger issues relating to the development of technology:

> Ethical responsibility . . . involves more than leading a decent, honest, truthful life, as important as such lives certainly remain. And it involves something much more than making wise choices when such choices suddenly, unexpectedly present themselves. Our moral obligations must . . . include a willingness to engage others in the difficult work of defining what the crucial choices are that confront technological society and how intelligently to confront them.

Recently, scholars have begun to address macroethical issues in connection with engineering [7–9]. Yet to be developed, however, is a comprehensive framework for integrating microethical and macroethical approaches. One approach to developing such a framework is to focus on the role of professional societies in bridging microethical and macroethical concerns as suggested in De George's concept of the 'ethics of engineering' (see Table 1). While De George focuses on the role of professional societies in relation to 'professional ethics', professional societies would seem to have the potential to serve as a conduit across the entire continuum of ethical frameworks indicated in Table 1; that is, professional societies have an important role to play in linking individual and professional ethics and in linking professional and social ethics. Product liability, a key concern to engineering designers, professional societies, and policy makers alike, is thus an interesting case study of whether professional engineering societies are successful in bridging microethical and macroethical concerns.

PRODUCT LIABILITY AND PROFESSIONAL RESPONSIBILITY

A key concept in engineering ethics is the notion of 'professional responsibility' [10], which many ethicists characterize as a type of moral responsibility arising from special knowledge possessed by an individual. According to Whitbeck [11, p. 37], 'for someone to have a moral responsibility for some matter means that the person must exercise judgment and care to achieve or maintain a desirable state of affairs'. As Martin and Schinzinger [12, p. 42] note, for responsible engineers the sought-after state of affairs is 'the creation of useful and safe technological products while

respecting the autonomy of clients and the public, especially in matters of risk-taking'.

The notion of professional responsibility is represented in a code of ethics, the hallmark of a professional engineering society's stance on ethics. While codes vary from one professional society to another, they typically share common features in prescribing the responsibilities of engineers to the public, their employers and clients, and their fellow engineers. All modern codes state that the most significant responsibility of engineers is to protect the public health, safety and welfare. Codes often also emphasize such characteristics as competence, trustworthiness, honesty and fairness [13].

Many ethicists such as Ladd [2] are skeptical of the relevance and usefulness of codes which they argue are primarily designed to create a positive public image of the profession, largely self-serving, used to divert attention from macroethical problems, of little meaning when it comes to ethical reasoning, and a form of ethical conventionalism. Others, most notably Davis, consider codes, in effect, to be ethical 'standards' of the engineering profession. Davis [14] gives several reasons why engineers should support their profession's code including: promoting a work environment that is supportive of ethical behavior and helping to make 'their profession a practice about which they need feel no morally justified embarrassment, shame, or guilt'.

While product liability is generally considered in a legal context, it is inextricably tied to the notion of product safety. In their explicit recognition of the 'paramount' importance of public health, safety and welfare, engineering codes of ethics thus provide a clear indication, consistent with the concept of professional responsibility, that product liability is an ethical as well as legal and policy issue.

PRODUCT LIABILITY AND PUBLIC POLICY

Professional engineering societies often become involved in the debates over public policy issues [1, 7] regarding the development and use of technology. Product liability is one such issue that has recently been the subject of controversy in the USA. Critics of current product liability law, including many engineering societies, call for rollbacks often approaching the 'buyer-beware' policies of bygone days. For example, in 1996 the US Congress passed legislation that would severely limit the effect of product liability litigation by placing a cap on punitive damages and enacting stricter requirements for holding manufacturers liable. President Clinton, as expected, vetoed the bill [15]; however, the debate over product liability reform has continued.

The proponents of product liability reform argue that the current system unjustly rewards plaintiffs and stifles technological innovation, resulting in a lack of competitiveness on the part of US manufacturers and decreased product safety. Supporters of the current system counter that it generally works as intended in discouraging the manufacture of defective products and compensating people injured by such defects [16]. To some the debate over product liability reform is a classic business/consumer conflict. A *New York Times* editorial [17], for example, described proposed legislation as 'The Anti-Consumer Act of 1996'. Despite the arguments of both sides, the evidence appears to be mixed concerning whether product liability rewards result in improvements in product safety [16].

PRODUCT LIABILITY AND MICROETHICS

Evaluation of the product liability system and calls for its reform are clearly areas of great concern from the standpoint of engineering design. Given the primary responsibility of engineers for the public safety, health and welfare noted above, the product liability issue should also be subject to scrutiny from the perspective of engineering ethics [1, 7]. For example, the role of product liability litigation in creating an environment wherein engineers with safety concerns are given a hearing by their managers is worthy of consideration. As Ladd [18] and others have argued, corporations are not moral agents, their sole goal being to generate profits. In order to influence a corporation's behavior, it must be in their economic interest to do the right thing. On the face of it, product liability litigation would seem one mechanism for realizing such influence. It is therefore not unreasonable to expect that the connection between the threat of product liability suits and the ability of designers, quality control engineers, and others charged with product safety to raise and press safety concerns be carefully considered by engineers and by the professional engineering societies when promulgating position statements on product liability reform.

A second ethical issue of relevance to evaluation of product liability reform is the notion of standard of care [19]. Though usually considered in a legal context, the standard of care in engineering design is also important in consideration of the ethical responsibilities of engineers. Many discussions of product liability seem to turn on the concept of standard of care. From classic engineering ethics cases like the Turkish Airlines DC-10 disaster, where some blamed the luggage handlers for failing to secure the poorly designed cargo door, to the recent notorious case of an elderly woman scalded by coffee at a McDonald's drive up window, where public (and engineering) opinion generally holds the victim responsible for the accident, there is the unspoken assumption that the *user* of a product or service should be held to an identical standard of care with the designers and producers of the product or service. On the

face of it, this assumption seems to undermine the notion discussed earlier that professionals have ethical responsibilities that go beyond those of non-professionals. An example of the exercise of such professional responsibility would be an engineering designer who attempts to foresee preventable harm to users by anticipating common forms of product misuse, a doctrine sometimes applied in legal rulings concerning standard of care [19].

The point here is not necessarily that all advocates of product liability reform are on shaky ethical ground, but rather to suggest that there are important ethical issues that should be explored in any serious consideration of product liability and potential reforms.

PRODUCT LIABILITY AND MACROETHICS

Engineers and engineering societies have tended to side with the proponents of product liability reform [1, 7]. A vice-president of engineering of a major US automobile company, for example, has argued that product liability restricts engineering practice by inhibiting innovation, discouraging critical evaluation of safety features, and preventing implementation of new or improved designs [20]. The position statement on product liability of IEEE-USA, a unit of the Institute of Electrical and Electronics Engineers (IEEE) concerned with professional issues in the USA (21), issued in 1998, calls for stringent limits on product liability including holding the manufacturer blameless when existing standards are met, adequate warnings are provided, or the product is misused or altered by the user. Other engineering societies, such as the American Society of Mechanical Engineers [22], have also actively supported product liability reform.

The available evidence seems to suggest that the policy positions on product liability adopted by the professional societies have not been subject to critical ethical reflection. Within IEEE, for example, the ethics-related committees have no formal interaction and little, if any, informal interaction with committees charged with drafting position statements on public policy issues. In fact, IEEE-USA represents only the roughly three fourths of IEEE members who live in the US and its position statements are often a source of controversy within the parent organization.

Beyond organizational barriers, there is little, if any, evidence to suggest that engineering societies promoting changes in the product liability system have considered the effect that decreasing the impact of product liability would have from the point of view of engineering ethics. It is not altogether surprising that the professional societies have not subjected calls for product liability reform to ethical scrutiny for, on the whole, the engineering community has paid little attention to the ethical implications of product liability. For example, a major 1994 study of product liability and innovation by the National Academy of Engineering [16], which considered such issues as corporate practice, insurance, regulation, and the role of scientific and technical information in the courtroom, touched only briefly on ethics (in a chapter on the need to address public risk perceptions) [23]. Even the ethics literature is equivocal on the issue of product liability [24]. In De George's well known essay on engineering responsibility in the Pinto case [25], for example, he advocates stronger regulation and fines and imprisonment for corporate officials to achieve desired levels of safety, giving only passing notice to the role of product liability litigation.

IMPLICATIONS FOR SOCIAL DIMENSIONS OF ENGINEERING DESIGN

Possible explanations for the apparent uncritical acceptance of product liability reform by professional engineering societies include:

- minimizing liability on the part of the engineering practitioner;
- bowing to business interests;
- an engineering culture that heavily values economic efficiency over social and ethical implications;
- reluctance to admit engineering projects sometimes do harm.

These explanations mirror the potential reasons for the reluctance on the part of professional engineering societies to provide support for engineers who become entangled in ethics-related disputes with their employers [1].

The apparent disconnect between the posture of the professional engineering societies on product liability and their concern for protection of public health, safety, and welfare as stated in their codes of ethics undercuts the ability of the professional engineering societies to constructively contribute to a discussion of the social and ethical dimensions of engineering design. Indeed, in revealing underlying ideological biases, the case of product liability suggests that even the educational and standards-setting activities of these organizations may be found inadequate when evaluated in light of their ethical responsibilities.

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