In the first of a series of three articles, John Uff looks at the issues involved when individual engineers seek to warn the public about potential and often preventable disasters. Since these warnings often constitute unauthorised disclosure by the engineer or engineers involved the result is often the termination of employment. However, current practice is under review and is moving towards the protection of ‘whistleblowers’. Other means of securing disclosure, such as confidential reporting systems and amicus curiae action by Institutions are examined.

The subject of ‘engineering ethics’ is no longer novel: there is a growing literature, in the United Kingdom,\(^1\) the Commonwealth\(^2\) and elsewhere in the world,\(^3\) particularly in the USA.\(^4\) The subject still lacks any generally accepted definition and its scope remains uncertain. However, a convenient summary of the subject’s practical objectives in the United Kingdom is to be found in the codes of conduct promulgated by the UK engineering institutions, some of which refer expressly to ethical principles.

While material differences exist between individual Institutional codes, all appear directed primarily at the public interest. The particular interest which many of the codes highlight is that of safety, coupled with the avoidance of damage to the environment. An analysis of legal obligations owed by individual engineers shows that the codes assume or require duties beyond those which are likely to be directly enforceable against the engineer, whether by the immediate client or others. This situation gives rise to a number of fundamental questions including: how is a duty involving the public interest to be enforced; and what steps are open to individual engineers when seeking to comply with codes of conduct? This article addresses the second of these questions.\(^5\)

There appears to be little in common between developments in engineering ethics in different countries. While no systematic study has been attempted, it is evident that developments in the USA over more then two decades have been led by court actions involving intervention or amicus curiae briefs. These developments are reviewed later in this...
This ... raises fundamental issues as to the actions that ought to be taken by those in a position to understand fully the implications of foreseen technical hazards ...

Warnings of preventable disasters

A great deal of the literature published on engineering ethics in the USA is concerned with the actions of individual engineers in the face of actual disasters which can be seen to have been preventable. Perhaps the most appalling and thoroughly researched incident was the loss of the space-shuttle Challenger in 1986. This followed clear warnings by engineers from the Morton-Thiokol company, manufacturers of the solid-fuel booster rockets, as to the danger of launching the vehicle at low temperature. The engineers’ warnings were overruled by a management decision. This case raises fundamental issues as to the actions that ought to be taken by those in a position to understand fully the implications of foreseen technical hazards. Likewise, numerous cases concerning the nuclear industry, airlines, the motor industry and most other branches of engineering, have provided a rich source of practical materials, forming the basis of the study and indeed the teaching of engineering ethics in the USA.

The UK has suffered its share of engineering disasters. Few have given rise to issues comparable to the space-shuttle Challenger. Many, however, have revealed deep-seated management problems, particularly a succession of serious railway accidents which have been fully investigated and reported. All such accidents can be seen to have been preventable in hindsight, often by the timely intervention of professional engineers. In 1991, The Royal Academy of Engineering (then the Fellowship) published proceedings of a conference on ‘Preventing Disasters’; this included ‘draft’ guidelines for warnings of preventable disasters. The guidelines were offered to the professional Institutions for consideration. The guidelines note that engineers:

‘are placed under a professional duty to uphold the safety of the public and the environment by the code of conduct of their Institutions and organisations. A reciprocal responsibility is placed on the Institutions and organisations to assist any member who turns to them for help in furthering this duty...’. The guidelines state that many organisations have established procedures and that engineers should work within those procedures where they exist. The guidelines emphasise the need for the engineer to stay within his or her existing framework of responsibility by passing on warnings to others in a position to take action and to those ultimately responsible for resolving the situation. Individual engineers are encouraged to consult others or obtain guidance from the relevant chartered engineering institution. The guidelines state that informal warnings should be followed by a formal written statement and that this process may involve senior executives or ministers. Guidelines and notes are, however, infused with concern about legal liability as well as confidentiality. The document represents an important if somewhat circumscribed recognition of the action that individual engineers should take in practice, given the practical constraint of working in an employed role.

The papers published in the volume of proceedings bear out the complexity of any real life situation in which an engineer is faced with the burden of passing on a warning of perceived danger. The papers indeed demonstrate the way in which even well-expressed principles and guidance can be of little assistance when faced with the need for practical action. The most valuable contribution to the collection is a paper by the late Dr Edmund Hambly FREng, describing two situations in which, as an independent consultant, he had been driven to act. He describes the difficulties that lay in the path of attaining appropriate action, inevitably involving serious economic consequences. Dr Hambly’s examples concerned major structures where, largely through the effect of carefully
considered action, appropriate remedial steps were taken in time to avert disaster. The papers contain other examples of warnings delivered, but acted on too late, including the case of High Alumina Cement (HAC) on which Professor A.M. Neville CBE FREng had given clear published warnings in the 1960s. Despite this, a series of collapses in the 1970s still took the industry and the public by surprise. The issue of warning of preventable disasters has also been considered by the Standing Committee on Structural Safety (SCOSS). The 13th Report of SCOSS issued in May 2001 includes a section on duties to warn and to heed warnings, which are to be regarded as essential elements in ensuring structural safety. The Royal Academy of Engineering Draft Guidelines for warnings of preventable disasters are endorsed by the SCOSS report, which discusses three types of situation in which professional engineers can find themselves under a duty to warn or to heed warnings. These are:

1. when the engineer is part of a group of professionals, where warnings should be given to the group;
2. when the engineer has direct responsibility for the relevant work, either by checking or certifying the design or construction or monitoring the structure;
3. in more complex situations such as where a warning has been given to an appropriate person but is being ignored; where the control of the unsafe structure is out of the engineer’s direct responsibility; where the engineer is a member of the public; or where an unsafe situation has passed but could recur or arise elsewhere.

It is emphasised that in all these situations the engineer must deal with each of the questions:

- whether to warn
- when to warn
- who to warn
- how to warn.

The report points out that there is a corresponding duty on persons to heed warnings both in the immediate and in the long term, and also to consider the significance of warning in relation to other projects. The question of warning of preventable disasters gives rise to many further issues, some of which are now considered.

Consequences of unauthorised disclosure

If an engineer takes it upon him- or herself to deliver a warning to the public in relation to issues of safety or environment, they expose themselves to personal risks beyond the threat of legal proceedings. The actions by engineers in such circumstances have given rise to major activity in the field of engineering ethics in the USA. There are many reported cases of engineers acting in a responsible manner, assuming the existence of a duty to warn members of the public, and of suffering personal hardship in consequence, frequently through being victimised as ‘whistleblowers’. While extensive state and federal legislation exists in the USA, publications on ethical issues report numerous cases of hardship following loss of employment and other forms of victimisation. It is abundantly clear from the American experience that engineers acting in pursuit of a supposed public duty are not necessarily perceived as heroes and there seem few instances of appropriate recognition being accorded to them.

In England relief is now available in such circumstances through the Public Interest Disclosure Act 1998. The Act prohibits dismissal in relation to certain disclosures defined as ‘qualifying disclosures’. These include information which, in the reasonable belief of the employee, tends to show one or more of the following:

1. that a criminal offence is being committed
2. that a person is failing to comply with a legal obligation
3. that a miscarriage of justice is occurring
4. that the health or safety of an individual is being endangered
5. that the environment is being damaged
6. that information is being concealed.

A qualifying disclosure is a ‘protected disclosure’ when made in accordance with the procedure under the Act. In most cases the employee is obliged to go first to his employer but in some circumstances may go over his head. These include where the worker reasonably believes he will suffer a detriment if he goes to the employer or that evidence will be concealed. Going direct to the public might also be justified where the matter is of an exceptionally serious nature. Where a disclosure is protected the employer is prohibited from subjecting the employee to detriment, dismissing him or making him redundant on the grounds of the disclosure. The Act follows experience in the USA which, as noted above, has not been wholly successful in preventing victimisation of ‘whistleblowers’. The effect of the English Act remains to be established.

Other means of securing disclosure

The importance of disclosure, and the adverse consequences which may flow, dictate that all other avenues should be explored to find more satisfactory means of passing on significant information. The most useful procedures presently available take the form of limited confidential reporting systems. Such reporting does not guarantee either publicity or action, but does have the advantage of informality and avoids accusations of disloyalty.

The 13th Report of SCOSS noted the existence of proposals for a confidential reporting system for the construction industry and that such systems had been developed in other sectors, particularly in air transport and in shipping. A confidential reporting
A confidential reporting system has been set up for the rail industry, initiated by the University of Strathclyde and subsequently adopted across the whole network as a result of government initiatives and public enquiries.

They themselves consider action in support of engineers who do publish warnings. As a result of pioneering activities within the ethics movement in the USA, it seems that such action is available in the form of amicus curiae or intervention proceedings in an existing court action relating to the issue. The existing action has usually comprised action by the engineer following dismissal, but it might also involve proceedings against the engineer, as already discussed, to restrain disclosure. The purpose of amicus or intervention proceedings is to afford to the Institution, or other appropriate body, the opportunity of placing material before a Court, which supports the actions of the engineer and upholds the public interest.

Amicus curiae means literally a ‘friend of the Court’. Historically, this title referred to those individuals and entities who were independent of the parties and who provided advice and information to the Court in particular cases. In England, the Courts have retained this more traditional notion of amicus curiae and in most cases restrict amicus submissions to those requested by the Court, although the request may be at the instigation of one of the parties. A Guidance Memorandum has recently been issued by the Attorney General and the Lord Chief Justice on requests for the appointment of what is now (since the abolition of Court Latin) renamed an ‘Advocate of the Court’. Since the original term remains more generally understood, it will be retained here. Frequently, the Court requests an amicus curiae to advise on an issue of law but, of particular relevance to this article, it may also request information on issues of fact and expertise.

English Courts also have the discretion to permit additional parties to ‘intervene’ in litigation where they demonstrate a sufficient interest in the proceedings but these parties are not considered amicus curiae. It may be noted that the term ‘intervener’ and ‘amicus curiae’, are beginning to fuse in other jurisdictions with the growth of outside intervention in litigation.

One of the earliest examples of intervention or amicus curiae in the field of engineering occurred in the celebrated case of Holger Hjortsvang v San Francisco Bay Area Rapid Transit District, brought in the State Court of California. The US Institute of Electrical and Electronics Engineers (IEEE) was granted leave to file an amicus brief on behalf of three engineers who were sacked for ‘whistle blowing’. The plaintiff, with two colleagues, had expressed...
concerns about the safety of the Rapid Transit System to the Board. Their concerns were dismissed, but not long afterwards, a BART train malfunctioned because of the problem pointed out by the engineers, and overran a station, injuring passengers. The engineers brought proceedings against their former employer in which the IEEE intervened.

The petition to the Court stated that:

‘California Courts recognise this principle and discretion should be liberally applied to favour Amicus Curiae intervention. The Court has broad discretion to permit the filing of an Amicus Curiae brief...because IEEE has a particular expertise with respect to engineers’ obligation to provide public safety’.

The case settled and shortly afterwards the IEEE set up a formal amicus curiae review mechanism whereby engineers could request the IEEE to file an amicus brief in a particular case when an ethical question was raised.20 This procedure is now provided for in the Institute’s Policy and Procedures Manual, which provides that the amicus statements submitted to the Court will be those judged ‘to be objective, verifiable and properly coming within the purview of the IEEE’.21 After over twenty years in operation, twenty-three amicus requests have been made to the IEEE under this mechanism, but for varying reasons (including settlement) none of these requests have led to the filing of amicus briefs in ethical support cases. Even so, there is much to learn from IEEE’s experience.

After more than two decades following the BART case, experience in the USA has seen a blurring of the line between intervener and amicus, coupled with an exponential increase in the use of such briefs. This was the impetus behind several Federal and State Courts prescribing the manner in which such briefs were to be submitted. At the Federal level in the United States, the amicus practice is now regulated by procedural rules which require that private entities and individuals seeking to participate in a case as amicus curiae must either gain the consent of all parties or, if such consent is refused, file a request with the Court which describes the applicant’s interest in the case and whether any portion of the brief was authored or funded by a party.22 This separation of the lobbyist brief from the true amicus brief is now essential when it is considered that amicus filings before the United States Supreme Court have increased eight-fold in the last fifty years and that amicus briefs were filed in over 85% of all Supreme Court cases in the period 1985 to 1996.23

There is, as yet, no similar development within the UK, which is still at an early stage in considering the usefulness of amicus briefs in aid of the maintenance of ethical standards. The experience from the USA indicates that caution will be required when seeking to establish appropriate procedures and that there will be a need to distance true ethical considerations from the interests of pressure groups.

**Conclusions**

This article has examined a limited number of current issues concerning the taking of direct action in response to perceived ethical duties in engineering. It is evident that engineering ethics, as currently developed in the United Kingdom, offers no complete solution and such remedies as can be identified raise other problems in their wake. Underlying all these difficulties is not merely a lack of established principles, but a fundamental dichotomy between the legal duties and responsibilities taken on by engineers, primarily to their clients, including duties of confidentiality, and the wider role in which the actions of engineers affect the public at large.

Finding solutions to the many problems that can arise dictates action at several levels. While this article has addressed primarily the position of individual engineers, the role of their Institutions, which must take primary responsibility for promulgating codes of conduct, is of great importance and equally in need of definition. The importance of the subject is nowhere more clearly demonstrated than in the actions of individual engineers who seek to uphold the public interest by taking individual actions in disregard of their personal interest. The profession owes them a duty to learn appropriately from their actions.

This is the first of a series of three articles that will appear in *Ingenia*.

The second article will examine some specific ethical questions that engineers may encounter, and discuss the rules and principles through which appropriate action may be determined, having due regard to legal duties.

The third article will consider the position of the Institutions who promulgate, and are assumed to review and enforce, codes of professional conduct intended to regulate the actions of their members.

**References**


2 Engineering ethics in Canada is subject to separate provincial statutes. The professional body for Ontario publishes reports of disciplinary hearings. There are also a number of Federal bodies. The Institution of Engineers in Australia operates on a national basis and has an established code of ethics, together with detailed enforcement procedures.
3 An international conference on ‘Research in Ethics and Engineering’ was held in Delft in April 2002 with papers presented from universities in Sweden, Holland, Germany, Israel, UK and USA.

4 For a general review and list of further authorities see Ronald R Klein, ‘Ethical issues in Engineering: Beyond Disaster Ethics’ (2000) at http://www3.itu.edu.tr/~sosbil/Sciencesemnas2.html. Several US websites contain extensive bibliographies as well, including those of the National Society of Professional Engineers (NSPE) at http://www.nspe.org/ethics/eh5-rel.asp and the Online Ethics Center for Engineering and Science at http://onlineethics.org/.

5 Both questions are addressed in the paper ‘Engineering Ethics: Do Engineers owe duties to the public?’, delivered as the Lloyd’s Register lecture to The Royal Academy of Engineering, 22 April 2002. This article is based on part of the lecture.

6 These include the public enquiries into the railway accidents at Clapham Junction (1988), Southall (1997) and Ladbroke Grove (1999).

7 The institutional rules quoted above are those current at the date of this article. In most cases no significant amendments have been made since the Academy draft.

8 The document itself ends with a complete disclaimer on behalf of the Fellowship.

9 FREng, subsequently President of ICE.

10 The Standing Committee was established jointly between the Institutions of Civil and Structural Engineers (and Municipal Engineers before their merger) following the partial collapse at Ronan Point, Newham, in 1968.

11 Whistleblower protection on the federal level in the US is scattered throughout various statutes, including the environmental laws (such as Superfund, 42 U.S.C. 9610, the Water Pollution Control Act, 33 U.S.C. 1367, and the Atomic Energy and Energy Reorganization Acts, 42 U.S.C. 5851), the employment laws (such as the Occupational Safety and Health Act, 29 U.S.C. 660(c), the Federal Mine Health and Safety Act, 30 U.S.C. 30 U.S.C. 815(c) (1977) and the National Labor Relations Act, 29 U.S.C. 158(a)(4)), and in a number of other subject areas.


16 Published in Counsel, February 2002 with an explanatory article by the Attorney General.

17 Under English Law, there is no settled rule as to whether amicus curiae can place evidence before the Court. See Gaskill v Gaskill [1921] p425 and Keys v Keys [1921] p204 but see also Re: H per Booth. However, the Court’s very request for factual information indicates that the amicus filing will be considered as evidence by the Court.

18 In the recent and widely publicised Pinochet case, the Divisional Court and the House of Lords permitted Amnesty International to intervene as an interested party – an intervener, as well as appointing amicus curiae to assist the Court R v Bow Street Magistrates ex. parte Pinochet Ugarte [1998] 4 AER 897.


22 SUP.CT.R.37 and FED. R.APP. p29. Many of the State Courts in the United States also have rules permitting the submission of amicus requests. However, the rules vary and in some cases are much more restrictive than Federal Court practice. For a sampling of State Court practice, see Nancy Bage Sorenson, ‘The Ethical Implications of Amicus Briefs’ (1999) 30 St. Mary’s LJ 1219.


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