

Engaged Engineering

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Professional engineering associations encourage their members to apply high ethical standards in developing technologies that involve public safety and environmental concerns. The IEEE's code of ethics, in fact, requires its members to consider these factors. But is this enough?

Engineers have customarily depended on public consensus and governmental guidance to determine the accepted levels of socio-environmental risk involved in their work. This approach has only encouraged engineers to see themselves as specialists, skilled in developing new technologies, while leaving social and environmental concerns to others. Codified ethics have thus set a limit to engineers' responsibility for the consequences of their work.

But circumstances have changed in recent years. Acceptable risk is now influenced by the public's increased awareness of the unintended effects that technological and economic progress may have on public health and the ecosystem. The public, as a result, expects technical professionals to take greater responsibility for assessing the risks entailed in the technologies they develop and in establishing the necessary safeguards against them.

The public further expects engineers to communicate the risks as well as the benefits of projects as they progress, a requirement engineers often find outside their comfort zone. Many of these engineers are highly trained specialists who prefer to focus on narrow problems. This is especially true in the area of

computing and telecommunications, where engineering often seems removed from the larger issue of applying technology to society's needs. While the phenomenal growth of the semiconductor industry has produced faster systems of computing and telecommunications, it has also raised unanswered questions about the environmental impact of increased production and subsequent disposal of used components. In fact, little is known about the adverse effects of electronic waste. The prevailing attitude among engineers appears to be, "We'll build it and let someone else sort out the consequences."

Engineers are not alone in overlooking the social and environmental aspects of their work. The general public is also complicit. Public perception and awareness are important in shaping policy in such areas as energy development, manufacturing, and resources management. Yet, a 2002 study by the U.S. National Academy of Engineering found that many people, lack a basic understanding of technology and are unable to appreciate the interplay between technological development and the social, political, economic, and scientific issues they entail.

When consumers dispose of used electronics, harm to the environment is the furthest thing from their minds. A study commissioned by Hewlett Packard found that 95% of American consumers are unfamiliar with the term "e-waste," and that 58% do not know if there is a recycling program for used technology products where they live.

What, then, is the ethical responsibility of engineers who design,

manufacture, and distribute potentially hazardous electronics? How can the IEEE serve as an effective vehicle for encouraging individual members to discharge their ethical responsibilities in these areas? Finally, how can the IEEE provide its members with opportunities to engage in public outreach or support the efforts of others in creating bridges between the profession and the public?

I. THE IEEE APPROACH

The IEEE currently addresses public policy through IEEE-USA, but at present there is no comparable way to reach the public on a global level. Yet, engaging in public discourse could keep current members in the IEEE and attract new ones to its ranks. This is especially important as it relates to young people who are interested in understanding the link between their work and its value to society.

The relationships of individual members to the profession and to their professional association are explored in the IEEE-produced video "Doing the Right Thing." Available on IEEE.TV (www.ieee.org/ieeetv), this program explores the challenges of defining the scope of engineering ethics and social responsibility. Professionals interviewed in this program state that engineers have an obligation to consider the social, environmental, and economic aspects of the technologies they develop. They also have an obligation to promote an understanding of technology and technology issues on the part of the general public. The IEEE has also produced two short videos for IEEE.TV targeting the e-waste issue and including a segment documenting the launch of the EPEAT standard.

II. TECHNOLOGY DISCOURSES

The IEEE Society on the Social Implications of Technology has funded an initiative called "Technology Discourses." This project prepares text and video materials to help members of the engineering community involve and educate the public, including educators and students, concerning technology and its role in shaping public policy.

This initiative builds on what the IEEE does regularly through the *IEEE Spectrum* and other magazines, as well as through meetings, workshops, and conferences. In 2005, the IEEE began organizing conferences directed toward policymakers and engineers expressly to deliver to global audiences what IEEE-USA's technology policy symposia currently deliver to U.S. audiences.

The Technology Discourses initiative taps IEEE-sponsored conferences that bring together experts who specifically focus on the social and environmental implications of technology. In 2006, conferences on electric ships, wind power, electronic recycling, and earth observation provided an opportunity to develop videos on sustainability. In 2007, additional programs will be produced under the auspices of the IEEE New Technology Directions Committee. Possible topics include discourses on handheld devices, biotechnology, infrastructure vulnerability (nuclear weapons, water resources, global warming, extreme events), and gambling technology. Once again, IEEE technical events will provide a venue for conducting interviews with leaders in these fields.

The success of the discourses will depend on how effectively they influence IEEE members and the public.

Initially, IEEE.TV will provide the major dissemination point, routing text and video content to IEEE Web sites, including the IEEE New Technology Portal, the IEEE Society on Social Implications of Technology, the IEEE Virtual Museum, IEEE Spectrum Online, the precollege Try Engineering site, and additional IEEE resources, including publications available through IEEE Xplore. An IEEE Online Community, called Technology Discourses, will provide an opportunity to engage in online discussion.

Another important step will be the integration of Technology Discourses with current IEEE Section and Student Branch educational programs, perhaps expanding the scope of topics covered by IEEE Distinguished Lecturers. IEEE Sections and Student Branches will then be encouraged to use Technical Discourses material at the precollege and university levels.

Engineering is best served when its practitioners apply their knowledge and expertise toward informing the public regarding the complexities of their profession and its impact on society, locally, nationally, and globally. Being informed, however, requires substantial scientific and technological literacy within the public sector. Today's engineers are thus ethically obligated to bring the public into their confidence as they help society adjust to the dramatic new technologies shaping their world. To do that, they must first look beyond the silos of their disciplines for a better appreciation of the social implications of technology. Engineers can express their professionalism through engagement with public issues, and the IEEE is uniquely positioned to foster that engagement on a global scale. ■