A History of the Society on Social Implications of Technology 1981-2009: Some Themes and Activities

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Abstract—The group was founded in 1971 as the Committee on Social Implications of Technology, largely in response to its founders' concerns about nuclear weapons and disarmament. It became an IEEE society in 1982 as the Society on Social Implications of Technology (SSIT). Since 1982, SSIT has addressed technology policy, risk, sustainability, the education of engineers, women and minorities in engineering and technology, peace and weapons, privacy, and ethics, among other topics. We publish refereed articles in our award-winning journal "Technology and Society Magazine". Our annual conference provides a forum for IEEE members to discuss topical subjects with social scientists, ethicists, and historians. Members join the society because they value the scope of its interests and the importance of discussing them. This paper looks at some of our conference themes and the issues we have discussed in the magazine over the years to demonstrate how we have enabled engineers to see beyond the technical challenges.

Keywords-sustainability; education; ethics; peace; privacy; weapons; women and technology

I. INTRODUCTION

The Society on Social Implications of Technology (SSIT) has always been a small society. We bring our expertise to IEEE members and the engineering profession in the same ways as all the other IEEE societies. We publish refereed articles, hold an annual conference, promote chapters and their activities within the IEEE sections, and have distinguished lecturers willing to talk to IEEE groups. Our members participate on IEEE and IEEE-USA committees and in national and international organizations.

Karl Stephan prepared a history on the occasion of our 25th anniversary [1]. That issue of Technology and Society Magazine (T&S) also includes a history of the magazine [2]. This paper provides a brief summary of some of the beginnings of the SSIT, and then looks at some of the topics of our field of interest to observe how these have been covered in our journal and conferences over the years.

II. HISTORY

In the aftermath of World War II, many scientists and engineers were alarmed at the destructiveness of nuclear weapons and the danger they posed to the world. Victor Paschkis founded the Society for Social Responsibility in Science in 1948. Its purpose was to resist the co-opting of science for military purposes and to focus on the need for individual scientists to consider the moral dimensions of their work. Albert Einstein joined with Bertrand Russell to issue the Russell-Einstein Declaration on 9 July 1955. The Declaration called for world leaders to seek peaceful resolutions to international conflict, and it became the founding charter for the Pugwash Conferences. These conferences are still held annually.

These were some of the scientists and engineers who influenced our founders to form the IEEE Committee for the Social Implications of Technology in 1971. Key members of this founding group were Stephen Unger, Mal Benjamin, and Ted Werntz, who had been a key figure in the Committee on Social Responsibility in Engineering. This group of engineers worked to make the committee part of the IEEE structure. After long discussions within the IEEE the group was set up as a committee of the Technical Activities Board (TAB) rather than a technical group. Similar discussions in 1980 preceded CSIT's change to an IEEE society (SSIT).

III. MAJOR THEMES AND ISSUES

Since almost every technology has social implications, SSIT has an extensive field of interest and we have published on a very wide scope of subject matter. Some subjects occurred regularly over the years, while others have been less frequent. The following topics have been subjects of concern, special issues of T&S or conference themes over the years.

A. Sustainability

The first formal conference held by SSIT was in Toronto in June 1991. The theme "Preparing for a Sustainable Society" has been a continuing interest. The conference issued a call for action that listed the national and international efforts needed in order to create a sustainable way of life. Two of our members prepared papers for this conference and again for our most recent conference, in May 2009, which had the theme "Social Implications of Sustainability", suggesting that progress has been slow.

While some progress has been made, at least in the intellectual acceptance of the need for change, little has been done. Our economic system is still based on growth. Until an economic model can be formulated that has sustainability

as its basis we shall continue on a path to resource depletion and environmental destruction.

The 2009 ISTAS conference was co-located with the IEEE International Symposium on Sustainable Systems and Technology (ISSST) organized by the IEEE Computer Society Technical Committee on Electronics and the Environment in Tempe, AZ, with separate tracks for each group and joint sessions and a joint keynote speaker. All sessions were open to all attendees and it was both intellectually and personally rewarding to hear and meet ISSST members. Sessions covered topics as diverse as "Thermodynamics and Sustainability", "Ethical Considerations in Technology Deployment", "Roles for Expert and Lay Knowledge in Sustainable Development", and a panel on autonomous robots. We plan to continue this collaboration, starting with activities within the IEEE Sustainability Project.

We have published regularly on sustainability as a concept, and on specific topics such as renewable energy, energy efficiency, and sustainable design. We have published special issues on "Creating a Sustainable Future" in 1996 [3] and "Sustainable Pervasive Computing" in 2005 [4]. Articles in this second special issue focus on the need for public involvement in the implementation of pervasive computing technologies because of the possible risks, loss of privacy, and impact on recycling and waste management processes.

B. Education

SSIT has long been interested in the education of future engineers, with special issues on T&S dedicated to the subject in 2005 [5] and 2006 [6]. These recent issues focus on education in a global context. The 2006 issue has articles on engineering education in transitioning societies, mainly those of the Middle East. T&S has also published articles on engineering education in the United Kingdom and South Africa.

A special issue in 1998 [7] looked at computers in the classroom in K-12 education. The role of computers in education was a subject for serious discussion then and it still is. As computer capabilities increase, making possible access to more information and new ways of manipulating it, the challenges to schools and teachers remain. How do schools ensure adequate access for all? What to students need to know and what skills do they need in a 21st century society and how do we make this learning possible? How do teachers keep up with increasing content, changing technology, and higher expectations of students? These same questions may also be posed for university education.

Some studies looked into more specific concerns. Given our early interest in sustainability, it is understandable that Vanderburg [8] could investigate how well engineers were being educated in sustainability issues.

Ethics in the engineering curriculum has been addressed over the years and we have been concerned with keeping humanistic studies as part of engineering education. This concern continues as the pressure on the engineering curriculum for more technical content has increased.

C. Women and Minorities in Engineering and Technology

SSIT has been concerned with the role of women and minority groups, both as practitioners and as users of technology. In the earliest days this concern was expressed in editorials and columns. Later, research articles considered the history of women in technological fields, why women do not study engineering, and how to overcome low enrollments of women and minorities in engineering. Henwood considered the issue of gender in technological education in 1999 [9].

This subject was the focus of our conference in 1999 and a special issue of T&S in 2003 [10]. The conference, with the theme "Women and Technology: Historical, Societal, and Professional Perspectives", was co-sponsored by the IEEE Women in Engineering group. It attracted many researchers from outside the IEEE's traditional fields of study and generated many informative discussions. The historical papers looked at technologies aimed at women and women's roles in specific industries. The societal papers covered topics such as the portrayal of women in video games, ergonomic design of work spaces, and computer misuse. The professional papers, the largest group, covered women's contemporary experience in industry and academia, including education and career advancement. Papers also covered women's experiences in engineering in other countries and the effects of globalization.

The special issue of T&S recorded some of the programs and initiatives aimed at increasing women's and minority enrollment in Information Technology (IT) programs. In spite of these programs, enrollment remained low. Reasons cited include poor facilities and preparation in high schools, particularly those with high minority enrollments (Margolis et al, [10]), leading to lack of preparedness for computer science course work (Katz et al, [10]). This leads to early dissatisfaction with the field, failure and withdrawal. Much is now understood about the need for a more cooperative, problem-focused, multi-disciplinary approach to attract and retain women.

The failure of so many studies, so many outreach efforts, and so many initiatives to raise significantly the numbers of women and minorities in the technology professions continues to be a concern. We continue to publish research on the subject, as applied to the United States and other countries. As for many of the problems facing societies, the solution or solutions are generally known. The difficulty is in implementing them.

D. Military/Weapons/Peace

As appropriate for a group that was started by engineers concerned about war and the dangers of atomic and other weapons, we continue to publish on these subjects. The use of technology to promote peace featured prominently in the early days when the risks of nuclear war and its consequences were more obvious. Later issues have focused more on weapons themselves, be they the aging nuclear

weapons stockpile and its safety, issues of secrecy in weapons development, and the development and use of unmanned or autonomous weapons. The world faces new problems of nuclear proliferation and increased risk of the use of nuclear weapons. Once again engineers working in nuclear technology need to consider the impacts of their work.

E. Privacy

In 1989, T&S featured an article [11] about an electric use monitoring device that could also be used for surveillance. The monitoring aspect is now a hot topic as a part of the Smart Grid; presumably the surveillance aspects are still as relevant. We can all see the benefits to providing power companies with accurate data on power usage and individuals will benefit if they can adjust their usage to lower-rate periods. Are we concerned that individual appliance use can be monitored and one's location within one's own home determined? In 1989, the prototype monitor could detect the turning on and off of a light switch.

Our interest in privacy has continued, so that recent articles assess the whole concept of privacy [12], ensuring data privacy in communications, and discussions of privacy in the context of pressure to improve security. These articles also ask us to consider the consequences when technologies fail.

F. Ethics

One of our founders' concerns was the making of ethical decisions by engineers. Members wrote articles and sent letters to IEEE publications, and provided ethics cases for engineers to consider. This in time contributed to the formation of the IEEE Member Conduct committee, now the IEEE Ethics and Member Conduct Committee, which is responsible for reviewing member conduct complaints, recommending ethics support, and keeping IEEE members informed about ethics-related matters. Our members have served on this committee and currently participate in engineering ethics organizations and associations such as the National Institute for Engineering Ethics and the Association for Practical and Professional Ethics.

Engineering ethics is a recurring topic in our publication and conferences. The subject spans the continuum from the design and production process of products, to their eventual disposal at the end of their service life. It extends from the ethical behavior of individual engineers to discussions of ethics and just societies. It includes contemplating what ethical systems are appropriate for 21st Century engineers, and how we educate engineers to enable them to deal with these issues.

Engineering ethics education received a boost when the Engineering Criteria 2000 were adopted. Our annual conference in 2001 addressed this change with the theme "Ethical and Social Issues Criteria in Academic Accreditation". The new criteria changed the focus from what courses a student must take to an assessment of the outcomes of those courses. Students may or may not need to learn to be ethical; they do need to learn about professional norms and the types of ethical dilemmas they may face when they become practicing professionals.

There are many paths to this goal. Two special issues of T&S in 2001 [13, 14] provided many examples. Discussion has continued and expanded to include sustainable development, computer ethics, and social responsibility. As engineering increasingly involves collaboration with other disciplines, practitioners need also to be aware of the ethics of other disciplines.

IV. BARUS AWARDS

Until 2006, we had only one award, the Barus Award, given periodically for "Outstanding Service in the Public Interest", performed despite personal financial or career risk. Engineers, technologists, and others working in an engineering environment are eligible for the award.

Carl Barus, for whom the award is named, was an engineering professor at Swarthmore College, a founding member of CSIT and SSIT, and chair of our Awards Committee from 1985 until his death in 1991. He was also an Administrative Committee member and a contributor to T&S and our conferences.

The first two awards were made in 1978 and 1979, while we were still the CSIT. The 1978 recipients were the three Bay Area Rapid Transit (BART) system engineers who identified design problems in the passenger cars. They were unable to get the problems corrected acting within the system and eventually reported their concerns to one of the BART board of directors. Their concerns became public and they were fired. At a subsequent test of the rail car, it failed to stop as designed and hit the barriers, vindicating the engineers.

In 2001, the recipient was Salvador Castro, whose story followed the same course, but in the medical products field. He identified a design flaw in an incubator that could kill an infant inside it. He reported the flaw to his supervisor, who told him that the company would not correct the design. Mr. Castro told the company that he would report the flaw to the FDA; within weeks he was fired. The product eventually failed FDA tests and had to be recalled for the design to be corrected.

Our most recent recipient was Michael DeKort, who in 2003 identified several problems with equipment being installed on the Coast Guard's 123 Project ships. These included the use of non-weatherproof radios for use in open boats, insecure communication equipment, and cables not up to code. These deficiencies had the potential to put sailors, the public, and national security at risk. He informed his management and when they did not correct the situation, he went through the corporate ethics office. He contacted the Department of Homeland Security Inspector General, whose office met with him. In 2006, with no results in sight, Mr. DeKort made a video that he posted on YouTube. That was what made things happen. The Inspector General issued a report in 2007 that agreed with some of his allegations. However, by this time other problems had forced the end of

the 123 Project. Mr. DeKort was transferred off the project and eventually fired in 2006.

Fortunately, most engineers do not face these kinds of problems in their work, and most problems are eliminated in the design phase so they never become an issue. Unfortunately, there will always be situations where engineers are placed in a position where they must take action in order to protect the public. The professional engineering societies have codes of ethics that define an engineer's responsibilities to the public. We are pleased to be able to recognize some of those who risk their careers to do so.

V. Conclusion

Technology is not neutral. Societies decide how and in what ways technologies are implemented.

We should not be implementing technology because it is available, but because it meets human needs more effectively than other means. The solution to a problem may be less in technology than in politics and culture.

There is more to engineering than the technical and intellectual challenges. The profession must also be concerned about how engineering and technology affect the society at large. Technology plays an ever-increasing part of our daily lives, often in ways we are not aware of or are unable to control. Engineers need to extend their vision to include what the public might do with a product or what might be done to the public. The Social Implications of Technology Society addresses these issues for the IEEE and its members.

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