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## Opening Address

Discours d'ouverture

Eröffnungsansprache

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## Building Bridges Between Engineering and Society

**Challenges to Structural Engineering** has been chosen as the theme for this Congress. One of the most demanding challenges facing the profession is the relation of the man-made environment to the natural environment. As emphasized by the President of IABSE in the invitation to this congress, at the same time as withstanding the forces of nature, man-made structures are expected to remain in harmony with nature. In the same way the whole engineering profession is expected to remain in harmony with human society. In order to achieve this goal, it is necessary to maintain channels of communication and thus build firm bridges between us and society at large. The successes achieved by engineering sciences do not detract from the importance of these bridges. On the contrary, the recent advances in technology make them all the more crucial. Technology influences our employment opportunities, our working habits, our leisure-time activities, our while living and its circumstances and even our way of thinking. Because of the strength of such influence, our situation is unique, although technical innovations have been an essential part of man's cultural achievements since earliest times.

One hallmark of a society will always be the environment that it builds up for itself. The beauty of ancient cities, buildings, bridges, roads and other structures is a source of inspiration for us today, and we, the engineers in society, have the responsibility for carrying this inspiring tradition forward.

There is an interesting change taking place in the industrialized countries at the present time. Now that the necessary heavy infrastructure has been largely built, increasing resources must be devoted to the maintenance and renovation of such structure. This change of approach has to be recognized by the engineering profession, government authorities and the public alike.

The maintenance and renovation of houses, roads, sewage systems, railways, bridges, harbours etc also calls for new technologies. The renovation of buildings, for example, is a labour-intensive undertaking at the present time and involves occupational hazards. There are therefore many opportunities open for developing new equipment and working methods which are flexible and cost-effective, also for evaluation of the condition of the existing capital stock which is a vital prerequisite for any actual renovation.

The traditional building industry, too, has to brace itself for the impact of high technology. Information technology can be of help at the design stage and in construction site management, while robots will inevitably make their appearance in this sphere, too, first of all in the factories manufacturing building materials and elements.

Considerable R&D efforts have been made to hasten the development of new building technologies and some remotecontrolled robots, for example, have already been tested on building sites. Such advances emphasize the importance of purposeful research and development in this field. Generally speaking, the days are long past when significant innovations could be brought into being by individual inventors with only a superficial scientific knowledge. Today development work is science-based and the domain of dedicated professionals.

Experience in other industries tells us that when a new technology is introduced the need for channels of communication is accentuated. There are always some people who consider new technology to involve a risk, while for others it is an opportunity. The values of a society or subculture influence the way in which new technology is viewed, and much depends on the manner in which it is introduced.

One mistaken assumption concerning new technology is that it will always be resisted on the shop floor. A recent survey nevertheless showed that almost a half of the chief shop stewards and occupational safety officers in the Finnish metalworking industry felt that the introduction of new technology had not caused any conflicts at all. Only one percent of those interviewed said that there had been a lot of conflicts.

Another common and evidently erroneous view on information technology is that it impoverishes work, whereas 73 % of wage earners affected by such innovations are reported in a Finnish survey to feel that automation of their old tasks had "clearly improved the situation".



In addition to the structural change in the economy, caused by new technologies, society also has to adapt to the growing internationalization of markets. International competition is becoming keener and signs of intensifying international competition in the building industry, too, are clearly visible. More reliance is then being placed on research and development as means of securing a competitive advantage in international trade.

It is not enough, however, to persuade companies to commit themselves to R&D for their own sake. Society at large must continue to understand why research is necessary and what it can accomplish. This is yet another reason for building bridges between engineering science and society. Here the basic links lie in education and the dissemination of scientific knowledge.

One of the most urgent educational tasks is to prevent the formation of two separate cultures, one technically and scientifically literate and the other not. Engineering cannot realize its full potential unless society can appreciate its achievements, and certainly not if it is hostile towards them.

At the same time the engineering professions have to understand fully and take into account the new demands being made upon them by society, including environmental standards and aesthetic values. This means new challenges again, but not insurmountable ones for professional problemsolvers.

An individual engineer cannot master everything that society now requires of the profession as a whole. Therefore, the universities of technology should concentrate on producing specialists of technology with varying supplementary skills in economics, law, psychology, collective bargaining, environment etc. We would then have a pool of necessary minimum expertise in different non-technical fields within the engineering profession. But even as individuals, it is highly important that we should relate our expertise to a wider perspective. While remaining proud of our specialist skills, we must avoid the trap of developing one-track minds.

It should be relatively easy to create a popular image for the engineering sciences because of the way in which they impinge on everyday life. Everyone can see technical advances at work and in the home and realize how they make life easier, more fun and even longer. Even so, disseminating scientific and technical knowledge to the general public is not a straightforward matter. Reports of steady progress and advances made by dint of hard work do not usually reach the headlines or pass the news thresholds imposed by the media. We can be confident, however, that such difficulties in bridgebuilding can be overcome. In an open, technologically advanced society problems can be much more easily solved than in a culture that would try to avoid opportunities technology has to offer. Success will be the more probable the more carefully we engineering professionals avoid compromises in the everyday application of technology that do not do justice to our skills!