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RISK, SAFETY AND SOCIETY

by

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In advanced societies such as Canada, human safety is greater than ever before. It is estimated that we spend 10% of our Gross Domestic Product on safety. Yet the process by which decisions on safety are made is often faulty. We could have much more safety for the money spent, or we could save and invest money in more productive endeavour for the same safety level. The issue addressed here is improvement of the management of risk and safety.

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Examples abound of the inconsistencies among safety standards and of heavily skewed allocation decisions which arise from mismanagement. Whether it is the reaction to threats of PCBs, asbestos or urea-formaldehyde, or the outright condemnation of nuclear power generation, society continues to approach risk management like a witch-hunt.

Any assessment of the many hazards involved in a modern industrial society and the cost per life saved for the regulated hazard level shows how inconsistent our processes of risk management have become. A range from $3000 to $1 billion per life saved has been documented. This approaches the absurd when studies show that the indirect loss of lives resulting from installing some elaborate safety features far exceeds any benefits gained. The equivalent in medicine would be when a vaccine kills more people from inoculation than it saves.

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Pursuing the enhancement of safety and quality of life, a group of engineers and scientists centred on the Joint Committee on Health and Safety of the Royal Society of Canada and the Canadian Academy of Engineering and on the Institute for Risk Research at the University of Waterloo are developing methods of rational, systematic evaluation of risks and benefits. They propose an approach that they believe will result in better management of risk, an approach based on two indicators, life expectancy and quality of life. Measuring quality of life is admittedly a debatable activity but it is argued that a good measure is the level of the gross domestic product per person.

Current practices which are found wanting are, for example, the absolute "dos and don'ts" embedded in codes of practice and the use of arbitrary criteria based on "acceptable" or "tolerable" probabilities of failure. We should reject dictums like: "Make it as safe as technically feasible". Not only does this beg the question "How safe is safe enough?", but it is open ended, meaning that decisions will be arbitrary and will probably be made by those who are ill equipped to make them.

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Decisions, it is argued, should be arrived at by weighing risks along with benefits among all feasible options to compute the greatest net benefit to society. Both risks and benefits can be expressed respectively as losses or gains in life expectancy and quality of life. Uncertainty will still exist and human judgement will still be necessary. Nevertheless if we accept meaningful measures to express these gains and losses, we should arrive at a system which optimises the impacts of technology on society.

To maximize life expectancy for people of all ages, we need to manage risk using an integrated system of values that covers the full range of hazards under public regulation. Such an approach rejects the view that risk is not measurable. Uncertainty is common to all decision-making. It is readily dealt with by assigning probabilities to alternative outcomes. Experts may differ somewhat on the assigned probabilities but this is less important than making some calculations to support the decision-making.

The gross domestic product per capita and life expectancy at birth can be mathematically combined to give a quality-adjusted measure of life expectancy, a product that the group contends can be a valid social indicator for the purposes of risk management. This "life product" may be used as a yardstick for judging if a policy or a project is in the public interest. This life product indicator will differ between countries and will change with time. However, the differences observed in practice seem intuitively reasonable from what we know of social well-being in various societies.

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Many of the obstacles in the way of achieving results are political or legal. Tort law, complexities of individual versus general liability, lobbying by special interest groups, all serve to confuse and confound any rational approach. In highly-charged political situations, all parties tend to exaggerate their cases or "cover their rears" and society is fed with answers representing "political safety" instead of real safety.

Although the political process can be criticised for lack of consistency in the management of risk and safety, politicians have challenged the professional risk assessment community to provide an improved framework and better tools for decision-making. In Canada, The Guiding Principle of the Regulatory Policy and The Citizens Code of Regulatory Fairness(1986) unequivocally state:
"... regulation entails social and economic costs, and the government will evaluate those costs to ensure that benefits clearly exceed costs... The government will ensure that the benefits of regulation exceed the costs... The government will not use regulation unless it has clear evidence that a problem exists, that government regulation is justified and regulation is the best alternative open to the government... the government will ensure that officials are held accountable...".

> *We should lend support to the compilation of a system of values which inspire rational and equitable expenditure or resources on enhancement of quality-adjusted life expectancy.*

With this clear challenge before us, members of the engineering profession and the public have a responsibility to press all regulatory authorities in the direction of standard approaches to the evaluation of undertakings which incur risk to humankind. Good work has already been done on the kind of process which offers broad application and meets the challenge the government has made. We should all lend support to the compilation of a system of values which inspire rational and equitable expenditure of resources on further enhancement of quality-adjusted life expectancy.

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