Al- Mustaqbal University College
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4th stage

Industrial Management and Ethics

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Lecture 9

Engineer's Ethics (continued)

Safety and risk

2020-2021

Engineer's Ethics (continued)

Safety and risk

Ensuring safety is often seen as one of the main professional responsibilities of engineers. In fact, in many engineering disciplines like chemical engineering, mechanical engineering, civil engineering but also for example biotechnology safety, and the protection of human health, is a prime concern. Although safety is a prime concern in engineering it is not always obvious how the idea of safety is best understood. One possible definition is that safety is the absence of risk. The disadvantage of such a definition is that technical installations are never fully safe in the sense that there is no risk. Zero risk is impossible, and, in as far it can be approached, it is often undesirable because it will increase costs.

Safety may therefore perhaps be better understood in terms of a reduction of risks as far as practically feasible and morally desirable.

In engineering, risk is usually defined as the product of the probability of an undesirable event times the results of that event.

Engineers often believe that the acceptability of risks is linearly related to the magnitude of risks.

The following considerations have been articulated as being relevant when deciding about the moral acceptability of risk. A consideration is the ratio or balance between risks and benefits. Also,a concern is whether the risks are taken willingly and whether people have given their acceptance to a certain risk. Another concern is whether there are alternatives technologies available that achieve the same end with lower risk. Finally, it may also be relevant whether the ones causing or introducing the risk have good or bad intentions, with possibly intermediate cases of risks that are due to negligenceإهمال or recklessness تهور. Here the distinction between safety risks and security risks may be relevant. Whereas safety risks are due to unintentional harm (like natural causes or unintentional human error), security risks are due to intentional harm (like terrorism, hacking or theft).

تنجم المخاطر الأمنية عن الأذى المتعمد (مثل الإرهاب أو القرصنة أو السرقة).

Environmental care and sustainability

Whereas safety (and the protection of human health) has long been recognized in engineering codes of ethics, attention for environmental care and sustainability is of a more recent date, at least in codes of ethics. One reason may be that also in society at large environmental care and sustainability became important concerns at a later point in time than safety. It also seems that whereas engineers realize safety as a value that is internal to engineering already for quite some time, sustainability was long seen as a more political issue and therefore also as somewhat more controversial مثير للجدل . However, this seems to be changing and environmental care and sustainability are increasingly included in codes of ethics of engineering societies and considered important values in engineering.

The relation between engineering and the environmental is obviously ambivalent متناقض. Engineering and technology have been, and still are, a source of unsustainability in many areas. At the same time, engineering and technology may contribute to environmental care and to sustainable development, and are perhaps even necessary to achieve such goals.

The idea of sustainability can be understood and defined in many different ways, but the most important definition is probably the Brundtlandt definition of sustainable development: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED 1987: 43). As this definition already witnesses, the idea of sustainability is broader than the idea of environmental care, also referring to social justice issues. In particular, it can be argued that sustainability in addition to the value of environmental care refers to the values of intra generational justice (justice within the current generation) and intergenerational justice (justice between generations).

The various value dimensions of sustainability may in fact sometimes conflict with each other, as in the case of biofuels. It can be argued that biofuels are a positive development from the viewpoint of intergenerational justice, as they may be a means to ensure the availability of fuels also for future generations. From an environmental or intra generational point of view, their desirability is much more open to debate (discussion), as their total environmental impact may sometimes be worse than traditional fuels and, by competing with food stocks, they may lead

to rising food prices, and so negatively impact food security in especially developing countries.

There are now various tools and approaches that can be used to integrate sustainability and environmental considerations in engineering and technological development and design, like for example environmental impact assessments, life cycle analysis, circular economy and so-called design for sustainability and eco-design approaches.

Ref:// Ibo van de Poel, 2015, Engineering Ethics

- DOI: 10.1007/978-3-319-05544-2_171-1
- In book: Encyclopedia of Global Bioethics