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The Ethics of Technological Risk: Introduction and Overview

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INTRODUCTION

Technology has advanced human well-being in a myriad of respects, for example in the areas of energy, communication and travel. Still, every technology has negative side-effects and may include risks from accidents and pollution. How to judge whether a risk is acceptable is a pressing ethical question that deserves thorough investigation.

There is a vast amount of sociological and psychological research on acceptable risks, but surprisingly, there is very little research from moral philosophy on risks. This is even more surprising given the fact that biomedical ethics has become a full-blown academic discipline. Moral philosophers, at least those in the analytic tradition, have largely avoided the discussion of technologies that belong to the domain of engineering. Continental philosophers have focused on technology, but mainly from a pessimistic perspective that sees technology foremost as a threat for a meaningful life. However, this is a very one-sided approach. It is true that technologies can change our lives for the worse; however, they can and do also change our lives for the better. It is too easy and too simplistic to reject technology as such. It is much more complicated, but much truer to the facts, to see technology as the bringer of a lot of good things but also a lot of problematic things. However, then it becomes far from obvious how we should judge whether we should accept a certain technology and its concomitant risks.

In risk management, the standard way to judge the acceptability of a specific technology is to calculate risk in terms of probabilities multiplied by unwanted outcomes and then apply cost-benefit (or risk-benefit) analysis. However, as well as the balance between the benefits and risks of a technology the following considerations seem to be important: the distribution of costs and benefits, whether a risk is voluntarily taken, whether there are available alternatives and whether a risk is catastrophic. This gives rise to the following questions. What are morally

legitimate considerations in judging the acceptability of risks? Is cost-benefit analysis the best method to reach a decision or do we need additional considerations that cannot easily be incorporated into that framework? Is the precautionary principle a fruitful tool in dealing with risks? What role should the public play in judging the acceptability of risks? What role should emotions play in judging the acceptability of risks? Are they irrational and distorting or are they a necessary precondition for practically rational judgements?

This volume aims to spark research into ethical aspects of risk by bringing together moral philosophers, sociologists and psychologists who reflect on the questions above. It comprises discussions on biomedical risks, as well as on risks originating in other fields of technology such as electromagnetic radiation and energy systems.

OVERVIEW OF THE CONTRIBUTIONS

In the opening chapter for this volume, *Sven Ove Hansson* develops an agenda for the ethics of risk. He points out that risk and uncertainty have so far been blind spots in moral philosophy. Most moral philosophers presuppose a deterministic world in which outcomes of actions can be known for certain. Hence, the predominant ethical theories are not well suited for the real world, which is inherently risky and uncertain. Hansson also discusses the various meanings the notion 'risk' can have. Shifts in meaning can lead to conceptual confusions. The main part of Hansson's essay discusses four subareas of the ethics of risk. The first subarea shows the value dependence of risk assessments. The second subarea consists of ethical analysis as a supplement to standard risk analysis. The third subarea sees the ethical study of risk as a means to improve risk analysis. The fourth subarea sees the ethical study of risk as a means to improve moral philosophy. In short, Hansson argues that the ethics of risk should be a central part of risk analysis as much as of moral philosophy.

Furthermore, Hansson emphasizes ten points that should especially be taken into account in further studies into the ethics of risk: (1) pay attention to uncontroversial values; (2) pay attention to the influence of values on the burden of proof; (3) we need a systematic treatment of ways in which values enter risk assessments; (4) and (5) the notions and implications of voluntariness and consent require more clarification; (6) pay attention to the intertwinement of actions by harmed persons and others; (7) probabilistic risk analysis should pay more attention to individuals; (8) pay attention to incommensurable types of value; (9) develop a theory for a *defeasible* right against risk impositions; and (10) develop a theory of justice that takes risk into account. Some of these points are addressed in the other contributions to this volume.

The five papers in Part II discuss various principles and guidelines that should be taken into account in morally acceptable risk management.

Carl Cranor's contribution is a plea for a 'rich conception of risks'. Cranor argues that in theorizing about risks, researchers should recognize the wide variety of risks and their properties. There are limitations to the standard approach in risk management, which takes into account probabilities and magnitudes but

overlooks other considerations that are morally important aspects of risk. There can also be limitations if researchers try to differentiate between risks where distinctions are not justified. In arguing for this thesis, Cranor makes several points. First, many people have life goals other than merely living as safely as possible. Secondly, in theorizing about risks, we should use a term that is neutral between risks that are imposed upon us and those that we have voluntarily taken, and he gives examples of cases that are ambiguous in that respect. Furthermore, we should distinguish between natural risks and humanly caused risks. He goes on to discuss the epistemic detection of risks, either through our senses or through technical tools, as well as the degree of control that we have over risks. Cranor also emphasizes the fact that people have different attitudes towards and value risks differently. In addition, benefits (or the lack thereof) associated with risks can make them more or less acceptable. Another important consideration is the extent to which risks are voluntarily incurred. Lastly, Cranor emphasizes that it is morally important how risks and benefits are distributed within a society; some risks raise explicit moral issues. According to Cranor, these considerations about risks should be taken into account in studying and theorizing about them.

In his contribution, *Henk Zandvoort* develops requirements for the social acceptability of risky technological activities. His argument is based on the assumption that all human activities should be in accordance with two ethical principles; that is, the principle of restricted liberty (the 'no harm principle') and the principle of reciprocity. Zandvoort argues that if applied to risk generating technological activities, these principles give rise to two requirements: the requirement of informed consent and the requirement of strict liability in the absence of informed consent. He relates these requirements to discussions of predominant views in economic theory and he points to the shortcomings of majority rule in political decision-making. For example, in the case of majority rule, there is the possibility that the rights of a minority, specifically the right to be safeguarded, are not respected. This is in conflict with the no harm principle and with the principle of informed consent. Such violations should be met with strict, that is full and unconditional, liability. Zandvoort then applies his requirements to the case of energy systems. In addition to the need for stricter liability legislation, he here also emphasizes the importance of transparent risk communication and risk information from the experts to the public, in order to allow for informed consent.

Duff Waring discusses different interpretations of 'clinical equipoise' in his contribution. Clinical equipoise is a principle in medical ethics that states that a novel, non-validated treatment may only be used for patients in a trial if therapeutic risks and benefits are approximately equal to those accepted by patients in clinical practice who consent to the standard treatment for the condition under study. If clinical equipoise pertains between the novel and standard treatments, then patients who become research subjects would not add to the therapeutic risk load they already carry by enrolling in a trial. Waring describes the types of trial clinical equipoise is meant to accommodate and then explores how the notion of 'approximate equal' can be applied to either sums or ratios of risks and benefits. He argues that 'approximate equality' is most plausibly construed as a prima facie requirement of acceptable therapeutic risk that can be overridden when it

conflicts with a weightier, more favourable balance of benefits over risks. He concludes that the application of clinical equipoise will not always prevent research subjects from adding to their therapeutic risk load when they participate in a trial. He also discusses the tension between 'risk cautious' and 'risk friendly' value frameworks in the application of clinical equipoise. He relates this tension to the Institutional Review Board system and suggests that we ought to acquire greater empirical knowledge about which of these frameworks the application of clinical equipoise reflects.

Marc D. Davidson discusses our obligations to future generations and argues that giving shape to intergenerational justice revolves around dealing with risk and uncertainty. He discusses various perspectives on how a society is to deal with risk using Cultural Theory. The cultural ideal types distinguished in that theory offer a useful tool for understanding the different positions taken in the debates about managing risks. However, although people may differ in their attitudes towards risk, society has already institutionalized a certain general standard of conduct as being acceptable for handling risks to others. Davidson argues that intergenerational justice requires future generations to be treated according to these same standards. By means of examples, he shows that this general standard of conduct can indeed be meaningfully applied in the intergenerational context.

In her contribution, *Arianna Ferrari* discusses the use of genetically engineered livestock for biomedical research, such as xenotransplantation and gene-pharming. She argues that these developments give rise to ethical considerations that go further than those entailed in traditional risk assessment. The risks of these technologies are to a high degree unpredictable. In the case of xenotransplantation there is, for example, the risk of 'xenosis', that is, of cross-species diseases which might only manifest themselves in a far future. In the case of gene-pharming, there might be unforeseen toxological effects. Furthermore, these technologies give rise to increased concerns about animal welfare. Ferrari proposes to broaden all assessments of unpredictable risks in order to include morally relevant considerations such as consent and equity. In addition, she argues that in the case of these specific technologies three other considerations should be included: the interests of future generations, the possibility of alternative research strategies, and the implications for the suffering and death for genetically modified animals. Ferrari concludes that, based on these considerations and given the high risks involved, xenotransplantation and gene-pharming are not ethically acceptable.

Part III contains three papers that discuss methodological considerations in thinking about the ethics of risk.

Douglas MacLean discusses how risk analysts try to avoid making normative claims. They see themselves as neutral scientists who study the likelihood of risky events and the preferences of people. Risk analysts think that they should merely inform policy-makers without making ethical or normative claims, thereby supposedly respecting the freedom of individuals to make up their own mind about their preferences. According to MacLean, this is a mistaken view. Risk analysis is actually a branch of ethics, since it is inherently normative and concerns important ethical issues. MacLean argues that contrary to the standard view amongst economists and risk analysts, values and reasons for action cannot be reduced to

preferences or willingness to pay. People can have irrational, self-destructive or immoral preferences, or preferences that are based on wrong information. Furthermore, we cannot determine what is good for society simply by aggregating preferences, since we also need to know how to value and balance the preferences of different individuals. Instead of just uncritically describing preferences of people, risk analysts should use their expertise by making explicit what are good reasons for or against options for action. They should not only advise policy-makers but also educate the public and influence individual preferences about risks.

Nicolas Espinoza unravels the different ways in which risks may be either evaluatively incommensurable or evaluatively incomparable. Both conditions may pose a serious risk to consistent weighing or prioritizing of societal risks. Risks are incommensurable if we fail to assign probabilities to potential negative consequences or if we fail to value the consequences of the risks. We are then unable to represent them on a cardinal scale. Cost-benefit analyses cannot be accurately performed on risks that are incommensurable because there is no common measure according to which a particular divide in the allocation of resources can be justified. Espinoza argues that incommensurable risks may still be comparable, in which case they can be ranked according to a common value. He shows that risks are only entirely incomparable if an additional condition pertains, namely if the evaluative relation that holds between the two risks is insensitive to small alterations in the probabilities or values associated with the risks.

Greg Bognar discusses how we should make welfare judgements about risks, and how far an ideal advisor model might be helpful in forming such judgements. Bognar understands an ideal advisor as somebody who is fully informed and ideally rational. An ideal advisor uses a 'fully developed theory of rational choice', plus a 'principle of reasonable levels of risk-taking' towards well-being, P. Bognar's argument is mainly targeted at possible candidates for this principle P. Principle P can either be: to be risk-neutral, to be risk-seeking, or to be risk-averse towards well-being. Bognar argues that for each of these principles we can give counter-examples. In contrast with an ideal advisor who makes decisions based on general principles, real people base their judgements also on contextual features. Not every risk is equally worth taking or avoiding. Furthermore, real people can decide to cooperate with others who are involved in a decision process. A purely principle-based approach for welfare judgements about risks fails to take such contextual features and substantive claims about risks into account.

Part IV contains four papers that argue for the view that there should be a more substantial role for the public in deciding about acceptable risks.

The contribution by *Paul Slovic, Melissa Finucane, Ellen Peters* and *Donald G. MacGregor* discusses empirical research about the role of affect and reason in judging risks. The authors base their views on ideas developed in cognitive psychology and neuroscience according to which human beings comprehend risks in two fundamentally different ways. This approach is also called Dual Process Theory. Our experiential system is intuitive, emotional and spontaneous; our analytic system is based on logic, rationality and is relatively slow. Slovic et al present studies that they have conducted which show that our feelings about a

hazardous situation determine how we perceive its risks and benefits. Apparently, people base their risk judgements on feelings. This can lead to a clouded understanding of factual information about risks. For example, information about probabilities is prone to be misunderstood if we do not use our analytic system. On the other hand, risk judgements based on feelings can be useful in responding quickly to complex situations. In addition, feelings can convey meaning that purely rational information, based on numbers, fails to communicate.

Sabine Roeser argues for a different conception of the relationship between reason and emotion than is generally found in the literature about risk. Most authors who write about affective responses to risk see reason and emotion as categorically distinct faculties. In accordance with this distinction there is Dual Process Theory, which states that there are two fundamentally different systems by which we process information and form judgements. The first system is taken to be spontaneous, intuitive and emotional; the second system is supposed to be slow, reflective and rational. While the emotional system is seen to be prone to biases, the second, rational system is considered to be normatively superior. In her contribution, Roeser questions this dichotomy, specifically by focusing on moral emotions such as sympathy and empathy, but also on fear. She argues that these emotions cross the boundaries between the two systems. They have features that are central to both systems. Partly because of this, emotions can provide epistemic justification for moral judgements about risks. Rather than being biases that threaten objectivity and rationality in thinking about acceptable risks, emotions are crucial to come to a correct understanding of the moral acceptability of a hazard.

Mark Coeckelbergh discusses the role that images and imagination do and should play in judgements about technological risks. He analyses the current literature on risk perception and argues that the concepts used suggest that 'the public' has an inferior, misguided outlook on risks compared to that of experts, and that the views of the public should be corrected by those of experts. Examples of such tendentious concepts are 'stigma', 'image', 'risk perception' or 'risk as feeling' in the case of laypeople, versus 'risk as analysis' in the case of experts. According to Coeckelbergh, this merely enforces the polarization between laypeople and experts. Instead, he pleads that the views and imagination of the public should be taken seriously. According to Coeckelbergh, imagination should play a crucial role in the dialogue between experts and laypeople about acceptable risks. It enables both parties to understand different viewpoints and to critically assess their own views. Imagination should be understood as necessary to moral judgement and in that sense as an indispensable source of wisdom in decision-making about the moral acceptability of technological risks.

Lotte Asveld provides an analysis of a contemporary debate in the Netherlands on the acceptability of (alleged) risks associated with mobile phone technology. Trust is a main problem in this debate. Participation in decision-making about the acceptability of technological risks can serve as a means to increase trust and resolve the dispute. The dispute concerns the identification as well as the estimation and the acceptability of the alleged risks. The opponents of mobile phone technology, including both experts and laypeople, have articulated views on supposed fallacies in the risk-assessments that are central to current risk-policies.

Asveld argues that neither additional research nor precautionary measures will bring a resolution to the debate. The current system for participation will not move the debate further either. Asveld claims that for both ethical and instrumental reasons, the government should pursue a participatory method that focuses on the criteria for proof of risk, since the divergence in views on these criteria is the main reason for the lack of trust by the opponents in the authorities and the operators.

Part V comprises two papers that discuss how risk management could become more democratic.

Gero Kellermann discusses the role national ethics councils play in public debates on technological risks. The main task of national ethics councils is to evaluate scientific developments, in particular in the life sciences, on their moral dimensions. They usually consist of an interdisciplinary team of experts. Their recommendations often influence political decision-making. Kellermann asks whether these ethics councils can be said to possess ethical expertise that legitimizes their position in a democratic society. From a discussion on the possibility of the existence of ethical expertise in general, Kellermann concludes that ethics councils derive legitimacy from generating a specific kind of knowledge. Members of ethics councils are not necessarily better ethical experts than other individuals, but the process of producing ethical recommendations by ethics councils can be said to be robust enough to warrant their advisory status in democratic societies. This process includes discussions of an interdisciplinary nature, investment of allocated time and a systematic consideration of the relevant arguments. Ethics councils should not, however, exceed their advisory status and they should not have a binding impact on political decision-making, Kellermann argues, as this is irreconcilable with the values of a democratic, pluralistic society.

Anke van Gorp and *Armin Grunwald* take on the issue of the responsibilities of engineers in a deliberative democracy. They argue for a view on technology that recognizes the values implicit in the design of a technology, in which the role of engineers in designing that technology should not be overestimated. The work of engineers is constrained by what van Gorp and Grunwald term 'regulative frameworks'. These frameworks are supposed to provide the moral guidelines with regard to technological risks as required by society at large. However, at present many regulative frameworks do not adequately represent the perspectives of all actors that may be affected by a particular technology. Additionally, these frameworks do not always provide adequate guidance to engineers. Van Gorp and Grunwald make a distinction between normal and radical design. Especially in instances of radical design the regulative frameworks may fail to provide moral guidance to the engineer. Van Gorp and Grunwald illustrate this claim with four case studies. The authors argue that engineers have specific responsibilities to assure that the regulative frameworks are sufficiently adequate and that the different interests of relevant actors are incorporated.

The volume closes with a chapter by *Michael Baram* on risk governance. Baram discusses the way modern, developed countries manage risks. This involves many actors, including legislators, regulators, courts, industrial organizations, professional organizations, unions and interest groups. These actors give rise to regulation that developers of technologies have to adhere to. This can lead

to complex and often impractical systems of rules. That is one of the reasons why recently there has been a shift towards self-regulation. However, self-regulation carries with it the danger that safety is only a minor concern in a competitive business environment. In addition, decision-making in such a context lacks transparency. Liability and control systems can prevent these pitfalls to a degree. In order to illustrate these issues, Baram discusses two cases of reforms towards self-regulation, i.e. concerning the offshore industry in Norway and in the United States, and concerning biotechnology and GM food in the European Union and in the United States. Baram concludes his essay with two messages: (1) most technocratic approaches to risk governance lack a sense of moral obligation; (2) it is not enough to comply with regulation, but organizations and individuals should also develop their own moral views and apply these to the 'eternal question' of 'how safe is safe enough'.

OUTLOOK

The contributions to this volume vary between rather theoretical, conceptual papers and papers that engage directly with concrete technological case studies. What they all have in common, though, is their critique of conventional risk management. There seems to be a general consensus amongst scholars who study the ethics of technological risk that we need to come to a much more multidimensional approach of risk management than the conventional, technocratic approach which defines risk in terms of probabilities and outcomes and applies risk-benefit analysis. That we should come to a more multidimensional approach has been defended by social scientists for the last decades, but their research is mainly descriptive. Philosophical analysis adds to this research by providing for normative argumentations and conceptual analysis. The contributions in this volume provide such normative and conceptual arguments. The philosophical, normative perspective is an important addition to the sociological research about acceptable risk. So far, philosophers have been comparatively quiet in this debate, but this volume is evidence that this is changing. Given the significant impact that technologies and their concomitant risks and benefits have on the well-being of people, we hope that more philosophers get involved in discussions about the ethics of technological risk.

With this volume we aim to broaden the debate on the ethics of technological risk. Technology is pervasive; at its best, technology is a tool that we control in order to improve our lives. At its worst, technology is a process that unpredictably can turn against its initiators. It is up to us to choose which way we go with technology. However, we need to engage in ethical reflection about technology in order to direct it in the way that we human beings want it to go.