RISK

Category:
Basic Ethical Concepts

When people discuss aspects of risk in the context of nanotechnologies, it happens rather often that they end up with the definition of risk that requires 'exposition' and 'hazard' as the main parameters: Risk = Hazard *x* Exposure.

This is because one of the major areas of concern are the effects of nanoparticles on human health and the environment, in short: their chemical properties, how we might be exposed to them, and whether they are toxic or not. In this important and narrow sense of risk, one might calculate risk by using this a formula– if one knows enough, if one has enough data to be able to determine hazard and exposure concerning a substance or certain kind of particle or other passive nanostructure.

Projects like NanoCare (financed by the German Federal Ministry of Education and Research) try to gather data to be able to do this calculation. A consortium with scientists from universities, research centers and industries work together on the basis of a special agreement on non-disclosure (since companies wouldn't otherwise contribute too much data). They not only observe scientific developments; they want to produce particles in a way that allows them to standardize them, develop and apply new measurement methods, run toxicity tests, etc.

Thus this traditional formula faces a problem: how are we to deal with non-knowledge? Should we treat it in a preliminary way as not-yet knowledge and a knowledge-gap that may soon be closed, or should we think of technical alternatives that would offer solutions if some of the non-knowledge turns out to be systemic non-knowledge and a gap that cannot be closed.

In case of not-yet-knowledge, a variety of activities is going on at the current time on a national as well as on an international level.

Ortwin Renn (and Mike Roco) propose two different frames for dealing with risks of nanotechnologies (2006). Each of these constitutes a risk governance framework:

"Frame 1. The context of classic technology assessment looking into the impacts derived from the application of nanoparticles and other passive nanostructured materials in different areas of application (such as paint, cosmetics, food, and coatings)."

"Frame 2. The context of social desirability of innovations looking into processes of modernization, changes in the interface between humans and machines/products and ethical issues of the boundaries of intervention into the environment and the human body. This frame addresses issues related to the future generations of nanoproducts (active nanostructures and nanosystems, and long-term implications of nanotechnology."

Accordingly, a rather classical version of technology assessment (Frame 1) is to be applied in cases where research is currently done and where a lot is known already about properties of materials etc., and where the degree of complexity and uncertainty concerning health effects is not too big, and where we thus have "less concern about social impacts."

Frame 2, as described above is designed for the "future generations" of nanoproducts where the uncertain and the unknown increase and major societal and cultural implications can be expected. In this case, the following three generic risk characteristics become more and more important:

(1) Complexity concerning relationships of time and cause,

(2) Uncertainty concerning system boundaries and ignorance, measurement etc., and

(3) Ambiguity, i.e. if there is no consensus how to interpret certain results, or if values and norms come into play: is something (a risk) tolerable or not?

☞ It is open to discussion whether only 'future generations' of nanotechnologies need a broader framework for risk assessment.

When the focus shifts to social aspects of nanotechnologies, traditional risk assessment is accompanied by "concern assessment" that focuses on socio-economic impacts, economic benefits and stakeholders' and individuals' concerns, where values, world views and morality come into play. The question is then how society sees itself and what kind of future with what kinds of technology it sees for itself.

Apart from these thoughts it is also important to draw attention to other concepts of risk, for example risk as it is calculated by insurance companies or reinsurers. Also social or ethical deliberations must not be overshadowed by the risk paradigm from toxicology.

According to the basic principles from an ethics of risk it has to be determined which risks a society (or every individual who is affected by a risk) is willing to take. This depends on different cultural aspects including values. Also it must always be clear that the expected use of taking a risk outweighs a potential negative outcome.

Additionally, the question of justice comes into play. When taking a risk there are always groups of individuals in society who profit more than others, and there are always groups who lose more than others in case of a negative outcome.

Such factors have to be balanced between different groups and stakeholders, and this balancing may require compensations. Also, those few people (authorities, industry leaders etc.) who actually *decide* to take a risk are usually not the same as those who will be mainly affected in the case of negative outcomes. It is a requirement of justice and fairness to expose somebody only to a risk if there is informed consent and as much information and deliberation as possible.

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Links to other Portfolio sheets:

Ethics and Morality · Green Nanotechnology · Justice · Justice & Nano · Values

Literature: Print & WWW

Renn, O. (2006). Nanotechnology: Risk Governance in a Plural Society. Nanoconvention. Bern.

Renn, O. and M. Roco (2006). White paper on Nanotechnology Risk Governance. Geneva, International Risc Governance Council (IRGC) white paper no. 2.