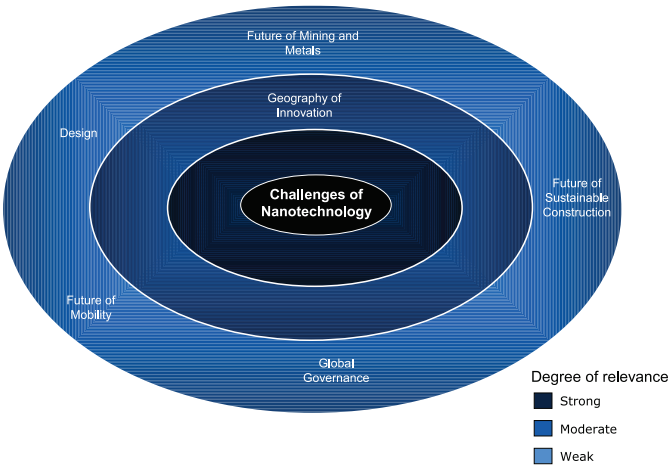
Challenges of Nanotechnology

A. Description of the issue

Although nanotechnology has been used in commercial applications for many decades, its speed of development has increased substantially in the last 10 years. In the next decade many new product opportunities will open up across all sectors of the economy: smaller and faster computers; drugs that filter through the body more effectively and can target specific cells; catalysts (e.g. in oil refining) that become more reactive; sensors that monitor with much greater accuracy; materials that are more robust, lighter and "smarter". Likely users will be the automotive, chemicals, construction, cosmetics, electronics, energy, engineering, food and beverage, household, medical, sports/outdoors and textiles industries.

Nanotechnology could also lead to new solutions to various global issues, including the fight against malnutrition and hunger through new types of crops, faster drug creation and diagnosis and the development of "green" technology.

But emerging technologies have always been associated with worries about unpredictable risks and are subject to resistance from the public. Since its development has yet to be subjected to full public scrutiny, the debate on the need for risk analysis, control or regulation is important and ongoing. Research has produced mixed conclusions. Some experts say there is a potential environmental impact, others are pointing to nano-products' potential toxicity. Proponents and opponents both agree that nanotechnology could have profound, broad-scale impacts.



B. Dimensions

- **Toxicity and "eco-toxicity":** By being reduced to the nanoscale, materials become more reactive and therefore possibly more toxic. Our bodies have not evolved to recognize nanoparticles. Clearly smaller particles can access smaller and therefore more spaces in our internal and external environment. The behaviour in particular of free nanoparticles should be carefully investigated.
- **Regulatory control:** Nanotechnology experimentation and research currently take place with no explicit consistent regulations or prohibitions. However, overregulation or a moratorium could stifle scientific research and the development of innovations that could greatly benefit mankind. Uncertainty and risk should be properly balanced against potential benefits. A global approach would be most beneficial.
- **Communication and transparency:** New technologies entail uncertainty and acceptance (if appropriate) but evolve only through involving key stakeholders and learning from past mistakes in developing other technologies. The perception of risk is contingent upon the role and behaviour of companies and institutions and their action to minimize unintended consequences. This will affect the cost of insurance and capital.
- **Usage of resources:** Progress in nanotechnology could mean that society will gradually be able to meet its needs with fewer materials.
- **Intellectual property rights:** Companies are staunchly preparing to protect the intellectual property rights of their nano-products, the consequences of which could be that patents with a broad range of industry-wide applications are controlled by a few companies. Conversely, a lack of protection will discourage research and development.
- **Nanoethics:** There's no doubt that nanotechnology will have profound effects on society. Some experts also predict possible negative impacts on health, the environment, privacy and terrorism. An open debate and careful evaluation of the ethical and societal implications of such a potentially beneficial technology are important. Technical, social and commercial concerns cannot be addressed in isolation.