Negotiating Global Priorities for Technologies

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A more pervasive understanding among scientists, technologists, and engineers of the social and global *context* of the development of technologies at the nanoscale is vital if these technologies are to provide real, large- scale benefits rather than simply add to the environmental crisis we already have.

It would be reckless to miss the historical opportunity to address some of the most pressing human needs because of a failure, even an unwillingness, to expand our grasp of context, while nano-trivia (skin creams, car wax, go-faster skis, etc.) proliferate at the shopping mall.

Expanding the Technical Mind

Starting from the biggest picture (global sustainability) rather than the smallest (how to functionalize this nanoparticle) will provide the essential dimension of a transdisciplinary and multistakeholder character to a debate on what nanoscale technologies can, cannot, should, and should not do for the 6.5 billion people on this planet and their children, grandchildren, and great-grandchildren. It is a tall order, but it is time to imagine big things for the smallest things, so that we humans can negotiate technological priorities.

To use a metaphor, the single brush strokes of the emerging picture need an underlying sketch, negotiated by dynamic international dialogue and coordinated action in a new spirit of economic and political cooperation, scientific openness, and transdisciplinary respect. This goes beyond the idea of early public engagement in a new technology advocated, for example, by Wilsdon and Willis (2004) and way beyond the efforts of bodies such as the Organisation for Economic Cooperation and Development (OECD) to establish testing and regulatory protocols. Never before was the effort to listen and grasp different and wider perspectives more important. All the scientific and technical disciplines, plus planners and policy makers, economists, industrialists, investors, and consumers, must meet more often and in more structured ways, to listen and hammer out consensual solutions. Market forces will play their part but will not work fast enough or expose long-term priorities.

This may sound like a modern day Tower of Babel, but I believe there is no other way at this historical juncture of converging crises of climate, energy, food, fresh water, systemic pollution, ecosystem collapse, demographic burdens, economic recession, and new financial and political instabilities. It would be absurd to suggest that nanoscale technologies have all the solutions. No single technology can solve all human problems, but it can have an importance beyond its immediate scope if it stimulates a collective rethink about the organizational and social values and relations that provide the implicit framework that shaped and directed technologies in the past and brought us to this critical point in world history. It would be reckless to miss the historical opportunity to address some of the most pressing human needs because of a failure, even an unwillingness, to expand our grasp of context, while nano-trivia (skin

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Can We Start?

There are those who assume that human beings are incapable of envisaging, let alone negotiating and undertaking, programs that address these needs. I think history shows they are wrong.

If the Manhattan Project could bring together the best brains in physics and employ 130,000 people, at a total cost of about $24 billion (in current value), to create an unprecedented force of destruction in only 5 years of technological endeavor, then how long would it take to create an unprecedented force of construction? OK, why not roughly triple or quadruple these figures: 500,000 people, $100 billion, and 20 years?

If the Marshall Plan, costing $13 billion (over $500 billion today), could, in just 4 years, help save European economies from collapse at the end of the Second World War, what plan could we negotiate along the lines suggested by Al Gore (2007) to save the world economy from an economic collapse induced by severe environmental degradation and resource shortages? The second of Gore's five strategic goals is rapid "development of environmentally appropriate technologies" (pp. 317–337). Nanoscale technologies are surely among these. An original Marshall Plan poster declared, "Whatever the weather we must move together!"—a slogan even more apt today for a new global plan. Do we really have to suffer another world war, fought over energy, water, food, and large population displacements, before we can negotiate a similar plan?

If 111 nations can cooperate for almost 15 years to research, design, and build the Large Hadron Collider, at a cost between $5 and $10 billion and involving 2,000 physicists from 34 countries, to satisfy a minority human curiosity about some niceties in theoretical physics, then surely scientists and engineers can also cooperate to develop new technologies to satisfy a majority human will to eat, drink clean water, stay alive, and enjoy biodiversity, community, and sunsets.

If the expenditure of even more billions of dollars can be seriously contemplated to man a mission to explore a planet of barren red dust and rocks, with no or very little liquid water and without a substantial atmosphere and protection against lethal cosmic radiation, how many dollars ought to be considered to understand anew a planet that is lusciously green, bathed in vibrant water, and coated in a life-sustaining and protective atmosphere? That is, the one the human family lives on right now.

Where Do We Start?

So, more concretely, where do we start? The initiative must be international as well as national and local. I challenge readers to respond to the following ideas to kick-start a debate on the necessary international structures.

1. A United Nations Framework Convention on Critical Technologies for Sustainability (UNFCCTS), with functions similar in some respects to that of the United Nations Framework Convention on Climate Change (UNFCCC), with its associated treaty, the Kyoto Protocol. Such a new framework could also develop together with an international treaty on the relevant technologies, including the nanoscale ones.
2. The creation of an Intergovernmental Panel on Critical Technologies for Sustainability (IPCTS), the reports of which could inform the proposed UNFCCTS. In a book on nanotechnology, I recommended, with sociologist Michael Mehta, that "the United Nations . . . should convene an international conference with a view to the creation of a permanent international multi-stakeholder body (for example, International Nanotechnology Agency) to review, monitor and regulate developments in nanotechnology" (Hunt and Mehta 2006, p. 280).
   Since then, I have moved beyond the idea of a protective regulatory agency to deal with possible hazards and uncertainties of nanomaterials, along the lines of the International Atomic Energy Agency (IAEA), to a cross-disciplinary and intergovernmental panel, like the Intergovernmental Panel on Climate Change (IPCC). Its

remit would include nanoscale technologies among a raft of critical technologies for sustainability; other possible candidates include hydrogen fuel cells, fusion, and geothermal technologies. It would include, but go beyond, protective "risk management" to a "benefits management" function of identifying and negotiating global priorities, researching, developing, assessing, developing pilots, and monitoring. The IPCC does not have research and monitoring functions, nor does it have a budget to pay the scientists who commit their research efforts, but the proposed IPCTS should be different in these respects, I suggest.

3. The creation, in association with the above initiatives, of a UN-associated International Institute (research center) on Critical Technologies for Sustainability (IICTS), which would include research on nanoscale technologies. Amongst other functions, the IICTS would fund basic research relevant to identified global sustainability problems; arrange cross- and transdisciplinary conferences; research projects; coordinate funding opportunities; and gather, collate, and make openly available critical technologies for sustainability and nanotech information databases on benefits and risks. It might also identify and help negotiate political, economic, and regulatory obstacles and catalysts.

A central platform of such an institute would be a program of work on prioritizing the analysis and evaluation of alternative industrial processes in which nanoscale (and other) technologies could be critical in dramatically reducing material and energy inputs and waste outputs: strong lightweight composites, nanosensors and nanocatalysts, clean energy generation and storage, nanophotovoltaics, and other techniques mentioned in this special issue on nanotechnology.

Certainly there will be new risks in the prioritized diffusion of any potentially disruptive technology into the industrial economy, but the risks of not proceeding in this way may be far greater. There must be planning for the management of such risks.

Governments need new accommodations with the insurance and risk management sector to prepare for new risks, uncertainties, and losses, which may be on a very large scale. In talks that my colleagues and I have given at Lloyds of London to insurance industry leaders, we have found a great concern about the uncertainties of nanoscale technologies. One concern is that insurers may currently be unwittingly covering liabilities for potential harms by treating unfamiliar nanosubstances as though they were the familiar bulk versions.

The time to put technologies into a global context and boldly negotiate the path into the future arrived yesterday. We are the ones we have been waiting for.

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