Some remarks on the meaning and the use of the term "nanotechnology"

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My contribution to the objective of this seminar will be some remarks on the debate about nanotechnology (NT). In other words I would like to talk about the "jelly aspect" of NT. Before one starts to find an answer to the question: What are the relevant issues of NT to be addressed by social scientists? it is necessary to reflect on the meaning of what NT could refer to. With my remarks I would like to draw your attention to the way the term NT is used, on the strategic meaning of the term for the debate about NT.

Most of the social scientist who are dealing with NT are aware that NT is not a specific unique technology. Nevertheless it seems to me that the discussion about societal, economic, environmental and other consequences of NT tends to ignore the fuzzy meaning of the term NT.
There are researchers who tried to assess **the** economic impact of **the** NT or there are those who call for a "new ethic" for NT issues. Everybody would immediately acknowledge that it is a senseless effort to try to find an answer to the question: What are the economic, ethical, social and legal consequences of **science**?
The same applies to NT. NT comprises a huge variety of totally different scientific approaches coming from quite different scientific disciplines. It comprises different technical concepts, and different visions of products and processes. Every attempt to find an answer to the question of the consequences of **the** NT will fail.
It is as if you would try to nail a jelly to the wall.

The Europaische Akademie Bad Neuenahr has addressed that problem by defining precisely what should be subsumed by NT and what not. The result of this project is published in the report: *"Small Dimensions and Material Properties - A Definition of Nanotechnology"*[1] available on the website of the Europaische Akademie.
(http://www.europaeische-akademie-aw.de/)
But it is one thing to create a clear definition and another thing whether this definition is used or if it is appropriate.

Obviously, we are faced by the fact that the vast majority of researchers policy makers or scientific journalist define NT only by the size of the man-made structure of the object under investigation. This definition leads to the huge diversity which is characteristic of NT.

Every promoter of NT declares that NT will deliver fundamentally new technical concepts with unimaginable possibilities.

[1] Small Dimensions and Material Properties - A Definition of Nanotechnology
G. Schmid, M. Decker, H. Ernst, H. Fuchs, W. Grünwald, A. Grunwald, H. Hofmann, M. Mayor, W. Rathgeber, U. Simon, D. Wyrwa,
Graue Reihe Nr. 35, November 2003

But what is really new within NT? What is genuinely different to other scientific activities that would justify the tremendous expectations which are connected with NT?.

Within the scope of this workshop we can not answer this question on the technological level. But one thing which is different to other scientific fashions is the above mentioned fact of the diversity of NT: its jelly aspect.

This diversity offers several strategic opportunities for the researchers on the one hand and policy makers on the other hand.

The following well known lines of reasoning are more pronounced within the NT community than in others due to the fuzzy meaning of NT.
One of those strategic opportunities is that the all-embracing meaning of NT allows researches to build up a huge coalition to strive for funding. A second is, that they can find a great number of possibilities to transfer positive connotations from other disciplines, like medicine or microelectronics, to their own research activity.
The oversimplified but well known way of argumentation which is present in the media, some times even in this naked form, is for example: *Nanotechnology will overcome the problem of aging – actually, what some German research institutes do is nanotechnology, so Germany helps to overcome the problem of aging*

But on the other hand when you ask researchers for concrete benefits of their work or even for possible problems, they often hide behind the diversity of NT and argue that they actually are only looking at what the electrons are doing, or that these concerns are far from being relevant, because possible applications will become reality, if at all, only in the far future. In addition,
what they do is only basic research.!

For policy makers the fuzzy term of NT gives them the flexibility to change the research priorities without the necessity to build up a new framework for research policy.

But on the other hand, journalist, consumer organisations, and policy makers which are not involved in the field of NT ask us: We heard peculiar things about NT from some guys from America. What the hell is it? Is it eatable? Is it dangerous? What is it good for?
They expect understandable answers from us which are valid for the whole field of NT.

How to deal with the situation: The diversity on the one hand, the demand for simple answers for policy makers and the media on the other hand?

I would like to present some “simple” answers to that question.

1) We should not ignore the diversity. We should use every opportunity to pronounce the varied character of NT.

2) We should give an overview about the most important R&D activities, structure them and monitor progress. Meanwhile there exist a number of studies with that purpose. Let me mentioned one which was performed by the Office of Technology Assessment at the German Parliament (TAB) and concluded in November 2003.

3) We have to concentrate on some R&D fields where we see the greatest impact. Here it is necessary to connect research activities with possible applications. One attempt to combine research with products which we pursue at ITAS is roadmapping. The background is that we need a vision of products in order to know in which context they will be used. Will people get in contact with the nanomaterial which is included in the product, will the nanomaterial be exposed to the environment and so on. To know the context of use is the pre-requisite to start with the assessment of a new technology. Another point is, that if we start to discuss social aspects of certain fields of NT we would like to prevent that it is put aside as pure speculation.

4) We have to follow and analyse the debate on NT, the argumentation used as well as their dynamics and we should deliver arguments which could rationalize this debate.

I hope that I have not bothered you with aspects which seem to be evident but I have the impression that it is necessary to recapitulate them from time to time to be aware of them.