NANOTECHNOLOGY ON SOCIAL PERCEPTION

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ABSTRACT: For more than two decades, worldwide communities of researchers, industry representatives, and academics are dealing on each day basis with the emerging issues raised by nanotechnology. Meanwhile, under the pressure of the newly traded products having "nano-sized particles inside" customers became more actively involved on understanding the real implications of these particles, of the newly defined substances and on their potential risk. Aware of the NanoTech and NanoMat impact on all humans' activities: social, economical, political, military, cultural and industrial or just assuming that sooner or later something wrong could happen, targeted groups equally expressed their concern on the nanotechnologies safety. As Nanotechnology becomes wider and wider each year, the public awareness increases regardless lack of legislation, standardization or clear ethical limitations. This paper focuses its analysis on the challenges determined by "nano-sized particles" inclusion on different products and on their possible harmonized regulatory approaches.

KEYWORDS: Nanotechnology, nanomaterials, risk, nanosized included lifecycle

1. INTRODUCTION

Nanotechnology's public perception could be described as a function of multiple parameters: *geographical area*, *education*, *profession*, *cultural* and *religious traditions*, *age*, etc.

Project on Emerging Nanotechnologies [1] reported that peoples' attitudes toward nanotechnology derive from their *affective* or *emotional responses* to it. Those who know little or nothing about the concept of "nanotechnology" experience a quick, visceral reaction to it that strongly influences their judgment about the relative size of nanotechnology's potential risks and benefits. As people learn more about nanotechnology, their reactions depend heavily on their *values*.

Related with this, it does *not* appear that learning more about nanotechnology tends in general to make people more favorably disposed to it. Consequently, there is a need of achieving an effectively communicating manner of information about nanotechnology to enable informed public deliberation; it is essential to develop strategies for communicating scientifically sound information that make it possible for people of diverse values to draw the same factual conclusions from it.

2. WHAT IS NANOTECHNOLOGY?

Nanotechnology is the engineering of functional systems at molecular scale' [2] - referring to the projected ability to construct items from the bottom up, using techniques and tools being developed today to make complete, high performance products.

- *The current era* is that of passive nanostructures, materials designed to perform one task.
- *The second phase* introduces active nanostructures for multitasking;
- *The third generation* is expected to begin emerging around 2010 and will feature nanosystems with thousands of interacting components.
- *A few years after that*, the first integrated nanosystems, functioning much like a mammalian cell with hierarchical system within systems, are expected to be developed.

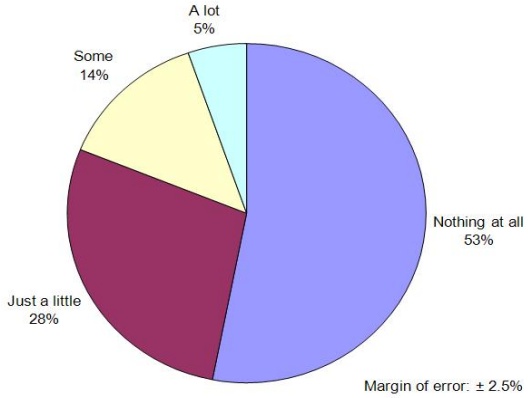

***Figure 1**. Prior Knowledge of Nanotechnology*

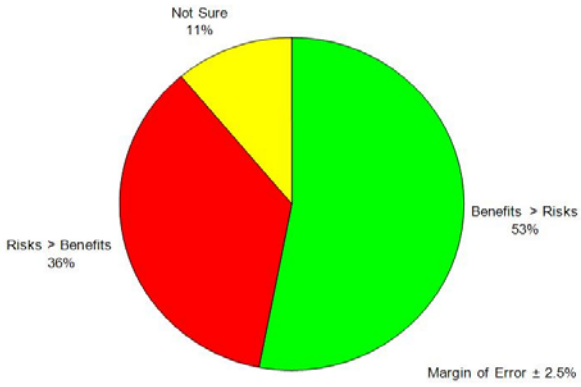

***Figure 2**. Perception of Risks vs. Benefits of Nanotechnology*

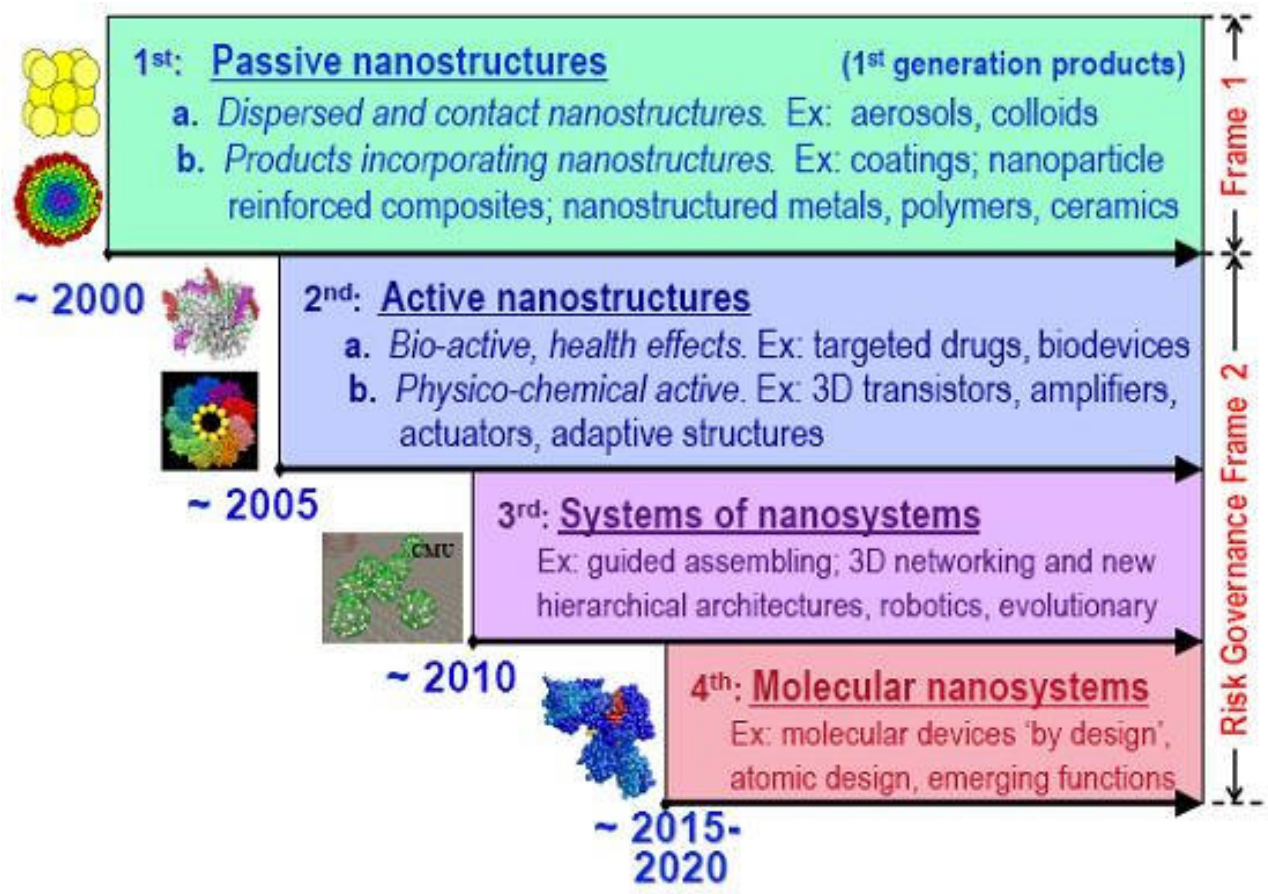

***Figure 3.** Nanotechnology development* [3]

3. SOCIETAL IMPACT OF NANOTECHNOLOGY

As in USA a *roadmap* for development on nanotechnology has already been established by the *Legislative* this year, based on technology roadmap project led by *Battelle* and the *Foresight Nanotech Institute*, and the *European Commission* through *Research Framework Program* 7 and 8 co-funded Themes and Areas settles development *rules*, *directions* and *norms* in nanotechnology, we could state that Nano-Era already started and *we are toward engineering of functional systems at the molecular scale*.

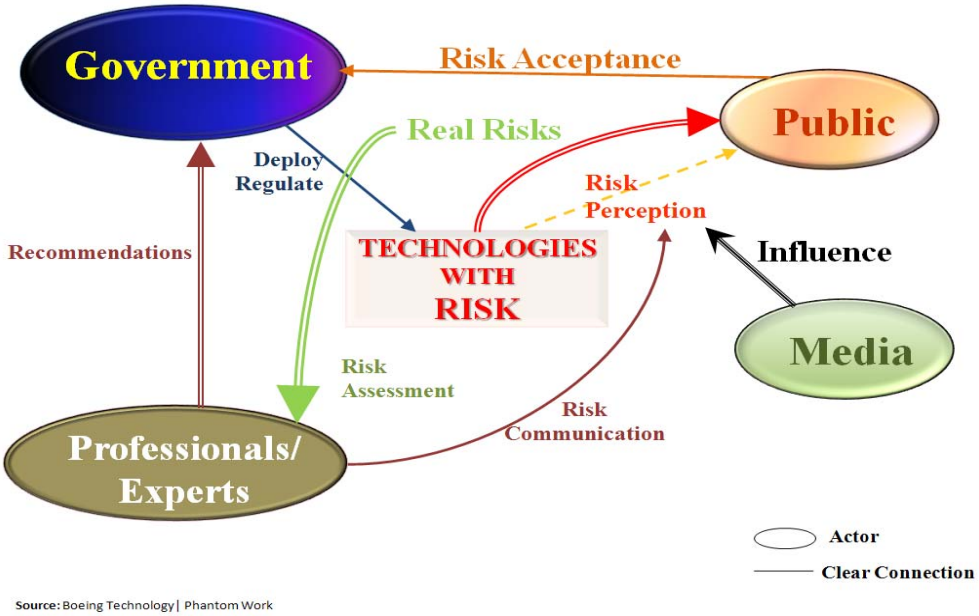

Fig.4. The Social Control of Technology, Actors and Mechanism

Shortly after this envisioned molecular machinery is created, it will result in a *manufacturing revolution*, probably *causing severe disruption*.
It would have also serious *economic*, *social*, *environmental*, and *military* implications.

a. **Economic Security**

- Economic disruption from an abundance of cheap products
- Economic oppression from artificially inflated prices
- Personal risk from criminal or terrorist use
- Constant intrusive surveillance
- Oppression from abusive restrictions
- Social disruption from new products/lifestyles
- Unstable arms race leading to war
- Collective environmental damage from unregulated products
- Black market in molecular manufacturing
- Competing nanotechnology programs (increases other risks)

b. **Medical and Ethical Issues**

- Nano-promises: regenerative medicine, novel therapy for cancer,

powerful diagnostic tools, heart rapid regeneration after infarcts,
curing Parkinson and Alzheimer diseases, minimizing stroke dysfunction through neuron repair, cell therapies for diabetics, new
cartilage in adulthood, repair of all bone fractures, new teeth

- It may become possible for individuals to completely alter their

physical appearances either through cosmetic surgery performed by
nanorobots or changes in genetic sequences on chromosomes.

- How will the meaning of these concepts evolve?

Should we encourage them?

- Where the line should be drawn between 'necessary' and

'unnecessary' procedures?

- Would you be able to transform your body?

Would anyone else be able to transform your body? Who decide on
this and how?

c. **Cultural and Confessional**

- Nano-devices that allow individuals to 'fix' physical characteristics

deemed fixable by society will affect particular communities that may
be seen as non-normative.

- The use of technology to 'fix' characteristics often resulting from and

contributing to the valuing of certain types of physical and cultural
characteristics over others.

4. THE COMMAND AND CONTROL OF NANOTECHNOLOGIES

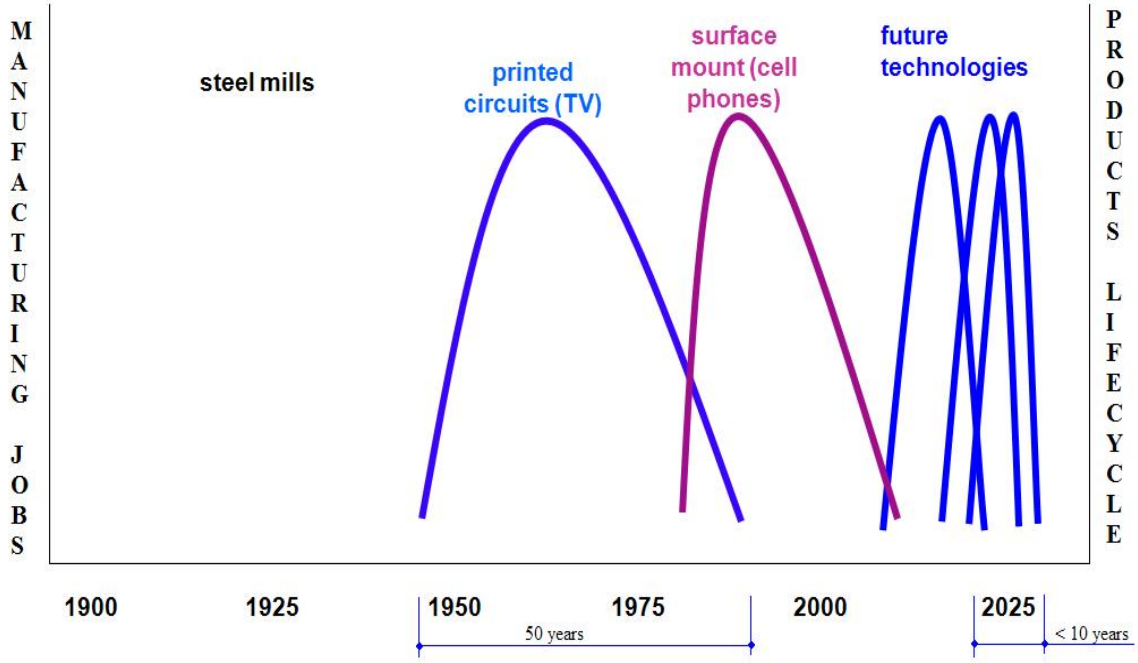

Fig.5. Lifecycle Tempo to Mfg. Technology

Like electricity or computers before it, nanotech will offer greatly improved efficiency in almost every facet of life.

As a general-purpose technology, it will be dual-use, commercial and military uses

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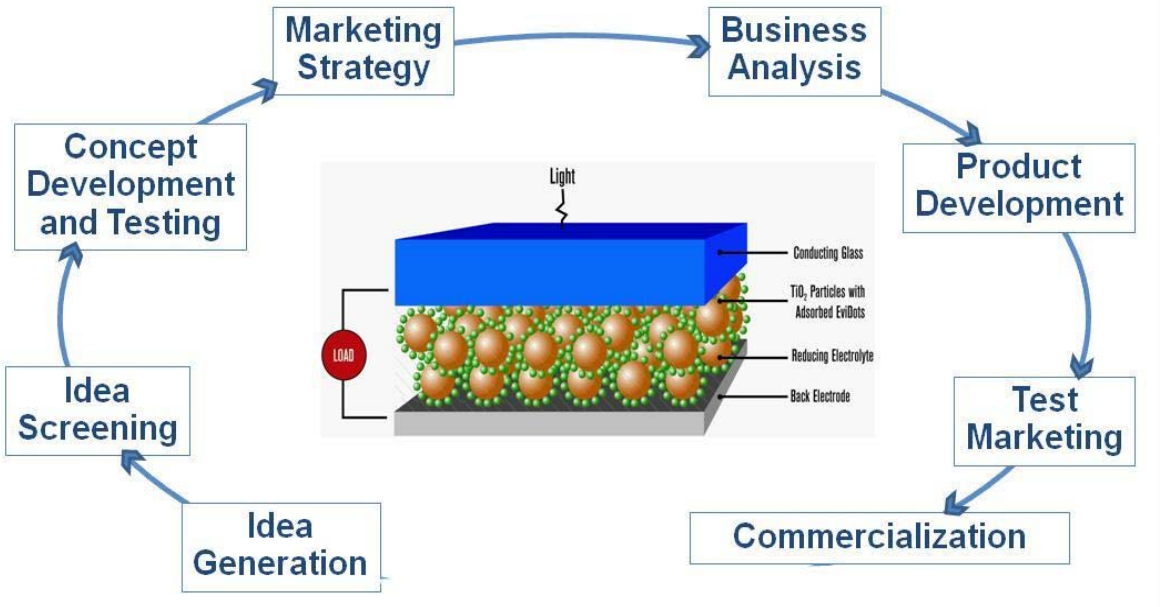

Figure 6. New Product Development Process

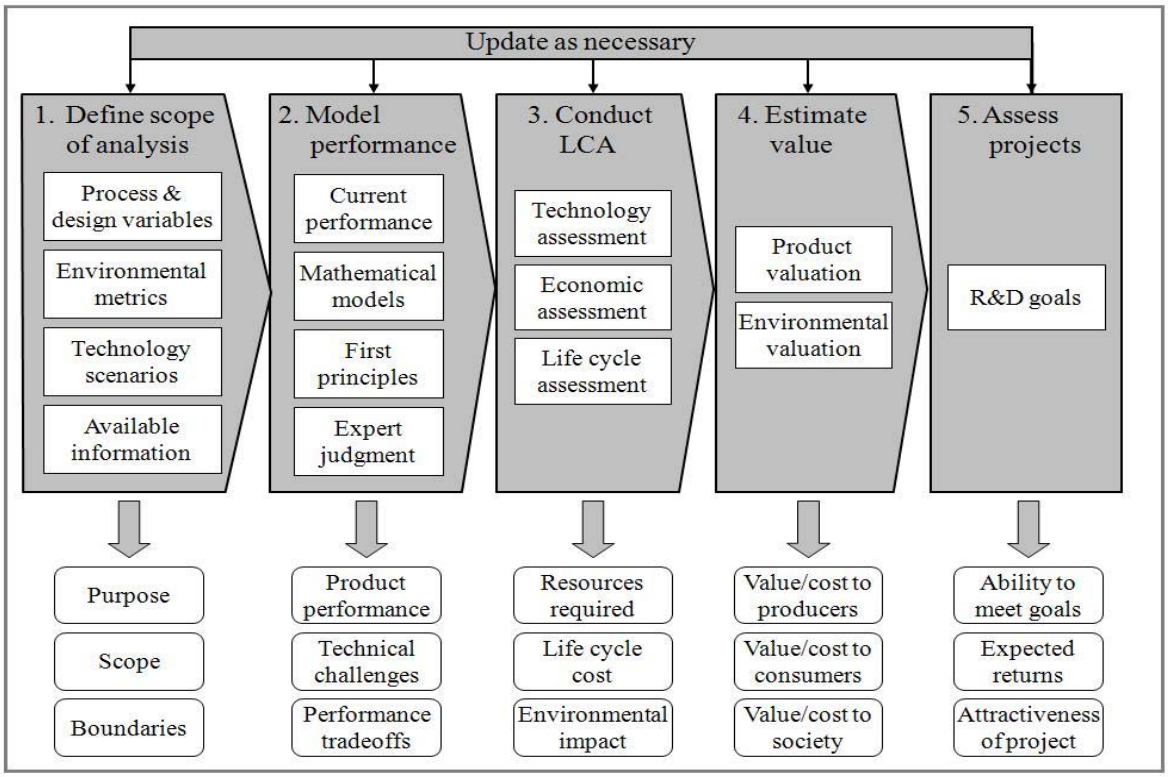

Figure 7. *Life Cycle Assessment (LCA)[5] for evaluating nanotech applications*

5. CONCLUSION

It may be only a matter of time until nano-replicate units will build themselves!
Some strong motivation for applying LCA now for emerging nanotechnologies are that they firstly are meant to address public concerns. Then, because this is the appropriate approach meant to reduce material and energy consumption as well as to reduce environmental discharge.
The main advantages of using LCD early in product life cycle are about optimizing the economic and social value, and above all on identifying the regulatory needs

REFERENCES

[1] Project on Emerging Nanotechnologies - an initiative launched by the Woodrow Wilson International Center for Scholars and The Pew Charitable Trusts in 2005, dedicated to helping business, government and the public to anticipate and manage possible health and environmental implications of nanotechnology.
[2] ******CRN - Center for Responsible Nanotechnology
[3] ***** Mihail Roco of the U.S. National Nanotechnology Initiative
[4] ****** Shannon M. Lloyd, U.S. EPA 2004 Nanotechnology Science to Achieve Results (STAR) Progress Review Workshop – Nanotechnology and the Environment II