

## Book review

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**Nanotechnology: Risk, Ethics & Law**, Geoffrey Hunt and Michael Mehta (Eds.), Earthscan, London, 2006, 256 pp., ISBN 1844073580.

# Nano-technology: plus ça change . . . ?

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This book is a collection of existing articles together with several original contributions that “add to a slowly accumulating literature on Nanotechnology (NT) within the Science Technology and Society field”. That literature in turn reflects an emerging wave of NT products. All this is happening some 50 years after Richard Feynman’s famous speech at Caltech: “There’s plenty of room at the bottom”. Many people will remember the “Mighty Micro” predictions of the late 1970’s, which proved substantially correct. We now have high performance consumer products containing engineered N-particles (e.g., my tennis racket), together with forecasts in the book that “the technology of the vanishingly small will be expansively influential, in the next couple of decades”. Materials 10 times stronger than steel and a fraction of the weight, efficient solar cells and new types of cancer treatment are but a few examples.

Although NT is important, the question I would like to consider in this review is whether it really is as “special” as the editors suggest. In particular, does this NT & Society discourse differ from an earlier IT discourse, or from a more general literature on business and ethics (BE). Descriptions of the social benefits of NT products comprise what is referred to (in BE) as “The narrative of the Cornucopians”. “Doomsayers”, on the other hand are telling a different story of “dust” and “grey goo”: the left-overs from a Global binge in which out-of-control nano-replicators consume and ravage the entire biosphere.<sup>1</sup> Both camps seem to agree, however, that “NT is outpacing our collective ability to direct (its) course”. Some infer from this that “we” should try to envision the society that we

want to achieve; so that “public involvement is in many ways the ethical key to the future of NT”.

Personally, I do think that such a “key” will unlock the door to an authentically desired future. First, in the late 1970’s the “public” would never have foreseen the potential for harm caused by IT-viruses (nor the extent of surveillance systems) and the public most certainly would not have generated (even grasped the possibility of) effective remedies like anti-virus programs. Secondly, the various survey findings reported in the book (and elsewhere) indicate that “we” are now quite perfectly divided, on this issue as on most others: precisely 50% of respondents (in the USA) think NT “will improve” quality of life. Exactly 51.3% think NT will do some good, and so on. Thirdly and most importantly, there are massive armouries of arguments that can be deployed by opposing camps, in order to covert or persuade the public. Furthermore such weapons are insignificant when set against or alongside movies, media and marketing campaigns.

Instead of public involvement, or unqualified stakeholder engagement (tactics that are often used by the powerful to perpetuate an illusion of procedural justice), a more enlightened approach to working with NT sees that dualism and ambiguity have become the new starting point. This was recently concluded by Margolis & Walsh (2003) in relation to the more general dilemma of corporate responses to social issues, such as poverty. Accordingly, in the remainder of this review, a framework of dualism is deployed<sup>2</sup> in order to organize and critique the many good contributions in the book. “Dualism” in this context refers to a set of bi-polar component constructs involving *inter alia*, efficiency & justice, financial & other forms of capital,

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<sup>1</sup>See for example Crichton [2].

<sup>2</sup>See Singer [4].

individual & corporate moral agency, optimistic & pessimistic trends, language-usage (e.g., weak & strong “property” regimes), and so on. A number of spanning themes that appear in the book, such as culture, or persuasion, then inform both poles of selected components.

## 1. Language

Early in the book, one is reminded that “the commercial discourse surrounding NT may overlap with but is not the same as the human welfare discourse”. It might have been noted that the qualifier “surrounding NT” is rather redundant; as there are many standard known limitations of market based systems with respect to achieving human wellbeing, or “welfare”. Later, it is duly claimed that a new “conceptual framework” is needed, in order to ensure the safe and responsible development of NT (for the sake of human welfare). It should incorporate the concepts of “criticality, holism, interaction, self-organization, emergence and long-term-ism” (i.e., CHISEL). Very appropriately, there are also several protests about the contemporary language of “property”, in line with comments made over 10 years ago (by Charles Handy in the UK) that it had already become “an insult to democracy”. In the book we find that “basic legal concepts such a property will be challenged . . . by the possible melding of living and non-living things into micro-systems”, raising the prospect of digital-slavery (a theme once explored in *Star Trek: Next Generation*). Later in the book, we are invited to “Imagine if someone held a patent on a brick” and to see that “tremendous waste would result”. Yet, we have already allowed the contemporary equivalent thing to happen, because the *nanotube* (the new brick) now has at least 250 different patents.

In these important discussions, there are but a few references to the more general *anti*-IPR literature. A few familiar weapons (arguments) are deployed, none of which really have “NT” engraved on them, so to speak. In view of the repeated appeals in the book for public consultations, it might have been noted that the present *pro*-patent era of strong IPR was heralded in by infamous closed-door WTO/TRIPS discussions from which the public was totally excluded; but to which representatives of the pharmaceutical, recording, legal and accounting industries were all warmly invited.

Despite the limited treatment, the gist of the IPR theme in the book is that patents on NT will be widely

seen in future as a step too far. Although NT has become a dedicated art-unit within USPTO, the *anti*-commons will soon become too tragic to tolerate. This time, however, it is going to hit influential stakeholders (unlike AIDS victims in relation to drug patents). For example, future patent lawsuits (launched by dedicated corporate entities that harvest patents and generate patent-thickets, but invent nothing) might cause delays in the availability of anti-dotes to harmful out-of-control nano-replicators. We might then see a more general political willingness to override patents and to weaken (re-optimize) IPR regimes across the board.

## 2. Justice

The notion that strong IPR regimes are a significant contributor to global injustice is accompanied in the book by several references to the likely effects of NT on poverty. It is claimed that NT products (like life-saving drugs) will “not be affordable by those on \$2 a day” and that the technology “has the capacity to increase the gap between the rich and poor”. Accordingly, there is a prediction of an emerging *nano*-divide (an excusable misnomer that refers to a large gap at the *macro*-level). In case one thinks that the gap does not matter, so long as the bottom is lifted, we are also warned that the *nano*-wealthy (to coin a phrase) will be able to oppress the *nano*-poor in horrible new ways. For example, future genetically-enhanced humans might decide to oppress the “non-elite . . . whose rebellious parents reproduced the natural way”. Furthermore, such “oppressors” will be able to deploy NT-enabled surveillance and punishment capabilities. Society will thus move fully towards a 2-tier *nano*-*panopticon*, just as we already have 2-tier marketing and intensive IT-based surveillance.

Apart from this cheerful prospect, the book as a whole seems to lack any new insights into the future of global distributive justice. For example we are reminded (quoting other sources) that annual expenditure on facial makeup (an NT product category) is currently around US18bn, whilst the cost of eliminating global hunger and malnutrition is estimated at US19bn. One is thus reminded more of the sham nature of “public consultation” on any ostensibly “ethical” issue, rather than any specific risks of NT.

### 3. Capital

The organizing framework of dualism includes a partitioning of the set of forms of capitals and the set of forms of rationality. In the book, “tensions” in policy and strategy are duly noted between competitiveness & sustainability (i.e., financial & ecological forms of capital); but also between diversity & integration (corresponding roughly to expressive and instrumental forms of rationality). The list of similar tensions could have been greatly extended, but once again it is their broadly dualistic nature and the accompanying ambiguity *per se* that is again prominent and noteworthy.

With regard to stakeholders (i.e., financial & all the others), the position of future generations is briefly discussed in the book. It is seen to be chaotic: if you use NT to manipulate genes “you *know* this is going to effect future generations” but you don’t know *what* effect it will have. In particular you *cannot* know whether your actions “will compromise the ability of future generations to meet their (own) needs”. We are working with *and in* dynamic chaotic systems: the so called nightmare for forecasters. We are no longer dealing with mechanical technologies whose downside effects are often reliably predictable. Accordingly NT is described in the book as “a system whose complexity is such that it cannot be modeled”; or (citing others) “it can only be modeled by experiencing it, by running the system in actuality”.

### 4. Trends

Despite the chaos, we do find some perceived (or cautiously hoped for) social trends. For example, “We may be witnessing in the legal arena in general a movement of the boundary that exists between narrow interests and the general protection of human welfare, towards the latter”, and (elsewhere) it is seen that “a new sense of responsibility is evolving”. Unfortunately, there is still no way of knowing if these cautious descriptions are accurate. They serve not so much to persuade us about the future, but to remind us of the perpetual existence of optimists: those who believe that humanity is making moral progress. Yet, there are roughly as many pessimists who see deterioration (or who harbor apocalyptic visions). On this point, it is worth remembering that twenty-five years ago, Kenneth Goodpaster (who held the first ever position in Business Ethics, at Harvard Business School) claimed there was, in 1983, “an evolution of thinking in the ex-

ecutive suite” with executives asking “what ought to go on”. Look at us now: in 2007, many corporate executives are pre-occupied with data security and physical security; the Enron episodes have played out and (as noted in the book) senior MNC executives and CEO’s are not exactly distinguishing themselves in areas like distributive justice and human rights.

### 5. Persuasion

As is also common in works of this type, perceived social trends are linked to appeals for urgent action. We are told that institutions will *have to* expand their “conception of NT as a commercial entity” to one that “promotes sustainable development and enhances human life on a global scale”. We are informed that NT is currently embedded in “in-egalitarian and competitive social relations” so that we need “urgent international political & legal action” towards adopting a co-operative precautionary framework. We are also reminded yet again of the moral high-ground of engaging in generative stakeholder dialogues: “we need a willingness to respond . . . with open-mindedness, subduing of sectarian interests, constructive suggestions and inquisitiveness”.

Some of these appeals, to their credit, have the tenor of formal recommendations to administrative committees. For example, “a reduction in particulate aerosol concentrations (including free N-particles) would definitely lead to tangible health benefits in the relatively short term and therefore should be actively pursued”. As a borderline asthmatic, I myself would very much like to endorse this recommendation; but the contemporary politics of global pollution tells me to save my breath.

### 6. Agency

The ambiguous philosophical question of moral agency (individual *vs.* collective) constitutes yet another component of the dualism framework (where “individual” sides with “financial”). It is also discussed in an informative way in the book. It is noted that “it is in the interest of businesses to exaggerate the conceptual difficulties of corporate moral agency”, because this tends to strengthen opposition to laws on corporate (collective) criminal liability. Meanwhile, proving that an individual is blameworthy for corporate acts is infamously difficult, whilst corporations can usually

muster the legal resources and public relations efforts needed to “recover their reputation after a disaster” that has harmed the public. Reference is then made to (i) the *agency* principle in legal philosophy, whereby the whole corporation is considered to be vicariously liable for the acts of various individuals, (ii) the *identification* principle, whereby a layer of senior officers is held to be the mind or brain of the firm, and (iii) the *systems* principle, whereby the existence of an internal decision making structure is deemed sufficient to confer corporate liability. There is a good account of the varieties of legal deterrents or punishments for harms caused by business activity (see “solutions” below).

## 7. Culture

Various regional differences in attitudes to new technology are discussed in a large section of the book. Many of the reported “differences” are attributed to culture. This is also one of the spanning themes in the dualism framework (i.e., there are observable cultural differences in attitudes to both efficiency and justice, etc.). It was not mentioned in the book that these aspects of “culture” can often be more productively thought of as ideologies. For example, in a chapter on NT policy in Japan, it was suggested that since most bioethics academics have been trained in USA, there has been little attention to (Japanese) cultural values. These values are derived from Buddhism, Shinto-ism & Confucianism . . . and they entail a “rather different kind of approach to nature and the environment”. I do not think that arguments of this type merit so much attention. For example, we now have technologically-enabled “cradle to *cradle*” cycles of product birth and re-birth. This is being taken seriously by some Western companies, although the idea has a definite Buddhist resonance. More generally, regionally-based culture-talk often rides roughshod over the full richness and variety of both Eastern and Western civilizations, their many *sub*-groups their *plural*-ideologies and diverse practices: whether productive or spiritual (or both).

Elsewhere, the book notes that there is currently “talk of the ultimate recyclable society”, with continued growth and prosperity; but that “without . . . an *ethical* renewal . . . any other kind of renewal is unlikely to succeed”. This is surely the more important point. Since *nano*-toxins respect neither culture nor borders, it is time to focus on the things that everyone everywhere can understand and appreciate: the classical human goods and the universal humane ideals.

I suspect that Americans, Europeans, Canadians and Japanese (the regions covered in the book), as well as just about every other ethnic group or tribe in the World, would all very quickly settle for the “values” of wealth, health, safety and justice; not to mention beauty, quality and harmony. The Global challenge can therefore be expressed quite simply: can NT systematically promote all of these things, thus overcoming their opposites (i.e., poverty, sickness, danger, injustice; ugliness, shoddiness and dissonance)?

## 8. Solutions

Throughout the book, several specific recommendations, prescriptions and appeals are made. These can be approximately summarized, as follows: Enterprises, institutions, laws and policies should . . .

1. Adopt the “precautionary principle” in order to try to forestall unwanted outcomes. That is, “do not use scientific uncertainty as an excuse to postpone cost-effective<sup>3</sup> measures to prevent environmental degradation”. Readers are duly referred to The Foresight Guidelines which set out some ways to avoid NT accidents ([www.foresight.org](http://www.foresight.org)).
2. Develop controls that are intrinsic to the technology (like digital anti-copying). Early warning devices are needed to alert the world to emerging pollutants (of all types, not just NT based ones). In this way, the new technology can solve some of the problems it creates, like IT virus-protection systems.
3. Optimize (not just harmonize) IPR regimes, mindful that NT (and I would say the entire Global economy) would grow more equitably *and* more efficiently . . . if patents applied for a shorter time, perhaps “10 yrs instead of 20”.
4. Shift paradigms: it is noted that the above “precautionary principle”, requires us to think “laterally, analogically and holistically”, in line with the CHISEL concepts. Put differently, all parties should exercise creativity, moral-imagination and open-mindedness. The weapon of openness has already proven effective in open-source IT and it is a prominent component of Zeleny’s Global Management Paradigm. We should also think in terms of both-and complementarity, or synthesis. Ways have to be found to regulate for en-

<sup>3</sup>This version of precautionary principle typifies the necessary compromise, in view of the unforecastability of the “costs”.

trepreneurship *and* sustainability; whilst in the USA “we” must . . . remove barriers to the development of NT *and* “conduct R&D in a manner that is socially ethically and environmentally responsible” (implying a mix of law and self-regulation).

5. Ensure that systems are in place (i.e., administrative controls) for “Life-cycle standards of care, environmental and health monitoring”. More generally, corporate standards of care are needed in the contemporary “arena of MNC power and mobility”. The work of Margolis & Walsh (2003) is again pertinent here. They recommended the exploration of a moral (and presumably legal) duty “for a company to act when it co-creates bad conditions, or when there exists unjust conditions from which the company benefits”. They also recommended a more general legal (and presumably global) “duty of beneficence” in business.
6. Globalize safety and justice: we should help the “*nano*-have-nots” (ourselves?) by establishing a permanent international (UN) multi-stakeholder body, to review monitor and regulate. In any case, “an integrated international regulatory enforcement strategy is more likely to achieve results.” The book also duly argues for the creation of a global (UN-based) NT-patent database.
7. Make punishments effective (this interacts with the agency problem). It is noted that a mixture of fines and incarceration of directors may be the most effective form of punishment, along with equity fines, adverse publicity and community-service sentences. It seems inevitable that any such deterrence based system would be full of holes. As is now very well known, directors and CEO’s are often misled by poor “intelligence”, but on the other hand it is all too easy for a boss to set-up a subordinate to take the rap.
8. Strengthen and develop relevant public institutions. Some UK firms have already placed their NT related findings in an open database, reducing costs whilst opening up the process. Also, public institutions are needed everywhere that are capable of absorbing and spreading losses from harms caused by NT; that is, effective health-care services and insurance systems.

## 9. Emerging themes

Finally, there are several distinctive “NT and Society” themes that emerge from a constructive reading of this valuable collection. They include:

1. *Poverty alleviation*: In the book, it is claimed that NT “will work against the interests of the developing world”, possibly creating substitutes for LDC resources and exports, whilst 1st-World corporations “gobble up the IP and military advantages”. However, the dualism framework quickly reveals that something important is missing here: we also need a detailed account of how NT products might be able to provide new forms of empowerment, opportunity and (real) security to the World’s poor. This might involve Bottom-of-Pyramid marketing of selected products and services *and* a host of other institutional programs. As indicated by the story of mobile-phone uptake in Africa, LDC populations can sometimes have distinctive habits and circumstances that amplify (leverage) the benefits derived from technological products, thereby lifting the bottom *and* reducing the gap. This is a serious and optimistic prospect and it merits fuller treatment in any future works on the effects of NT.
2. *Multifaceted approach*: In line with Amartya Sen’s prescriptions for reducing global poverty through the sustaining of freedom, a multifaceted approach to developing NT is generally recommended. Compared with previous episodes involving hazardous products like asbestos, or lead in paint, we now “have the opportunity to get NT right the first time”. However, in order to succeed we must formulate and implement “the right *mix* of risk-research, regulation, self-initiated corporate standards and inclusive stakeholder engagement”, as mentioned.
3. *Dualistic appraisals*: this book-review might have persuaded some readers that although we seem to need a pluralistic approach to situational analysis, it can be helpful and efficient to organize all the relevant material and report-contents with reference to bi-polar components and spanning themes of an underlying dualism. Each component and theme has already been discussed, literally hundreds of times, in all sorts of ways and other works that apply quite directly to “NT and Society”.

4. *Recursive understandings*: It was noted in the book that we have to attempt to govern the NT system, even though we are ourselves a *part* of that system. Thus, in a sense we are talking about *self*-management. This raises an ancient philosophical conundrum, one that was recently discussed in HSM, as follows:

“strategic thinking can now be seen *either* as an intrinsic part of an ecology of mind, *or* as a distinctively human or ethical activity that transcends nature. With the second interpretation, strategists are understood to be capable of transcending their material and natural circumstances, thereby operating at a higher level of moral consciousness, or with humane ideals in mind”<sup>4</sup>

Finally, it was suggested in the book (citing Colvin, 2003) that NT could well be “the first technology that introduces a culture of social sensitivity and environmental awareness early in the lifecycle”. In a particularly strong contribution, one of the book editors noted that NT might have “the effect of forcing adjustments and compromises by the existing forces of global injustice and inequality”, as was alluded to earlier with reference to IPR. Put differently, through some mixture

of foresight and coping with future disasters, the NT wave will evoke broad and deep political reactions. In the last 30 years, the IT wave carried with it new variants of capitalism and forms of social surveillance that many (about 50%) see as wrong, bad, or even brutal. The NT wave of the next 30 years might indeed herald a “reaction” and a transition towards a “kinder and gentler” World (remember?). If that happens, it will indeed be . . . *pas la même chose*.

## References

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- [2] M. Crichton, *Prey*, NY, Harper Collins, 2002.
- [3] J. Margolis and P. Walsh, Misery loves companies: rethinking social initiatives by business, *Administrative Science Quarterly* **48**(2) (2003), 268–306.
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- [5] A.E. Singer, Strategy and recursivity, *Human Systems Management* **22**(2) (2003), 73–86.

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<sup>4</sup>See Singer [5].