

Comments on Civil Society meeting report – Denis Loveridge, PREST, University of Manchester, UK

General comments

The general tenor of the discussion seems to resemble that of other meetings that have taken place over the past several decades, but particularly of those that occurred in the early 1970s as the notion of technology assessment (TA) was being launched. TA originated in the American Congress where the Office of Technology Assessment was formed in 1972. Similar organisations were formed elsewhere, for example the Programmes Analysis Unit in the UK. The need for public participation in the control of the directions being taken by science and technology was proposed stridently at these conferences to the extent that TA became associated with the notions of technology *harassment* or *arrestment* which TA has never escaped from. It may or may not be fair to propose that the often acrimonious debate has been between those people who believe that humanity is ‘in charge of the Earth’ to the extent of being ‘in control’ (the unfortunate spaceship Earth concept) and those who deny this position is feasible or acceptable. A period of relative calm followed those early debates, but in the last few years the *hubris* of ‘spaceship Earth’ seems to have re-emerged with considerable contributions to the ‘hype’ concerning genetics, information technology and the ill-named ‘nanotechnology.’ The level of *hubris* may well be the reason why the old calls for public control of science have re-emerged.

Only in genetics has there ever been any pause for reflection on the desirability or otherwise of pursuing further research (the Asilomar conference of 1973 that followed the achievement of gene splicing in that year). Reflections of this kind have never occurred in computing or IT as it has now become nor, so far, have there been many pauses for thought regarding nano-science, technology and engineering. Recently, there have been some faint rumblings of concern.

If TA has been dogged by its early history this is not the case for its parallel themes of environmental impact (EIA) and risk. Environmental impact is now a firmly established process with EU Directives. Thanks, in part, to the Royal Society, risk assessment (RA) has also seen major developments including the emergence of the *precautionary principle* and some notions of the principle of parsimony (an outgrowth of Occam’s razor). It is hard to see how either EIA or RA can proceed without a strong set of principles for TA within them. In a quite different vein, while in industry there is a growing acceptance of elements of Corporate Social Responsibility, companies claim, as they have done consistently throughout the last 30 years, that many proposals for public participation in the introduction of new technologies are simply *impractical* in their world. Many would say so even more strongly now with the enhanced levels of competition as globalisation of trade has progressed.

Comments on specific points

The low level of attendance is disappointing, but may be a measure of the level of interest in the general public and among CS groups. The CS groups invited were a cross section of organisations that might be thought to represent the ‘general public’ but probably do not. Public

interest in science is generally low unless self-interest is involved. The promotion of the public interest in science remains a barren field.

It is a common complaint by CS groups of all kinds that there is not enough *public control* over the directions taken by science. However, there would need to be a deeper understanding of science and technology by the public for this to be possible which is why Greenpeace and others have deliberately become more deeply involved in research into areas where they have concerns. It is wrong to suppose that private companies control science - the owners of the science are those who do it, wherever they are located, via patents, etc. If the concern is for the independence of scientists when their work is clearly funded by companies and industries then there has to be some concern as revealed by the smoking and lung cancer and similar sagas. The scientific world has its own ways of dealing with what might be perceived as 'rogue' or fraudulent work as has been clearly demonstrated in a number of high profile cases in recent years. There is nothing to stop the general public protesting against various forms of scientific activity and its outcomes as these can then be resolved through democratic processes as has happened in the past.

There is a concern about the **universal role of markets** and it is well known that they do not always achieve what is needed. The problem is much wider than simply purchasing power. The pharmaceutical industry has recognised this and now provides some drugs, particularly AIDS related, at special rates in badly affected regions. The problems of distribution often top the list of impediments to availability.

Analysis of the possible obvious and less obvious effects of a new technology is the purpose of TA as a formal activity. The US Congress's Office of Technology Assessment was probably the most successful TA group, but it was disbanded at the beginning of the Clinton era. Similar organisations elsewhere have had an equally chequered history. In this connection it is hard to see how an activity that drives change does not enable it - this seems to be a semantic distinction drawn by the CS groups. There is always the question of whether the Benthamite dictum of the 'greatest good for the greatest number' applies - whenever it does there is always a group of dissenters, rich and poor, who fall outside the Benthamite dictum.

There are or have been **conventions** concerned with developments in science and technology. Almost by definition they are reactive if their purpose is to propose regulations or other controls: they are unlikely to be otherwise unless their purpose is to anticipate advances in science before they happen, something the scientific community itself finds difficult. The reactive nature of most conventions often results in conflict ridden outcomes and they remain so as the science is often found to have uncertainties, as in the case of BSE, so that sharp conclusions, let alone legally binding ones, cannot be reached. In 1972 Alvin Weinberg referred to these situations as *post-normal science* where characteristically science cannot answer the questions posed by the polity and politicians, but where policy requires immediate responses. BSE, GM foods and the possible influences of some forms of nano-artefacts fall into this category.

The three points made under **Lessons from GM** try to reduce a complex set of problems, typical of post-normal science, in a simplistic way whereas they are an inter-related set: none can be worked with in isolation. Mostly, people do not know what kind of products they wish to own, but simply react to what is offered. Companies have to sense what these products need to be (the

penalties for getting this wrong are severe). By contrast, institutions often do know what kind of products and services will solve their concerns (e.g. vaccines, non-invasive procedures, etc. in the medical field). There is no simple way in which technological progress can be matched to ‘**citizen deliberations**’, as there is unlikely to be any consensus even at highly aggregated levels. All three points relate to TA and its purposes, but in the global market UK companies would incur great risks if they acted in isolation and if they did, their directors might be in conflict with the requirements of company law regarding the duties of directors. However, some precedents are being set in the field of sustainability and corporate social responsibility; this might be a fertile area to study. On a more specific point, ‘nano’ products have been in the marketplace for decades and this has led to some gross misunderstanding throughout the paragraph concerning the **existence of a Nanotechnology Industry**. The misunderstanding arises from the activities of certain ‘nano’ protagonists who have come to the nano field from the micro world. Biologists, chemists, material scientists and others have worked in the nano region for decades. There are definitions of nano-technology that set out clearly what to expect of it. The current almost dialectical debate is simply typical of any that takes place in a free society when proponents seek to establish ‘their place in the sun.’

Nanotechnology is certainly integrative merging many different strands from science and technology, but then so is motor car manufacturing and aircraft building, a point drawn out by EIRMA Working Group 43 in 1992. In that sense nanotechnology is an assembly industry - only the size scale and theoretical basis is different. The matter of presentation by companies and the investment community is a concern because their purposes are to attract investors while investors must be aware of the *caveat emptor* principle. Ensuring that potential investors can get a well balanced view of the opportunities and otherwise of the nano-world is a task that should not be left to City analysts (who should be interviewed by the working group). It is, perhaps, a role for an outgrowth of the current working group.

The comment about **patents** is just plain wrong - the way a technology may migrate from one industry to another is commonplace and largely unpredictable. Cross licensing of a technology from one company to another is very common and is an important part of the vitality of all industries.

So far I believe the **process adopted by the working group** is one of the more open ones and has some of the aspects of a ‘consensus conference.’ Perhaps the presence of the web site could be made more widely known but with due care. An effort needs to be made to counter the lack of balance shown in the recent BBC Horizon programme, where some gross and unwarranted claims were made for nanotechnology and Moore’s law. Separating hype from reality is very important, as referred to above, but it will also be very difficult. Both the positive and negative potential of nanotechnology need to be presented in a considered way. TA attempted to do this but was not always successful because there is always the question of the independence of the assessors.

The CS group’s repeated concerns for the control of science and technology are commonplace - whether it even features in the lives of the general public is another matter.

The paragraph on the use and preparations of **scenarios** is unhelpful. Scenario writing is a skilled art and not a science: scenario planning even more so. Both require much learning about the process of scenario writing and about the 'world' being considered. Some narrowly focused scenarios relating to nano-technology already exist. Any scenario will need to encompass all the four points listed - they are not viable as individual scenarios in themselves. The set of scenarios will also need to include within them the five listed topics of eradication of disability down to military uses together with many others - these should not be separate scenarios as they will all be interdependent. It cannot be stressed enough that the preparation of credible scenarios and their use in scenario planning is a time consuming and intellectually challenging task, as is scenario planning itself.

When considering **regulation**, there is always a fascination for the radical discontinuities though they are rare occurrences that most companies fight shy of. They are far too risky for most companies who often acquire rights to use the radical technology after someone else has demonstrated it. Because radical discontinuities occur seemingly at random in many, if not most instances, concentrating on trying to identify them can be unhelpful and time consuming, particularly as most industrial effort is likely to go into product extension and improvement using whatever a new technology will permit. Nano-artefacts are already in widespread use in catalyst support systems, materials, etc. and have been for many years: that needs to be recognised. It also needs to be recognised that companies will not talk about their immediate business plans but may do so for ideas that lie 10 or more years ahead. Equally, regulators cannot discuss potential regulations because they do not know what they will be required to regulate. Again, the relationship between regulation and TA is evident

The three points raised under **new processes** are not helpful in the context of global business: they are similar to the issues raised in conferences held in the early 1970s as already indicated. The strident demands made then were seen as technology *harassment* or *arrestment* by many industries and have coloured the perceptions of TA ever since. Similarly, the claim made that 'the institutional dynamic between government and the emerging nanotechnology industry' will be fully set within two years is the 'end of the world is nigh' syndrome and of course it never happens this way.

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