RICS Research

RICS Fibre (Findings in built and rural environments) May 2005

Deliberate futures: precaution and progress in technology choice

Sixty second summary

Concepts of 'sound science' and 'good science' are now being used to support what are essentially political choices that are being made on future options. This can give the impression that the options available to us are pre-determined and that the outcomes are simply the result of the application of 'sound science'. However, there is a real need for a greater use of the precautionary principle in technology choice. This can be a positive process, and can enrich the debate on the options open to us and enable us to arrive at better decisions than simply relying on an appeal to 'sound science'.

SDRN

RICS Research

Science-based policy?

In controversies over policy on science and technology, few phrases are more well-worn than the concept of 'science-based' decisions. The British Prime Minister provides a typical example in holding that *"… this government's approach is to make decisions on GM crops on the basis of sound science."* In this way, across the world, key decisions on the directions taken by science and technology are routinely presented as a simple balance between 'anti-science' and 'pro-innovation' positions.

Although seemingly straightforward, this view presents a series of problems. It implies that political decisions over science and technology can be determined by the findings of science. This is so, regardless of the specific questions that have been posed, the applications and priorities envisaged, or the degree of uncertainty, ambiguity or divergence in the answers that science is able to provide. It also suggests that such 'sound science' will be self-evident to all, no matter what their perspective.

In reality, science seldom yields such unambiguous answers. Technology in any given field, rarely unfolds in only one direction. From the energy sector, through chemicals to food and agriculture, it has been shown time and again that science actually delivers radically divergent answers under different reasonable priorities, questions or assumptions. 'Sound scientific' procedures like risk assessment offer powerful ways to deal with 'risk' – where we can confidently quantify the possibilities and probabilities. But they are intrinsically incapable of addressing broader and more intractable states of 'uncertainty', 'ambiguity' and 'ignorance'.

This is not in itself a prohibitive difficulty – all methods are limited. Uncertainty and competing understandings are the lifeblood of science. The difficulties start when we fail to recognise the resulting limits for policymaking. The problem thus lies not with science itself, but with those (on any side) who wish to conceal the limits and contingencies of science in order to assert a single uniquely 'science based' position. In this way, rhetorics of 'science-based policy' can undermine both politics and science alike.

The dynamics of technology choice

If issues like taxation, defence, education and monetary union can be seen in terms of open politics, why is this not also true of large-scale, long-term choices over the directions of science and technology? One possible answer is that science and technology are different. Our choices are constrained by what is physically possible – let alone technically feasible or economically viable. Science reveals nature, and technology just follows from this. As such, there are no 'choices' at all – but simply questions over the speed, efficiency and single-mindedness with which we follow a pre-determined path of progress.

This is indeed the picture presented in the current Reith lectures. But it is not the way things really work. We used to think of technological progress as a one-way street. But – informed by many disciplines and enormous evidence – we now realise that technological evolution is a much more open process. 'Paths-not-taken', like narrow gauge railways, steam automobiles, gas-fired refrigerators and even betamax videos are often far from inevitable 'technological failures'. Through well-documented processes of 'lock-in', markets can easily snuff such options out, even where they show manifestly superior long run performance. This applies even to economic efficiency. It holds even more for environmental or social performance. But for a quirk of fate, some of these branching 'paths-not-taken' may themselves lead on to different technological landscapes. What modern economics clearly shows, is that there is no guarantee that markets on their own will select the most viable technologies.

What is true of the past is also true of the future. That this is so, can be seen in great set-piece debates, like those over nuclear power versus renewable energy or organic farming versus genetic modification. For all the polemics, the crucial point is not that one or other alternative is unfeasible, unaffordable or self-evidently disastrous. The key issue is not even about relative risk. The real challenge lies instead in that different paths appeal under different political perspectives. In a finite and increasingly interconnected world, we cannot do everything. All else being equal, the making of any choice will close down others. If progress plays out as a one-way process, this is simply a consequence of time and choice, not of possibilities. The big issues are not about slogans like 'sound science' or 'pro-innovation'. The real questions are about 'which' rather than 'how much' technology.

Deliberate futures: precaution and progress in technology choice

The missing politics of technology

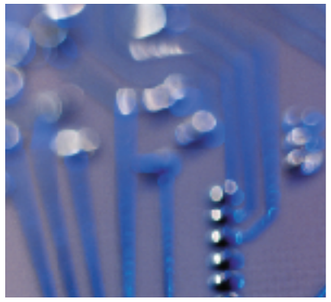
So, if the paths that are taken by our technologies are not inevitable, where then is the idea of 'sound science'? Clearly, some paths are just impossible. But when it comes to what is economic or socially viable, the picture is more open. Science can say what cannot be done, but not what should be done.

The picture is further complicated by the fact that big technological choices don't just follow a random path. Behind the 'sound science', 'pro-innovation' rhetoric, those responsible for corporate decisions and government policies hold clear understandings of the multiple possibilities. Huge resources are devoted to the fostering of particular directions – through research strategies to marketing and advertising. Such efforts may often be in vain – indeterminacy and blind momentum also play powerful roles. But one thing is clear: the fewer the drivers wrestling over the 'steering wheel', the better the chances for each. Whatever the favoured direction, the deterministic language of progress helps command support and acquiesence. Challenges can then be portrayed as anti-science. In this way, the true scope for technology choice is curtailed or denied.

Sustainability and precaution

So where do sustainability and precaution fit in to all this? By contrast to ostensibly 'value free' notions of 'sound science' or 'pro-innovation', these provide a more explicit framework for debating the essentially subjective aspects of scientific and technological choices. In so doing they 'break the political ice'. Despite – and even because of – the many loose ends, these concepts offer a basis on which we can develop a more open and deliberate politics of technology.

Of course, concepts of 'sustainability' and 'precaution' are no more immune than 'sound science' or 'pro-innovation' to being hijacked. On all sides of the policy debate, we see these concepts drummed into the service of quite distinct – and entirely legitimate – vested interests. In particular, it is important to recognise that, in the absence of an agreed set of criteria, even the concept of sustainability is more a potentiality than an actuality. The ambiguities and contradictions evident in tensions between 'sustainability' and 'sustainable development' play ample witness to this.



Likewise, much like risk assessment, the 'precautionary principle' rarely offers a uniquely authoritative basis for decisions. Against the background of multiple choices, particular decisions can seldom be more definitively 'precaution based' than 'science based'. Yet, though it may not determine the decisions themselves, what precaution can do is offer a framework for the process though which decisions arise. In particular, precaution insists that the appraisal of technologies go beyond mere risk assessment, to allow a greater consideration of the uncertainties. To this extent, it presents a 'sound scientific' response to the unsolvable problems of 'sound science'.

What then are the key features of this more 'precautionary' framework? The first is the quality of humility in the face of uncertainty, ambiguity and ignorance. Rather than depending on small groups of experts to come up with the 'right' answer, we should involve a diversity of specialist disciplines, stakeholder interests and citizen constituencies. Only in this way, can there be confidence that the right questions have been asked of the science, the appropriate values and priorities applied, the relevant assumptions tested and the salient sensitivities explored.

A second feature is that precaution considers a range of contending technological options – taking account of the full spectrum of direct and indirect effects. This contrasts with conventional practice, where an individual technology is considered in isolation, simply in terms of whether it is 'safe', 'acceptable' or (sometimes) simply 'safer than the worst conceivable alternative'.

Third, in looking at a range of options, precaution requires consideration of whether the impacts and uncertainties are justified by the benefits. Freed from the shackles of particular methods (like cost-benefit analysis), this call for open deliberation over the pros as well as the cons represents an interesting convergence between contending positions of environmentalists and industry.

Beyond this, precaution highlights the importance of being clear over who must bear the burden of proof in the interpreting of evidence. It stresses the importance of monitoring and surveillance rather than modelling, and an understanding of the value of options that are more flexible to future changes of direction and to hedging against standardisation by 'putting eggs in different baskets'.

The crucial common feature of all these elements of precaution, is that they reflect rational responses to the predicaments of uncertainty, ambiguity and ignorance in the deliberate social choice among contending technological pathways. In this, they contrast strongly with the blank denial of such problems represented by empty appeals to 'sound science'.

A crisis of confidence?

Precaution is simply about being honest and rigorous over uncertainty. As such, it applies to all policies and technologies, including those that are already in place. Since precaution applies also to the status quo, there is no necessary bias against innovation. As with technological progress itself, we can only really understand this if we stop lumping together all technologies as if they were one. Where a particular option raises disproportionate uncertainties, this will be highlighted and alternative strategies encouraged.

Even in this case, there is nothing in precaution that necessarily entails prevention. Instead, what is triggered is a more elaborate process of appraisal – applying both to the option in question as well as to its alternatives.

So, there is no necessary tension between precaution and progress. Indeed, by ensuring that a wider range of options are given attention, precaution actually drives and catalyses technological progress in the more sophisticated sense revealed by modern economics. For every fossil fuel technology discouraged by climate change precaution, there spring a range of wind and solar innovations. Precaution over genetic modification prompts attention to a host of neglected research strategies on sustainable farming.

If economic competition is routinely recognised as a spur to innovation, why is it that the broader challenge of precaution may not have the same effect? Whether regulation is a help or a hindrance depends on the context and perspective. It can, of course, be done either poorly or well. But by fostering more openness and deliberation at the earliest stages, precaution can help us towards more efficient and effective technological choices.

Perhaps most importantly, precaution puts public participation at the centre of scientific and technological choices. This is not as a means to 'close down' decisions by fostering trust or engineering consensus. Rather, it is a way to 'open up' debate by revealing assumptions and exploring alternatives. Here, we see the essential synergy between science, participation and politics. Science can ground and bound our decisions, but it cannot determine them. Participation shows the way the answers depend on the questions. The result is to catalyse a more honest and vibrant politics.

The message is easily summarised. Only by going beyond the 'sound science' and 'pro-innovation' rhetorics can we make explicit the essentially political nature of technology choice. Both as an underlying imperative and as a catalyst, the sustainability agenda presents real opportunities for establishing this richer debate. When conceived as a process, rather than as a rigid rule, precaution presents a series of practical guides for more rigorous and robust responses to uncertainty. Taken together, these elements offer a real opportunity for more legitimate, diverse and truly deliberate scientific and technological futures.

About the paper

This is based on a presentation made by Andy Stirling of the University of Sussex in the RICS/Sustainable Development Research Network 'Sustainable Development and Quality of Life' seminar series on 10 May 2005.

The views expressed are those of the author and do not reflect those of the RICS or of the Sustainable Development Research Network.

The Royal Institution of Chartered Surveyors
12 Great George Street
Parliament Square
London SW1P 3AD
United Kingdom

T +44 (0)870 333 1600
F +44 (0)20 7334 3811
contactrics@rics.org
www.rics.org

April 2005/200/RICS Fibre/50237/C. Davidson