

**Why the dual use potential of  
scientific breakthroughs is more  
likely to manifest as practical  
problems than ethical dilemmas**

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**US National Academies report, *Biotechnology Research in an Age of Terrorism* (The Fink Report, 2004):**

‘Biotechnology represents a dual use-dilemma in which the same technologies can be used legitimately for human betterment and misused for bioterrorism.’

**Lemon-Relman report of 2006, *Globalization, Biosecurity, and the Future of the Life Sciences*:**

‘....illustrative examples of scientific publications that pose dual-use dilemmas.’

**General purpose applications and adaptations that routinely feature at fundamental levels of scientific advance condition the perception and acknowledgment of dual-use:**

- The beneficent/pernicious calculus becomes less dichotomous
- Moral disquiet becomes more likely than disabling moral dilemmas

- Powerful forms of validation maintain the momentum of fundamental scientific and technological advance

**EU report on nano-enabled technological convergence, *Converging Technologies: Shaping the Future of European Societies*:**

‘Each [of the likely characteristics of converging technologies applications] presents an opportunity to solve societal problems, to benefit individuals, and to generate wealth. Each of these also poses threats to culture and tradition, to human integrity and autonomy, perhaps to political and economic stability’

‘Tremendous transformative potential comes with tremendous anxieties. These anxieties need to be taken into account. When they are, converging technologies can develop in a supportive climate. To the extent that public concerns are included in the process, researchers and investors can proceed without fear of finding their work over-regulated or rejected.’

- Deliberative systems are increasingly likely to be outpaced, bypassed or overwhelmed

Deliberative systems are formal and informal human systems for consideration of the acceptability, appropriateness and control of novel developments in, or impacting on, shared social and physical arenas. This includes both private and public modes of reflection, analysis and decision-making, and also the full range of practical, ethical, legal and political reasoning



**Mihail Roco, Senior Advisor for Nanotechnology, US National Science Foundation:**

‘The speed and scope of Nanotechnology [research and development] already exceeds for now the capacity of researchers and regulators to fully assess human and environmental implications.’

**UK Royal Commission on Environmental Pollution:**

‘Under current procedures it can take up to 15 years for a new testing protocol to achieve regulatory acceptance. Given the rapid pace of market penetration of novel materials and the products that contain them, existing regulatory approaches cannot be relied upon to detect and manage problems before a material has become ubiquitous.’

- A problem-solving orientation becomes both a default and an act of faith

**A benefits/risks calculus favours the former:**

Interests trump fears

Both benefits and risks are not accurately calculable,  
so the case for precaution is no stronger than the case for advancement

The benefits will provide a hedge against the threats

Risks/threats can be dealt with on a case-by-case basis

**Additional momentum from:**

Interlocking institutional interests

Competitive impulses

Realist fears

**The promise of fundamental scientific and technological advances – including synthetic biology - will not only offer challenges *for* our established paradigms of creating and maintaining order, but also challenges *to* them**

Altered relational boundaries, not only disciplinary ones

Sources of instability including but extending beyond new/enhanced weapons/delivery systems

The capabilities/intentions rubric of threat assessment is likely to be of decreasing utility, as is extrapolation from current trends

## **Limits:**

There are limits to the degree/pace of change to which societies can coherently adapt

‘Transformations’ are not readily or easily channelled

We are capable of creating an ungovernable world