

NUFFIELD COUNCIL ON BIOETHICS

Forward Look

25 February 2016

Dual use in biology and biomedicine

Introduction

- 1 The Forward Look session on dual use¹ began with presentations from three invited speakers,² followed by discussion with assembled guests. This note summarises themes which emerged during the meeting and suggestions for possible further work in this area. It should not be assumed that everyone present agreed with all points made.

Emerging themes from presentations and discussions

Terminology and scope

- 2 Much of the current work on and discussion around 'dual use' in the biosciences is, it was argued, dominated by particular framings and perspectives which may need unpacking:
 - *Negative framing*
 - Initially, the term 'dual use' was used positively, as something to be encouraged, associated with economic efficiency ('spin off spin on'), e.g. civilian benefits arising from military investment. It has recently morphed into a *negative* framing focussing on terrorism, states and weapons.
 - *Political context*
 - 'Dual use' in current and recent literature and debate often represents a specific US dominated discourse and problem framing which is concerned with bioterrorism in particular, with associated baggage of who a likely 'user' is and what type of regulatory framework should apply.

¹ A background paper for this meeting was produced by Dr Filippa Lentzos, Senior Research Fellow in the Department of Social Science, Health and Medicine, King's College London. See: Nuffield Council on Bioethics (2015) *Background paper: Dual use*, available at: <http://nuffieldbioethics.org/wp-content/uploads/Background-paper-2016-Dual-use.pdf>

² Dr Caitriona Mcleish, Senior Research Fellow (SPRU - Science Policy Research Unit), University of Sussex, Professor Malcolm Dando, Professor of International Security, University of Bradford, and Dr Brett Edwards, Lecturer in Security and Public Policy, University of Bath.

- Questions raised by some of the most commonly used definitions include:
 - What do we actually understand by the terms ‘military’ and ‘civilian’? Are all military applications bad? Are all civilian applications good?
 - What is it to threaten public health, safety and other aspects of national security? Whose health, whose safety and whose security are we actually talking about?
 - Why do we give definitions which are embedded in a legalistic culture so much legitimacy in these discussions?
 - Is this ‘US framing’ appropriate in the UK, given differences in how risk is perceived and managed in the two countries?
- *Narrow scientific focus*
 - Much of the discussion about dual use since the ‘Fink report’³ has focussed on microbiology and immunology, whereas others⁴ make the point that the possibilities of dual use and misuse are much wider and all kinds of ways in which advances in our knowledge about the life sciences could be misused should be considered.
- *Focus on cutting edge science and technology*
 - We should be wary of hype about new technologies (such as CRISPR-cas9).
 - The emphasis placed on cutting edge technologies skews the discussion about dual use in a particular way which may not be helpful. For example, biological weapons are not about using the latest technologies to create something, they are about using disease with a hostile purpose – which can be done using extremely simple technologies.
 - We also need to consider the scale of dual use and the user, e.g. a lone wolf or a state? This brings up different categories of access to tools and resources.
- *Focus on arms control*
 - We need to look beyond the particular issues in arms control, at the broader issue of ‘biochemical crime’- ‘the ‘dark side’ of the globalisation of biotechnology’.

Context and trends

- 3 A number of current developments were identified as having an impact on dual use and the discussion around it.

Trends in science and technology

³ National Research Council (2004) *Biotechnology research in an age of terrorism*, Washington, DC: National Academies Press.

⁴ See: Institute of Medicine and National Research Council (2006) *Globalization, biosecurity, and the future of the life sciences*, Washington DC: National Academies Press

- *Convergence and multidisciplinary*
 - Most, if not all, major advances in life science and technology today do not take place within traditional scientific disciplinary boundaries but involve a range of disciplines.
 - In the field of arms control and disarmament this 'convergence' is thought to give rise to a new set of demands for those involved in ethical decision making.
- *Access and barriers*
 - Automation and de-skilling means it is increasingly the case that things that used to require complex lab techniques can now be achieved using kits which can be bought online. Kits which used to be expensive and large are now cheaper and smaller (for example, it was suggested that over the last five years, the barriers to acquiring and using technological weapons have significantly eroded). This suggests shifts in capacity, and it might also suggest that existing control systems, based around material and technology control, are increasingly outmoded.
 - Such developments may mean that the importance of tacit knowledge is decreasing, though this might vary in different fields.
 - There are concerns that if biotechnologies are becoming more accessible to a wider range of people then this would include rogue individuals.
 - CRISPR-cas9 is seen by many as a 'game changer' - a powerful, simple, cheap technology which means 'almost any lab can do almost anything with any gene'.

Trends in global relations

- *Societal change*
 - Moving from a bipolar to a multipolar world, with the rise of new economies bringing new perspectives and demands.
 - Changes in the role of the state and the rise of civil society, 'hollowing out' of the state and moves 'from government to governance'.
- *Global crime*
 - The emergence of the 'dark net' - a closed, internet system which is anonymised and uses anonymised currency. This is facilitating the expansion of new emerging markets for contraband products such as drugs (e.g. opiates), illegal pharmaceuticals (e.g. fake and illegal Botox), and potentially opening up for small scale production and sale where there was not a market before (e.g. an increasing range of unusual toxins and poisons are now available on the dark net).
 - At the same time, scientists are developing new ways of producing drugs using biotechnology (e.g. the modification of yeasts to produce opiates). Over time we might see these technologies and methods becoming more accessible outside the lab (see section on access and barriers above).
- *Security and the nature of conflict*

- The rise of non-state actors (e.g. terrorist groups, networks, biocriminals) for whom the properties of chemical and biological weapons could potentially appear attractive.
- States are faced with decreasing tolerance of 'body bags' and moving towards new forms of warfare which distances the human from the battle field, developing new agents for use in mixed environments, such as incapacitating and law enforcement agents.
- New messy wars are emerging (e.g. in Syria) that are not about traditional issues such as territory, and that involve new tactics such as the use of small scale, 'battlefield-weak' weapons aiming for emotional impact - the mere threat of which displaces whole populations in ways that traditional weapons have not done in the past.

Challenges for policy and regulation

4 There are concerns and questions about the adequacy of current legal regimes dealing with dual use issues in the biosciences, particularly in the face of recent developments (such as those listed above):

- *Issues and developments relating to the 1993 Chemical Weapons Convention*
 - Concerns about the interpretation of the Convention's sections on law enforcement (Article II.9(d),) including riot control as a potential 'peaceful purpose' for the use of chemical agents.
 - The speed of change in science poses a challenge - advances in neuroscience might for example give rise to new forms of law enforcement such as the use of agents that act on the central nervous system (e.g. the use of fentanyl derivatives during the 2002 Moscow theatre siege⁵). International efforts are underway to encourage states to set out their position on the 'weaponisation' of the central nervous system with the aim of making positive recommendations for the Chemical Weapons Convention.
- *Concerns about the 1972 Biological Weapons Convention*
 - The Biological Weapons Convention is considered to be weaker than the Chemical Weapons Convention, e.g. there is no verification system and a much smaller organisation associated with it.
- *Concerns about the impact of convergence*
 - These two conventions treat biological and chemical weapons as separate issues but there has always been overlap (e.g. they both cover toxins and other 'mid-spectrum agents'). Convergence is expanding this overlap and populating it with people and science in ways that the negotiators of these regimes never anticipated.

⁵ CNN (30 October 2002) *Russia names Moscow siege gas*, available at: <http://edition.cnn.com/2002/WORLD/europe/10/30/moscow.gas/>

- Convergence is not only blurring the science that is being conducted but also blurring the two regimes together. If treaties and norms are to remain relevant, they will have to react faster to the current reality of science and technology.

Role and responsibilities of researchers

5 Speakers highlighted the role of researchers in society and argued that particular responsibilities and needs might arise from this:

The relationship between scientists, their science, and society

- Scientists have a social contract with society which is precious, trust is invested in scientists.
- Scientists have ethical and moral responsibilities beyond just research for new knowledge.
- As we understand more and more about life systems, we need to understand the consequences.
- The issue of dual use is ultimately about people (e.g. researchers) and the decisions they make.
- It might be suggested that we need scientists to ask questions like ‘are there some experiments we should not do because they are too dangerous?’

Need for education, awareness raising and dialogue

- Most life scientists are now made aware by their institutions of the internal requirements for responsible conduct of research – but not necessarily about the external consequences and dual use aspects. Given possibilities in the life sciences in the next few years, we need to address this.
- It will be difficult to think about how to handle dual use unless scientists – such as practising neuroscientists and neuroethicists – are involved.
- In terms of biosecurity education, there are good resources and guides available for life scientists but awareness of these resources could be improved.
- Those involved with interdisciplinary science work are going to have to resolve any ethical dilemmas that arise at far greater speed than has previously been encountered. They need to be equipped with the ability to understand when an ethical dilemma arises and give tools to deal with them in a timely fashion.
- The discussion about responsibility of scientists has to be had repeatedly, not all university students end up in university laboratories so there is a need to engage with all areas of scientific practice.

A role for Responsible Research and Innovation (RRI)?

- RRI approaches could potentially provide useful tools for creatively exploring the issue of dual use and bringing people from outside the security and disarmament fields into the discussion.
- RRI in synthetic biology has brought innovative approaches to addressing concerns about bioterrorism pre-emptively, but has raised more questions than answers in terms of ethics and what we can expect from scientists.

Need for engagement and dialogue

6 Speakers pointed to a need for public engagement and input on this issue:

- The public is increasingly aware of scientific progress, such as in next generation genomics and the potential impact on their lives.
- There is a need to hear from the public – they are missing from this discussion. What risks are they prepared to accept in order to gain the tremendous benefits science and technology can bring, such as in personalised medicine?
- Specific technologies have appeared in the press which raise public concerns, and there is increasing public awareness about emerging phenomena such as the dark net and synthetic drug markets.
- The public expects the UK to act on a global stage in their interest and engage in systems of control at international level.
- Governments get caught up in worst case scenarios – apocalyptic terror and catastrophic health events – there is a risk that an ill-conceived policy response can cause damage to science and technology innovation. What does the public think about this?

Suggestions and questions for a contribution from the Council

Mapping the terrain / helping to frame the issue

- There is a need for a more holistic look at the dual use issue. At the moment we have a relatively closed arms control community and it might be helpful to look at this issue in a wider frame of biocriminality and biosecurity.
- The area of biocrime has not yet been defined as a problem area, a project by the Council could be to scope and map this and generate an ethical terrain, considering cross-cutting ethical themes.
- Biosecurity concerns have generally been dealt with as a fringe issue and concerns and issues in a dual use context have been framed in very narrow ways, e.g. specific to US-centred policy issues and paranoia. The Council could help to reframe and bring together discussions in a more convincing way.
- There is need for a better understanding of who the stakeholders are globally and nationally (e.g. among government departments, regulatory agencies, and innovators) in order to set up a meaningful dialogue.

- The Council might be in a position to help convene a dialogue, e.g. to find out what the public thinks and wants in relation to this issue.

Contributing to existing policy processes

- The conventions on chemical and biological weapons are reviewed every five years. The next review will be in late 2018 – it was suggested that the Council could usefully make an intervention ahead of this to help push for progress.
- It was felt that the Council could provide a distinct perspective compared to equivalent organisations working on this issue in the US and in Europe.

Questions about relevance for the Council's scope and remit

7 Questions were raised about 'dual use' as an ethical issue and its relevance to the Council, such as:

- What is the difference between 'dual use', misuse and abuse?
- Anything can be used for a 'good' and a 'bad' purpose (e.g. a pen intended for writing with can be used to stab someone) – what makes this an ethical issue, rather than a practical, regulatory one?
- If there is an absence of public debate could that be because the public thinks 'it's obvious – misuse is a bad thing, and needs to be dealt with'?
- Is it more appropriate from the Council's point of view to look at a particular practical application than to address it in a broader way?
- Where are the new complex ethical issues? There might be a clear need for education and culture change, public debate, regulation and governance but why is the Council the best placed organisation to address that?