ELSI and Synthetic Biology:

A Perspective from the Wider International Efforts to Address Dual Use Implications in the Life Sciences

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The views presented here are derived from work by the NAS, its constituent bodies, and its international partners but are those of the author and do not always represent official conclusions or positions of the NAS.

Starting Point

- Synthetic biology cited as
  - An example of a research community taking initiative
  - A better reflection of contemporary “life sciences” given its interdisciplinary nature
- Synthetic biology thus often cited in broader national and international discussions about dual use issues in the life sciences

Questions

- How much and how best – and even whether? – to relate synbio-specific ELSI initiatives to broader efforts?
- Do synbio initiatives offer models for broader initiatives on dual use?

As background for discussion, examples from work of national and international science organizations

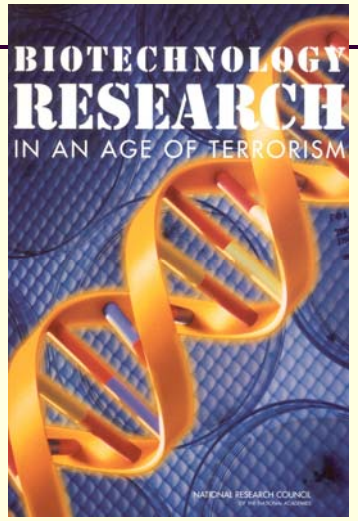
The US National Academy of Sciences and Biological Weapons

- Long history of NAS activity on biological weapons (BW) issues
- In the 1980s and 1990s much of the work with other academies, especially Soviet Union/Russia and the Royal Society
- Now also deeply engaged with international scientific organizations on dual use issues

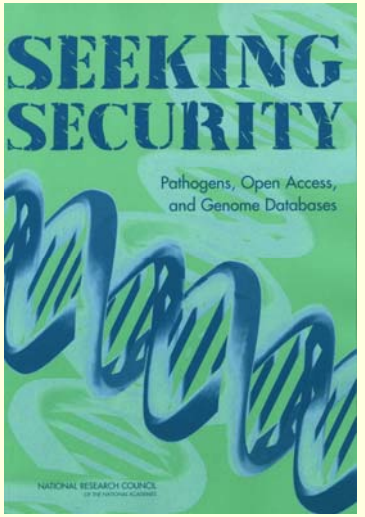
NAS and Dual Use Issues

- **Became involved with dual use issues in biotechnology research before 9/11 and anthrax mailings**
- **Concerned with:**
  - **Potential risks of misuse of research for bioterrorism or biological weapons**
  - **Potential negative impact on research and scientific freedom**
- **Focus on security but clear ties to broader ELSI**

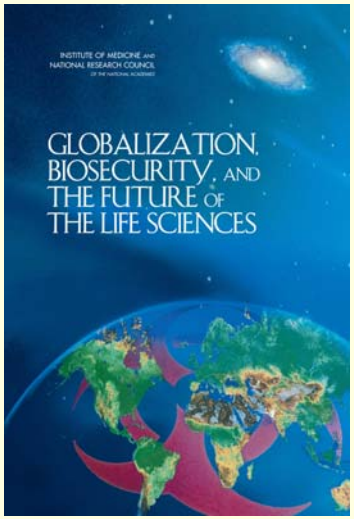
Three Early NAS Reports



Biotechnology Research in an Age of Terrorism (2004) NRC



Seeking Security: Pathogens, Open Access, and Genome Databases (2004) NRC



Globalization, Biosecurity, and the Future of the Life Sciences (2006) National Research Council / Institute of Medicine

Common Messages

- **Misuse of research is a serious potential risk for biological weapons and bioterrorism**
- **Need a mix of policies that both enhance security and enable continuing scientific advances**
- **Scientific community has key role – and responsibility – in helping to reduce the risks of misuse**

Common Messages (2)

- **“Web of prevention” most likely to be effective**
- **Mix of formal, including legal and regulatory, and informal, including self-policing and guidelines**
- **Preference for self-governance by scientific community and guidelines by governments**
- **Important role for “soft law” – norms, codes of ethics, conduct, and practice**

Importance of International Efforts

- Science is a global enterprise
- Growing diffusion of life sciences research and industry
- National actions essential and important
- But to be effective any effort to address dual use issues ultimately must be international in scope

Roles for International Scientific Organizations

- Not so much “top down” as providing endorsements respected within the scientific community – need messages re dual use from more than governments
- Initiatives can be carried out by national and regional affiliates and networks – and word of successful national and regional efforts can be disseminated internationally
- Easier for international scientific groups to work with international arrangements and organizations (BWC, CWC, WHO, UNESCO, etc.)
- **NOTE**: Importance of opportunities like the BWC intersessional meetings on codes of conduct (2005) and biosafety and research oversight (2008) to raise awareness and focus activities to foster and sustain networks

Key International Science Organizations

- IAP: The Global Network of Science Academies
- InterAcademy Medical Panel (IAMP)
- International Council for Science (ICSU)
- International Union of Microbiological Societies (IUMS)
- International Union of Biochemistry and Molecular Biology (IUBMB)
- International Union of Pure and Applied Chemistry (IUPAC)
- Etc.

Examples of International Activities Relevant to ELSI (I)

- **Ist International Forum on Biosecurity (IAP, ICSU, IAMP co-sponsors), March 2005**
- **IAP, ICSU, and several unions present to BWC experts meeting on codes of conduct for scientists, June 2005**
- **IAP releases Statement on Biosecurity, December 2005**
  - Presents guiding principles that should be addressed in formulating codes of conduct:
    1. Awareness
    2. Safety and Security
    3. Education and Information
    4. Accountability
    5. Oversight
- **IUMS (2005) and IUBMB (2006) adopt codes of conduct**

Examples of International Activities Relevant to ELSI (II)

- 2nd International Forum on Biosecurity (IAP, IUBMB, IUBS, IUMS, Hungarian and U.S. academies), March 2008
- IAP, unions, and national academies present to 2008 BWC experts meeting
- Workshop on promoting education about dual use issues in the life sciences (IAP, IUBMB, IUMS, Polish and U.S. academies), 2009

Also ELSI-Relevant Activities by National Science Bodies

- Polish Academy of Sciences workshop on research with dual use potential, 2007
- Israel Academy of Sciences and Humanities report, *Biotechnological Research in an Age of Terrorism*, 2007
- Uganda National Academy of Sciences workshops & reports on biosecurity and biosafety for East Africa region, 2008 and 2009
- French National Academy of Sciences study, *Les Menaces Biologiques - Biosécurité et Responsabilité des Scientifiques*, 2008
- Chinese Academy of Sciences/IAP/OECD workshop on biosecurity, 2008
- Royal Society and International Council for the Life Sciences workshop on approaches to risk assessment, 2009
- U.S. National Academies, Royal Society, OECD International symposium on synthetic biology, 2009
- 6-Academies (science and engineering academies of US, UK, and China) symposia on synthetic biology, 2011-12

Emerging Theme

- For most life scientists and their collaborators from other fields, dual use issues best seen as part of broader issues of responsible conduct of science and the social responsibility of science
- Especially clear with efforts on education
- Thus can take potentially advantage of other important international efforts with this broader focus
- Topic of increasing importance for global science

Examples of Broader Efforts That Include Dual Use/Biorisk

- UNESCO World Commission on the Ethics of Scientific Knowledge and Technology, Draft Report on Science Ethics, June 2010
- 2nd World Conference on Research Integrity, Singapore/Singapore Statement, September 2010
- IAP/IAC project, an international edition of *On Being a Scientist*, beginning late 2011
- Many others that do not have a dual use/biorisk component

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THANK YOU!

For more information

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