

## Science in context

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## The purpose of this seminar series

- To promote responsible science
- To encourage thinking in relation to the implications of scientific and technological developments
- To enable scientists to communicate their work to people outside of their field

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## Science in context

- There is a traditional view that science has a purity – separate from the society it sits within
- A creature visiting from the planet Mars would be expected to understand the speed of light and acceleration due to gravity in the same ways we would
- But how science is carried out is a reflection of the human experience

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### Science and power

- Knowledge is power
- Scientific and technological developments bring with them significant potentials for benefits and harms
- With power comes responsibility – the greater the power, the greater the responsibility

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### Science and history

- Science has been misused in the past
- Yet there is no common standard that defines what misuse is
- Anecdotally, many cases of misuse take place where there are no considerations of what is the right thing to do

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### Who is responsible?

- Scientists?
- Governments?
- Society?
- Or do all play their part?

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### Responsibilities/duties of scientists

- To their profession
- To those who make and enforce policy
- To society
- Are these responsibilities always the same or do they change with context?

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### Influences on science (and technology)

- Examination of objects shows that science (and technology) does not occur in isolation
  - QWERTY keyboard
  - Clutch-brake-accelerator driving controls
  - VHS vs Betamax
- Derivation of all of these were in interaction with society – there was no inevitability in the outcome

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### Path dependency vs adjacent possible (1)

- Many assumptions that science and technology follow a particular trajectory (path dependency)
- Yet examples examined show no inevitability in the outcome
- So are there inevitable pathways?

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## Path dependency vs adjacent possible (2)

- 'adjacent possible' – the 'set of configurations, reachable from any configuration in one step'\*
- What looks with hindsight as a path-dependent trajectory could have been simply a sequence of adjacent possible choices

\* Stuart Kauffman and Lee Smolin, 'A possible solution to the problem of time in quantum cosmology', Santa Fe Institute Working Paper no 97-03-020, 5 March 1997, 15 pp, citing: Stuart Kauffman, 'Investigations on the character of autonomous agents and the worlds they mutually create', Santa Fe Institute preprint, 1996.

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## Key point

As active researchers, you have the chance to:

- create adjacent possibles
- influence which choice within any adjacent possible is followed

With power comes responsibility!

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## The challenge of multiple uses (1)

'Every major technology — metallurgy, explosives, internal combustion, aviation, electronics, nuclear energy — has been intensively exploited, not only for peaceful purposes but also for hostile ones. Must this also happen with biotechnology, certain to be a dominant technology of the twenty-first century?'

Matthew Meselson, 'Averting the hostile exploitation of biotechnology', *The CBW Conventions Bulletin*, no 48, June 2000, pp 16-19 at p 16.

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## The challenge of multiple uses (2)

'At present, we appear to be approaching a crossroads — a time that will test whether biotechnology, like all major predecessor technologies, will come to be intensively exploited for hostile purposes or whether instead our species will find the collective wisdom to take a different course.'

Matthew Meselson, 'Averting the hostile exploitation of biotechnology', *The CBW Conventions Bulletin*, no 48, June 2000, pp 16-19 at p 18.

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## Conclusions

- Science is not value neutral
- Scientists have key roles to play in promoting positives outcomes and reducing risks, alongside governments and societies
- Regular consideration reduces potentials for misuse of science. This is the core of responsible science.

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Questions?

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