Biosecurity and Synthetic Biology

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US National Academies/Royal Society/OECD Symposium

10 July 2009

The dilemma

- synthetic biology presents risks
- consequences could be devastating
- risks are hard to quantify

The factors

- technologies
- practitioners
- biology itself
- public

Technologies

- genome synthesis
  - viruses
  - bacteria
  - “new” organisms
- engineering
  - designed circuits
  - molecular shuffling
  - self-replicating systems

Practitioners

- traditional scientists
- other organized groups
- “DIY community”
- terrorists

Biology

- (un)predictable
  - design principles
  - selection
  - virulence
  - intangibles

What do we do?

Equipment and supplies

- mostly low tech
- inexpensive
- widely available

Synthetic genomics

- screen orders
  - buy-in from providers
  - better, and uniform, screening tools
- rational lists of agents

Engineered systems

- circuits
  - improve predictability
  - build a “biosecurity database”
- shuffling
  - highest risk
  - be conservative regarding containment
  - be prepared for unintended outcomes
- self-replicating systems
  - presently low concern

People

- traditional scientific community
  - insider threat real but very low
  - awareness
    - results
    - others
  - responsibility
- other synbio communities
  - identify
  - engage in dialog

The public

- **why do we engage in biological research?**
  - **intellectual pursuit**
  - **fun**
  - ***benefit mankind***

The public

- we work for the public
  - taxpayers
  - donors
  - beneficiaries
- we must:
  - listen
  - educate
  - be humble
  - maintain openness
  - be honest about possible risks

Good news

- synthetic biology community is being thoughtful
  - meetings
  - websites
- science and security communities are talking to each other
- ongoing international dialog
- governmental actions have been measured