Diplomatic Expert Elicitation for Intelligence, Strategy and Scientific Technology Threat

Terry O'Sullivan, PhD

Center for Risk and Economic Analysis of Terrorism Events (CREATE)
University of Southern California

Science as Diplomacy Panel

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Increasing *Terrorist* Capabilities

Expanding Terrorism Lethality:

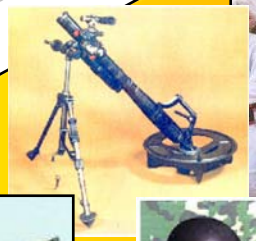
- ***Rapid technology improvements***
- ***Access to weaponry***
- ***Innovative tactics***

Bio-/Nano-terror

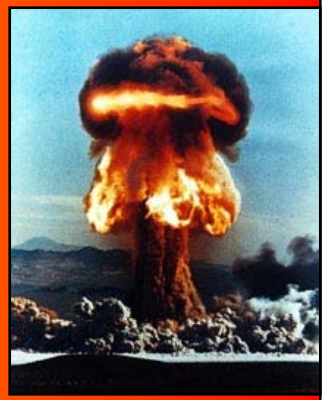
- Future -

Casualty Producing Ca







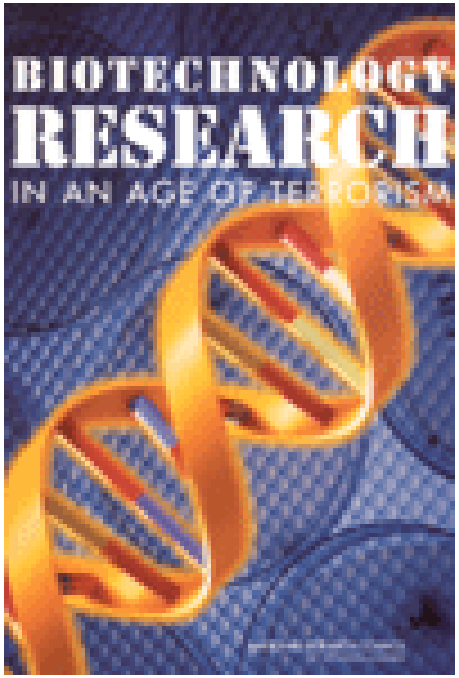

One → Dozens → Thousands → Millions

Slide adapted from Admiral William Sullivan, DoD

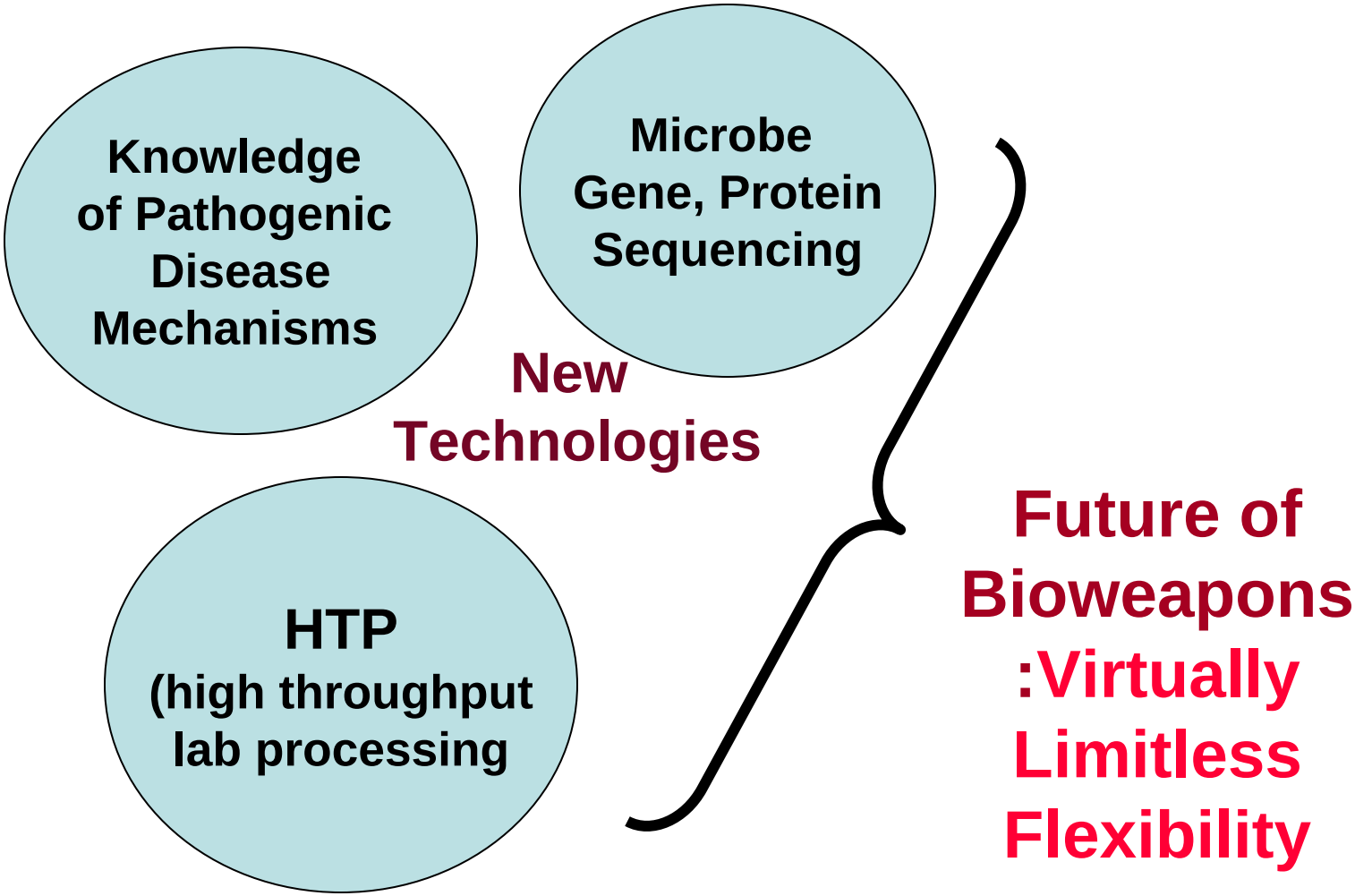
Biotech: Genetic, Medical, & Pharmaceutical Knowledge for Good and Evil

Genetic engineering breakthroughs

- **Genetic sequencing data** on specific microbes -- soon will all be known
- **Rapid gene sequencing** (can exploit vulnerabilities
- **Proteomics** (protein genomics -- essential functioning of cells)
- **Nano-Technology** - Numerous converging technologies, often unrelated until breakthrough
- U.S. National Academies of Science (NAS): ***Biotechnology Research in An Age of Terrorism*** **(2004)**



Biotech: Genetic, Medical, & Pharmaceutical Knowledge for Good and Evil



Adapted from S. Johnston (2006): IOM

Globalization-related Vulnerabilities for Public Health, Infectious Diseases

- **Biological Technology Diffusion**
  - Very steep Technology Curve
  - Biomedical revolution double-edged sword
  - Most biological technology is “dual use” (useful for *both* medicine & weaponry)

Biotech: Genetic, Medical, & Pharmaceutical Knowledge for Good and Evil

- **Equipment virtually the same (dual use)**
  - **for civilian and bioweapons production**
  - **Very difficult to police, detect programs**
- **"Chimera" pathogens** (combined bugs, or newly constructed ones)
- **Enhanced "superbugs"** (drug-, vaccine resistance by manipulating IL-4)
- **Pathogens reassembled from DNA fragments** in labs (already occurred)
- **Skill threshold dropping** ("lone gunman")

Biotechnology: New Research Safeguards

Guidelines Recommended to Prevent Releasing Technology that might:

- Boost the threat posed by a biological agent or toxin, such as by augmenting its virulence, stability or transmissibility
- Impair a host's immunity or the effectiveness of an immunization
- Enhance a pathogen's resistance to vaccines or other countermeasures, or its ability to avoid detection
- Heighten the stability, transmissibility or ability to disperse a biological agent or toxin
- Increase the number of species or populations that could be infected by a disease
- Enhance the host population's susceptibility to a biological agent
- Develop a new pathogen or toxin or recreate an extinct agent.

NSABB Draft Guidance Documents
February 2007

NATIONAL SCIENCE ADVISORY BOARD FOR BIOSECURITY

Biosecurity Risk: Realities, Issues

Analytical Complications:

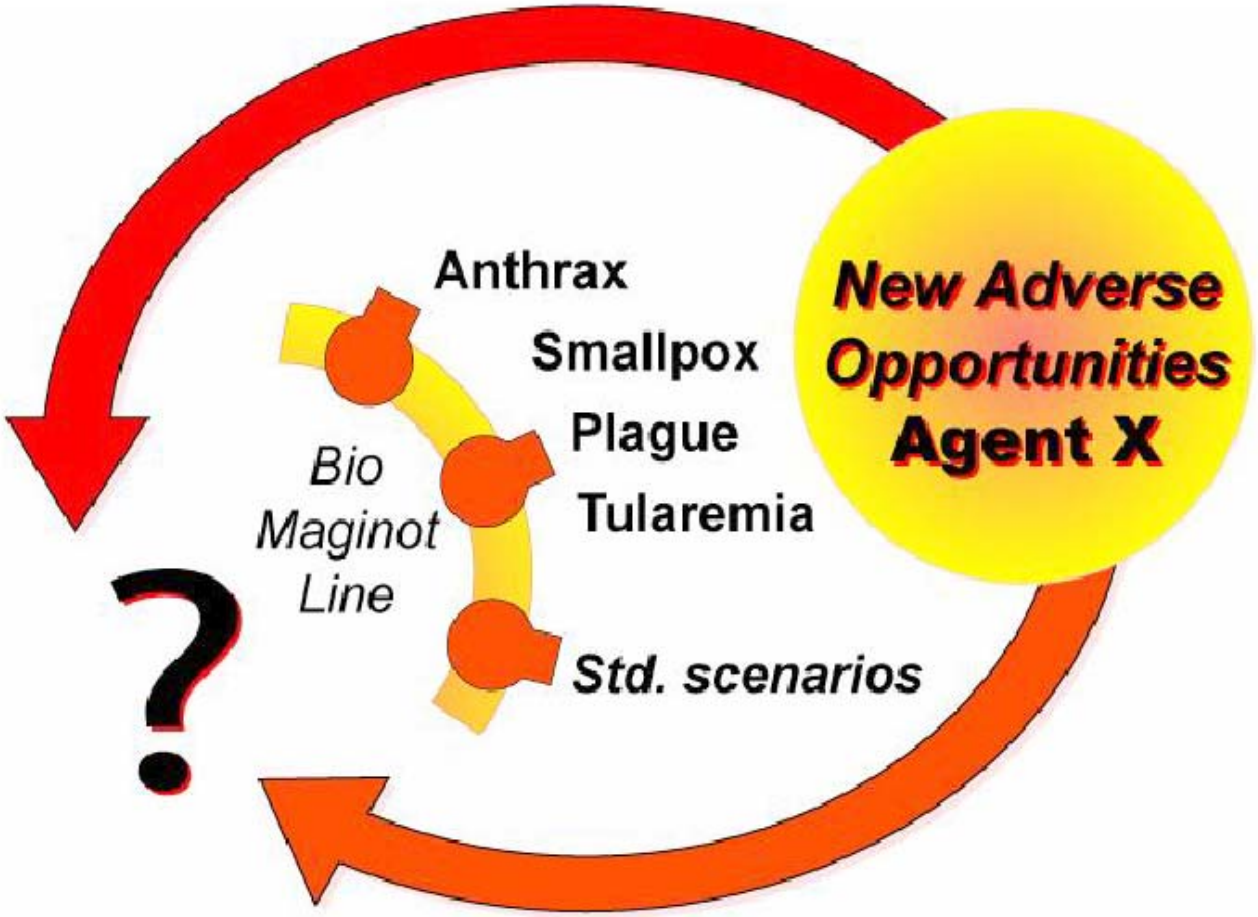
- ***Expert Elicitation*** **is more difficult (complexity)**
- ***Ranking of Agents*** **not as useful as might be thought**
- ***Scenario-creation*** **may even be problematic**
  - **Too many variables in outcome, science**
  - **May lend degree of overconfidence to planners**

Biosecurity Risk Analysis: Realities, Issues

Expert Elicitation

- **Limited by:**
  - **Doctors:**
    - **Lack of ID training in medical schools, lack of Bioterror, terrorism knowledge**
    - **Lack of experience** with even natural epidemics
    - **Little knowledge of agents, pathogens**
    - **OR how they would propagate in epidemic** -- due to ignorance AND lack of data, modern precedent
  - **Security experts:**
    - **Lack of medical knowledge at all**
    - **Even Nano-tech "experts" cannot know it all, given the disparate fields that are converging**
    - **"brainwashed" by "All-Hazards" approach -- apples and oranges**

Avoiding a Biosecurity "Maginot Line" and "Agent X" Problem



Stephen Johnston - U.S. Institute of Med. presentation 12/6/07

Overview:

- Technology change increasingly rapid
- Disparate technologies increasingly merging
- Expertise and investment shifting overseas, out of direct control
- Increasing overlap between civilian enterprises and military/weapons technologies and production methods
- Changes occurring in:
  - Nature of information gathering, and even problem framing
  - Ability of in-house Subject Matter Experts to anticipate future threats, or to be able to respond effectively
  - Will be more reliant on cooperation from overseas AND domestic SMEs
- Need to reshape modus operandi of intelligence gathering and international diplomacy
  - Transparency: More, not less (to coincide with open scientific cultures)
  - Cooperation: Can't afford to alienate expert communities, to preserve good will and government/agency reputations in long term
  - Two way communication: What's in it for them?
- Issues, Problems:
  - How to address diverse S&T SME cultures: Government vs. private sector enterprises
  - Globalization widens security "systems" to entire world -- multiple countries, enterprises, MNCs: Who do you negotiate with?