

The World is Small: Addressing Biological Risks as a Global Science Community

Elizabeth Griffin Foundation Presentation

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American Association for the Advancement of Science

What is the Problem?

Figure 1: Spectrum of biological risks (Taylor 2006)

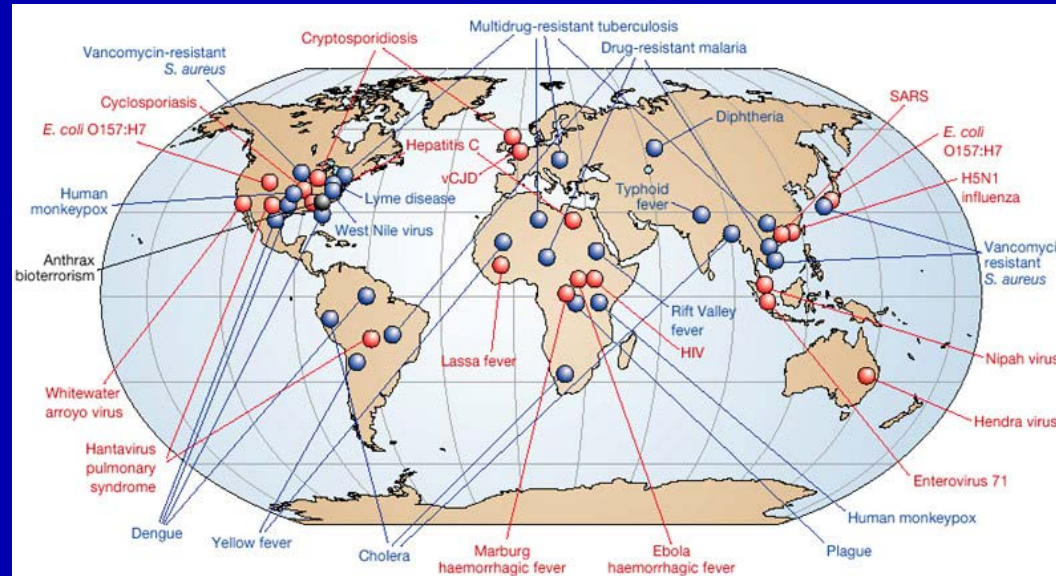
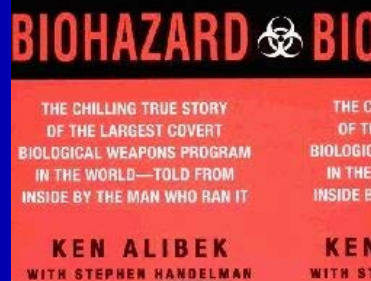


Royal Society. New approaches to biological risk assessment. (2006)

From Nature to Weapons to Terrorism and Back Again



Center for Nonproliferation Studies

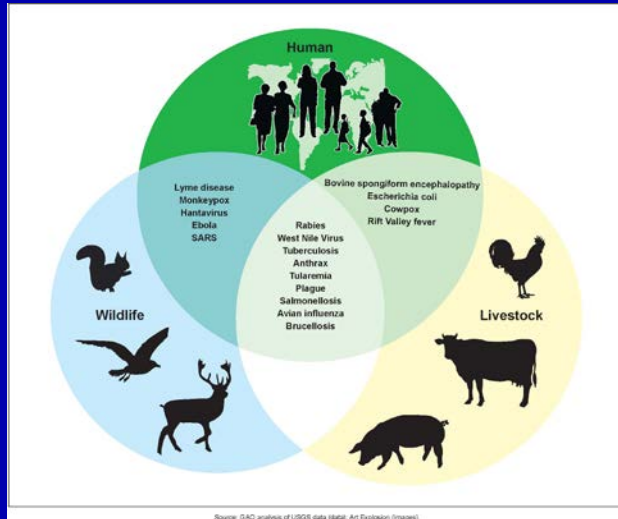


Fauci. Nature. 2004



Defense Threat Reduction Agency

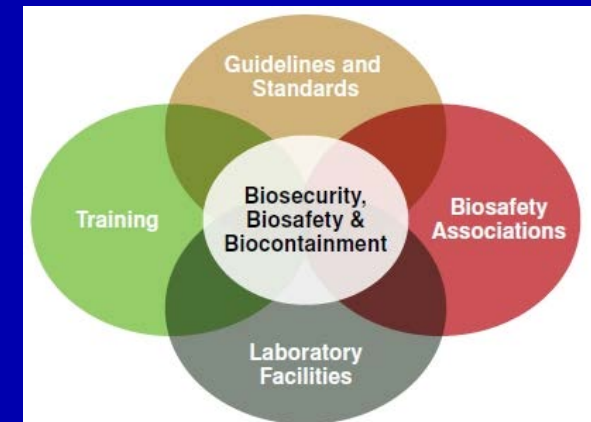
The International Community Responds...



Government Accountability Office



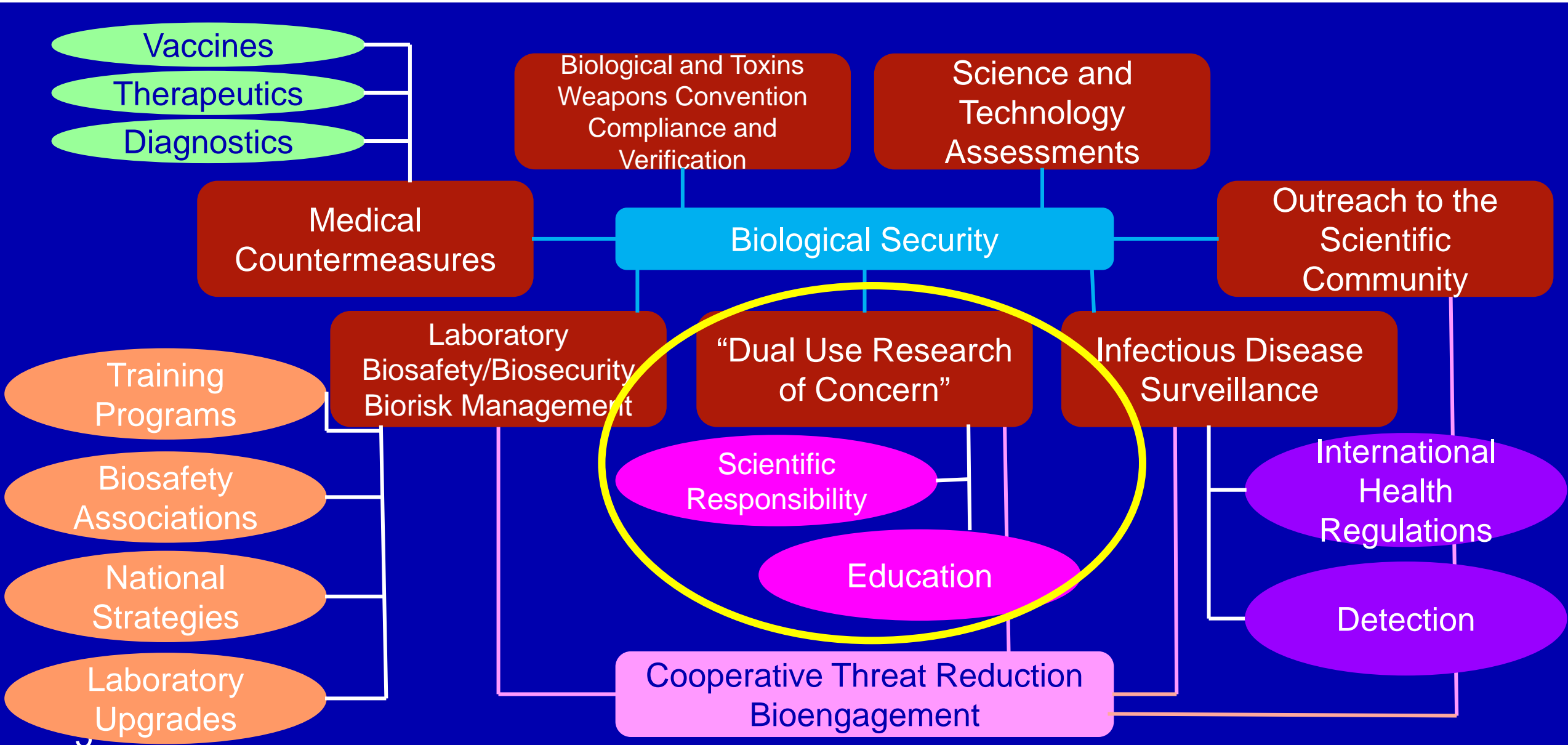
United Nations



Foreign Affairs, Trade and Development
Canada



Global Partnership



Spectrum of Biological Risk and Responsible Science



Science, Security, and Global Health: H5N1 Influenza

THREAT AND RESPONSE

[CLICK HERE](#) To view the story of mutant flu



nature

LETTER

doi:10.1038/nature10831

Experimental adaptation of an influenza H5 HA confers respiratory droplet transmission to a reassortant H5 HA/H1N1 virus in ferrets

Masaki Imai¹, Tokiko Watanabe^{1,2}, Masato Hatta¹, Subash C. Das¹, Makoto Ozawa^{1,3}, Kyoko Shinya⁴, Gongxun Zhong¹, Anthony Hanson¹, Hiroaki Katsura⁵, Shinji Watanabe^{1,2}, Chengjun Li¹, Eiryo Kawakami², Shinya Yamada⁵, Maki Kiso⁵, Yasuo Suzuki⁶, Eileen A. Maher¹, Gabriele Neumann¹ & Yoshihiro Kawaoka^{1,2,3,5}

Science

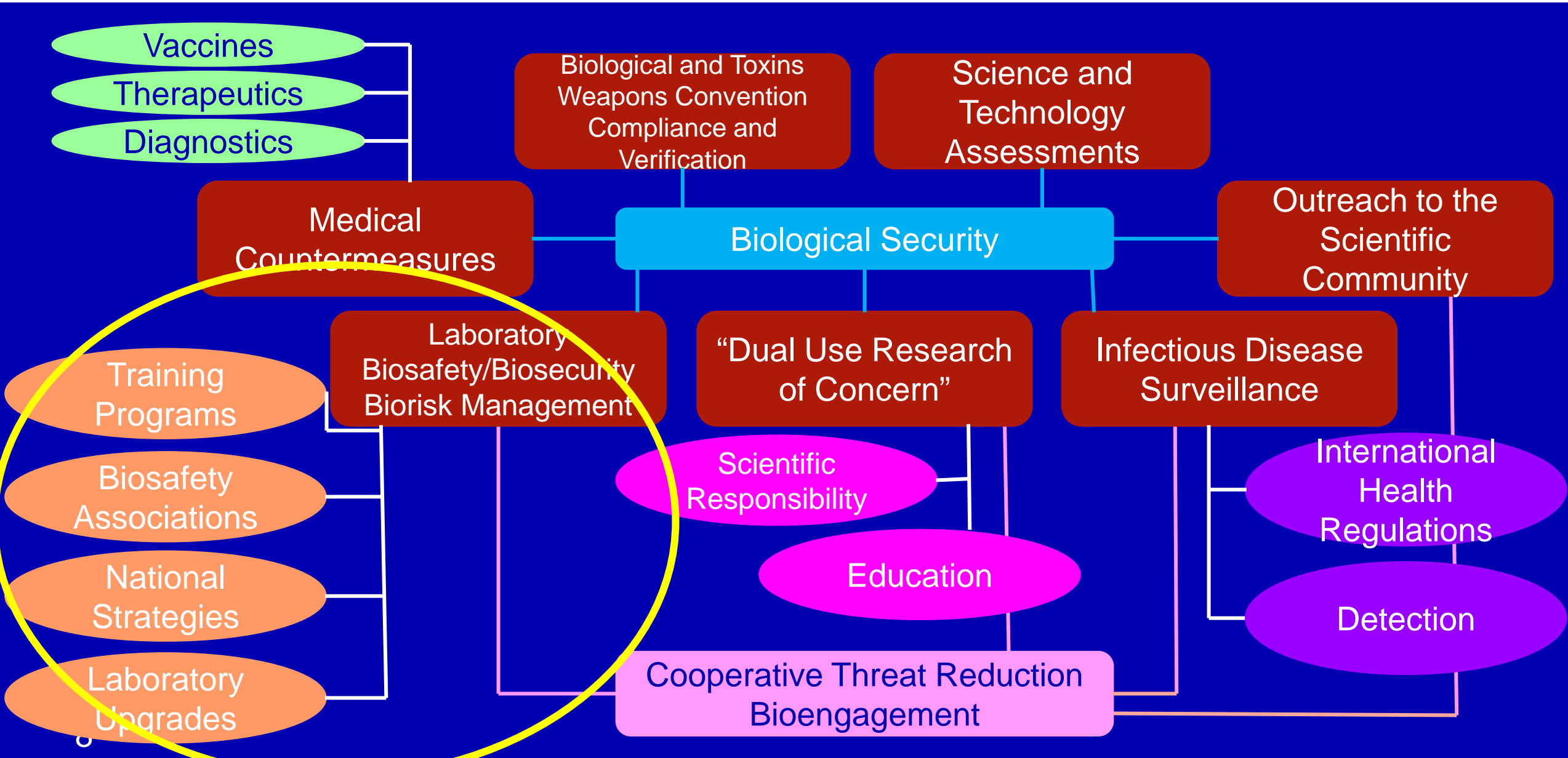
AAAS

REPORT

Airborne Transmission of Influenza A/H5N1 Virus Between Ferrets

Sander Herfst¹, Eefje J. A. Schrauwen¹, Martin Linster¹, Salin Chutinimitkul¹, Emmie de Wit^{1,*}, Vincent J. Munster^{1,*}, Erin M. Sorrell², Theo M. Bestebroer¹, David F. Burke², Derek J. Smith^{1,2,3}, Guus F. Rimmelzwaan¹, Albert D. M. E. Osterhaus¹, Ron A. M. Fouchier^{1†}

Highly pathogenic avian influenza A/H5N1 virus can cause morbidity and mortality in humans but thus far has not acquired the ability to be transmitted by aerosol or respiratory droplet ("airborne transmission") between humans. To address the concern that the virus could acquire this ability under natural conditions, we genetically modified A/H5N1 virus by site-directed mutagenesis and subsequent serial passage in ferrets. The genetically modified A/H5N1 virus acquired mutations during passage in ferrets, ultimately becoming airborne transmissible in ferrets. None of the recipient ferrets died after airborne infection with the mutant A/H5N1 viruses. Four amino acid substitutions in the host receptor-binding protein hemagglutinin, and one in the polymerase complex protein basic polymerase 2, were consistently present in airborne-transmitted viruses. The transmissible viruses were sensitive to the antiviral drug oseltamivir and reacted well with antisera raised against H5 influenza vaccine strains. Thus, avian A/H5N1 influenza viruses can acquire the capacity for airborne transmission between mammals without recombination in an intermediate host and therefore constitute a risk for human pandemic influenza.



Biorisk Management



Center for International Trade and Security

CEN
WORKSHOP
AGREEMENT


CWA 15793
February 2006

ICS 07.100.01

English version

Laboratory biorisk management standard

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WHO/CDS/WP/06.4

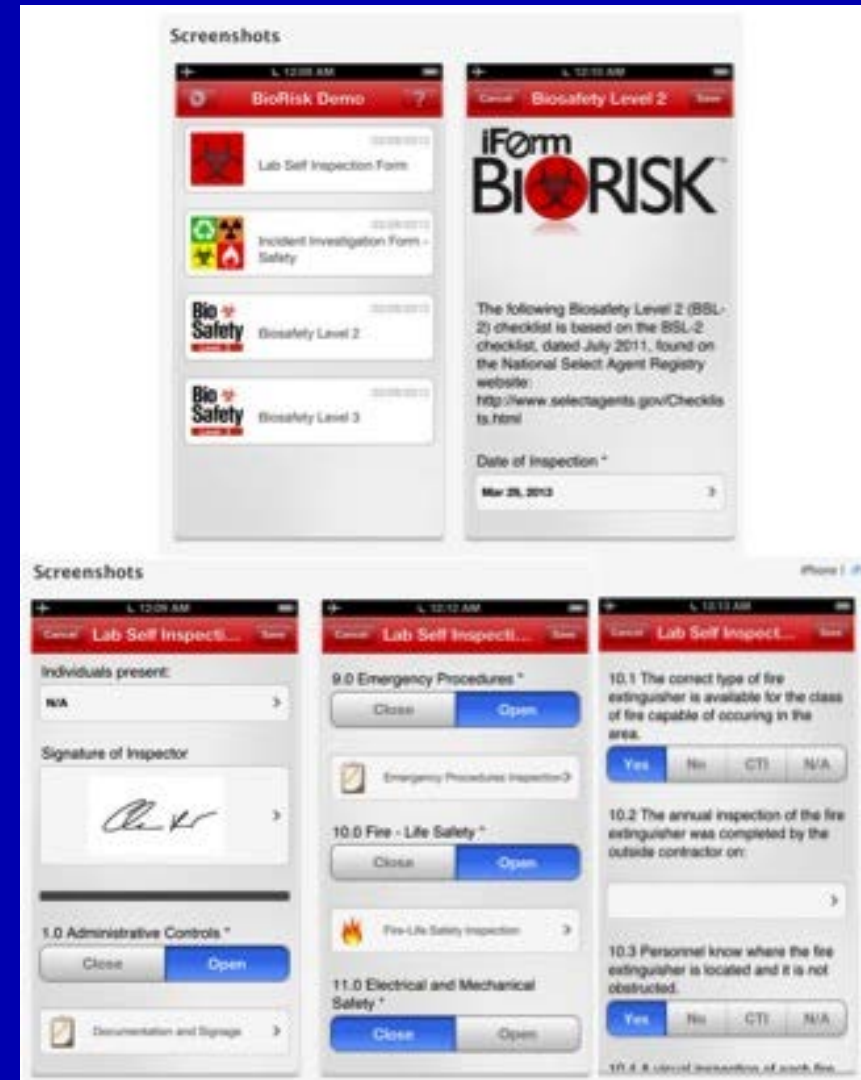
Biorisk management
Laboratory biosecurity
guidance

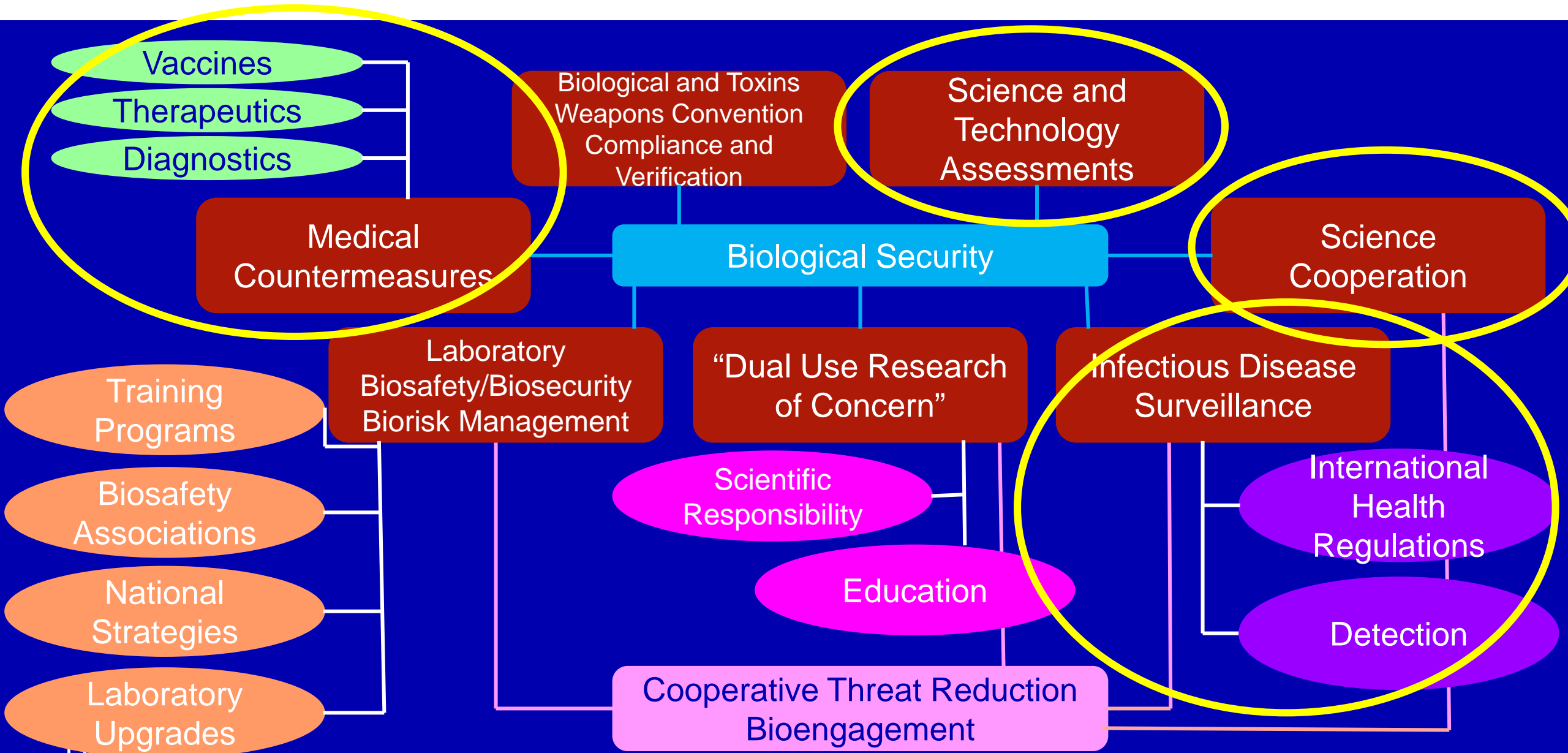
September 2006


EPIDEMIC AND PANDEMIC
ALERT AND RESPONSE

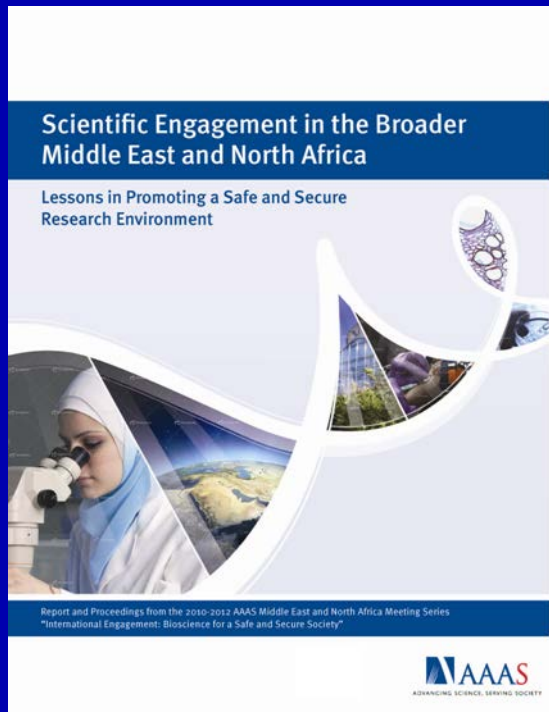
 World Health
Organization

A New Job for iPADS: Elizabeth R. Griffin Research Foundation



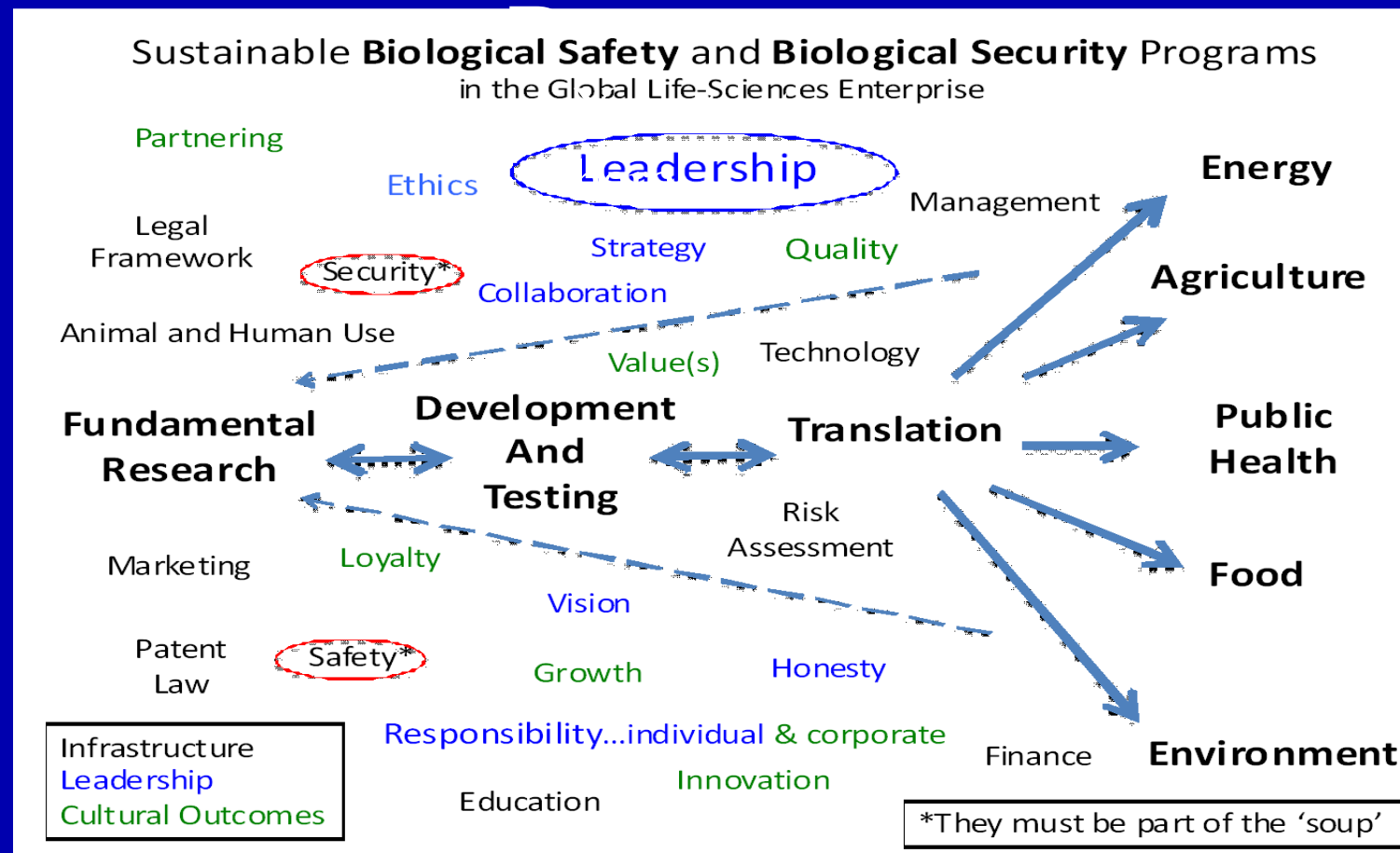


Biological Science Engagement

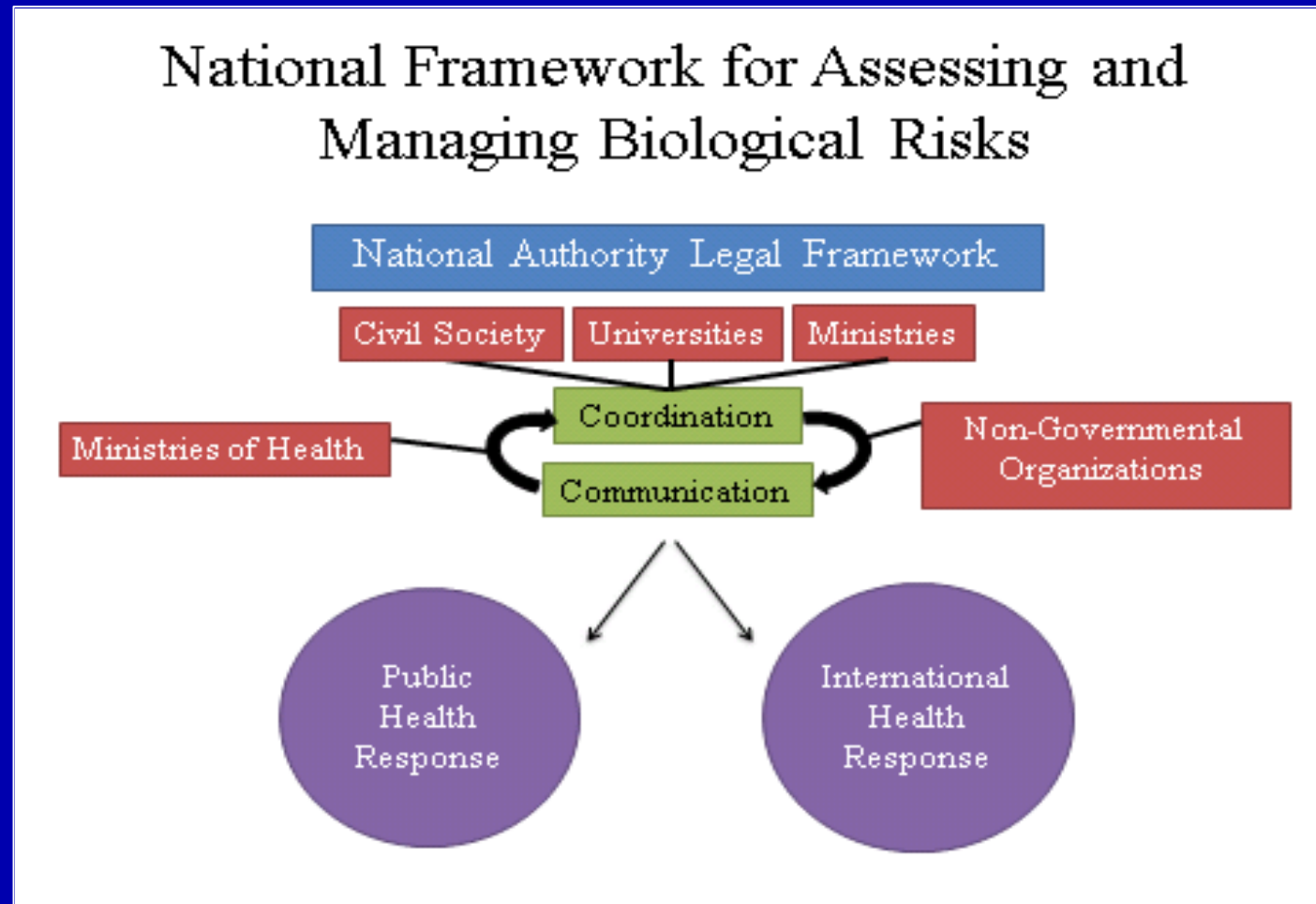


- Scientific collaboration promotes safe, secure, and ethical conduct on research to address biological security risks
- Stakeholder communities include researchers; human, animal, plant, and environmental health officials; and administrators
- Biosafety, biosecurity, and biosecurity are complementary of overlapping risks
- Early-career scientists should be included in the development and implementation of risk prevention and mitigation activities
- All stakeholders have a collective responsibility to address biological risks
- Scientific networks provide opportunities for training, funding, and discussing scientific issues

Sustainable Biological Risk



Integrated Biological Risk Framework



Approaches for Addressing Biological Risks Throughout the World



What Can Scientists Do?

Engagement with State Parties Delegates

- Logistics of preparedness and response
- Informative Confidence Building Measures
- Benefits to Articles 7 and 10

Sharing of Best Practices with Broader Scientific Sectors

- Safety and Security Practices
- Ethics and Corporate Responsibility
- Personnel Security

Science and Technology Assessments

- New Technology Developments
- Applications of Technologies to Preparedness and Response
- Risks of Technologies

Cooperative Threat Reduction

- Health Systems Strengthening
- Laboratory Safety and Security
- Infectious Disease Surveillance
- Technology Transfer

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