

**Biosecurity:  
Escalating Technological, Geopolitical and  
National Security Complexities**

**Dr. George Poste**

**Regents' Professor and Del E. Webb Chair in Health Innovation  
Complex Adaptive Systems Initiative, Arizona State University  
[george.poste@asu.edu](mailto:george.poste@asu.edu)**

**BioSecurity and Pandemic Resilience: Winter 2025  
BIOE 122, EMED 122/222, PUBLPOL 122/222  
Stanford University School of Medicine, January 22, 2025  
Slides available @ <https://casi.asu.edu/presentations/>**

# The Four Horsemen of the Apocalypse

- pestilence
- war
- famine
- death



Albrecht Dürer, 1498

# The Horsemen of the Apocalypse

- pestilence
- war
- famine
- death
- (social media will arrive later five centuries )



Albrecht Dürer, 1498

# Biosecurity



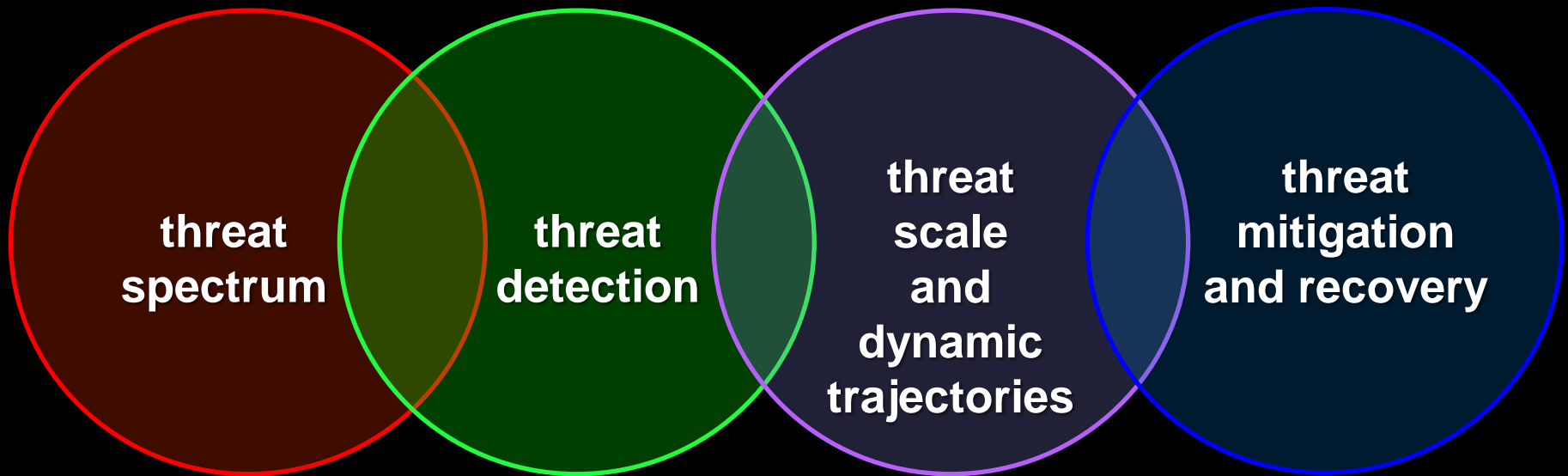
- **more than protection against infectious diseases (natural or engineered)**
- **a complex spectrum of multi-dimensional events with potential to cause major disruptions in societal stability and/or increase risk of global conflict**
- **escalating complexity driven by global connectivities and acceleration of technology innovation**
- **substantial expansion of theoretical dual-use applications from convergence of advances in biotechnology, synthetic biology and AI**
- **parallel strategic importance for national economic competitiveness and military advantage of the industrial bioeconomy**
- **increased importance of biosecurity and the bioeconomy in global trade, foreign policy and military strategy**

**The Global Risks  
Report 2025**  
20th Edition

INSIGHT REPORT



# **Biosecurity: Preparedness, Response, Resiliency & Recovery (PR3) Capabilities**

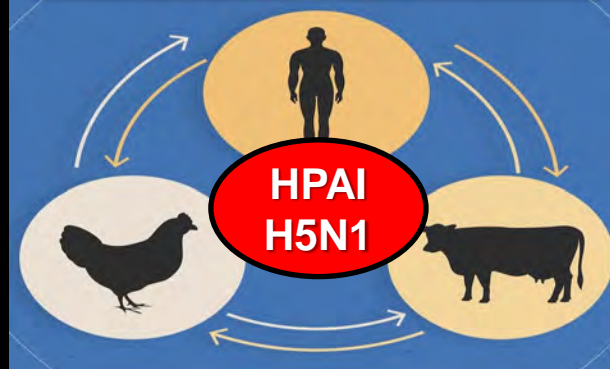


# The Relentless Ever-Changing Dynamics of Infectious Diseases

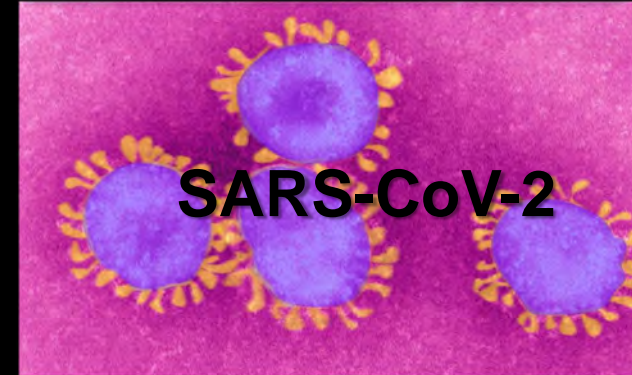
old foes resurgent:  
Rx – resistance



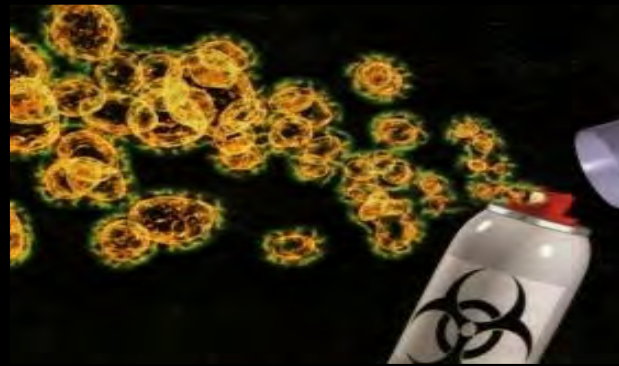
omnipresent  
pandemic threats



new foes:  
emerging infectious  
diseases



climate change and  
new vector ranges



bioterrorism and  
bioweapons



dual-use  
research of concern

# Comfort and Complacency: The Enemies of Vigilance and Preparedness



6 of the 18 most alarming **antibiotic resistance threats** cost the U.S. more than **\$4.6 billion annually**



Vancomycin-resistant *Enterococcus (VRE)*



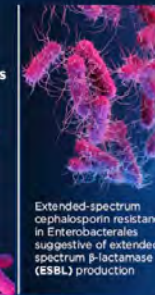
Carbapenem-resistant *Acinetobacter* species (*CRAsp*)



Methicillin-resistant *Staphylococcus aureus (MRSA)*



Carbapenem-resistant *Enterobacterales (CRE)*



Extended-spectrum cephalosporin resistance in *Enterobacterales* suggestive of extended-spectrum  $\beta$ -lactamase (*ESBL*) production



Multidrug-resistant (MDR) *Pseudomonas aeruginosa*

[www.cdc.gov/DrugResistance](http://www.cdc.gov/DrugResistance)

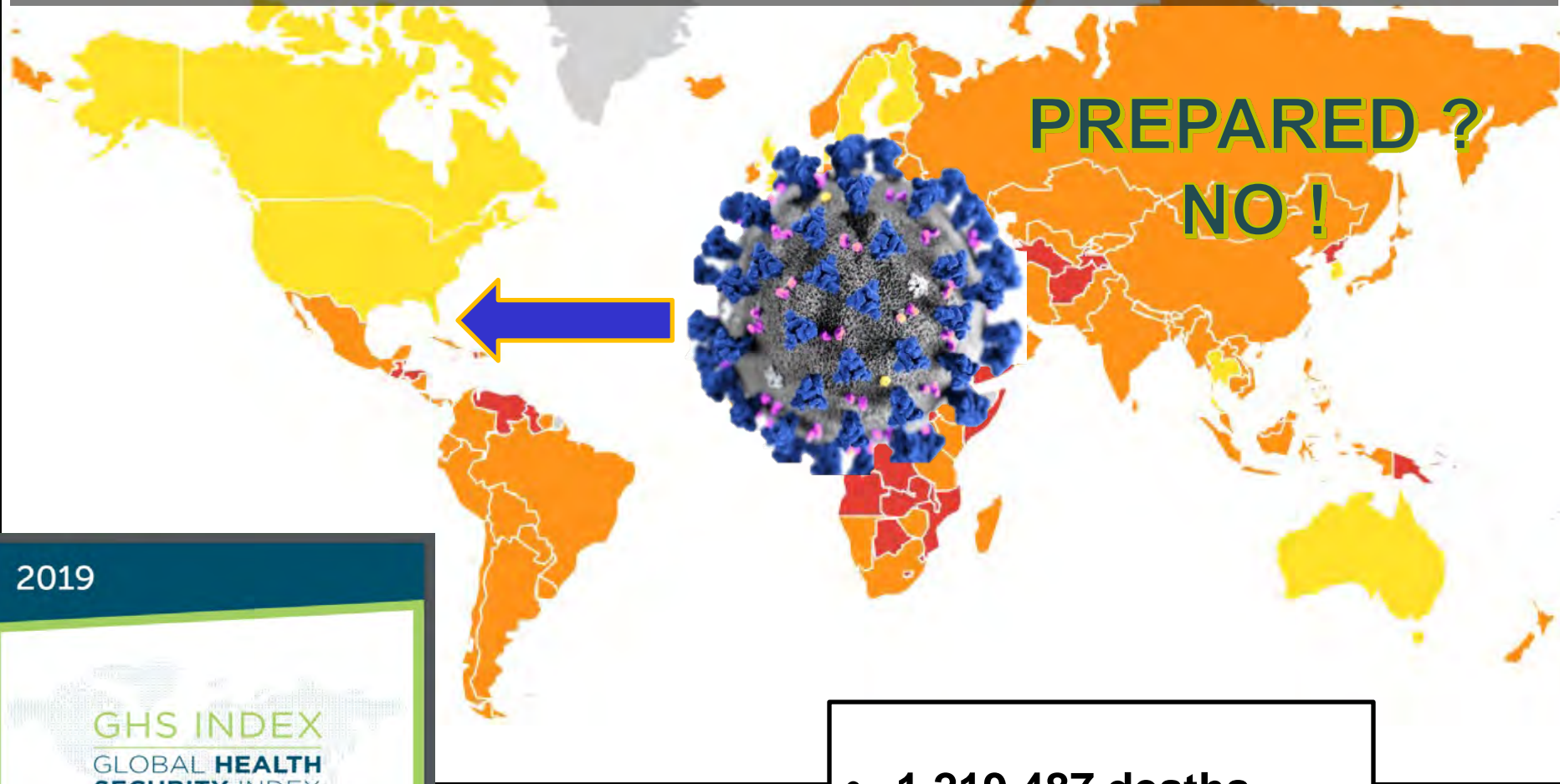


U.S. Department of Health and Human Services  
Centers for Disease Control and Prevention





# SARS-CoV-2 Revealed Major Shortcomings in US Public Health Capabilities and Fragility of Healthcare Delivery Systems



2019

**GHS INDEX**  
GLOBAL HEALTH  
SECURITY INDEX

Building Collective Action and Accountability

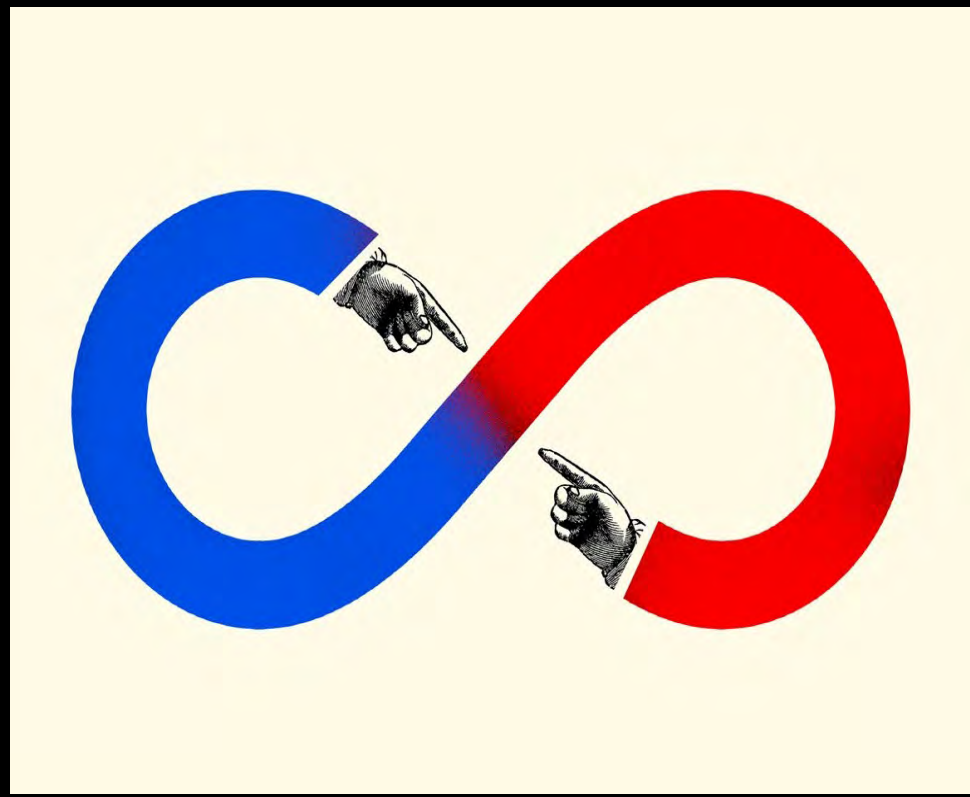


- **1,219,487 deaths**
- **111,820,000 cases**
- **estimated \$14 trillion economic impact**

# **The (False) Comfort and Complacency in the COVID Pandemic: Rude Shocks**

- **epidemics are something that happens over there!**
- **out-of-sight/out-of-mind**
- **unvoiced but persistent belief of American exceptionalism**
  - **money, resources, sophisticated research capabilities and superior health will stop disease in its tracks**
  - **delusion rudely shattered by COVID-19**
- **chronic neglect of public health investment in an era of globalization of commerce and transport**
- **risk warnings long ignored**
- **COVID just latest episode in repeated historical cycles of neglect-panic-fund-forget again in preparedness, response, resilience and recovery (PR3) against the threat of infectious/parasitic diseases**

# A Critique of the US Response to COVID-19

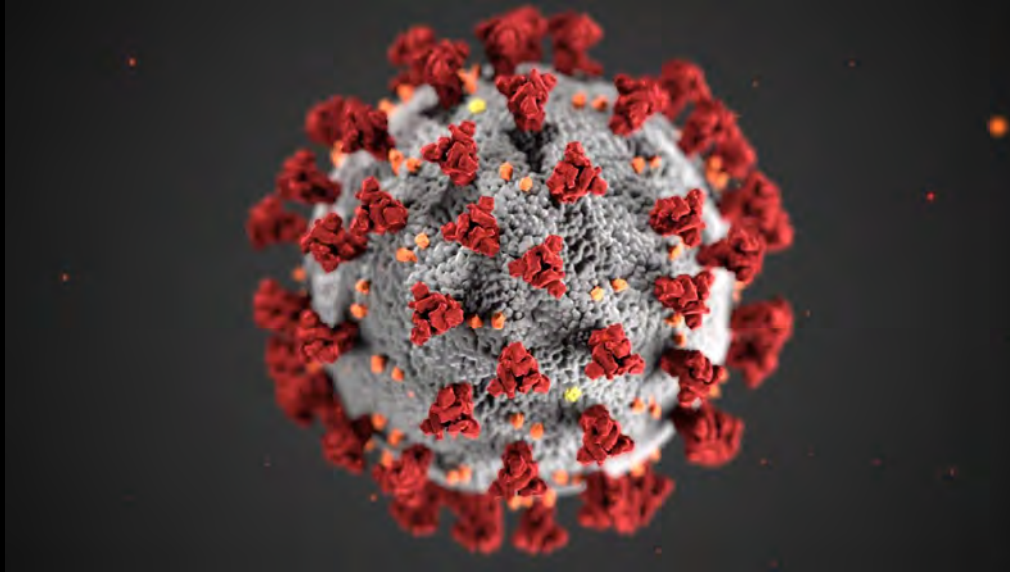


- mix politics and public health then politics always wins
- technological illiteracy of the legislative and executive branches
- divisive partisan politics
- ever changing messaging
- media sensationalism and 'gotcha' journalism
- proliferation of disinformation on social media
- public confusion and mistrust

# Countering Disinformation: A Growing Challenge in Public Health Communications and Sustaining Public Trust



- unchecked dissemination of inaccurate information on social media
- controversy and extremism drives clicks=revenue
- manipulate public opinion, increase socio-political tensions and erode trust in authorities/decisions
- active role of PRC and Russia in COVID-19 pandemic



**If we knew then what we know now,  
what would we have done differently?**

# **Seven Overarching Requirements for Proficient Preparedness, Response, Resilience and Recovery (PR3)**

- **pathogen agnostic capabilities**
- **detection (surveillance, diagnostics:Dx)**
- **countermeasures (Dx, Rx and vaccines)**
- **speed, scale up, stockpiles and supply chains (private sector engagement)**
- **data (real-time situational awareness)**
- **coordination (national, international)**
- **decisions (policy, transparency, messaging, public trust)**
- **equity (resources, training)**

# **Preparedness, Response, Resiliency and Recovery (PR3) Capabilities**

- **epidemics can be as devastating as pandemics at the local level**
  - **dengue, yellow fever, Marburg, Ebola, Zika, Chikungunya**
- **next major epi-pandemic (Agent-X) may have very different features to COVID-19**
  - **transmissibility; symptomatic: asymptomatic ratio; duration of fomite shedding**
  - **lethality; organ morbidity patterns; and post-infection sequelae**
  - **different high-risk cohorts (children vs adults)**
  - **GI vs respiratory spread vs vector-borne**
  - **contaminated surfaces risk vs aerosols**
  - **environmental persistence and decontamination needs**
  - **zoonotic source(s) and reverse zoonoses risk**

# Silos Subvert Solutions!

## The Imperative for Integrated, Systems-Based Coordination of PR3 Capabilities



December 2024





# New Technologies for Rapid Detection of Biothreats



- **waste-water surveillance and pathogen detection**



# Flying Blind!

## The Dangerous Void Created by Lack of Comprehensive Diagnostic Infrastructure for Pathogen Detection



- massive gaps in real-time spatio-temporal epidemiological data in early stages of COVID-19 pandemic
  - inadequate availability of diagnostic tests to map infection prevalence and distribution
  - underappreciation of asymptomatic infections
- negative impact on accuracy of computational forecast modeling of pandemic trajectory
  - influence on national policy decisions
  - 'lock downs', school/work closures, travel bans, employment
  - multibillion USG emergency financing to support the economy

# The Dangers of Intellectual Arrogance: Public Sector Failings as a Major Vulnerability in Limiting COVID Detection



## CDC Advisory Committee to the Director (ACD) Laboratory Workgroup (LW)

Review of the Shortcomings of  
CDC's First COVID-19 Test and  
Recommendations for the Policies,  
Practices, and Systems to Mitigate  
Future Issues

ADOPTED BY ACD VOTE ON FEBRUARY  
7, 2023



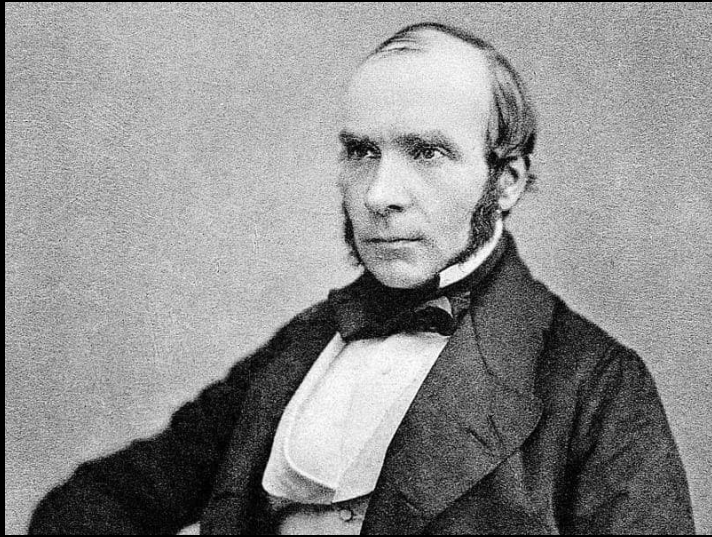
World Health  
Organization



**Abbott**

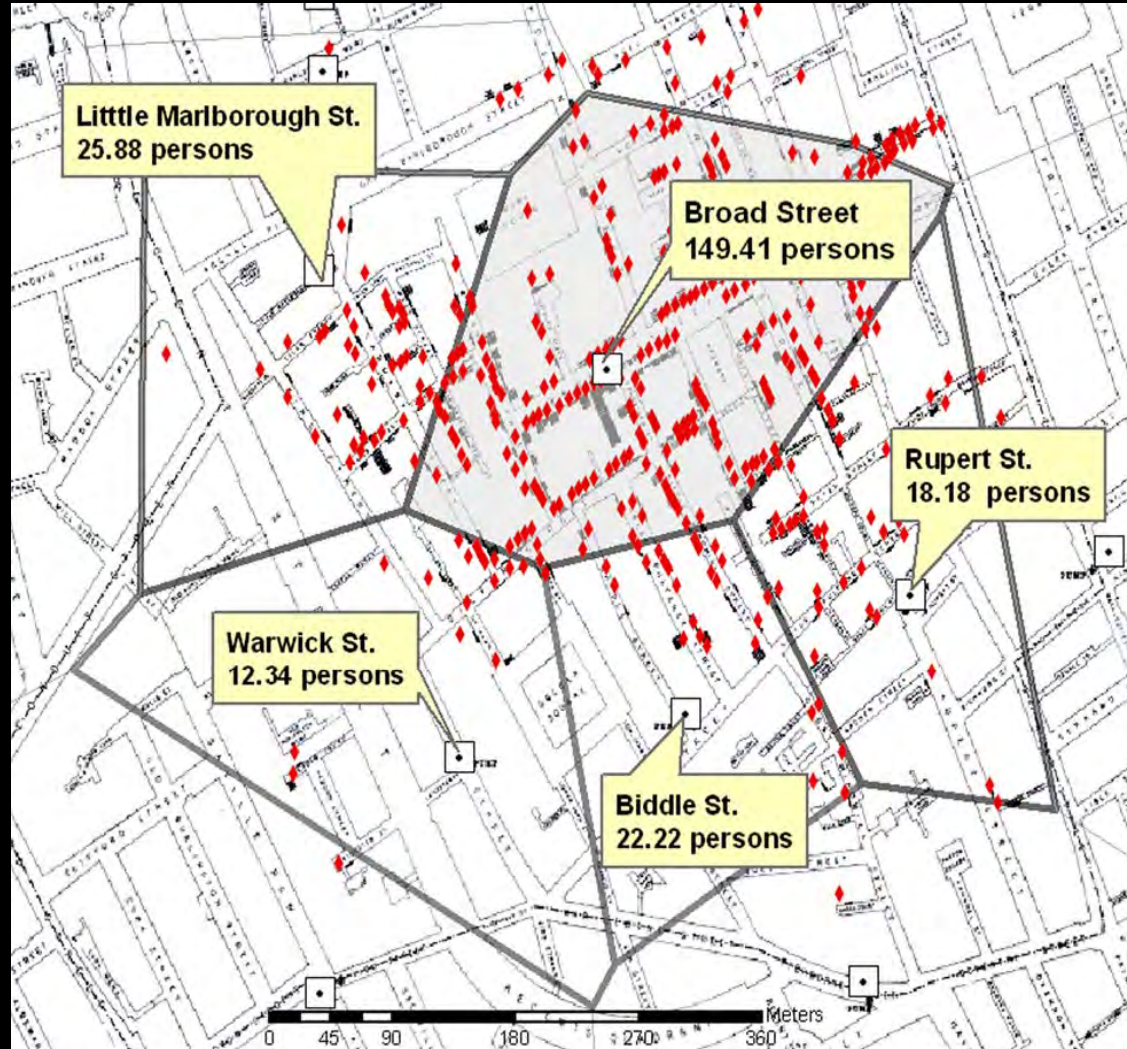
- **WHO turned down Abbott's application to join WHO's outbreak alert network**
  - **“discomfort with the industry connection”**
  - **“free from concerns which are primarily of a commercial or profit-making nature”**

# Data: The Foundation of Epidemiology and Informed Decisions



**Dr. John Snow, 1855**

- cholera deaths per 1,000 population

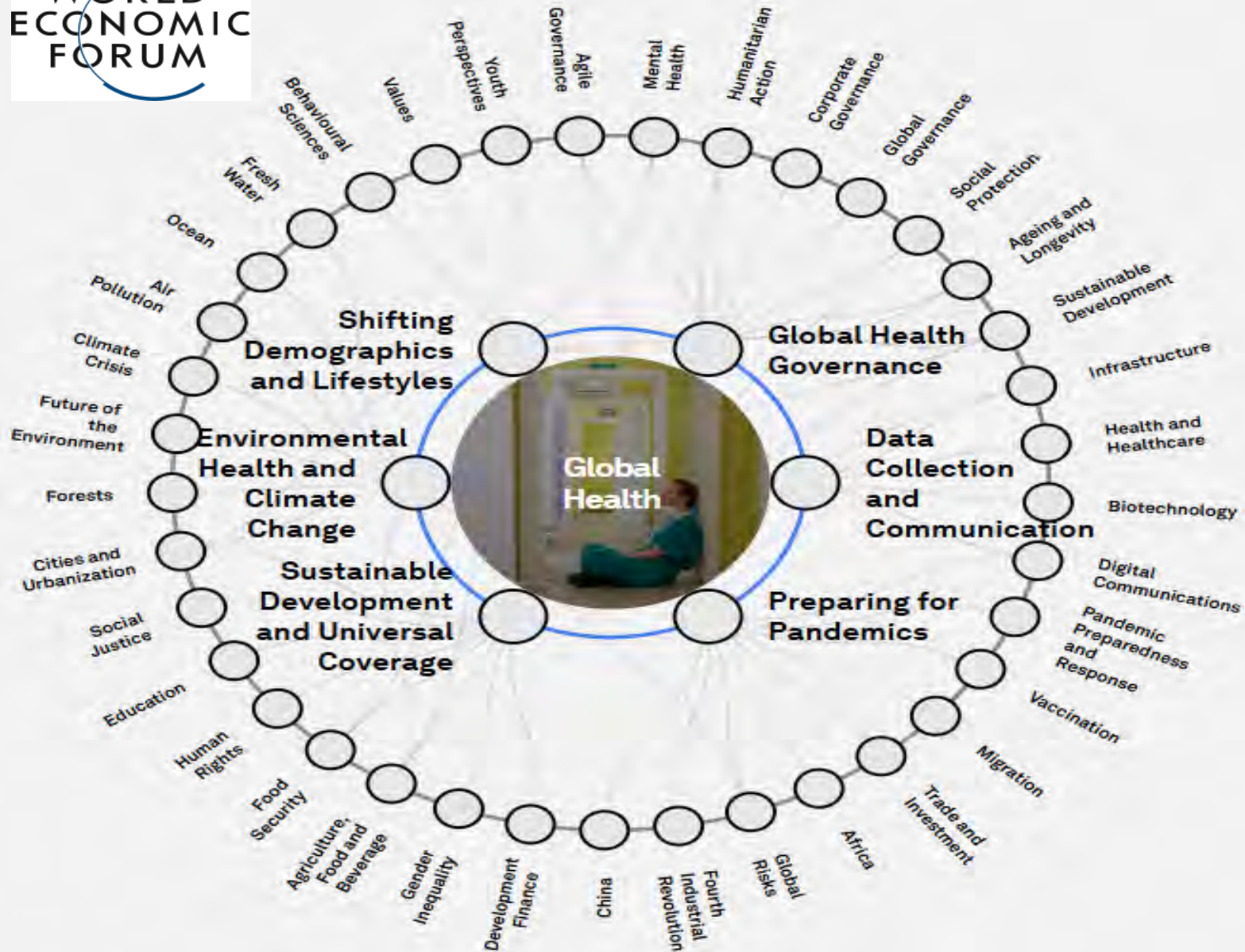


# **Biosecurity and BIOINT: Capture of Threat-Agnostic Multi-Modal Data**

- **global to local**
- **threat tracking (known, suspected, theoretical)**
- **population demographics**
- **public health, syndromic surveillance**
- **geospatial (environmental, meteorological, ecological)**
- **travel and trade patterns**
- **social media and behavioral patterns**

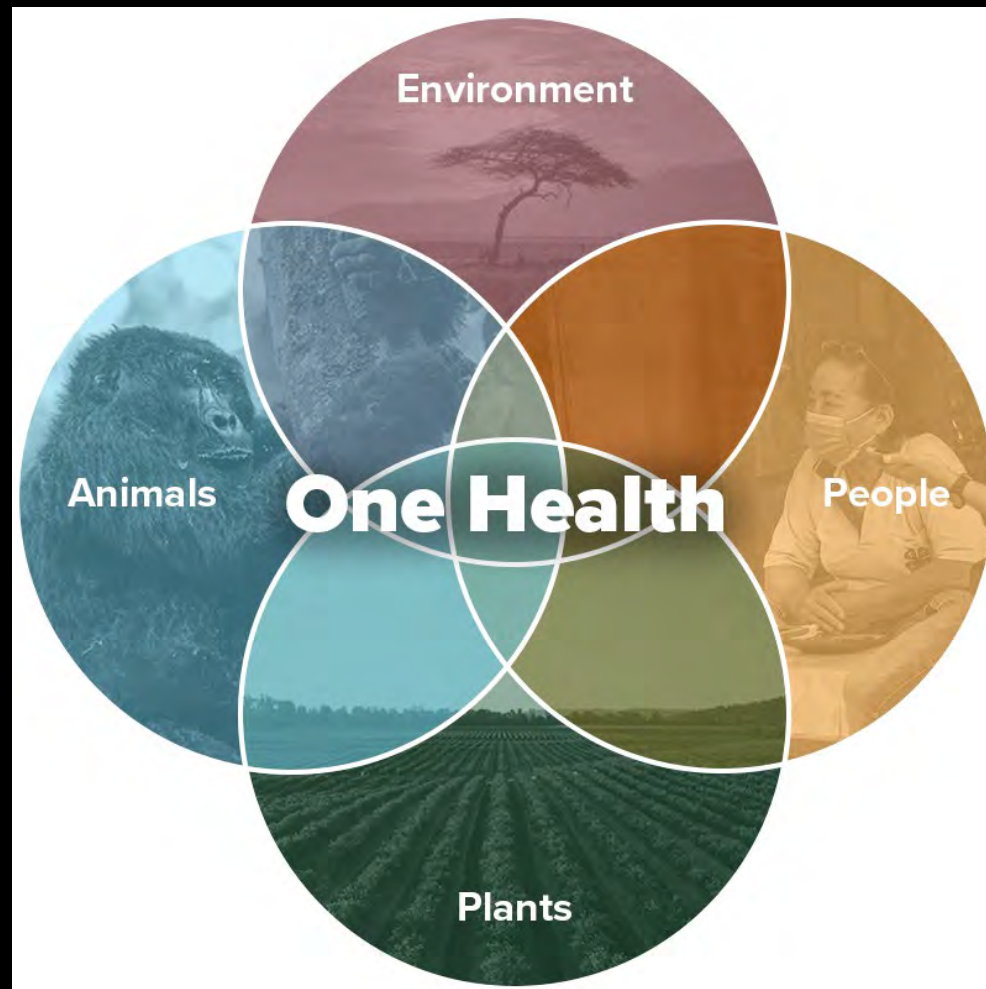
# Biosecurity: Everything Connects

WORLD  
ECONOMIC  
FORUM



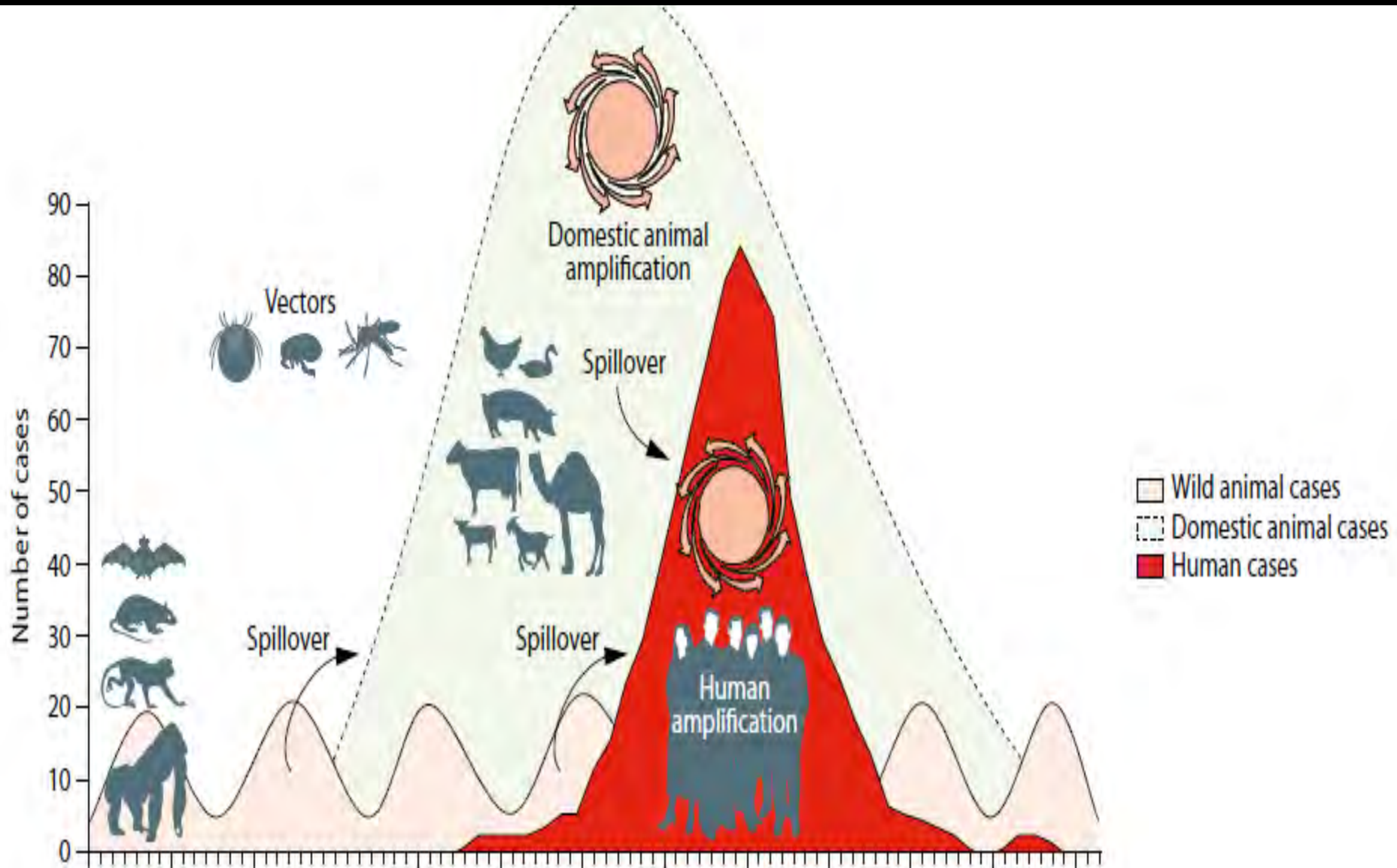
# One Health and Global Biosecurity

- an integrated, systems-based approach to optimize the health of people and animals, ensure availability of crucial food chains and sustainable environmental ecosystems

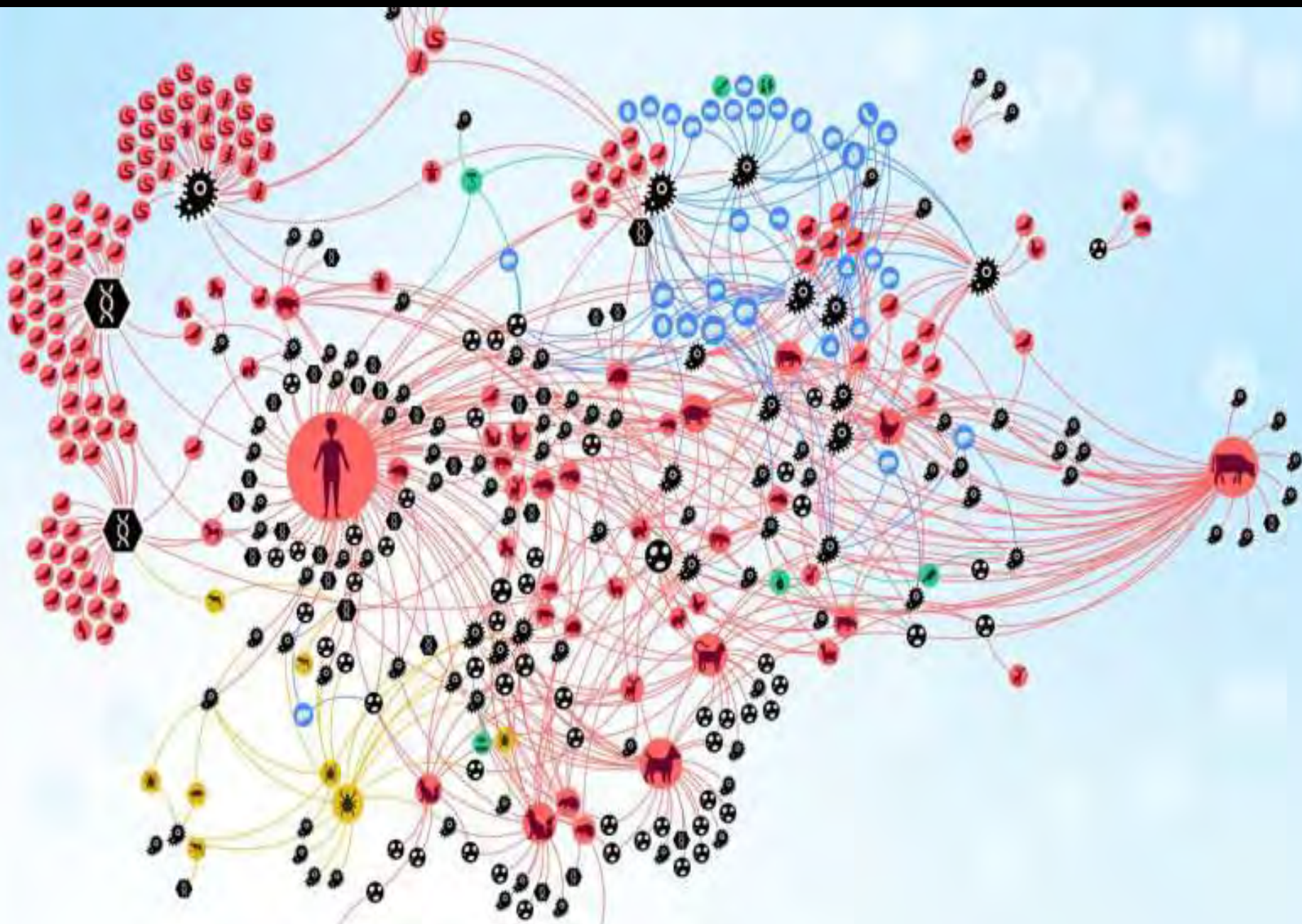




# Dynamics of Cross-Species Zoonotic Pathogen Risk Spillover



# Complexity of Zoonotic Transmission Chains



# RNA Viruses as Major EID Threats

- **45-50% of EIDs**
- **error-prone replication cycles**
- **faster evolutionary rates and emergence of variants**
  - **higher risk of ‘species-jump’**
  - **immune evasion mutations**
  - **altered tissue tropism**
- **genetic reassortment between avian, mammalian and human viruses**

# Dissecting Pandemic-Prone Viral Families

**Picornaviridae**

**Orthomyxoviridae**

**Paramyxoviridae**

**Pneumoviridae**

**Adenoviridae**

**Coronaviridae**

# Urbanization and Mega-Cities in LMICs



# Urbanization and Mega-Cities in LMICs and the Increased Threat of Zoonotic EIDs

**High Population Density With Inadequate Biosurveillance**



**Expanded Footprint and New Zoonotic Exposures/Risks**



**Major Gaps in Health Infrastructure and Rapid Disease Reporting**



# Anthropogenic Forces That Increase Exposure of Human and Livestock to Feral Animal Zoonotic Reservoirs

## Habitat Destruction for Expansion of Urban Food Supply Chains



## Concentrated Animal Feeding Operations (CAFOs)



Science 380, 6640 Apr 2023



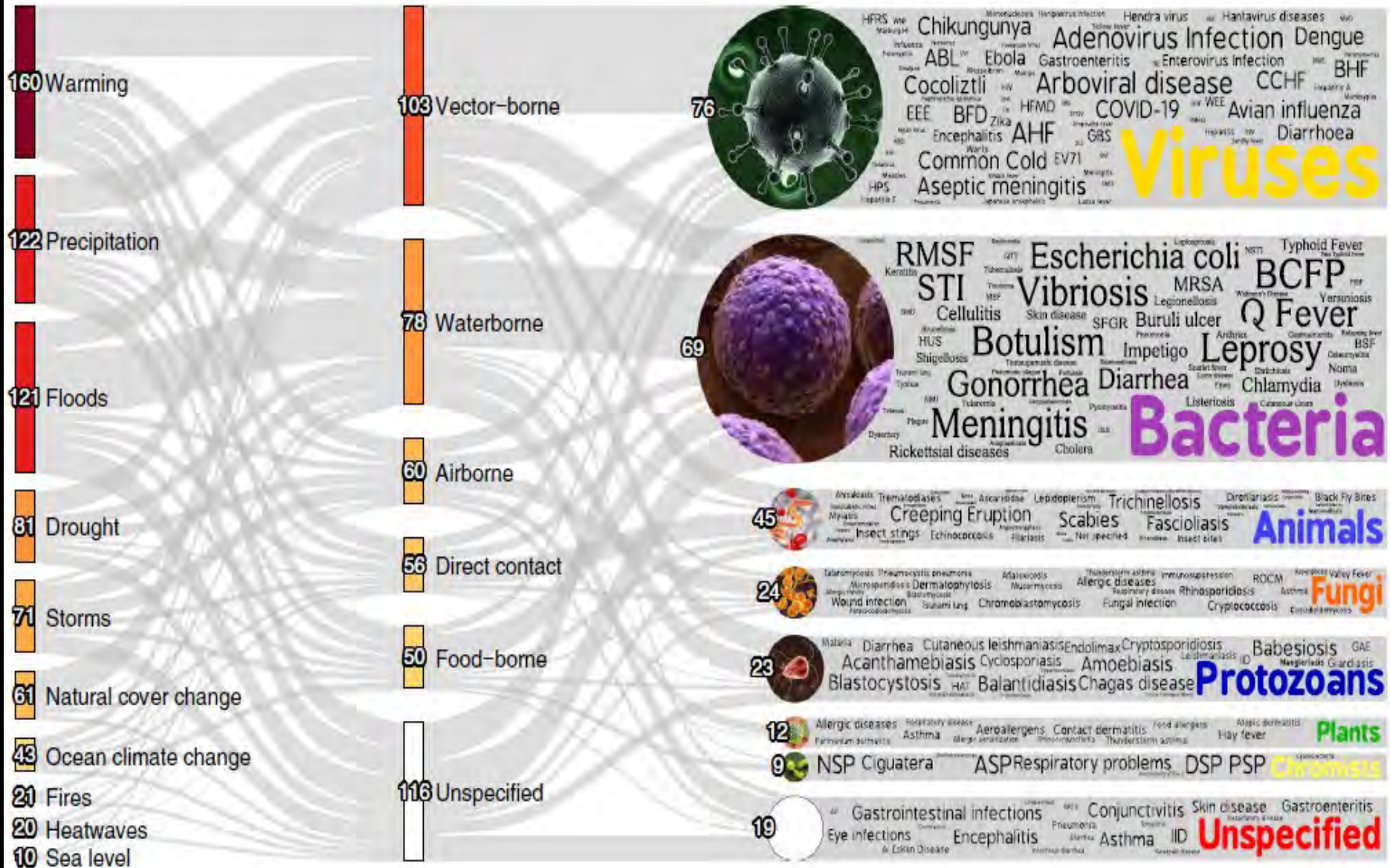
February 2020, Photo: Feature China/Barcroft Media via Getty Images

# Aggressive Actions to Contain Highly Pathogenic Avian Influenza as Potential Human Pandemic Agent





# Over Half of Known Human Pathogenic Diseases Can Be Aggravated By Changing Weather Patterns



# **The Convergence of Biotechnology, Synthetic Biology and Artificial Intelligence (BIOxAI)**

**Dramatic Expansion of the Dual-Use Dillema**

# Oversight Mechanisms for Biosafety and Biosecurity

- dual-use research of concern (DURC)
- pathogens with pandemic potential (PPP)
  - enhanced PPP (ePPP)
- gain-of-function (GOF)
  - “research with pandemic potential risks”

- understandable but narrow historical focus on microbial pathogens and toxins
- bias towards anthropocentric risk versus zoonotics, crop infestations and ecosystem disruption
- pace of rapid technological change outstripping oversight and regulatory revisions

**Increased Public and Legislative Concerns  
Regarding Adequacy of Oversight**

# Global Expansion of High Biosafety Level (BSL-3/4) Laboratories



- COVID-19 pandemic highlighted gaps in preparedness resources for handling high-risk pathogens
  - conventional public health (BSL-3)
  - expanded capabilities for translational research (Rx, vaccines)
- plans announced to build 27 new BSL-4 facilities
  - Russia (15), PRC (4), India (4), Kazakhstan, Singapore, Philippines, US (1)
- long lead times for construction and certification
- high operational costs (\$15-20M/year)
  - maintenance, air handling, security
- staff training and (re)certification in stringent-biohazard containment protocols to limit risk of biosecurity breach

# Discovery of Illicit Chinese Laboratory: Reedley, California



Figure A.

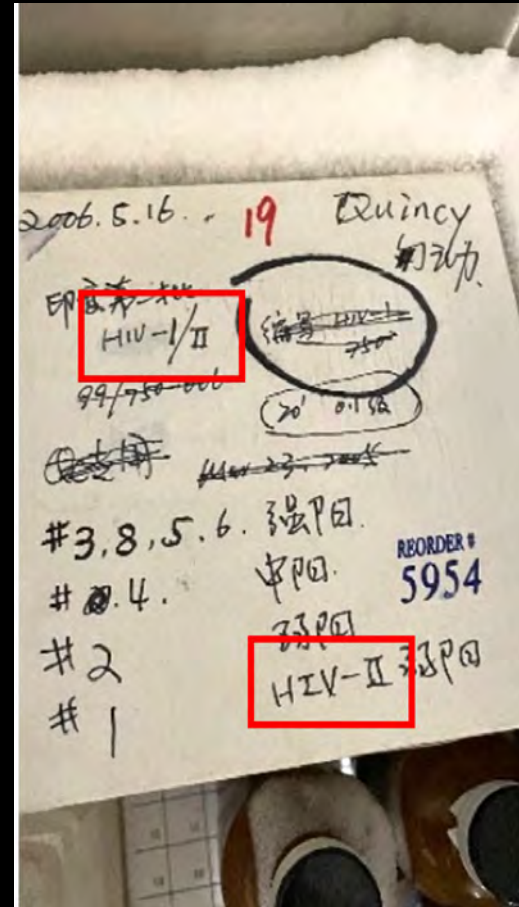


Figure B.



THE SELECT COMMITTEE ON THE  
CHINESE COMMUNIST PARTY  
FREEDOM IS THE VICTOR

INVESTIGATION INTO THE  
REEDLEY BIOLAB



# Predictable and Destructive Partisanship: Ideology Matters More than Facts- A Poor Prognosis for Addressing Future Escalating Complexity

December 4, 2024



SELECT SUBCOMMITTEE ON THE  
**CORONAVIRUS PANDEMIC**

— CHAIRMAN BRAD WENSTRUP —

**AFTER ACTION REVIEW OF THE COVID-19 PANDEMIC:  
The Lessons Learned and a Path Forward**



Final Report of the  
Select Subcommittee on the Coronavirus Pandemic  
Committee on Oversight and Accountability  
U.S. House of Representatives



**Partisan Probes Over Pandemic  
Prevention and Preparedness**  
*Select Subcommittee Republicans Spent the 118th  
Congress Putting Politics Over People and Public Health*

Democratic Final Report  
December 2024

**The Eroding Commitment to  
International Coordination in Public Health**

**Dangerous Times Ahead: The International  
Competition for Commercial and Military  
Dominance of BIOxAI**



# The Geopolitical Race for Commercial and Military Superiority in Applications of Biotechnology, Synthetic Biology and Artificial Intelligence



## REPORT TO THE PRESIDENT Biomanufacturing to Advance the Bioeconomy

Executive Office of the President  
President's Council of Advisors on  
Science and Technology

December 2022



## BOLD GOALS FOR U.S. BIOTECHNOLOGY AND BIOMANUFACTURING

HARNESSING RESEARCH AND DEVELOPMENT  
TO FURTHER SOCIETAL GOALS

MARCH 2023

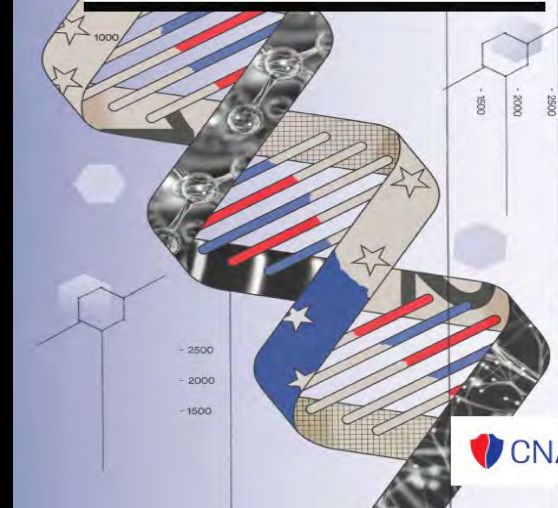


JANUARY 2023

## Biopower

Securing American Leadership in Biotechnology

Vivek Chidukuri and Hannah Kelley



## Biosecurity-by-Design to Safeguard Emerging Bioeconomies



INTEGRATING BIOSECURITY CONSIDERATIONS INTO THE COMPLETE  
BIOTECHNOLOGY INNOVATION AND DEVELOPMENT PIPELINE

Gurpreet Dhaliwal, Askar A. Kleefeldt, Alexandra Klein

NOVEMBER 2023

The National Academies of  
SCIENCES • ENGINEERING • MEDICINE

CONSENSUS STUDY REPORT

## SAFEGUARDING the BIOECONOMY



## BIO SAFETY AND BIO SECURITY INNOVATION INITIATIVE PLAN FOR THE BIOECONOMY

DECEMBER 2024

PREPARED BY

The United States Government and Led by the  
Departments of Health and Human Services and  
Homeland Security



# Global Problems Require Global Solutions

- **balancing growing tension between nation-focused economic and military competitiveness in advanced technologies with global cooperation in mitigation of shared threats**



# New Biosecurity Challenges Posed by the BIOxAI Convergence and the Escalating Complexity of Oversight and Governance

**The Bioeconomy**

- commercial innovation
- global competition
- equity and disparities

**Adversarial Appeal**

- military superiority
- terrorism
- industrial espionage
- cyber attacks

- adversarial
- unintended consequences
  - error
  - accident
- oversight
- counter measures

**Proliferation of Dual-Use Risks**

# The Changing Dimensions of Big Data



# 2024 Nobel Prizes Reflect Two Pathways in AI

## the science of AI

### ▶ Physics



**John J. Hopfield**  
Princeton University, NJ, USA



**Geoffrey Hinton**  
University of Toronto, Canada

## applications of AI

### ▶ Chemistry



**David Baker**  
University of Washington, USA

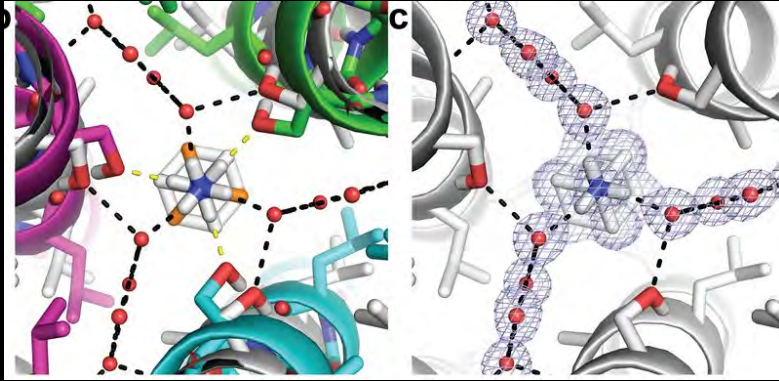


**Demis Hassabis**  
Google DeepMind, UK

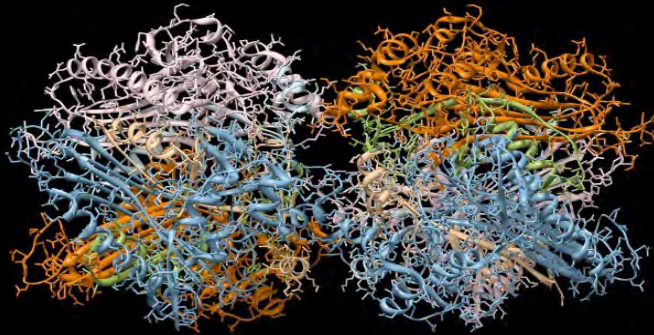


**John M. Jumper**  
Google DeepMind, UK

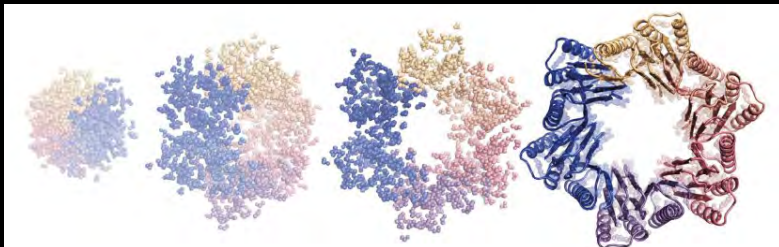
# Use of ML-AI in Protein Design in Drug Discovery and Synthetic Biology



J. Park et. al. (2019) Elife doi.org/10.7554/eLife.47839



<https://www.cnet.com/science/biology/googles-deepmind-ai-predicts-3d-structure-of-nearly-every-protein-known-to-science/>



E. Callaway (2023) Nature 619:236-238; doi.org/10.1038/d41586-023-02227-y

- Expanded Inventory of Novel Protein Structures
- Improved Drug-Pocket Affinities and Allosteric Sites
- Design of Protein-Protein Interactions
- Drugging the Undruggable
- Designer ADME, Targeting Systems for Drug Delivery and Cellular Therapy

# AI-Enabled Protein Design: A Strategic Asset for Global Health and Biosecurity

By Lynda M. Stuart, Rick A. Bright, and Eric Horvitz

October 28, 2024 | Commentary <https://doi.org/10.31478/202410d>

[DAVID BAKER](#) AND [GEORGE CHURCH](#) [Authors Info & Affiliations](#)

**SCIENCE**

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[DOI: 10.1126/science.ad01671](https://doi.org/10.1126/science.ad01671)

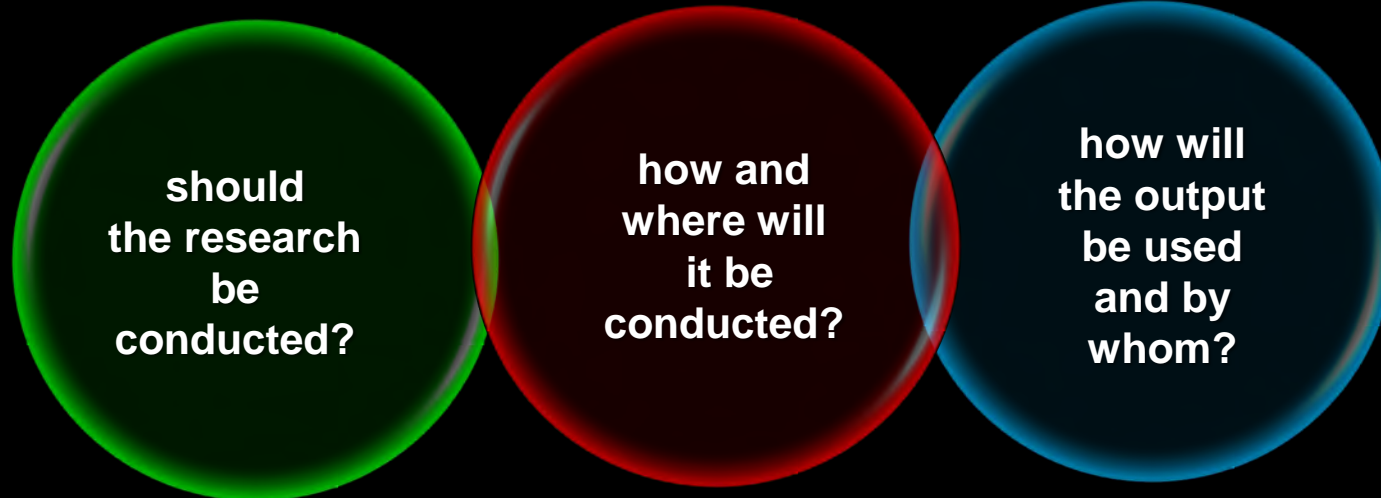
## Protein design meets biosecurity

PAPER — Nov 14, 2024

# Developing Guardrails for AI Biodesign Tools

NTI 

# The Dual-Use/High Risk Triad



- risk: benefit assessment
- alternative methods
- cost
- classification level
- within/outside current regulations
- organizational safety pre-commitments

- credentialed expertise
- biosafety protocols
- facilities
- cybersecurity
- oversight and audit
- red teaming and penetration

- original envisaged confirmed
- unexpected outcomes/implications
- open vs. controlled data dissemination
- cybersecurity
- post-deployment monitoring



# Secure Screens for Synthesis of Sequences of Concern (SOCs)



## FRAMEWORK FOR NUCLEIC ACID SYNTHESIS SCREENING

A product of the  
FAST TRACK ACTION COMMITTEE ON  
SYNTHETIC NUCLEIC ACID PROCUREMENT SCREENING  
of the  
NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

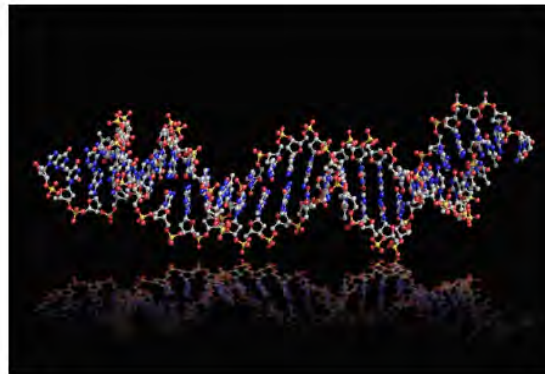
April 2024



Research Report

FORREST W. CRAWFORD, KYLE WEBSTER, GERALD LEWIS EPSTEIN,  
DEREK ROBERTS, JOSEPH FAIR, SELLA NEVO

## Securing Commercial Nucleic Acid Synthesis



NTI:bio

## Benchtop DNA Synthesis Devices:

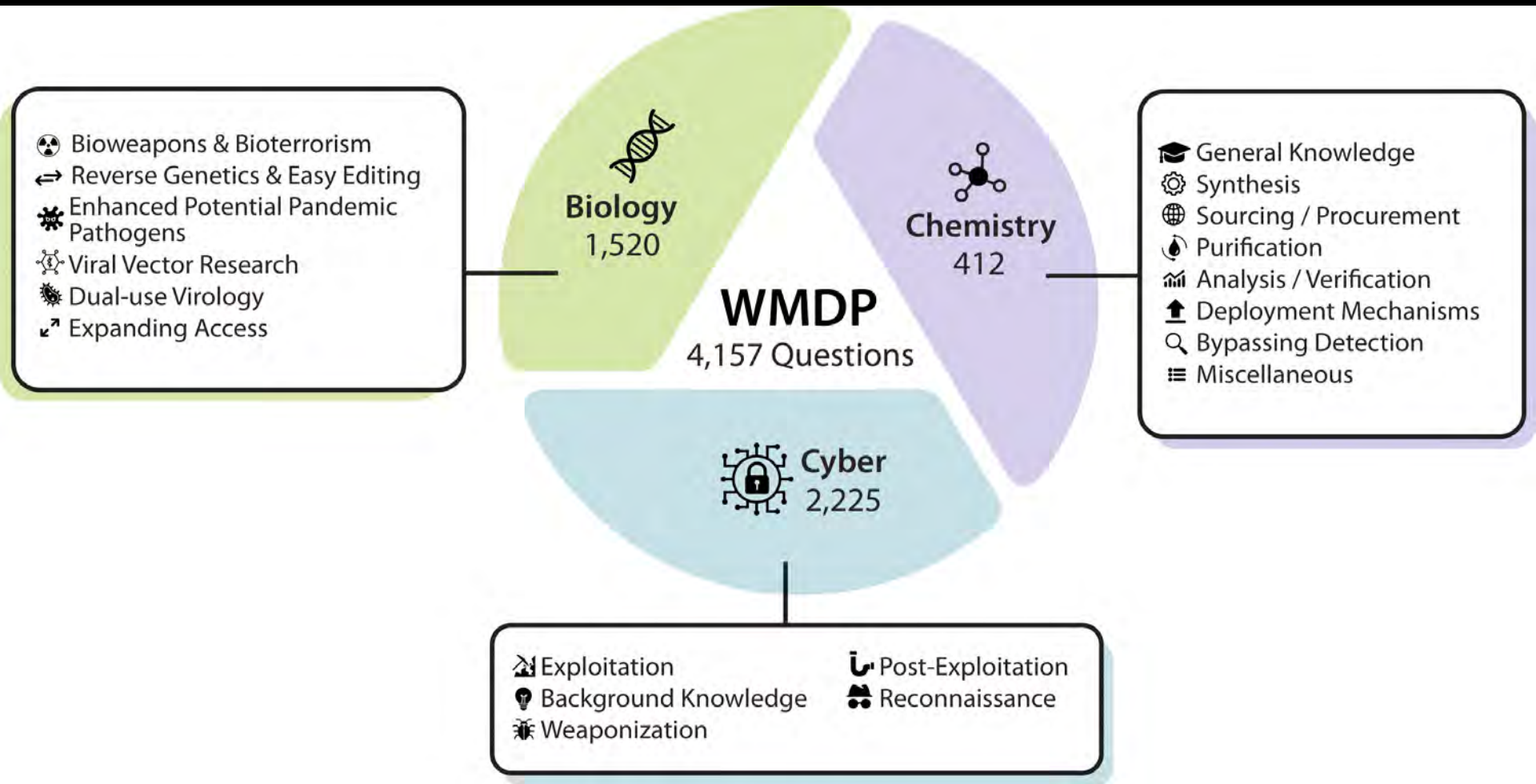
Capabilities, Biosecurity Implications,  
and Governance

MAY 2023

Sarah R. Carter, Ph.D.  
Jaime M. Yassif, Ph.D.  
Christopher R. Isaac, M.Sc.

- all viruses described as potential pandemic pathogens
- all known viruses capable to human-to-human transmission

# Technology Convergence, Rapid Global Diffusion and Proliferation of Dual-Use Risk: The Challenge for Biosafety Professionals and Credentialling



## Weapons of Mass Destruction Proxy (WMDP) Model

# **PRC and Targeted Biotechnology and Pharmaceutical Espionage\***

- **PRC ‘military-civil’ fusion merges the military and pharmaceutical sector**
- **US House Committee on Oversight and Accountability (2024)**
  - **escalation of PLA industrial espionage “to weaponize genomic and medical data”**
- **2022 CuckooBees multiyear cyberespionage campaign sponsored by PLA Winnti APT (APT41) hackers**
  - **exfiltration of estimated hundreds of gigabytes of research innovation and IP**

MAY 2023

# Optimizing Export Controls for Critical and Emerging Technologies

*Semiconductors, Quantum Technology, AI, and Biotechnology*

AUTHORS  
William A. Reinsch  
Emily Benson  
Thibault Denamiel  
Margot Putnam

A Report of the CSIS Scholl Chair in International Business

CSIS | CENTER FOR STRATEGIC & INTERNATIONAL STUDIES

## Department of Commerce Export Controls for Biological Equipment and Technology



Chemical and Biological Controls Division  
Office of Nonproliferation & Treaty Compliance

# BIOSAFETY AND BIOSECURITY INNOVATION INITIATIVE PLAN FOR THE BIOECONOMY

DECEMBER 2024

PREPARED BY

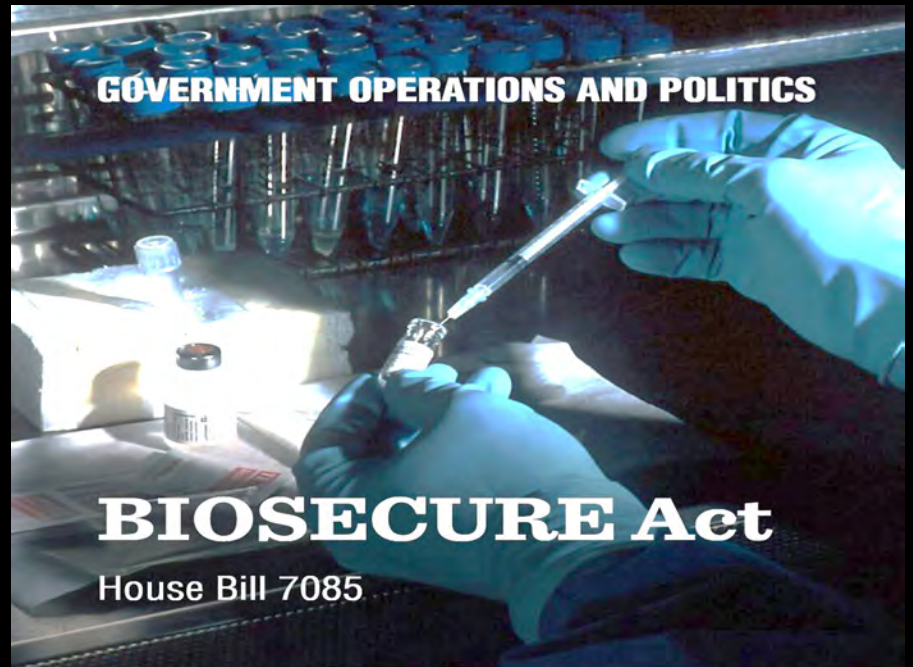
The United States Government and Led by the Departments of Health and Human Services and Homeland Security



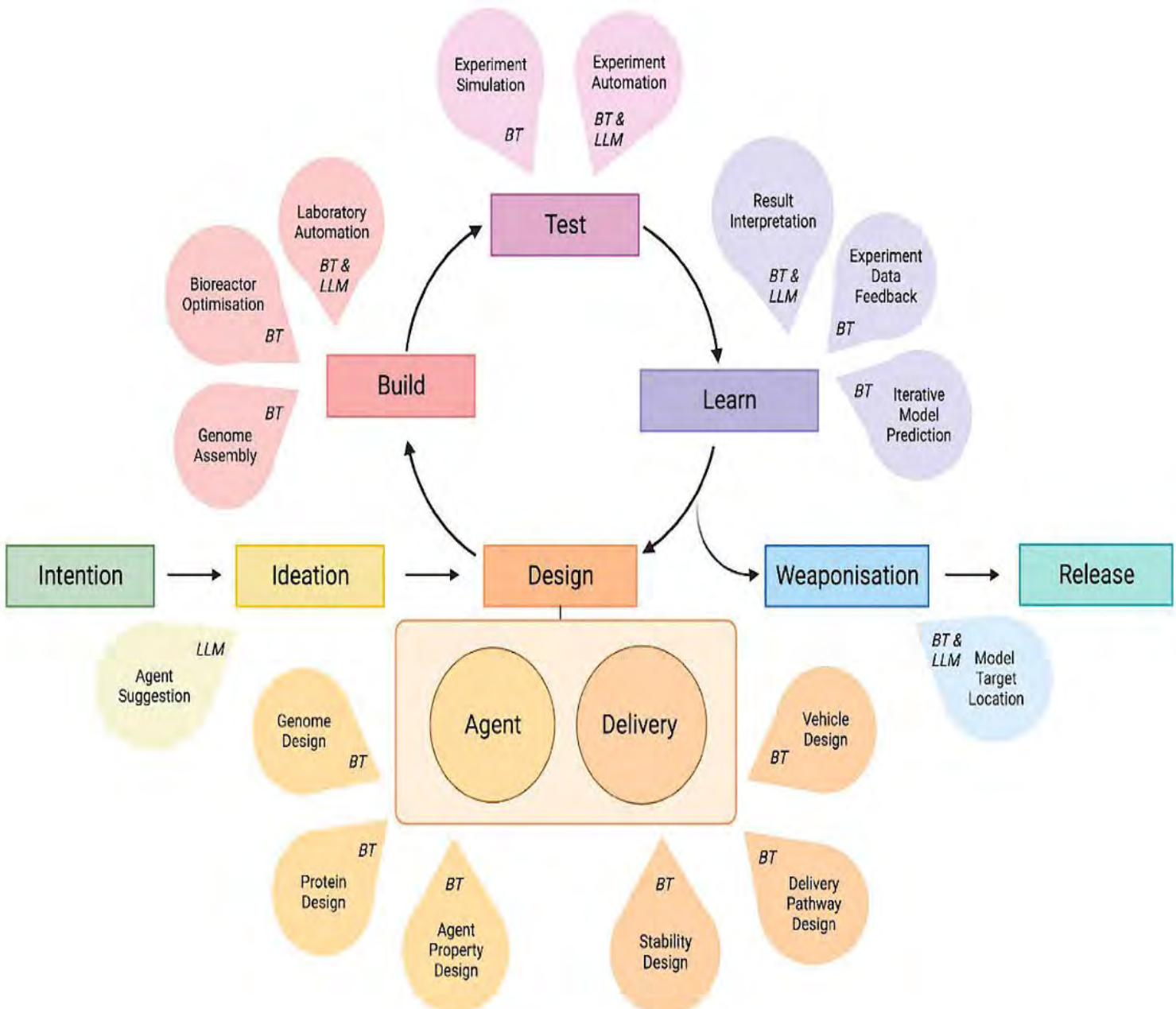
## GOVERNMENT OPERATIONS AND POLITICS

# BIOSECURE Act

House Bill 7085



# Risk Chain Analysis in Biological Weapon Development



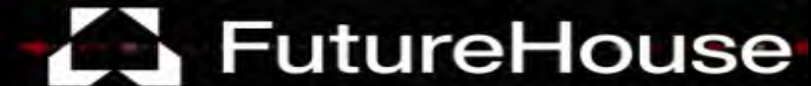
# Large-Scale Automation of Biomedical Laboratory Research



## Building an AI Scientist.

Our 10-year mission is to build semi-autonomous AIs that can scale scientific research, to accelerate the pace of discovery and to provide world-wide access to cutting-edge scientific, medical, and engineering expertise.

WikiCrow: Automating Synthesis of Human Scientific Knowledge



# New Biosecurity Challenges from Cloud Laboratories



## Robust Biosecurity Measures Should Be Standardized at Scientific Cloud Labs



COMMENTARY — Nov 8, 2024

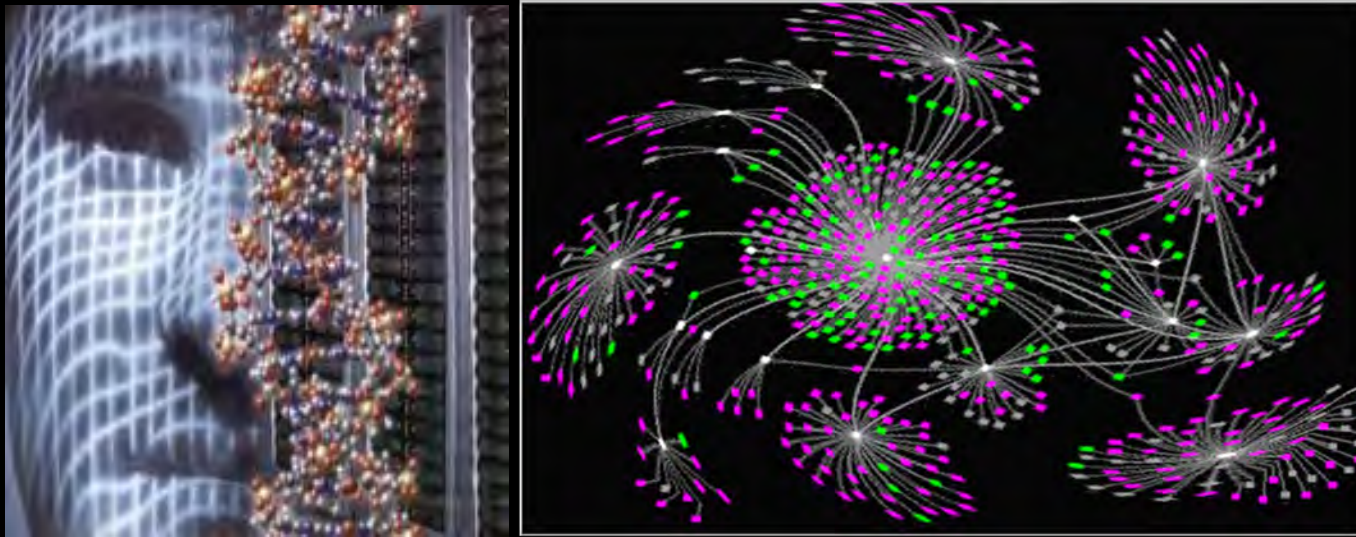
# Scale and The Facilities “Forensic Footprint”





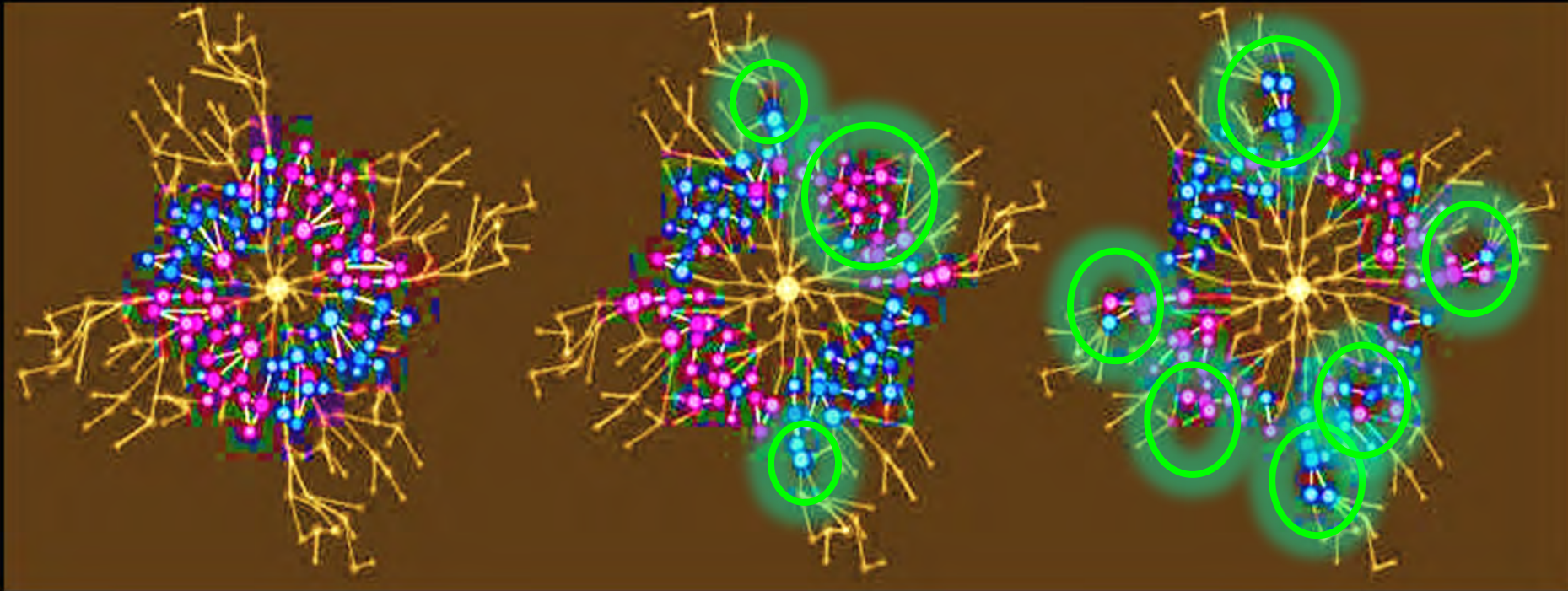
# Precision Health

Detection of Altered Molecular Signaling Networks in Disease:  
A New Taxonomy of Disease and Subtype Classification



MDx Signatures of Disease Predisposition and Subtyping  
of Overt Disease for Optimum Rx Selection

# Precision Health: Mapping System State Shifts (Phenomes) and Cumulative Perturbations in Molecular Signaling Networks in the Health to Disease Continuum



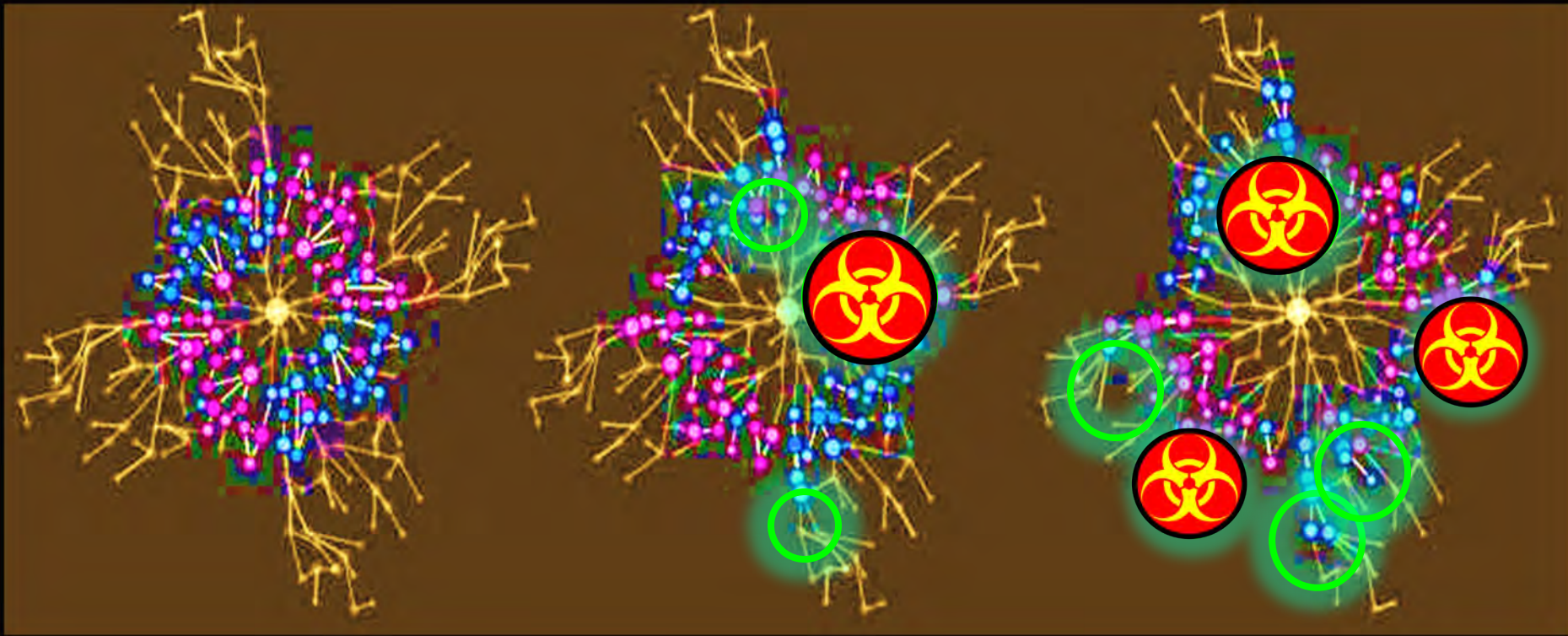
$T_{1(n)}$  health

$T_{2(n)}$  subclinical disease

$T_{3(n)}$  overt disease

- identification of biomarkers/diagnostics and therapeutic targets in dysregulated networks
- DrugMechDB (2023) 4583 Rx indications, 5666 pathways  
32,249 molecular interaction networks across 14 biological parameters

# Molecular Information Networks: a Limitless Range of Targets for Nefarious Dual-Use Activities



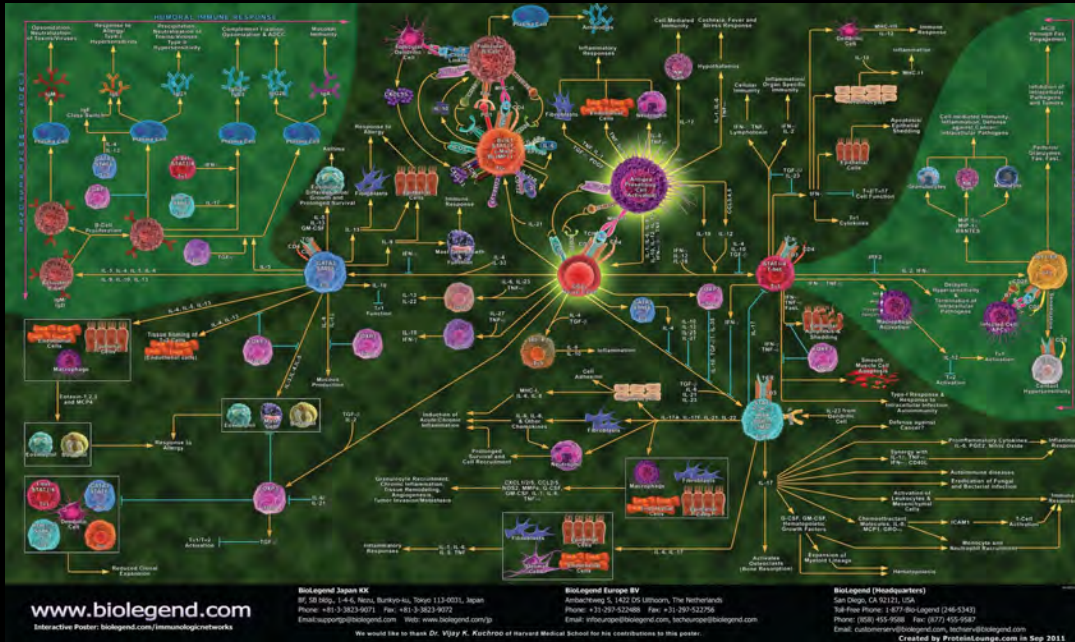
health

acute disease:  
single-target

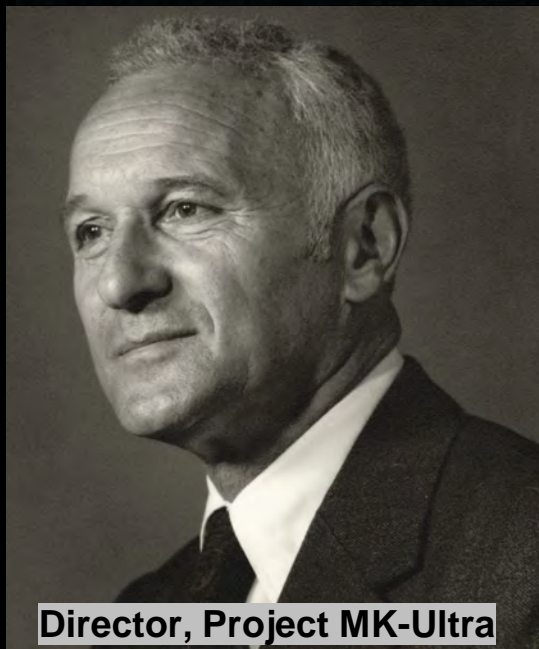
chronic disease:  
multi-target pleiotropic

- next-generation chemical weapons
- more complex viral targeting including latent agents

# Targeting of Biological Signaling Networks



- immune systems



Director, Project MK-Ultra

**POISONER  
IN CHIEF**

SIDNEY GOTTLIEB AND THE CIA  
SEARCH FOR MIND CONTROL

**STEPHEN  
KINZER**

BESTSELLING AUTHOR OF *THE BROTHERS* AND *ALL THE SHAH'S MEN*

- neuromodulation

# **Technical Report on Mirror Bacteria: Feasibility and Risks**

K. P. Adamala et al., “Technical report on mirror bacteria:  
Feasibility and risks” (Stanford Digital Repository,  
2024); <https://doi.org/10.25740/cv716pj4036>.

December, 2024

# The Quartet of BIOxAI Platforms

novel  
biological  
design  
space

- organism construction
- genome modification
- viral vectors

- large multimodal data sets
- LLMs

- low MWt heterocycles
- protein design
- ADME modification

novel  
chemical  
design  
space

autonomous  
synthesis

# Guardrails for Limiting Dual-Risk Threats from the BIOxAI Convergence and LLMs

**model design**

**pre-release risk assessment**

- AI training sets for intended use
- removal of hazardous information

- robustness to manipulation for adversarial purposes
- independent red teaming

- open vs closed access
- user certification
- surveillance and V<sup>n</sup> updating

**post-release monitoring**

**Open AI Models:  
Democratization of Innovation or National Security Threat?**



# Proponents of Open Source of AI Models

- **transparency and accessibility as catalysts to accelerate AI research and democratized innovation**
- **public release of model weights allows greater scrutiny, enhancing safety and security by ID and mitigation of flaws and biases**
- **US restrictions versus PRC open-source models might encourage more countries to adopt PRC standards/tools that will not align with liberal democratic values**

# Critics of Open AI

- **use for disinformation campaigns**
- **enhance cyberattacks**
- **development of military capabilities by adversarial state and non-state actors**

# Codes of Conduct

## Asilomar, February 1975




## AI and Protein Design

### Responsible AI x Biodesign

March 8, 2024

Community Values, Guiding Principles, and  
Commitments for the Responsible  
Development of AI for Protein Design

# International Cooperation in Countering the Proliferation of Weapons of Mass Destruction



**A Framework to Evaluate the Risks of LLMs for Assisting CBRN Production Processes**

**CNS**  
Washington, DC Office  
**NONPRO NOTES**  
FEBRUARY 2024

Ian Stewart

Middlebury Institute of International Studies at Monterey  
James Martin Center for Nonproliferation Studies

**CONCEPTUALIZING INTEGRATED DETERRENCE TO ADDRESS RUSSIAN CHEMICAL, BIOLOGICAL, RADIOLOGICAL, AND NUCLEAR (CBRN) ESCALATION**

Natasha Lander  
Ryan Arick  
Christopher Skaluba



**Atlantic Council**  
SCOWCROFT CENTER FOR STRATEGY AND SECURITY



U.S. Department of Defense

STRATEGY FOR  
COUNTERING WEAPONS  
OF MASS DESTRUCTION

2023



**2023 Biorisks, Biosecurity and Biological Disarmament Conference Report**  
4-5 JULY 2023

EDITED BY DANIEL FEAKES, MARIA GARZON MACEDA, ALEX LAMPALZER, JADE MASON, SOANTIANA RAJATONIRINA, JAMES REVILL, ANNA LAURA ROSS, VERONICA ROVEGNO, EMMANUELLE TUERLINGS, TAYLOR WINKLEMAN



UNODA UNIDIR World Health Organization



**Exploring Science and Technology Review Mechanisms Under the Biological Weapons Convention**

James Revill, Alisha Anand, and Giacomo Persi Paoli

UNIDIR UNITED NATIONS INSTITUTE FOR DISARMAMENT RESEARCH



# Compliance With Biological Weapons Convention



- 4 signatory nations assessed as likely to have active offensive BW programs (the CRINK axis)





# Biotech Battlefield

## Weaponizing Innovation in the Age of Genomics

Craig Singleton  
January 2025



# Satellite Images Show Major Expansion At Russian Site With Secret Bioweapons Past



# A Study in Contrasts

## Chemical Weapons Convention

- **robust international treaty with mandated declarations, inspections and member state compliance**
- **comprehensive verification scheme enforced by the Organization for the Prohibition of Chemical Weapons**

## Biological Weapons Convention

- **lack of comparable robust verification and inspections**
- **reliance more on voluntary compliance and transparency**

## International Health Regulations

- **WHO oversight and major gaps revealed by COVID-19 pandemic and lack of cooperation by nation states**
- **do not address laboratory accidents or DURC activities and no inclusion in draft still unratified pandemic treaty draft**



# Biosecurity

- **historical and current policies dominated by reactive responses to threats versus proactive mitigation**
- **expanded conceptual landscape to identify and mitigate societal instabilities posed by a broad spectrum of human interactions with diverse biological ecologies**
- **communicable and non-communicable diseases**
- **complex interactions of ecological, socio-economic, cultural, technological, commercial and political factors**
  - **global to local**
- **‘One Health’ concept: the inter-dependencies (and vulnerabilities) of human, animal, plant health and ecosystem (in)stability**
- **the challenge of international harmonization**

# **Mobilization of Whole-of-Government Capabilities to Counter Existential Threats**

- **the Cold War brought a sense of urgency to government decision making and whole of society engagement**
  - **USG (and allies), academia, industry**
- **similar engagement for biosecurity has not yet taken hold**
- **proactive inventory of known and potential threats to provide decision makers with requisite information/options to mobilize proactive actions**
- **many future threats are not the kind that can be defeated, only managed**
  - **microbes, climate, genes, digits**



**“There’s nothing more frightening than ignorance in action.”**

**Goethe (1826)**



**Napoleon Bonaparte**  
**“In politics, stupidity is not a handicap.”**

ANDY  
BOROWITZ



PROFILES *in*  
IGNORANCE

How America’s Politicians  
Got Dumb *and* Dumber

# The Burden of Leadership



- transcending short-termism and kicking the problem down the road
- forceful advocacy of the consequences of continued neglect and failure to act
- moving beyond the current media gotcha circus that drives political timidity and adoption of adults-in-the-room policies
- acknowledge complexity(ies) and where uncertainties exist
- communicate the unavoidable need for painful choices



**“Politicians the world over  
known what needs to be done,  
just not how to get re-elected  
having done it.”**

**Jean-Claude Juncker  
Former EU Commissioner  
The Economist 7 Sept. 2024**

# Biosecurity:

international harmonization

expanding  
threat spectrum  
and  
risk assessment

threat mitigation:  
global to local  
preparedness,  
response, resiliency  
and recovery

geopolitical  
dynamics  
and economic  
competition

public  
health  
and  
healthcare  
systems

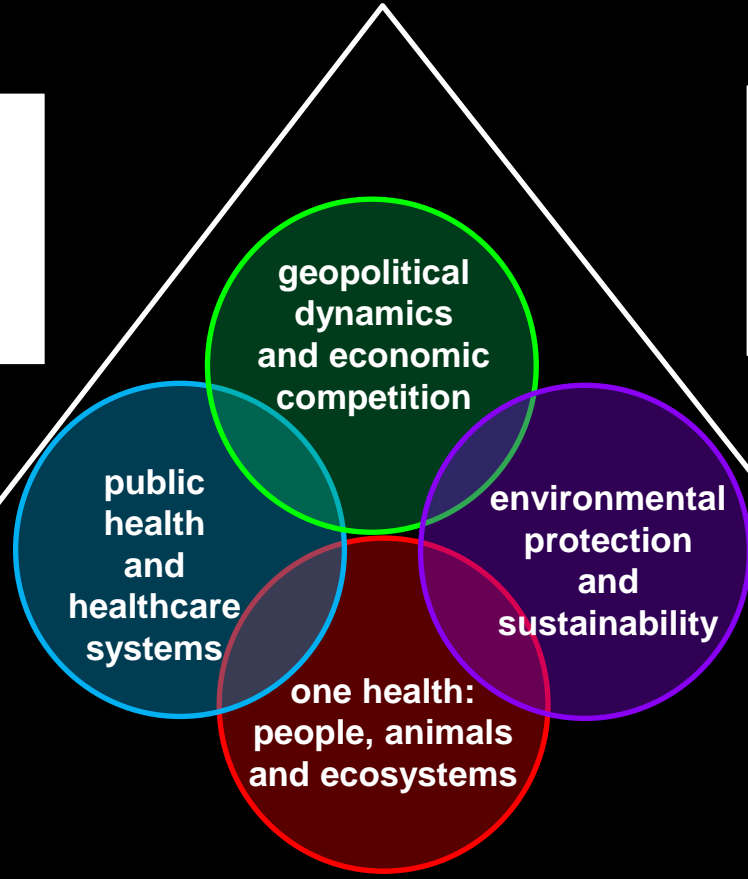
environmental  
protection  
and  
sustainability

one health:  
people, animals  
and ecosystems

technology acceleration  
and  
cross-disciplinary  
convergence

rapid global  
diffusion of  
technology innovation

expansion  
of  
dual-risk  
technologies



**“Politics is the art of the possible,  
the calculated science of survival”**

**Prince Otto von Bismarck**



**“Survival owes little to the art of politics,  
but everything to the calculated application  
of science”.**

**Professor Rudolph Virchow  
(in reply)**



**“Politics is the art of the possible,  
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**Slides available @ <https://casi.asu.edu/presentations/>**

**“Survival owes little to the art of politics,  
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(in reply)**

