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The Open Philanthropy Project Biosecurity & Pandemic Preparedness Initiative



Overview

I. The Open Philanthropy Project

- Background on Open Phil
- Why we chose Biosecurity & Pandemic Preparedness (BPP)
- How we think about BPP & where biosafety fits in

II. Biosafety

- Why it's important
- Ways to strengthen it

III. BPP Strategy: Preliminary Thinking

- Potential focus areas

IV. Summary

I. The Open Philanthropy Project

What is the Open Philanthropy Project?

- The Open Philanthropy Project identifies outstanding giving opportunities, makes grants, follows the results, and publishes its findings. Its mission is to give as effectively as it can and share the findings openly so that anyone can build on them.
- We look for: Importance, Neglectedness, Tractability
- It is primarily funded by Cari Tuna and her husband Dustin Moskovitz (co-founder of Facebook and Asana).



Open Philanthropy Project Focus Areas

- **US policy**
 - Criminal Justice Reform
 - Farm Animal Welfare
 - Immigration Policy
 - Macroeconomic Stabilization Policy
 - Land Use Reform
- **Global Catastrophic Risks**
 - Biosecurity & Pandemic Preparedness
 - Potential Risks from Advanced Artificial Intelligence
- **Other Developing Interests**
 - Scientific Research
 - Global Health & Development

Why we choose biosecurity & pandemic preparedness

- Global catastrophic risks - definition
- Open Phil evaluated a range of global catastrophic risks:
 - Near-earth asteroids
 - Large volcanic eruptions
 - Nuclear weapons
 - Antibiotic resistance
 - Anthropogenic climate change
 - Geomagnetic storms
 - Biosecurity & pandemic preparedness
 - Potential risks from advanced artificial intelligence

How we think about BPP. Where biosafety fits in.

- Mission: Reduce catastrophic biological risks from deliberate, accidentally released or naturally occurring infectious disease outbreaks.
- Focus: global catastrophic risks
- Prevention, Detection, Response
 - Similar systems will be needed for detection and response, independent of outbreak cause.
 - For prevention, different approaches are required for each source of risk.
- Strong biosafety systems are necessary to prevent accidental pathogen release that could result in an international epidemic.

II. Biosafety:
Why it's important.
Ways to strengthen it.

Why biosafety is important to us

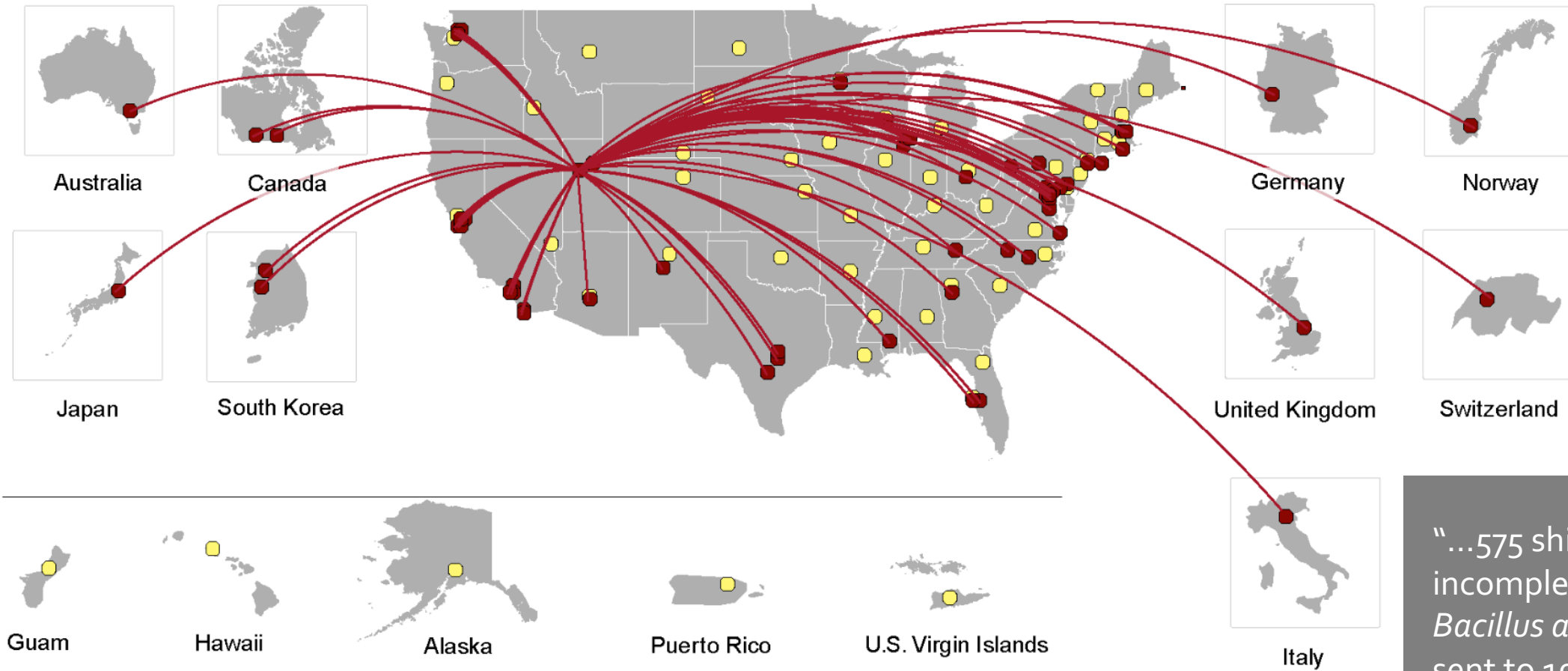
- The work that biosafety professionals do is critical.
- Two elements:
 - Occupational safety of researchers in the lab
 - Preventing accidental release of pathogens into the environment
- Lab acquired infections with high consequence pathogens could spread beyond the lab, potentially causing an international epidemic.
- Preventing this type of event is the main reason Open Phil is interested in biosafety.

What happens when biosafety fails?

- 2004 – SARS lab acquired infection at China Institute for Virology
 - 2 researchers infected
 - One researcher infected her mother → 5 additional cases
- 2014 – Possible anthrax exposures at CDC
 - Transferred anthrax samples thought to be inactivated from a high-containment lab to a lower safety level lab.
 - Up to 70 staff potentially exposed
- 2004-2015 – US Army Dugway Proving Ground accidentally shipped samples containing live anthrax spores
 - Samples incompletely irradiated
 - Shipments involved every state in the US + several other countries



Figure 4: Sites around the World that Received Viable *Bacillus anthracis* (anthrax) Samples from 2004 through 2015 Thought to be Inactivated from the Department of Defense's Dugway Proving Ground



“...575 shipments of incompletely inactivated *Bacillus anthracis* were sent to 194 laboratories and contractors around the world from 2004 through 2015.”

- 194 total laboratories
- 88 primary recipients from Dugway Proving Ground
- 106 secondary recipients from primary recipients



NEWS

Army Blames 'Complacent' Leadership at Dugway for Anthrax Scandal



Military.com | Jan 15, 2016 | by Richard Sisk

NEWS

GAO Discovers More Problems at Military Labs Beyond Anthrax Fiasco



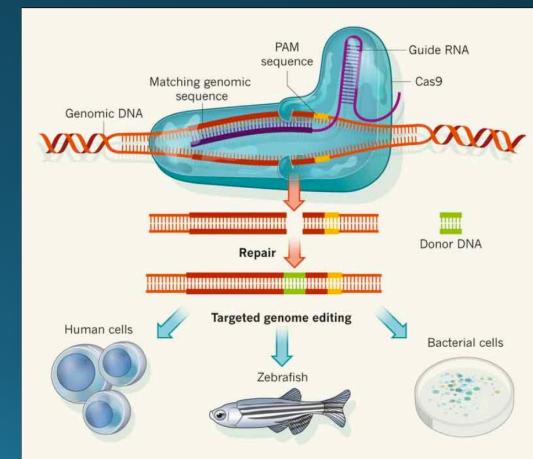
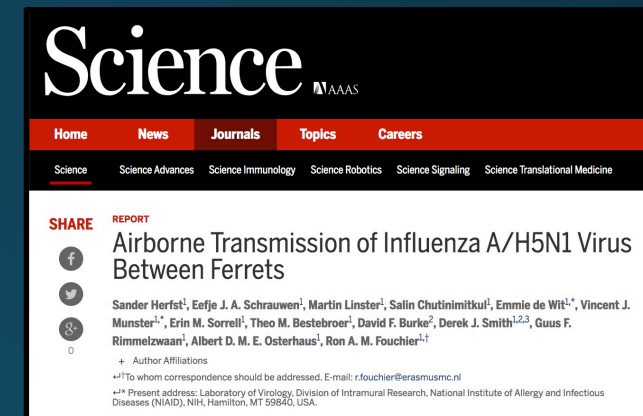
This is Referee Module No. 2 of the Whole System Live Agent Test at Dugway Proving Ground in Dugway, Utah. (AP photo)

Military.com | Jun 29, 2015 | by Richard Sisk

Growing importance of strong biosafety systems internationally

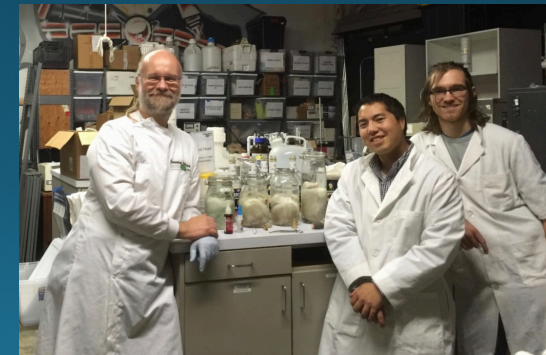
Increasing risks due to advances in biotechnology, global spread & deskilling

- Advances in biotechnology—ability to read, write and edit genetic material.
 - Easier to modify pathogens to make them more transmissible, virulent or resistant to antibiotics.
 - CRISPR gene editing technology—most recent development, but it won't be the last.
 - Low cost, large scale DNA synthesis



Growing importance of strong biosafety systems in the US and internationally

- Growing lab capacity internationally
 - Economic incentives—Countries investing in biotech for economic growth
 - GHSA & IHR-driven investments in building lab capacity internationally
- De-skilling of research:
 - DIY labs
 - Low-cost molecular biology kits—Until recently these techniques could only be performed by a handful of experts at select elite research institutions.



How can we strengthen biosafety? Opportunities and Challenges

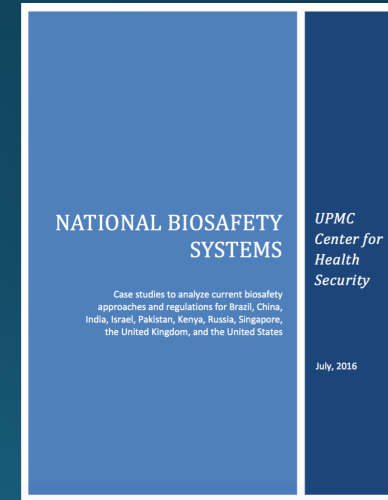
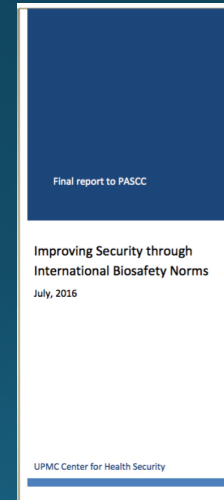
- Goal: Prevent lab accidents from causing outbreaks that can turn into international epidemics.

- Current Gaps:

- International biosafety norms
- Data on incidents and near misses
- Studies on human reliability and best practices
- Strengthen biosafety culture

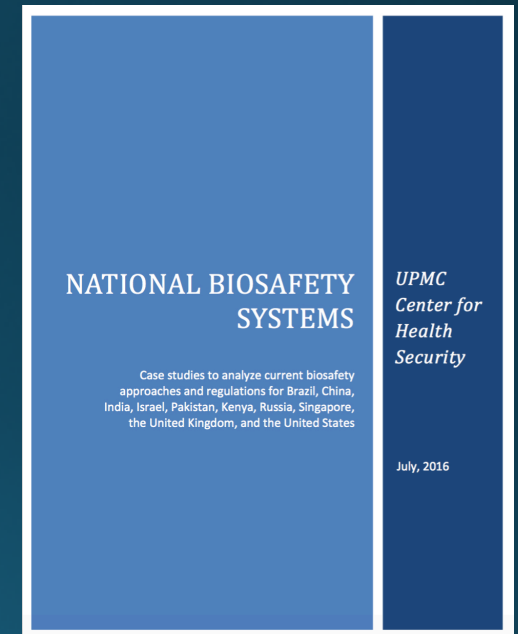
- References:

- Improving Security through International Biosafety Norms. UPMC Center for Health Security (2016)
- National Biosafety Systems. UPMC Center for Health Security (2016)
- Risk and Benefit Analysis of Gain of Function Research. Gryphon Scientific (2016)



Strengthening Biosafety: International Norms & Standards

- Countries should be able to demonstrate that their bioscience research is safe and does not risk causing an international epidemic.
- Recent study on current laws and standards and found that international biosafety norms were a gap.
 - Looked at national biosafety standards and practices in 10 countries
 - Looked at international instruments like WHO IHR, GHSA and BWC
- ABSA can play an important role by advocating for international dialogue on biosafety norms.
- ABSA's increased international focus is a step in the right direction.

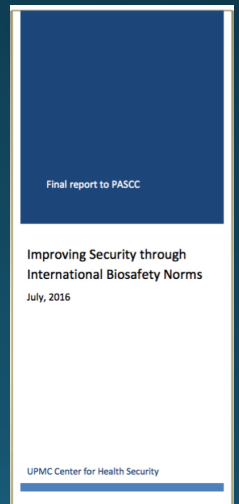


Strengthening Biosafety: Data on Incidents & Near Misses

- A comprehensive set of incident data would provide info about the frequency of biosafety incidents.
 - This would improve risk assessment and mitigation.
- U.S. Government is setting up an incident reporting system
- Challenges:
 - How to incentivize reporting?
 - How to define a near miss?
- How to establish a useful system that does not add to the burden on biosafety officers?
 - Important to get input from biosafety community

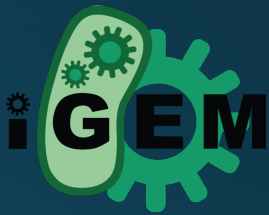
Strengthening Biosafety: Human Reliability and Best Practices

- Human Reliability: Human error is biggest driver of biosafety risk.
 - Lack of data or studies on human error in bio labs
 - Human reliability studies would enable proactive identification of things that can go wrong before they happen.
- Best Practices - Procedural studies to determine:
 - What are the right protocols for inactivating pathogen samples?
 - Which equipment works best for a given protocol?
 - Which personal protective equipment is most effective at protecting laboratory workers?



Strengthening Biosafety: Stronger Biosafety Culture

- We have a robust biosafety system, but it's not perfect.
- Ideally we could motivate PIs, grad students and postdocs to be more personally invested in biosafety.
 - Develop a stronger biosafety culture
 - People talk about this a lot, but it is still a challenge.
- Open Phil grant: iGEM - biosafety and biosecurity



How can we learn from biosafety to strengthen biosecurity?

- We have a robust biosafety system, but we lack a biosecurity equivalent.
- What lessons can we learn from biosafety that are applicable to biosecurity?
- What are the similarities and differences between the two systems?

III. Biosecurity & Pandemic Preparedness Strategy: Initial Thinking

We're developing our strategy for biosecurity & pandemic preparedness.

- Scope: Reduce risks of deliberate, accidental & naturally occurring outbreaks.
- Focus: global catastrophic risks
- Governments are the largest funders. We plan to fund two types of work:
 - Filling gaps
 - Leveraging work done by governments
- Using “Prevent, Detect, Respond” frame to organize our thinking
 - The systems needed for detection and response are similar, independent of the outbreak cause.
 - For prevention, more intellectual work is needed. Different approaches for each source of risk.
- We can work on high-consequence, low-probability events.

Biosecurity and Pandemic Preparedness

Prevent

Manage Risks:
Biotech Advances

Threat Assessment

Manage Risks: Emerging
Infectious Disease

Detect

Biosurveillance

Diagnostics

Respond

Response
Preparedness

Medical
Countermeasures

Cross-Cutting

Reduce Global
Catastrophic Risks

Advocacy

Field Building

Potential Focus Areas: Prevention

Manage risks associated with biotechnology advances,
global spread and deskilling

1. Building a Biosecurity & Biosafety Culture

- How can we motivate researchers and practitioners to feel truly invested in biosafety and biosecurity?

2. International Best Practices for Biosafety

- Support development of international biosafety norms that reduce the risk of accidental release of a pandemic pathogen

3. Governance

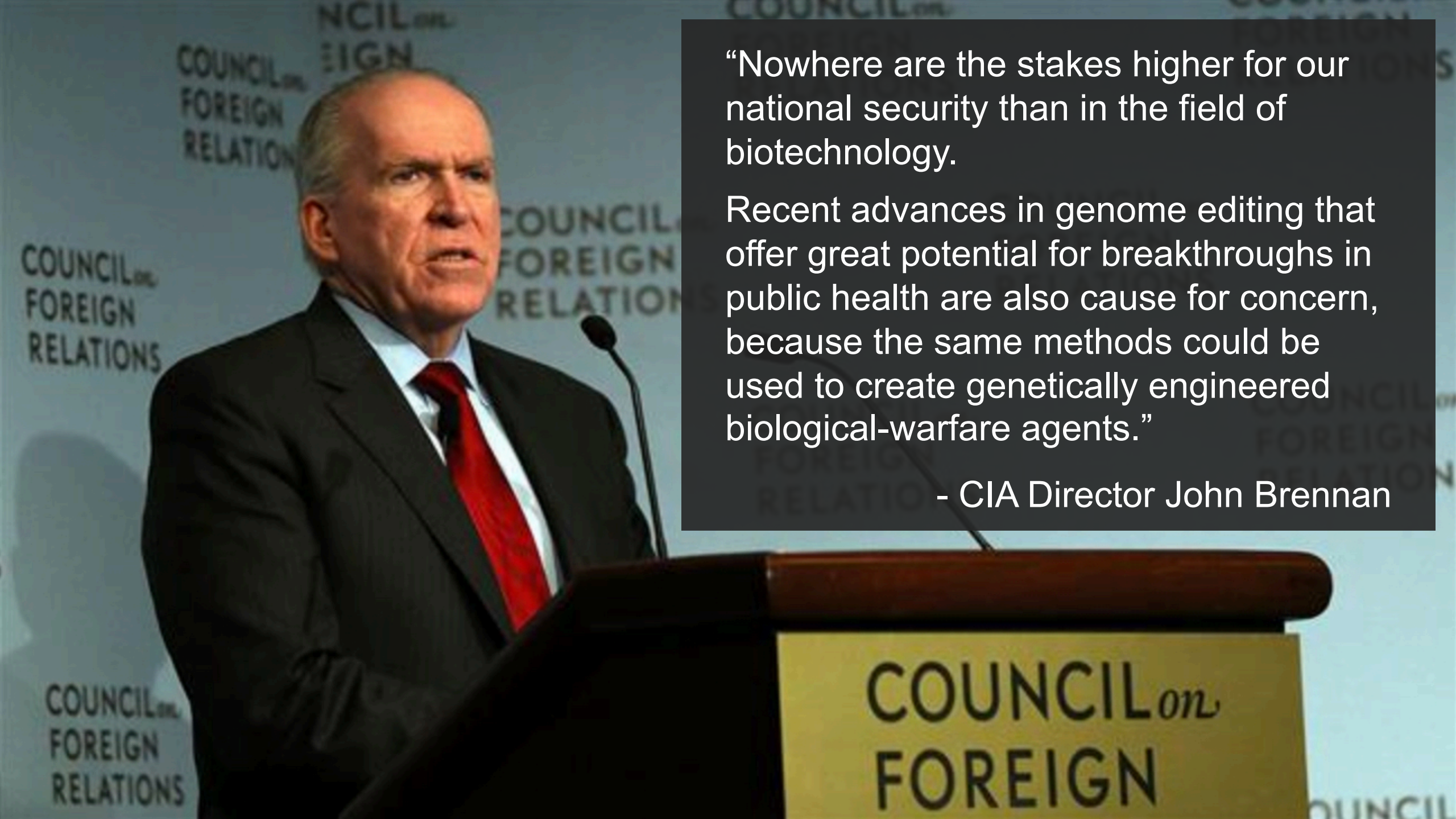
- What governance approaches can most effectively manage risks?



Potential Focus Areas: Prevention

Threat assessment and advocacy

- Most governments do not place a high priority on biological threats.
 - Inadequate leadership attention
 - Insufficient funding
- Areas of interest include:
 - Research on bio-threats and threat perception
 - Risk assessment for emerging biotechnologies
 - Build support for BPP work within governments

A photograph of CIA Director John Brennan speaking at a podium. He is wearing a dark suit, a white shirt, and a red tie. The podium has a sign that reads "COUNCIL on FOREIGN RELATIONS". The background is a light blue wall with the same text repeated. A dark grey text box is overlaid on the right side of the image.

“Nowhere are the stakes higher for our national security than in the field of biotechnology.

Recent advances in genome editing that offer great potential for breakthroughs in public health are also cause for concern, because the same methods could be used to create genetically engineered biological-warfare agents.”

- CIA Director John Brennan

Potential Focus Areas: Prevention

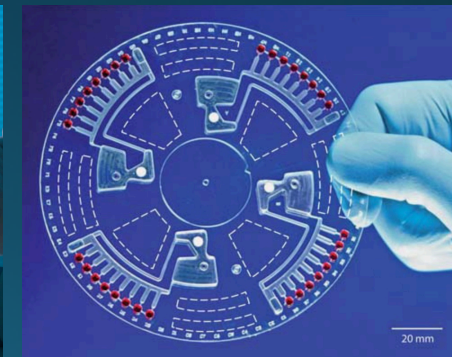
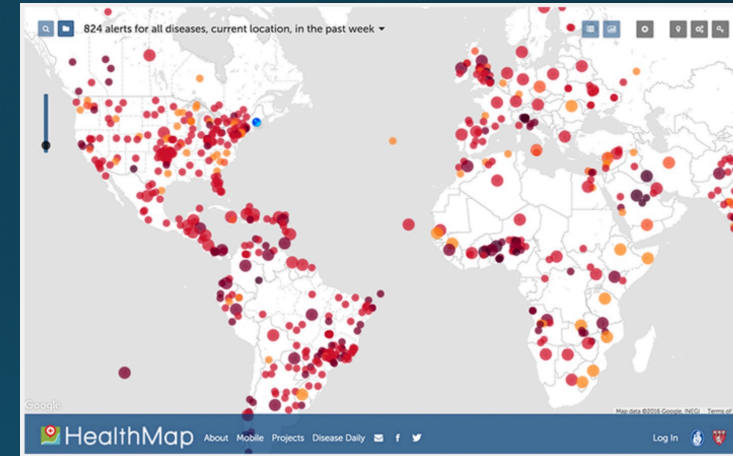
Risk reduction of naturally emerging infectious diseases

- 75% of emerging infectious diseases in humans come from animal populations.
- Examples: Ebola, MERS CoV, Avian Influenza
- Thinking through if/how Open Phil should engage in this space
- Open question: Is prevention the most cost-effective way for Open Phil to reduce risks posed by emerging infectious diseases – as compared to rapid detection and response?



Potential Focus Areas: Detection

- We see needs in two areas:
 - Developing national & global biosurveillance capacity
 - Research and development of broad spectrum and point of care diagnostics
- Many funders and stakeholders are actively working in this space.
- We are considering whether it makes sense for Open Phil to engage, and if so, how.



Potential Focus Areas: Response

- We see needs in two areas:
 - Build capacity to rapidly develop, manufacture and distribute medical countermeasures
 - Strengthen national and international response preparedness
- Many funders and stakeholders are actively working in this space.
- We are considering whether it makes sense for Open Phil to engage, and if so, how.



Potential Focus Areas: Reduce Global Catastrophic Risks

- Reducing global catastrophic risks posed by pathogens includes prevention, detection and response.
- Work in these three areas will reduce risks across multiple orders of magnitude of potential impact.
- Building systems to manage smaller scale outbreaks will be critical for preventing outbreaks from evolving into large scale pandemics.
- However, we are also interested in developing systems and technologies that specifically address GCRs.

Potential Focus Areas: Advocacy

- Government spending is the largest source of funds for BPP work, and that's not going to change.
 - The US Government is the largest funder—estimated budget \$6B/year.
 - Many other governments fund BPP.
- Advocacy to influence government programs is a potentially effective way to improve BPP.
- Grant: Blue Ribbon Study Panel on Biodefense



Potential Focus Areas: Building the Field

Build independent BPP policy research & advocacy capacity U.S. and internationally

- This field is relatively small.
- Growing the community of think tanks and experts focused full time on BPP will be important for achieving advocacy goals.
- Areas of interest include:
 - Developing a network of independent BPP research centers
 - Building a robust BPP talent pipeline

IV. Summary

Summary

- Open Phil is a new funding organization working in biosecurity and pandemic preparedness. We're developing our strategy and identifying our priorities.
- We think biosafety is important for reducing risks of international infectious disease outbreaks.
- More work is needed to strengthen biosafety.
- ABSA can play an important role – including by working internationally.
- Thank you for the important work that you do every day!

Questions