## VIRTUAL EVENT 4 MAY 2022

**Speakers** WILMOT JAMES HAYLEY ANNE SEVERANCE JESSICA A. BELL GREGORY D. KOBLENTZ ANDREW C. WEBER REBECCA KATZ W. IAN LIPKIN

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# **Event Partner**



ACADEMY OF POLITICAL SCIENCE The History and Future of Planetary Threats: Biological Risks and Hazards in the World Today with Special Focus on Russia and Ukraine

BIOLOGICAL RISKS, WHETHER of natural, accidental, or deliberate origin, threaten safety and security across the world and continue to evolve, especially amid the rapid pace of scientific and technological innovation. It is within this context that the panel will discuss the health security environment in the post-Soviet states, as assessed by the Global Health Security Index of 2019 and 2021, and the biological risks posed by Russia's invasion of Ukraine and associated disinformation campaign. The webinar was cosponsored by the Institute for Social and Economic Research and Policy (ISERP) and The Academy of Political Science.

The views expressed by speakers are their own and not necessarily those of any organization with which they are affiliated.

**WILMOT JAMES**<sup>1</sup>: Today's seminar is part of the ISERP History and Future of Planetary Risk series. The series examines catastrophic risks and hazards in the following domains: geological, infectious disease, biological, environmental, chemical, extreme weather, radiological and nuclear, or combinations of these. By catastrophic we mean classes of events that could lead to sudden, extraordinary, widespread disaster beyond the collective capacity of national and international organizations and the private sector to control, causing severe disruptions in normal social functioning, heavy tolls in mortality and

<sup>1</sup> WILMOT JAMES is Senior Research Scholar at the Institute for Social and Economic Research and Policy (ISERP), Columbia University.

mobility, major economic losses; in sum, events that may well alter the direction of history. Today we are focusing on biological risks and hazards. We will touch on chemical risks as well.

The first speakers, who will lay the groundwork for today, are Jessica Bell and Hayley Anne Severance. Jessica is a Senior Director for the Nuclear Threat Initiative's Global Biological Policy and Programs team. In this role, she leads the Global Health Security Index and the assessment and benchmarking of 195 countries with regards to their national health security capacities. She is joined by Hayley Anne Severance, who is a Deputy Vice President of the same organization and program. In that role, she supports and leads the team's effort to reduce biological risks that imperil humanity. Thank you to both of you for doing the first presentation on the health security environment across post-Soviet states.

**HAYLEY ANNE SEVERANCE<sup>2</sup>**: Thank you very much, Wilmot. Thank you for having us here today. We look forward to a productive discussion among this very distinguished group. As Wilmot mentioned, I am Hayley Severance, the vice president of the Global Biological Policy and Programs team at the Nuclear Threat Initiative (NTI). And I am joined by my colleague, Jessica Bell, senior director, and co-lead of the Global Health Security (GHS) Index. NTI is a nonprofit, nonpartisan global security organization focused on reducing nuclear and biological threats that imperil humani-ty. On the NTI bio team, we address biological threats across the spectrum—whether they be natural, intentional, or deliberate in origin—given their potential to kill millions and cost billions global-ly. Our work centers around three broad mission areas: countering catastrophic biological risks, which includes preventing biotechnology catastrophe; strengthening biosecurity and pandemic preparedness; and building accountability for global health security progress.

Before we delve into the current health security environment across the 15 countries that comprise the post-Soviet states, we thought it would be useful to provide a brief, very high-level history of the public health systems in those countries and the transformation they underwent following the fall of the Soviet Union. I will focus on the anti-plague system because it was the focus of activities that dealt with especially dangerous pathogens, which is often the type of work that falls at this intersection of health and security.

The Soviet Union fell in December of 1991. Before 1991, the Soviet anti-plague system was designed as a hierarchical network of civilian facilities, whose mission was to control and prevent the importation of disease into the Soviet Union. This involved mostly surveillance and biological research activities to protect their populations against infectious disease threats. By most account, it was quite effective. It was also considered to be part of the Soviet biodefense program, codenamed Problem 5, primed to defend against biological attacks and to detect those attacks early. But in the 1960s, the Soviet offensive biological weapons program began to task the anti-plague system. In the 1970s, the anti-plague system was an active contributor, at least in part, to the offensive program known as Ferment. The collapse of the Soviet Union resulted in the fragmentation of the anti-plague system, and public health systems in general, as the newly independent or post-Soviet states were established. In some countries, attempts were made to fold the anti-plague system into what they called their sanitary epidemiological system. But there were concerns that the special knowledge of the anti-plague system about especially dangerous pathogens may be lost along the way. During this time, overall funding for infrastructure and personnel decreased significantly, threatening the safety and security of the work being done-including potential unauthorized access to pathogen stores. There were also concerns that dual-use knowledge among staff whose pay had deteriorated would make them attractive targets to be diverted for criminal or terrorist activity.

<sup>&</sup>lt;sup>2</sup> **HAYLEY ANNE SEVERANCE** is the Deputy Vice President for Nuclear Threat Initiative's Global Biological Policy and Programs team. In that role, she supports and leads the team's efforts to reduce biological risks that imperil humanity.

FIGURE 1 Global Health Security Index Categories



**JESSICA A. BELL<sup>3</sup>**: There have been efforts in the intervening years to rebuild these overall health systems within these specific countries. This is to the credit of the countries, their own investments, but also to certain collaborative programs. For example, the Cooperative Threat Reduction program sought to build out these capabilities and to address some of the vulnerabilities Hayley described. However, as we move more to the present, the vulnerabilities within the system remain, and that is the focus of the topic I want to talk about, the GHS Index. It is essentially a benchmarking of 195 countries and their national level health security capacities. Think of it as a dashboard of risk that looks at existing capacities. We first published the GHS Index in 2019, and it was published just before COVID took a global stage.

Our findings from this report showed an alarming set of data. Scores were very low, showing gaps across the pandemic preparedness spectrum. Even among the highest scoring countries, like the United States, we saw severe gaps in national level preparedness. Fast forward to December 2021, when we published our second report, and were able to compare these two sets of data to see how countries improved over time. Given the response to COVID and the innate or organic capacities that were built up, we continue to see significant weaknesses in preparedness. I would like to step back and share some of the framework of our Index.

The Index is a structure of six categories (see Figure 1). It is three of the more, may I say, traditional categories: prevention, detection, and response. Then it also looks at enabling characteristics of measurement: global commitments and financing, health systems, and risk. As part of this effort, we have collected over 60,000 data points.

<sup>3</sup> JESSICA A. BELL is a Senior Director for NTI's Global Biological Policy and Programs team (NTI | bio). In this role, she leads the Global Health Security Index.



FIGURE 2 Global Health Security Index Scores

In 2021, we expanded on the number of questions we used to gather additional data. There were many lessons learned from the COVID-19 experience and we were able to use other feedback we received since 2019. We incorporated some of those lessons learned by expanding the questions asked. It is important to emphasize that we pulled this data from open sources. It was observable data, meaning it was from publicly available data sources, as we wanted to make sure we were continuing to emphasize transparency. Maintaining transparency is critical in the aggregation of this data and in making it available to the wider public. Some of the additional questions we incorporated into the 2021 Index looked at the scaling of laboratory capabilities. Supply chain issues became critical, especially early on in COVID. We looked at risk communications and more nuanced measurements related to political insecurity measures.

What did the data tell us? Overall, there has been little progress on the global level. The overarching average score is still very low, 38.9 out of a possible 100. In Figure 2, the darker the color, the greater the score for that country. 118 of 195 countries scored in the bottom two tiers, and not a single country scored in our top tier. I will delve into this in more detail, but I want to specifically highlight some of the measures we incorporated.

In Figure 3, the overall score for all countries is not even a 40 out of 100. For the post-Soviet states, we saw the average around that same weak scoring, 41 out of 100. Prevention, detection, and response are the three categories highlighted in Figure 3. Overall, we are not seeing a lot of change. It looks static—the coloring is similar across the three views—because it is.

Prevention was our lowest scoring category in general across all countries within the Index. This includes measures like antimicrobial resistance, zoonotic diseases, biosafety, and biosecurity. Most of the post-Soviet states show no evidence of biosecurity and biosafety training and practices using the more standardized methods. We also looked at dual-use research oversight and a culture of responsible science. The post-Soviet states show incredibly low scores. It was only a four out of a possible 100. But to be fair, prevention was one of the lowest scoring categories within the Index across all countries globally.



FIGURE 3 Global Health Security Index: Post-Soviet States

When we look at detection, again we see a score of 40 out of 100 for this grouping of post-Soviet countries. These scores measure laboratory system strength, supply chains, surveillance, reporting and data accessibility, case-based investigations, and the sufficiency of the epidemiological workforce. We saw significant gaps in the current data set as far as surveillance and reporting were concerned, and low scores for laboratory supply chains.

The response category of measures takes into consideration emergency preparedness and response planning, as well as emergency response operations. Another critical component is linking public health and security authorities and risk communications. Access to communications infrastructure is an important factor in the response category. The lowest score across all indicators for these post-Soviet states was in communications with healthcare workers during a public health emergency. Another low score was awarded for public healthcare spending levels per capita.

This is the picture of three of the six categories we measured. For the Index as a whole, we looked at 195 countries—all of them State Parties to the International Health Regulations (IHR). We constructed the GHS Index's measures on an absolute scale. While we asked 171 questions and scored these individually, any one capacity could negatively impact prevention and response efforts related to the next pandemic. Each of these capacities is critical. It is important to understand where those gaps are for a country's pandemic preparedness.

That leads me to our findings for 2021. It is a stark picture of poor preparedness in a few key domains—particularly when it comes to robustness in health systems, being able to address vulnerable populations, and the extent to which political and security risks impacted, for instance, on the provision of services and the financing of preparedness. Our data regarding longer-term financing for pandemic preparedness showed critical gaps. Without the resources to address capacity gaps, there would be little or no movement by governments, donors, regional or international bodies, or the private sector to address the gaps identified through the Index. Overall, the data shows gaps in the capability of the post-Soviet countries, and their neighbors, to prevent and

detect biological events, especially those that may originate as accidents or deliberate misuse. These risks have increased in the current political context.

**SEVERANCE**: In the current political environment, we are aware of Russia's ongoing disinformation campaign, which includes falsely claiming that animal and public health biological research facilities are secretly being used to build bioweapons, relying on support from the United States and other countries. This is not a new tactic, but it has been somewhat effective in sowing division and confusion, especially when the propaganda is parroted by other countries and news outlets. It also creates an environment where Russia could be seen as justified in the future illicit use of these weapons. The risk of deliberate spread is worrisome and has potential to become a global threat, especially given the vulnerabilities that the GHS Index highlighted in health security capabilities in post-Soviet states, but also globally.

It is also concerning that our global systems lack the authority and agility to respond to these emerging risks. In March 2022, a high representative for disarmament, Izumi Nakamitsu, addressed the UN Security Council in response to Russian allegations about the so-called existence of biological weapons in Ukraine. In addition to stating she is not aware of any such programs, she took the time to note that the UN currently has neither the mandate nor the technical or operational capacity to investigate these claims, highlighting a significant gap in our global systems.

The challenges we have described throughout this presentation—specific to the post-Soviet states, but also more globally in their implications—can be summarized as follows: the geopolitical context and associated risks in the region is a challenge for short and long-term preparedness. This lack of preparedness is also a challenge for immediate prevention and response efforts. A lack of international verification and investigation protocols have been exploited in this case to sow distrust, but it also signals rising and greatly concerning risk of an intentional use scenario. A lack of investment has negatively impacted preparedness levels in countries that have already been suffering from fragmentation of their systems and are most likely to be impacted should this risk of a deliberate event eventually become reality. And finally, and this is more forward looking, we also must be aware of risks that loom on the horizon. We must be aware that rapid biotechnology advances are currently outpacing the ability of national governments to provide oversight and to prevent accidents or deliberate misuse.

**BELL**: To end on an optimistic note, we have a lot of opportunities to address these challenges. First, national governments must look at the foundational elements of preparedness. These are things that build trust in the system. For instance, the provision of access to healthcare, transparency of data, and risk communications with your communities, as well as commitments towards the longer term planning of emergency response and financing, are critical in building out these capacities and creating trust in the system.

Second, I think we need to build stronger global systems that address the full spectrum of biological threats. The international community needs to establish an effective verification mechanism for the Biological and Toxin Weapons Convention (BWC), and this mechanism also needs to be grounded in transparency to prevent, deter and counter further spread of dis- and misinformation. Parties working together towards common aims makes us safer. We have an opportunity to do this at the upcoming BWC Review Conference (RevCon).

Third, the Index showed us that longer-term financing is weak globally. To make sure those gaps in health security are addressed, priority must be given to consistent multi-year pandemic preparedness financing. The global conversation around the Financial Intermediary Fund marks a major and welcome step in the right direction. Finally, we need to ensure that the world continues to benefit from bioscience advances. We need to protect the global research and development enterprise. This involves investing in protective systems to mitigate catastrophic accidents, counter deliberate misuse and build stronger biosecurity and biosafety capabilities at all levels. This includes the strengthening of biosecurity norms and developing innovative, but practical tools and incentives, to anchor them. With that, Dr. James, I will pass it back to you, and thank you for this time.

**JAMES**: Thank you very much to Jessica Bell and Hayley Severance for laying the groundwork. Just to mention that there are two bodies of metrics we regard as credible for assessing risk and hazards. The first is the Joint External Evaluations (JEE) of the World Health Organization (WHO). The JEE is voluntary. It does not therefore involve the entire globe. The Global Health Security Index however does—all 195 countries. For those of you who are interested in looking more closely at the issues, please <u>consult the Index</u>. It is a remarkable database. I now introduce Gregory Koblentz, who is an Associate Professor and Director of the Biodefense Graduate Program at George Mason University's Schar School of Policy and Government. Greg is an expert in this area. He's going to talk about the evolving biosecurity landscape today.

**GREGORY D. KOBLENTZ<sup>4</sup>**: Thank you very much, Wilmot. It is my pleasure to be here with everybody. I am going to take a global approach to the challenges we are facing in the biosecurity realm, because we are facing a much more complex and complicated environment than ever before. COVID-19 has dramatically demonstrated the power of pandemics to impact every facet of our lives, societies, and economies. While the pandemic was most likely caused by a natural zoonotic spill-over event, it also highlighted the risks posed by human-made biological threats. Ironically, the greater efforts we are now investing in preventing future pandemics and strengthening bio preparedness could inadvertently lead to increased risks of accidental or deliberate pandemics occurring. Our bio risk management policies are failing to keep up with these new threats, as Jessica and Haley described.

I am going to describe ten trends shaping the bio risk landscape that were underway before COVID-19 but have been significantly accelerated by the pandemic. To meet this challenge, we need to strengthen bio risk management at the international level to deal with field biosafety, laboratory biosafety, laboratory biosecurity, and oversight of dual-use research, with the overall goal of reducing the risks posed by biological threats resulting from the accidental, reckless, or deliberate misuse of biotechnology.

The first trend is the increased number of maximum microbiological containment laboratories around the world. These are the labs that are designed to handle and conduct research on the most dangerous pathogens known to humanity. Research I am conducting with Filippa Lentzos at King's College London has identified 60 such laboratories in operation, planned, or under construction in 23 countries. Most of these laboratories are in urban areas, and only a quarter of the countries housing these labs have scored high on international measures of biosafety and biosecurity, such as those found in NTI's Global Health Security Index. Furthermore, since the start of the pandemic, we have seen signs that a further 20 maximum containment laboratories are planned for construction, and most of these have been announced by Russia. There are international standards for bio risk management, but they are not widely adopted and there is no international mechanism for ensuring compliance of labs with these standards.

<sup>&</sup>lt;sup>4</sup> **GREGORY D. KOBLENTZ** is an Associate Professor and Director of the Biodefense Graduate Program at George Mason University's Schar School of Policy and Government. Dr. Koblentz is also a member of the Scientist Working Group on Biological and Chemical Security at the Center for Arms Control and Non-Proliferation in Washington, DC.

The second trend is the growth in high-risk and "gain-of-function" research. The pandemic will likely increase the number of laboratories and scientists engineering viruses to have enhanced virulence or transmissibility compared to naturally occurring strains. This gain-offunction research is motivated by the desire to better understand how easily these viruses can affect human cells, which is indicative of the potential for the virus to jump from animals to humans and to spread from human-to-human—potentially causing pandemics as we are witnessing today. We saw a similar increase in this type of gain-of-function research by influenza virologists following the 2005 H5N1 and 2009 H1N1 outbreaks. This research led to the creation, for example, of a strain of H5N1 avian influenza that could be transmitted between mammals something that the wild-type virus could not do. There is currently at least one lab in the United States that is trying to add genetic material from the original SARS virus to SARS-CoV-2 to create a chimeric virus of the two strains. Unfortunately, oversight of gain-of-function research in the United States has been very problematic, but it is simply nonexistent in most other countries.

The third trend is the growth in large-scale viral prospecting, because research activities outside of laboratories are also increasing risks. For example, last year the United States Agency for International Development (USAID) launched a new \$125 million viral characterization program targeting Southeast Asia. Chinese researchers have also called for more field research to improve their ability to predict the risk of zoonotic spill-over events. The growth in large-scale viral prospecting to identify potential pandemic pathogens in the wild increases the risk of researchers becoming infected while collecting biomedical or environmental samples in the field. The emergence of SARS, MERS, and SARS-CoV-2, has already demonstrated that such viruses are currently circulating in animals, can jump from animals to humans, and can spread internationally under the right conditions. However, standards for field biosafety are much less developed than for laboratory biosafety. For example, neither the United States nor China have national field biosafety standards. There is also no international guidance available on this subject.

A fourth trend is the increased risks posed by the life sciences beyond microbiology. There are important developments taking place in fields of the life sciences beyond microbiology and molecular biology that pose dual-use risks. For example, advances in immunology, population genomics, gene therapy, viral vectors, genome editing, synthetic biology, and neuroscience raise concerns about potential misuse. However, most of the research in these fields is not covered by existing biosecurity and dual-use research policies, which tend to focus on a small list of pathogenic organisms. Furthermore, scientists in these fields are generally unaware of how their research can be misused by reckless or malicious actors.

We are also seeing increasing risks posed by the convergence of the life sciences with other emerging technologies, such as machine learning, artificial intelligence, data analytics, and nanotechnology. One recent example of this type of risk is the development of an AI-trained algorithm that identified hundreds of new compounds even more toxic than known chemical warfare agents. Again, there is little to no awareness in these other fields about how their research can be misused in ways that threaten biosecurity.

A related trend is the growth of the private sector as the driving force of life sciences innovation. Non-governmental sources of funding for life sciences—such as corporations, foundations, individuals, and crowdfunding sites—account for an increasingly large share of life sciences research. For example, in 2021, the synthetic biology firms in the United States raised \$18 billion in private funding, more than the combined investment the industry received over the previous ten years. The potential risks posed by privately funded research is illustrated by the synthesis of horsebox virus, which is closely related to smallpox. This experiment was financed by an American biotech company for only \$100,000. However, privately funded research is generally exempt from dual-use oversight in the United States and most other countries. Given the rapid growth of the global bioeconomy, the exclusion of the private sector from dual-use research oversight is an increasingly large loophole in our biosecurity.

We have also seen a rise in pre-print servers. The urgency of responding to the pandemic led to a dramatic rise in the use of pre-print servers, where scientists can post their findings online before going through the traditional peer review process. The main benefit of this is that scientists can get their research results out more quickly. Roughly 50 percent of all scientific publications on SARS-CoV-2 have been disseminated this way in comparison to only 5 percent of articles published during previous outbreaks. The emergence of pre-print servers, however, has removed a key layer of review that could be used to check for security and dual-use concerns before publication. In fact, several articles related to the synthesis and engineering as SARS-CoV-2 that were posted on pre-print servers have raised concerns about the dual-use applications of this research.

We have also seen the pandemic lead to an increase in the cyber biosecurity vulnerabilities of biomedical facilities. At the same time, the pandemic also created greater incentives for actors to exploit these weaknesses. The digitization of biology, the migration of biomedical research and healthcare data into the cloud, and the rise of remote working has made it harder to protect valuable data than before. The pandemic has also highlighted the value of data in this space with countries rushing to develop vaccines and therapeutics, steal the intellectual property of rivals, and possibly even sabotage their efforts to develop medical countermeasures. Russia, China, North Korea, and Iran are all known to have actively sought out and exploited vulnerabilities in the cybersecurity of biomedical research institutions and pharmaceutical companies around the world.

The ninth trend is the emergence of a much more virulent form of disinformation. While disinformation and disease outbreaks have long coexisted, the phenomenon has been magnified over the past decade by the combination of social media, the weaponization of fake news, and the delegitimization of scientific expertise. The disinformation campaigns around COVID-19, combined with misinformation spread by social media, likely influenced the course and severity of the pandemic by amplifying mistrust of official reporting and the rejection of scientific evidence by parts of the public. The problem became so bad that the WHO coined a new term for it: an info-demic. In the future, any unusual disease outbreak or deliberate biological attack is likely to be accompanied by disinformation, which could undermine the credibility of public health institutions and adversely affect public behavior.

Most recently, as was already mentioned, Russia's unfounded allegations that Ukraine, supported by the United States and other countries, are working on biological weapons has become the centerpiece of the Kremlin's domestic and international disinformation campaign to justify Russia's illegal and unprovoked invasion of Ukraine. Where Russia has a long history of using such allegations for propaganda purposes, the United States and its allies are still playing catch up on how to best counter this disinformation.

A final challenge I want to highlight can be labelled the "biosecurity dilemma." As more countries invest in biomedical research, engage in gain-of-function experiments, build maximum containment laboratories, and increasingly view biotechnology through the lens of national security, there is a risk that this research will generate the very outcomes it is trying to avoid. Paradoxically, the more countries invest in preparedness against a pandemic, especially if it involves research on potential pandemic pathogens and the engineering of viruses, the greater the risk that a biosafety or biosecurity breach could lead to the emergence of that very pandemic that we are trying to prevent. Pandemic preparedness research could also be misinterpreted as a precursor to, or a cover for, an offensive bioweapons program—like the way Russia spread disinformation about the peaceful cooperation between the United States and Ukraine to bolster the latter's bio

surveillance capacities. Geopolitics and disinformation could fuel the suspicion and mistrust needed to trigger a biosecurity challenge that may lead countries to take steps to defend themselves in ways that are perceived as threatening by other countries. This is a growing problem, especially in the context of U.S.-China and U.S.-Russia relations, where both sides have accused the other of engaging in dangerous research and leveraging biotechnology for military purposes.

In conclusion, at a time when the global pandemic has highlighted the need for greater biomedical research and international cooperation to prevent and prepare for pandemics, there are several trends which threaten to undermine progress towards those objectives. The key to strengthening global health security over the long term is to strengthen national and international bio risk management so that we can all be confident that research in the life sciences around the world is being conducted safely, securely, and responsibly. Thank you very much.

**JAMES**: Thank you, Greg, for that splendid overview—a powerful summary of how innovation in science and technology has created new risk domains and how we always struggle to catch up with those. Thank you very much. I now introduce Andrew Weber, who is currently a Senior Fellow at the Council on Strategic Risks' Nolan Center on Strategic Weapons. Andy has decades of U.S. government service behind him, including five-and-a-half years as the Assistant Secretary of Defense for Nuclear, Chemical, and Biological Defense Programs. Andy is a great colleague. He is going to discuss what we know about the Russian Federation's biological and chemical weapons program.

**ANDREW C. WEBER**<sup>5</sup>: Thank you, Wilmot, for hosting this amazing conversation today, and thanks to my colleagues for these outstanding presentations. In 1969, President Richard Nixon ended the United States offensive biological weapons program. In 1975, the Biological Weapons Convention (BWC) entered into force, making the development and stockpiling of biological weapons illegal. In the 1980's, as the ink was still drying on that convention, the Soviet Union built a facility at a formerly secret city called Stepnogorsk, just over the Russian border in Northern Kazakhstan.

The 200-meter-long facility was proven to be able to produce 300 metric tons of anthrax agents during a war time mobilization period. There were ten, four-story high, 20,000-liter fermenters, all in a biosafety level four high-containment facility. It was an offensive program of extraordinary scale. They also developed other bacterial agents. This facility had a large explosive-aerosol test chamber where they tested hemorrhagic fever viruses like Ebola and Marburg on animals. If you were to go to this facility today, you would just see a green field. It was safely dismantled at the request of the government of Kazakhstan with support from the U.S. Cooperative Threat Reduction Program or the Nunn-Lugar program.

Another facility on Vozrozhdeniya Island in the Aral Sea was the Soviet Union's open air biological weapons test site. About 800 military personnel and scientists during testing season would spread animals, mostly non-human primates or monkeys, over a large test grid. In a single test, they would expose 80 to 100 monkeys to biological weapons agents, including smallpox, anthrax, plague, tularemia, Venezuelan equine encephalitis, and other bacterial and viral agents. Then they would take the monkeys back into a containment laboratory to observe the onset of disease and to determine the effectiveness of their weapons. The Soviet Union in 1988 also bur-

<sup>5</sup> **HONORABLE ANDREW C. "ANDY" WEBER** is a Senior Fellow at the Council on Strategic Risks' Janne E. Nolan Center on Strategic Weapons. Mr. Weber has dedicated his professional life to countering nuclear, chemical, and biological threats and to strengthening global health security. Mr. Weber's decades of U.S. government service included five-and-a-half years as the Assistant Secretary of Defense for Nuclear, Chemical and Biological Defense Programs.

ied over 100 tons of anthrax agent in 11 pits on this island. A U.S. team took core samples and determined there were still viable spores of anthrax in those pits. We did a project with the government of Uzbekistan in the early 2000s to dig up the pits and thoroughly decontaminate them.

The Soviet Union, and then Russia, had a massive biological weapons program. They also had a huge chemical weapons program. They had over 40,000 tons of chemical weapons, including nerve agents like VX, Sarin, and so on. Those were destroyed under the supervision of the Organisation for the Prohibition of Chemical Weapons with over \$1 billion of support from the United States Department of Defense and other G7 partners. That work was finished, but they maintained an illegal covert chemical weapons program. In 2002, there was a hostage situation. Chechnyan terrorists seized a theater in Moscow, and Russian special forces pumped fentanyl analog into the theater, knocking out all the hostage takers as well as the hostages. Over 100 people were killed as the result of using fentanyl as a chemical weapon. We know for sure that the Russian military still has fentanyl in its chemical weapons arsenal.

In a bungled assassination attempt against Colonel Sergei Skripal in Salisbury, England, two GRU officers used a fourth-generation chemical weapon called the Novichok agent. It was recovered in a dumpster. The perfume bottle used to deliver that chemical weapon contained over 10,000 lethal doses of Novichok agent. The intent of this bungled operation was to kill one person, but using this covert delivery mechanism could have killed many more.

In the context of Ukraine, the fact that Russia had Novichok agent is a smoking gun. Russia retains chemical weapons, probably nowhere near the quantities that they once had, but they have the ability still to produce them. I see it as a produce-on-demand capability. That includes certainly fourth generation chemical weapons agents, as well as pharmaceutical based agents, like the fentanyl analogs.

Russia has three military biological facilities that are still part of its offensive biological weapons program. One in Sergiyev Posad, another in Yekaterinburg, and a third in Kirov. They have never been open to international visits or inspections, even during the relatively open years of the 1990s. The Russian general, who runs what remains of Russia's offensive and illegal biological weapons program, has been the main spokesman on TV making up outrageous false allegations that the United States and Ukraine are developing biological weapons.

It is important to note that none of the former Soviet states in Eurasia have chemical weapons or biological weapons programs. That is verified every year in the State Department's Compliance Report. Russia, however, has never been able to show compliance with the Biological Weapons Convention. So, the very person who runs Russia's top secret illegal biological weapons program is going on TV making these outrageous allegations. And the question of course becomes, why is general Igor Kirillov, who is head of the NBC defense forces, making these accusations? United States and British intelligence believe, and have revealed publicly, that Russia is planning to launch chemical or biological weapons attacks in Ukraine.

Russia has a whole range of agents they could use for this purpose—ranging from Novichok agents, which would clearly have a home address in Russia, to something like fentanyl, which is also widely available, or even chlorine, which has been used in Syria—and that they could blame Ukrainians for using in a false flag operation. Similarly, were they to employ biological weapons, they would likely use something non-contagious like Anthrax, but they could also use endemic disease like cholera and other diseases to provide deniability.

One of the paradoxes of the ongoing Russian war against Ukraine is that as the military continues to lose in the battlefield, the likelihood increases that President Vladimir Putin will reach for weapons of mass destruction. I think it is more likely he would use chemical and biological weapons than nuclear weapons, although that is still a very serious possibility we need to be prepared for and to do everything we can to deter. It is a very dangerous situation. The fact that Russia continues to have illegal chemical and biological weapons programs is deeply disturbing, given the shooting war that is happening today.

Finally, I would like to close with the example of a Ukrainian public health laboratory in Kyiv which conducted peaceful research on real public health issues, and improved biosecurity and biosafety with help from the United States government. Laboratories like this played a very important role in the COVID response in countries like Ukraine and Georgia, and they have nothing to do with biological weapons. So, the Russian accusations are just poppycock. Let me close by quoting President Obama, who said, "We simply cannot allow the 21<sup>st</sup> century to be darkened by the worst weapons of the 20<sup>th</sup> century." Thank you.

**JAMES**: Thank you very much, Andy, for that masterful navigation through the alarming risks. Only you can give that talk, given your direct hands-on experience as a policy maker and strategist. I am grateful to you for your expertise in addressing this particular issue. I now turn to Rebecca Katz for comments. She is Professor and Director of the Center for Global Health Science and Security and holds joint appointments at Georgetown University Medical Center and the School of Foreign Service.

**REBECCA KATZ**<sup>6</sup>: Thank you so much for having me today. I want to make a few points in reference to what has been presented so far. Like many of us, I wear multiple hats, but I want to note that I am speaking today solely in my academic capacity. Ian is better suited to comment on the biosecurity landscape laid out by Greg and the risk presented. I would like to focus on governance and response mechanisms, and to talk a little bit about what happens *if* an alleged biological event occurs. To underscore, this is an *if*, and particularly for this discussion if biological weapons are used in Ukraine.

I think, frustratingly, very little has been advanced in this space over the last 40 years the space of response to deliberate biological events. We have better technical tools, microbial forensics, advances in genomic sequencing, methods for sampling and interviewing, culturally appropriate engagement, and molecular epidemiology. We have the technological advances that Greg mentioned—in the context of concern, but still exciting to think about.

What we do not have yet is a robust, tested system for requesting assistance in response to an alleged deliberate biological event, which is step one. There have been years of proposals at the Biological Weapons Convention. There has been a great deal of agreement that this is a good idea, but no actual change or clarification about the process. We do not have a diplomatically viable process for rapid deployment of investigative teams. We do not and cannot invade countries for outbreak response, including alleged deliberate use events. And there is no real clear path for making this better. There have been a lot of efforts underway to try to operationalize response, though. We have the bio investigations under the UN Secretary General's Mechanism for Investigation of Alleged Use of Chemical and Biological Weapons. Efforts by our colleagues from NTI are trying to push forward some innovative thinking on this.

There is no rapid response mechanism under Article VII of the Biological Weapons Convention. We have no answers today on who would deploy to an alleged use event. There is no deployable force. There is nobody in charge. There has been a lot of work around the margins. We can create standard operating procedures. We can identify and train people who can potentially deploy. We can identify laboratories that can receive samples for analysis and sequencing.

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There are discussions around a database for assistance. We occasionally have tabletop exercises, and there are some draft efforts to highlight the challenges and propose new lines of effort.

But I think the big picture here is that it is just not being done. I refer to the latest unclassified non-compliance report from the Department of State that speaks to the capacity of Russia. If bio is used in Ukraine by Russia, then what? Who asks for help? To whom? Who responds? It is not going to be any of the permanent representatives on the Security Council. It is not going to be the World Health Organization. Not many of the humanitarian organizations have the capacity or the insurance coverage for their volunteers to be involved.

What does a rapid response team for a deliberate biological event look like? What protocols do they use? What international law governs their actions? Who owns the samples or the genetic sequence data from an investigation? Could those samples also be used further—in say, the development of a medical counter measure? Would such a team be allowed to say if a biological agent was used, and if so, who used it? There is a clear line in a lot of these discussions between fact finding missions and attribution assessments. There is a question about the role of the Biological Weapons Convention Implementation Support Unit. What would the Secretary General do, versus the General Assembly of the UN, versus the Security Council? Is there a role for a group like NATO or other regional groups that have developed some of these capacities internally? Then, what is the role of the World Health Organization or humanitarian response efforts?

I wanted to raise this because we have been asking these questions for a long time. And again, while there have been dialogues and tabletops in Geneva and Munich and an effort to draft an International Bio-Emergency Management Framework, we still cannot say with any satisfaction if there is a viable process for rapid deployment of an investigative team with a chance of answering any of these questions. The risk, as has been discussed to this point, is real. The potential response has a lot of work left to do. I do not know what would happen if there was a use event tomorrow. There is no clear plan.

**JAMES**: Thank you very much for that, Rebecca. If there was a moment to introduce a mechanism that has authority to intervene globally, it is now. We know what we are like. Crisis happens, we raise the alarm; crisis passes, we let our guard down. So, you are absolutely right to remind us of the fact that there is no facility in the world that can rapidly respond to an event we all recognize to be catastrophic. So thank you for doing that. It is a big challenge.

And with that, I would like to introduce Ian Lipkin, who is the John Snow Professor of Epidemiology and Director for the Center of Infection and Immunity at the Mailman School of Public Health and the Vagelos College of Physicians and Surgeons, Columbia University. Ian is a well-known specialist in this area, and I hand over to him to give the last word before we open up for discussion and Q&A.

**W. IAN LIPKIN<sup>7</sup>**: Thank you very much, Wilmot. And thank you Rebecca for that sobering view of our status. I am going to go back to the talks we have heard and try to summarize what I think were the key points. Beginning with Hayley Severance and Jessica Bell, I like the idea of the Global Health Security Index. The challenge, as they highlighted, is getting access to accurate information. It is important to emphasize that the countries that surround the portion of the former Soviet socialist republics will be critical to achieving this goal.

We have some insight into what can be learned about these countries and the challenges we can anticipate from recent COVID work in Mongolia. Mongolia gets its vaccines from China

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and Russia where they have strong trade relationships. Mongolia was reluctant to forego those vaccines in favor of others that worked better because they did not want to threaten those relationships.

Gregory Koblentz at George Mason gave us an interesting description of the burgeoning number of high-level biocontainment laboratories, and the risks associated with viral prospecting and gain-of-function experiments. I appreciate the concern for inadvertent release of high threat pathogens. I am more concerned about those that emerge naturally. Nonetheless, I agree that we need international standards for work with bioprospecting and work in laboratories with infectious agents. There are international standards for the BSL-4 laboratories, but none for the BSL-3 laboratories. We do not know what goes into them. We do not know what comes out of them. The need for oversight is even more apparent in the light of Andy Weber's disconcerting revelations concerning work pursued behind the iron curtain prior to the demise of the USSR.

So, what are we to do? As Rebecca has said, we do not have a commitment to continued investment in threat reduction. Risks can change rapidly. We have seen a dramatic change in a woman's right to reproductive choice. A new administration could decide, "We are not as focused on the risk of infectious agents emerging in wildlife as we are on the Wuhan Institute of Virology (WIV)." As somebody who has talked about this issue *ad nauseam* for two and a half years, I can confirm those fixated on the WIV are like dogs with a piece of meat. They are not going to let go. This is going to be an enormous challenge, I think, if the House of Representatives goes back over to the Republican side, with Jim Jordan, Steve Scalise, and others pushing this to the forefront.

I think that it will be increasingly risky to confine our funding to government contracts. We will need philanthropy. John Doerr has just endowed a new climate change school at Stanford. We need similar investments in infectious disease surveillance. When Andy was at the Department of Defense, he worked closely with Tom Frieden of the CDC to find ways to complement and leverage their efforts. We must keep trying to find ways to join the Defense Threat Reduction Agency and the Defense Advanced Research Projects Agency with the Centers for Disease Control and Prevention and the National Institutes of Health. However, we need other partners. Jeff Skoll has been very helpful in setting up one such program—the Global Alliance for Preventing Pandemics. Mike Bloomberg has been helpful as well. Science is rapidly improving the rate of which we can detect infectious agents. Nonetheless, we do not yet have algorithms or tests that will allow us to say that an agent identified in a bat is something that poses a risk to humankind.

At meetings like this we talk about infectious threats to human health but not about threats to food security or our political systems. Several years ago, I was at a meeting hosted by the military focused on a wide range of viruses. We talked about viruses of animals, plants, and computer networks. Most of our agriculture is monoculture. Somebody could introduce a pathogen—it need not be a virus, but a fungus or what have you—that would take over and destroy our food crops. We have all witnessed the impact of computer viruses and the viral spread of misinformation on social media. We really need ways to rapidly detect and respond to all infectious agents.

**JAMES**: Thank you very much, Ian. I would like to echo and amplify Ian's call for greater investment in this area, including philanthropy. I know the G7-led Global Partnership is focused on this question. There clearly is a need to establish not only global norms, but also to have a system of accountability. I know NTI is working on that. We recognize the limitations and possibilities in terms of using the UN or the WHO for this purpose. Thank you very much for those closing comments and your summary of the seminar.

I would like now to open the floor to questions. During the height of the Cold War, there was always a conversation between the nuclear scientists, specifically U.S. and Soviet scientists. They recognized that when faced with an existential threat, there must be a communication channel at the highest levels to prevent mutual destruction, but if that is not possible, at the very least the science community must remain in touch. The same must surely apply to weapons and materials of mass destruction. The question is whether there exists a communication channel between scientists.

**WEBER**: We had in the late 1990s and early 2000s an extraordinary set of relationships with Russian scientific counterparts. But by 2012, it was eliminated as the Russian security services under Putin closed off foreign contacts to those scientists. So the relationships are there, but they are dormant. And I agree that they are very important. Even during the depths of the cold war, we had good scientist to scientist relations. On the nuclear side, that helped lead to some of our arms control breakthroughs in the late 1980s and 1990s.

I want to comment on Rebecca's proposal. The Council on Strategic Risks, where I am currently affiliated as a senior fellow, has proposed a rapid assessment team based on the Organisation for the Prohibition of Chemical Weapons (OPCW) model. Ambassador Ahmet Üzümcü, one of our advisors, was Director-General of the Nobel Prize winning OPCW. He has written about this, and you can read about it on our website at <u>www.councilonstrategicrisks.org</u>. He set up a team for this purpose—to investigate chemical weapons use. And if chemical weapons were used tomorrow in Ukraine, the government of Ukraine could request that this OPCW team be deployed to investigate. We do not have something like that currently for biological weapons use, although toxins which fall in between could be captured by the Chemical Weapons Convention team. So we need that team and it cannot just be a roster of people, like a pickup game. It needs to be a standing team that has a peace time role of building national capacity. And it is clearly time for the world to come together and have a trained, equipped, and routinely exercised team to investigate biological incidents, no matter their cause.

**JAMES**: Thank you, Andy. Rebecca, from the point of view of understanding how governments work, is there room in the diplomatic arena for advancing on this issue?

**KATZ**: I think the global community is grateful for the proposals from Andy and his team, and from NTI. I think the people on this call probably make-up most of the folks who have thought about this issue, which is frightening. I remember going to a meeting on the Secretary General's Mechanism. The conversation had not moved on to think about the development of global governance regimes around pathogens, who owns them, and any of those issues. You sit in this room and people go, "Where is everybody else? Why isn't everybody focused on this?" It is a little disturbing. This is critical. Many of us who think about this believe this is a big deal, and we need to be able to have these capacities. But the community that is thinking about it has been way too small and under-resourced—and not with the type of political will and attention required to make anything happen.

I think, Andy said it right, science diplomacy is critical. Having these relationships between experts, between colleagues, is sometimes the only thing that continues to operate when geopolitical concerns make official engagement difficult. We see that today in different areas of the world. Having the space to continue those relationships, and in other ways build them, is as important as ever. This has also been challenged given the last couple of years. So being able to move forward and think about reestablishing some of those relationships will be important.

**JAMES**: Thank you. Hayley, I am aware that NTI has a biological risk reduction initiative underway as well as research and development of a Joint Assessment Mechanism (JAM). NTI has done and continues to do a lot of work in this area.

**SEVERANCE**: Thanks for the opportunity to comment. Regarding the discussion around investigative or assessment mechanisms, the fact that it has been brought up many times is acknowledging a real gap between the UN Secretary General's Mechanism and the WHO's ability to investigate public health emergency through a public health lens. And so, there needs to be something in place. NTI, through our work with Angela Kane, former head of the UNODA, Office for Disarmament Affairs, is putting forward a joint assessment mechanism which could be seen as eventually a component of a future OPCW. But let us get this mechanism in place for when it is really needed, which is now. I could see what Ian was saying about this constant monitoring of threats to feed in and inform that type of assessment mechanism—making it more routine, as opposed to a roster of experts that does not get exercised or used frequently. So, I think we are all coalescing around that.

In terms of the question posed around the need for talks, we agree. This has been the tradition on the nuclear side. There is room, I think, for a civil society to contribute to this, through Track II dialogues between scientists. We had a Track II with St. Petersburg University in early 2019. Obviously, given the tumultuous last couple years, that has not continued, but it is important to pick up and eventually transition to Track 1.5 with a mix of government officials and toward direct bilateral talks.

**BELL**: Pulling together some of the pieces on transparency and governance—at NTI we have the Global Health Security Index, working with Johns Hopkins, but we also have the Nuclear Security Index. Both projects—and we are working closely with our nuclear team now—look at what is that risk dashboard and what are the trends we are seeing now. We have multiple sources of data, and we can use that data for driving some of the decision making. This data is built on regulations, legislation, national policies, and plans. Seeing what is out there, what is the baseline, and what are the gaps to fill, are important on both the nuclear and the biological side. Having a closer conversation between not only the teams within NTI, but also across the community, is important because we are seeing a lot of overlap, particularly in the geopolitical risk context.

JAMES: Thank you very much for that Jessica. Any last word on the subject, Greg and Ian?

**KOBLENTZ**: Picking up on the point about governance on laboratories and biosecurity in general, we have some challenges moving forward, but there is some low hanging fruit that we can take advantage of now. There is already an international standard for bio risk management for laboratories called ISO 35001, which sets policies and processes that labs can use to make sure they are prioritizing biosafety and biosecurity. This is something that has been already negotiated at the international level. It is ready for adoption. We just have not seen it taken up by a lot of labs yet—in part because they have been busy responding to COVID and in part because this standard is very new. So there is just not a lot of awareness and familiarity with it.

But if we had some mechanisms to encourage labs to adopt this standard and, even better, an international mechanism to audit compliance by these labs with the standard, I think that would go a long way to helping reassure the scientific community, policy makers, and the public that the research these labs are doing is being done safely and securely. There would be a paper trail in the labs that would help the public health community identify if a lab was involved with an outbreak or not, because a lot of the ISO 35001 standard must deal with documentation and

having proper policies in place in the event of any kind of incident, accident, or something else. There are a lot of benefits to this kind of standard. We just have not seen a concerted effort either at the national level or the international level to get the standard adopted. But that is one of those low hanging fruits that we could grab onto early, to bootstrap us up to some of the more robust governance measures that we have been talking about today.

JAMES: Thank you, Greg. Ian, any last word on this?

**LIPKIN**: The cost for BSL-4 and BSL-3 laboratories—maintenance, sewage, electrical, security, and everything else—is staggering. Every time we build a BSL-4 laboratory, we must be prepared to spend millions of dollars annually to maintain its integrity. I am concerned to hear that there are now several being built in Russia. I do not know how they are going to pay for it. Even the BSL-3 laboratories are very expensive and labor-intensive.

We do not need that many BSL-4 laboratories. Most research into highly pathogenic microbes, can be done with surrogate agents at lower levels of containment, and only moved for the final validation steps into a BSL-4. We have far too many BSL-4s in the United States. Last I checked it was over ten. We probably need two or three.

**JAMES**: Thank you very much, Ian. An audience question asks, "Will a biological and chemical attack be conducted by the Russians? Is there any indication where in Ukraine it will be launched?"

**WEBER**: That is the insidious thing. This would likely be a covert attack carried out by operatives of the GRU or other Russian intelligence services. So it could occur anywhere. It only takes one or two people with a backpack sprayer to launch an attack with many thousands of lethal doses. It would not involve munitions that blow up. Think about spray tanks or drones that you can buy at Best Buy as the delivery mechanism.

An attack could occur against leadership targets in the Ukrainian military or political leaders like the assassination attempt in the United Kingdom. For example, there is the steel plant in Mariupol where there is one unit of the Ukrainian military national guard hanging on for dear life in bunkers underground. The Russians could inject either chemical weapons or biological weapons into underground facilities. That is what is so insidious. It could also occur in any city in the world—NATO countries that are involved in the supply lines—because there is a level of deniability. And with bio, because it takes five or ten days before symptoms would even be displayed, the perpetrators would probably be long gone.

JAMES: Thank you very much, Andy. Would any of the other panelists like to respond?

**KOBLENTZ**: I agree that the Azovstal steel plant in Mariupol would become the ideal target for Russian use of chemical weapons, particularly incapacitating agents, because that would give them a way to avoid the very bloody hand to hand combat, they would need to take that facility, and we have clearly seen Russia's aversion to excessive casualties. If we do not see Russia using these kinds of weapons in that location, I think the odds of them using them elsewhere in Ukraine are extremely low, because, in many ways, the benefits of these weapons are not that great. These are weapons designed to kill on a large scale indiscriminately. Russia has plenty of conventional weapons that can do that.

The risks of using any kind of weapon of mass destruction—whether it is chemical or biological in Ukraine, on the border of a NATO country, or within a NATO country—are just way too high for Russia. Given the incompetence we have seen in terms of their planning and

conduct of the invasion of Ukraine, I doubt that the Kremlin would have a lot of confidence in the security services to successfully conduct a covert attack of this sort and have them avoid attribution and retaliation. I am hoping all of those factors would dissuade and deter the Kremlin from using these weapons, which I think at the end of the day would make the Russian situation worse rather than better.

**JAMES**: Thank you very much for that, Greg. There is a comment from an audience member that goes as follows, "Don't endless blockages of the OPCW process over Syria, and the abuse of Russian and Chinese veto power in the UN Security Council over COVID-19, mean that effective investigation, assessment, and mitigation of a new ambiguous virus cannot reliably be WHO or UN led? So it must be, at least partially, regional and ad hoc." It is a strong comment.

I also want in closing to draw attention to a message from Ian Lipkin saying that he is eager to engage with anyone who wants to help with capacity building in the world of surveillance. We need to be involved in this together. There is also a comment in the chat from SynBio Africa mentioning their recently launched global catastrophic biological risk initiative and inviting collaborators.

And with that, I want to thank all the panelists and speakers today. That was a very powerful conversation. The first step to fixing anything is to understand it properly. We had the strongest high-end experts illuminate the details of the issues, from theory to practice. We need, as everybody pointed out, to develop a global mechanism to deal with this, and that global mechanism must be effectively financed. I hand over to Loren Morales Kando to close today's seminar.

**LOREN MORALES KANDO<sup>8</sup>**: We have come to the end of today's event, which has been brought to you by Columbia University's ISERP. Thank you, Dr. James, for organizing and moderating today's panel discussion. Thank you, Harlowe Zefting for your support and for coordinating the History and Future of Planetary Threats series. Thank you very much to our distinguished speakers, Jessica Bell, and Hayley Severance on the health security environment across the post-Soviet states; Gregory Koblentz on the evolving biosecurity landscape; and the Honorable Andrew Weber on Russia's biological and chemical weapons program. Thank you, Rebecca Katz and Ian Lipkin for your special comments and discussion today. We thank our audience for joining us today. The Academy of Political Science is delighted to be partnering with ISERP to publish the transcript of today's proceedings. Once again, thank you everyone for joining.