PANDEMIC FUTURES and NUCLEAR WEAPON RISKS

Recommended Citation

## THE NAGASAKI 75TH ANNIVERSARY PANDEMIC-NUCLEAR NEXUS SCENARIOS

RECNA-NAGASAKI UNIVERSITY, ASIA-PACIFIC LEADERSHIP NETWORK, NAUTILUS INSTITUTE

DECEMBER 17 2020

I. INTRODUCTION

This report declares: "Leaders today must take urgent action to mitigate the rising threat of nuclear war in the era of pandemics reflecting the voice of Nagasaki, *Let Nagasaki be the Last!*" The report provides specific policy recommendations to reduce the risk of nuclear war due to the pandemic, and to resume nuclear disarmament. These include: slowing and reversing nuclear force developments and operations in the Northeast Asia region, including through nuclear-weapon-free zones and nonproliferation treaties; developing a secure, reliable nuclear hotline network for communicating in a nuclear crisis; launching public health security initiatives in the Northeast Asia region to respond to pandemics; Engaging younger generations in the nuclear disarmament movement and mobilizing a broader base of potential stakeholders in nuclear issues; and enlarging existing city networks such as Mayors for Peace and establishing new city/regional cooperation networks to play a more direct role in reducing nuclear risk and pushing for nuclear disarmament.
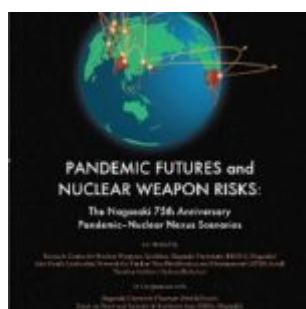
This report may be downloaded [PDF, 1.4MB] **here**

Session 1 of the workshop is livestreamed **here**

This report was prepared by Doug Randall, Chuck Kapelke, and staff of Nautilus Institute, RECNA, and APLN.

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Banner image: Sophia Mauro for Nautilus Institute. This graphic shows the pandemic distribution from the COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University (JHU) as of September 25, 2020; and the two-directional nuclear threat relationships between nuclear-armed states in the form of missile trajectories with re-entry vehicle at the apogees.

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PANDEMIC FUTURES AND NUCLEAR WEAPON RISKS: THE NAGASAKI 75TH ANNIVERSARY PANDEMIC-NUCLEAR NEXUS SCENARIOS

DECEMBER 17 2020

Executive Summary

The COVID-19 pandemic has exposed the inefficacy of nation-states and international institutions in managing global risks and introduced new dynamics—including economic recession, border closures, vaccine competition, and shifts in military behavior—that could heighten the risk of nuclear disaster in the years to come. The threat of nuclear war is particularly urgent in the Northeast Asia region, the locus of multiple simmering conflicts. Leaders today must take urgent action to mitigate the rising threat of nuclear war in the era of pandemics reflecting the voice of Nagasaki, "Let Nagasaki be the Last!"

Specific recommendations include the following:

- Slowing and reversing nuclear force developments and operations in the Northeast Asia region, including through nuclear-weapon-free zones and nonproliferation treaties

- Developing a secure, reliable nuclear hotline network for communicating in a nuclear crisis

- Launching public health security initiatives in the Northeast Asia region to respond to pandemics

- Engaging younger generations in the nuclear disarmament movement and mobilizing a broader base of potential stakeholders in nuclear issues

- Enlarging existing city networks such as Mayors for Peace and establishing new city/regional cooperation networks to play a more direct role in reducing nuclear risk and pushing for nuclear disarmament

- Solving the DPRK puzzle and denuclearizing the Korean peninsula

- Increasing monitoring and controls for the storage and transportation of nuclear materials

- Reforming existing global institutions and establishing new programs and initiatives to improve

collaboration among nation-states

- Taking advantage of the proliferation of apps and sensors for "on-the-ground" information in a nuclear crisis, while ensuring that authorities do not abuse these apps for social and political control
- Developing new platforms for sharing emergency response information and ways to ensure the integrity of this information

These recommendations were developed through the Nagasaki 75th Anniversary Pandemic-Nuclear Nexus Scenarios Project, an international initiative aimed at exploring how the far-reaching effects of the COVID-19 pandemic (and future pandemics) could alter the landscape for nuclear risk and disarmament. This event aimed to identify opportunities for governments, civil society, and market actors to reduce nuclear risk and resume nuclear disarmament in Northeast Asia, with special attention to new strategies emerging from this unprecedented time in history.

Convened as a series of online workshops in October-November 2020, the project brought together nearly 50 participants from diverse backgrounds, ages, and nationalities.[1] The Project was co-sponsored by the Research Center for Nuclear Weapons Abolition, Nagasaki University (RECNA), the Asia-Pacific Leadership Network for Nuclear Non-proliferation and Disarmament (APLN), and the Nautilus Institute for Security and Sustainability, in cooperation with the Nagasaki University Planetary Health Project and the Panel on Peace and Security of Northeast Asia (PSNA).

The goals of the workshop were to (1) develop an analytical understanding of the interrelated nature of the co-occurring existential threats of nuclear weapons and global pandemics; (2) explore potential levers and pathways to influence the future under various conditions; and (3) identify concrete strategies to reduce the risk of nuclear war and resume nuclear disarmament by state and non-state actors, particularly in the Northeast Asia region.

The workshops were structured through a process of scenario planning, a widely used methodology for imagining future conditions that are highly uncertain and generating robust strategies for shaping the future. Participants developed four plausible futures for the year 2030 that aim to help explore the focal question:

> *What are the opportunities driven by global pandemics for Northeast Asian governments, civil society, and market actors to reduce nuclear risk and resume nuclear disarmament?*

The scenarios were developed based on the intersection of two critical uncertainties: (1) Will the locus of influence and power in nuclear disarmament reside with nation-states, or will it shift toward non-state actors, such as local governments and civil society organizations? And (2) will the relationships and mutual actions among actors be characterized by fragmentation and isolation or collaboration and cooperation? The scenario narratives are described in the Scenarios section, beginning on page 14.
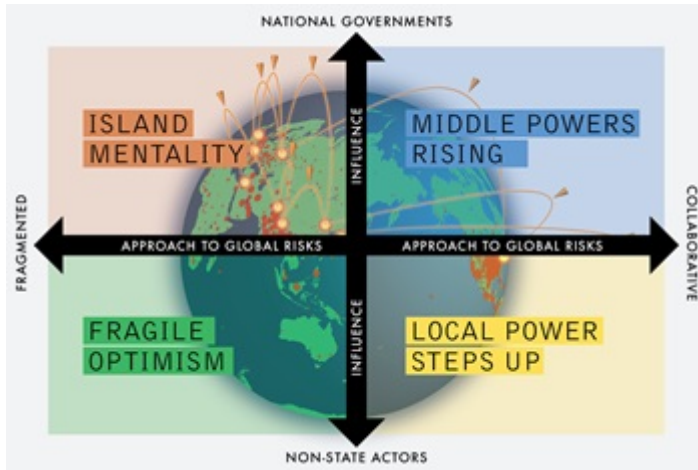
In summary, the following four scenarios were developed:

- **Middle Powers Rising:** National governments are the primary locus of influence, and the approach to global risks is collaborative. The pandemic brings about a new recognition of the critical role of global, multilateral collaboration for dealing with existential risks like pandemics and climate change. "Middle power" countries fill the leadership void left by traditional superpowers.

- **Local Powers Step Up**: The locus of power and influence shifts toward non-nation-state actors, and the approach to challenges is collaborative. The scenario envisions a new role for local governments and civil society to lead a bottom-up effort to address increasingly dire existential challenges that national governments prove incapable of tackling by themselves.

- **Island Mentality**: In this scenario, national governments are the primary drivers of influence, but the approach to global risks like pandemics and nuclear deterrence is fragmented. Resurgent nationalism around the world has led to heightened tension and a sense of instability and fear of war.

- **Fragile Optimism:** The role of nation-states has diminished and non-state actors—including cities and civil society organizations—have stepped up to fill the gap. But there is a lack of coordination among these groups, and they often find themselves working at cross-purposes.

Through exploring these scenarios, participants identified steps that could be taken today to help advance the challenge of nuclear disarmament in a world re-shaped by pandemics, as detailed in the Recommendations on page 29. The next step in this project will be to develop more concrete recommendations for policymakers, who must now adopt and implement practical measures to manage existential risks posed by the nexus of pandemics with nuclear weapons.

Introduction

The year 2020 marks a symbolic milestone for nuclear disarmament, as it is both the 75th anniversary of the atomic bombing of Hiroshima and Nagasaki and the 50th anniversary of the entry into force of the Treaty on Non-proliferation of Nuclear Weapons (NPT). But the distressing reality is that the risk of a nuclear war—intentional or accidental—is greater than any time since the end of World War II. As of January 2020, the "doomsday clock" published by the Bulletin of Atomic Scientists shows only "100 seconds to midnight," indicating we are the closest we have been to nuclear apocalypse since the clock was introduced in 1947.[2]

Over the past year, coronavirus (COVID-19) has transformed the world. It is estimated to have already killed more than 1.5 million people as of the start of December 2020[3] and has led to global economic shutdowns and societal shifts on an unprecedented scale. The pandemic has slowed efforts

to support nuclear disarmament: the 10th NPT Review Conference, scheduled to take place in 2020, was postponed to the middle of 2021. How the COVID pandemic will affect the international order remains unclear: could it usher in a new era of international cooperation as nations join together in a coordinated fight against the disease? Or will economic recession, border closures, and beggar-th--neighbor "vaccine competition" exacerbate global conflict and antagonism? Given these uncertainties, it is critically important to analyze the relationship between the post-pandemic international order and nuclear weapon risks.

The pandemic has also brought to light another key uncertainty: the changing role of local and state governments and civil society in the pandemic era. These institutions could play a role in reducing nuclear risks. Will civic diplomacy increase or decrease in relative power compared to interstate and corporate diplomacy, and will it prove sufficient to curb tendencies on the part of nuclear weapons states to use or threaten to use nuclear weapons during the pandemic? Asked broadly, how might the COVID-19 pandemic (and future pandemics) create new opportunities or challenges for governments, civil society, and market actors to reduce nuclear risk and resume nuclear disarmament? And how might those challenges and opportunities emerge in Northeast Asia, a region that has in recent years seen increased potential for conflict around issues such as the status of Hong Kong and Taiwan, territorial rights in the South and East China Seas, and the nuclear weapons program in the Democratic People's Republic of Korea (DPRK, or North Korea)?

These questions were at the heart of the Nagasaki 75th Anniversary Pandemic-Nuclear Nexus Scenarios Project, an international collaboration aimed at exploring how the far-reaching effects of pandemics could alter the landscape for nuclear risk and disarmament. The project was co-sponsored by the Research Center for Nuclear Weapons Abolition, Nagasaki University (RECNA), the Asia Pacific Leadership Network for Nuclear Non-proliferation and Disarmament (APLN), and Nautilus Institute, in cooperation with Nagasaki University Planetary Health and the Panel on Peace and Security of Northeast Asia (PSNA).

Convened over the course of two weekends in October-November 2020, a series of four three-hour workshops brought together roughly 40 participants from around the world. Through the Zoom video conference platform, attendees were able to join from across time zones, including from Australia, China, Hong Kong, India, Italy, Japan, Mongolia, Philippines, Republic of Korea (ROK), Russia, and the United States. The workshops took place under the "Chatham House Rule," and so ideas and insights are presented in this report without attribution.[4]

The workshops were centered on *scenario planning*, a non-predictive means of examining a variety of possible futures to identify critical uncertainties and strategic opportunities. As described in this report, the workshops led to the development of four distinct scenarios for the year 2030. These narratives are intended to highlight key questions about dynamics that could shape the "pandemic-nuclear nexus" over the next ten years.

The goals of the Pandemic-Nuclear Nexus Scenarios Project are to:

- Develop an analytical understanding of the interrelated nature of the co-occurring existential threats of nuclear weapons and global pandemics

- Explore potential levers and pathways to influence the future under various conditions

- Identify concrete strategies to reduce the risk of nuclear war and resume nuclear disarmament to be considered by state and non-state actors, particularly in the Northeast Asia region

The Challenge: Multiple Existential Threats

The relationship between pandemics and war is as long as human history. Past pandemics have set the scene for wars by weakening societies, undermining resilience, and exacerbating civil and inter-state conflict. Other disease outbreaks have erupted during wars, in part due to the appalling public health and battlefield conditions resulting from war, in turn sowing the seeds for new conflicts. In the post-Cold War era, pandemics have spread with unprecedented speed due to increased mobility created by globalization, especially between urbanized areas. Although there are positive signs that scientific advances and rapid innovation can help us manage pandemics, it is likely that deadly infectious viruses will be a challenge for years to come.

The COVID-19 is the most demonic pandemic threat in modern history. It has erupted at a juncture of other existential global threats, most importantly, accelerating climate change and resurgent nuclear threat-making. The most important issue, therefore, is how the coronavirus (and future pandemics) will increase or decrease the risks associated with these twin threats, climate change effects, and the next use of nuclear weapons in war.[5]

Today, the nine nuclear weapons arsenals not only can annihilate hundreds of cities, but also cause nuclear winter and mass starvation of a billion or more people, if not the entire human species. Concurrently, climate change is enveloping the planet with more frequent and intense storms, accelerating sea level rise, and advancing rapid ecological change, expressed in unprecedented forest fires across the world. Already stretched to a breaking point in many countries, the current pandemic may overcome resilience to the point of near or actual collapse of social, economic, and political order.

In this extraordinary moment, it is timely to reflect on the existence and possible uses of weapons of mass destruction under pandemic conditions—most importantly, nuclear weapons, but also chemical and biological weapons. Moments of extreme crisis and vulnerability can prompt aggressive and counterintuitive actions that in turn may destabilize already precariously balanced threat systems, underpinned by conventional and nuclear weapons, as well as the threat of weaponized chemical and biological technologies. Consequently, the risk of the use of weapons of mass destruction (WMD), especially nuclear weapons, increases at such times, possibly sharply.

The COVID-19 pandemic is clearly driving massive, rapid, and unpredictable changes that will redefine every aspect of the human condition, including WMD—just as the world wars of the first half of the 20th century led to a revolution in international affairs and entirely new ways of organizing societies, economies, and international relations, in part based on nuclear weapons and their threatened use. In a world reshaped by pandemics, nuclear weapons—as well as correlated non-nuclear WMD, nuclear alliances, "deterrence" doctrines, operational and declaratory policies, nuclear extended deterrence, organizational practices, and the existential risks posed by retaining these capabilities —are all up for redefinition.

A pandemic has potential to destabilize a nuclear-prone conflict by incapacitating the supreme nuclear commander or commanders who have to issue nuclear strike orders, creating uncertainty as to who is in charge, how to handle nuclear mistakes (such as errors, accidents, technological failures, and entanglement with conventional operations gone awry), and opening a brief opportunity for a first strike at a time when the COVID-infected state may not be able to retaliate efficiently—or at all—due to leadership confusion. In some nuclear-laden conflicts, a state might use a pandemic as a cover for political or military provocations in the belief that the adversary is distracted and partly disabled by the pandemic, increasing the risk of war in a nuclear-prone conflict. At the same time, a pandemic may lead nuclear armed states to increase the isolation and sanctions against a nuclear adversary, making it even harder to stop the spread of the disease, in turn creating a pandemic reservoir and transmission risk back to the nuclear armed state or its allies.

In principle, the common threat of the pandemic might induce nuclear-armed states to reduce the tension in a nuclear-prone conflict and thereby the risk of nuclear war. It may cause nuclear adversaries or their umbrella states to seek to resolve conflicts in a cooperative and collaborative manner by creating habits of communication, engagement, and mutual learning that come into play in the nuclear-military sphere. For example, militaries may cooperate to control pandemic transmission, including by working together against criminal-terrorist non-state actors that are trafficking people or by joining forces to ensure that a new pathogen is not developed as a bioweapon.

To date, however, the COVID-19 pandemic has increased the isolation of some nuclear-armed states and provided a textbook case of the failure of states to cooperate to overcome the pandemic. Borders have slammed shut, trade shut down, and budgets blown out, creating enormous pressure to focus on immediate domestic priorities. Foreign policies have become markedly more nationalistic. Dependence on nuclear weapons may increase as states seek to buttress a global re-spatialization[6] of all dimensions of human interaction at all levels to manage pandemics. The effect of nuclear threats on leaders may make it less likely—or even impossible—to achieve the kind of concert at a global level needed to respond to and administer an effective vaccine, making it harder and even impossible to revert to pre-pandemic international relations. The result is that some states may proliferate their own nuclear weapons, further reinforcing the spiral of conflicts contained by nuclear threat, with cascading effects on the risk of nuclear war.

Developing Pandemic-Nuclear Nexus Scenarios

How might the COVID-19 pandemic (and future pandemics) create new opportunities or challenges for governments, civil society, and market actors to reduce nuclear risk and resume nuclear disarmament? And how might those challenges and opportunities emerge in Northeast Asia, in particular?

In the face of so much uncertainty, a powerful way to obtain navigational guidance and to develop robust strategies is to conduct *scenario-based dialogues*. Scenarios may be underpinned by analysis, but they rest primarily on eliciting diverse insights through a dialogic process (typically a workshop) that explores the multiple, powerful drivers of complex problems and possible strategies to resolve such problems. Rather than predict any specific future, the goal of developing scenarios is to prepare individuals and organizations for radically divergent, *possible* futures.

A scenario is a tool for ordering one's perceptions about alternative future environments in which today's decisions might play out. In practice, scenarios resemble a set of stories built around carefully constructed plots. These stories can express multiple perspectives on complex events and give multiple meaning to these events.

The development of such scenarios was the primary goal of the Nagasaki 75th Anniversary Pandemic-Nuclear Nexus Scenarios workshop. Through this project, we wanted to develop an analytic understanding of the interrelated nature of nuclear weapons and global pandemics. We wanted to explore the potential levers and pathways to influence the future. And we wanted to find concrete strategies to reduce the risk of nuclear war and resume disarmament, particularly novel approaches that could engage both state and non-state actors.

Shaping the Focal Question

At the outset of the Pandemic-Nuclear Nexus Scenarios Project, the organizers framed a focal question that would guide the development of the scenarios:

What are the opportunities driven by global pandemics for Northeast Asian governments, civil society, and market actors to reduce nuclear risk and resume nuclear disarmament?

This focal question has twin normative values in it: (a) how to reduce the risk of nuclear war arising from the pandemic and (b) how to resume nuclear disarmament under pandemic conditions. Measures to realize (a) might be in opposition to measures to realize (b). They might be independent, or they might be complementary. Discovering opportunities where the measures are synergistic has the highest value; avoiding contradictory measures might be critically important. But forced to choose, we likely must go first and foremost with measures to reduce the risk of nuclear war, as disarmament becomes moot and improbable if nuclear war occurs.

As in any scenarios event, we sought to identify robust strategies that could work *across* the divergent, uncertainty-based scenarios and move each story line toward a higher probability of realizing these two strategic goals. We were particularly interested in prompting discussion on the role of *cities* as potential new players with regard to nuclear war risk reduction. The challenges of "global nuclear governance" and nuclear disarmament have traditionally been dominated by great powers (that is, nation-states). But given their evident and emerging leading role as "first responders" to the existential threats of the coronavirus pandemic and climate change effects, we wanted to see how cities' capacity and experience may be useful in relation to nuclear risk and disarmament.

The focal question also centers on Northeast Asia, a region that was the site of the first use of nuclear weapons (in Hiroshima and Nagasaki), and that today has thousands of cities, as well as potential for conflict on multiple fronts, including between China and Taiwan, China and the United States, and the ROK and DPRK. Northeast Asia sits at the nexus of relations between the world's three largest nuclear armed states (China, Russia, and the United States), and it is home to the DPRK, a rapidly developing new nuclear-armed state.

Identifying Critical Uncertainties

In the first phase of the scenario development process, participants were divided into four groups where they brainstormed a broad range of "critical uncertainties," variables whose outcomes are both undetermined and important for shaping the near- and long-term future. Participants were asked to consider uncertainties based on different categories (social, technological, environmental, economic, political, military, and epidemiological).

Through their initial brainstorm, groups developed a list of dozens of critical uncertainties (see Appendix 2). They were asked to narrow down their lists of uncertainties to those most likely to play a major role in shaping the pandemic-nuclear nexus. They then considered how these uncertainties could unfold along an axis with two diverging outcomes. Following are a few of the drivers participants identified:

How might a distanced society affect nuclear strategies? On one end of the spectrum, for example, re-spatialization could lead to greater cooperation as people work across borders, physical and virtual. On the other end, the need to maintain distance could lead to shifts in militaries' offshore strategies for deterrence/military projection of might and could potentially lead to the increased use of non-conventional (including nuclear) weapons.

How will changes in budgets affect dis/armament? The economic recession caused by the pandemic could lead to drastic cuts in funding for the military, including for nuclear weapons. On the other hand, countries' economic struggles could lead them to increasingly favor investing in nuclear, as opposed to higher-cost conventional weapons.

How might pandemics affect global cooperation? The COVID-19 pandemic could serve as an impetus for increased international cooperation and the sharing of global information, which could extend to other areas, including nuclear. On the other hand, questions over the origin of the virus, border closures, and "vaccine competition" could lead to a rise in tensions.

How will information sharing evolve? The proliferation of misinformation through diverse media channels (including social media) could erode progress in tackling shared global challenges. Or new systems could emerge that help ensure that information is shared with a high level of transparency and be verified as accurate.

Will inequality increase or decrease? Following the economic recession caused by shutdowns aimed at limiting the pandemic, the gap could continue to grow between (and within) societies regarding economic well-being and human health. Or the pandemic may usher in a more redistributive economic system that leads to a decrease in inequality.

How will governments manage simultaneous or prolonged threats? Governments may struggle to contend with concurrent challenges of pandemics, climate change, food insecurity, and terrorism, leaving them to ignore the nuclear issue. Or they may find ways to collaborate, reallocating budgets toward effective solutions and developing international agreements that could later pave the way for disarmament.

What is the effect of technology on nuclear risk and disarmament? Changes in technology could have a major influence on nuclear risk. New risks could emerge from the proliferation of artificial intelligence systems (including in nuclear command, control, and communication systems), deep fakes, drones, and hackers intercepting and altering messages. On the other hand, technology could enhance capacity for early warning systems, increase monitoring of military movement, and improve communication systems.

The Scenarios Matrix

Based on the initial brainstorm, the workshop organizers zeroed in on two uncertainties highly relevant to shaping the near- and long-term future of the pandemic-nuclear nexus and for exploring the focal question: *what are the opportunities driven by global pandemics for Northeast Asian governments, civil society, and market actors to reduce nuclear risk and resume nuclear disarmament?* These uncertainties were chosen and plotted on two axes to create four separate quadrants (see figure 1).
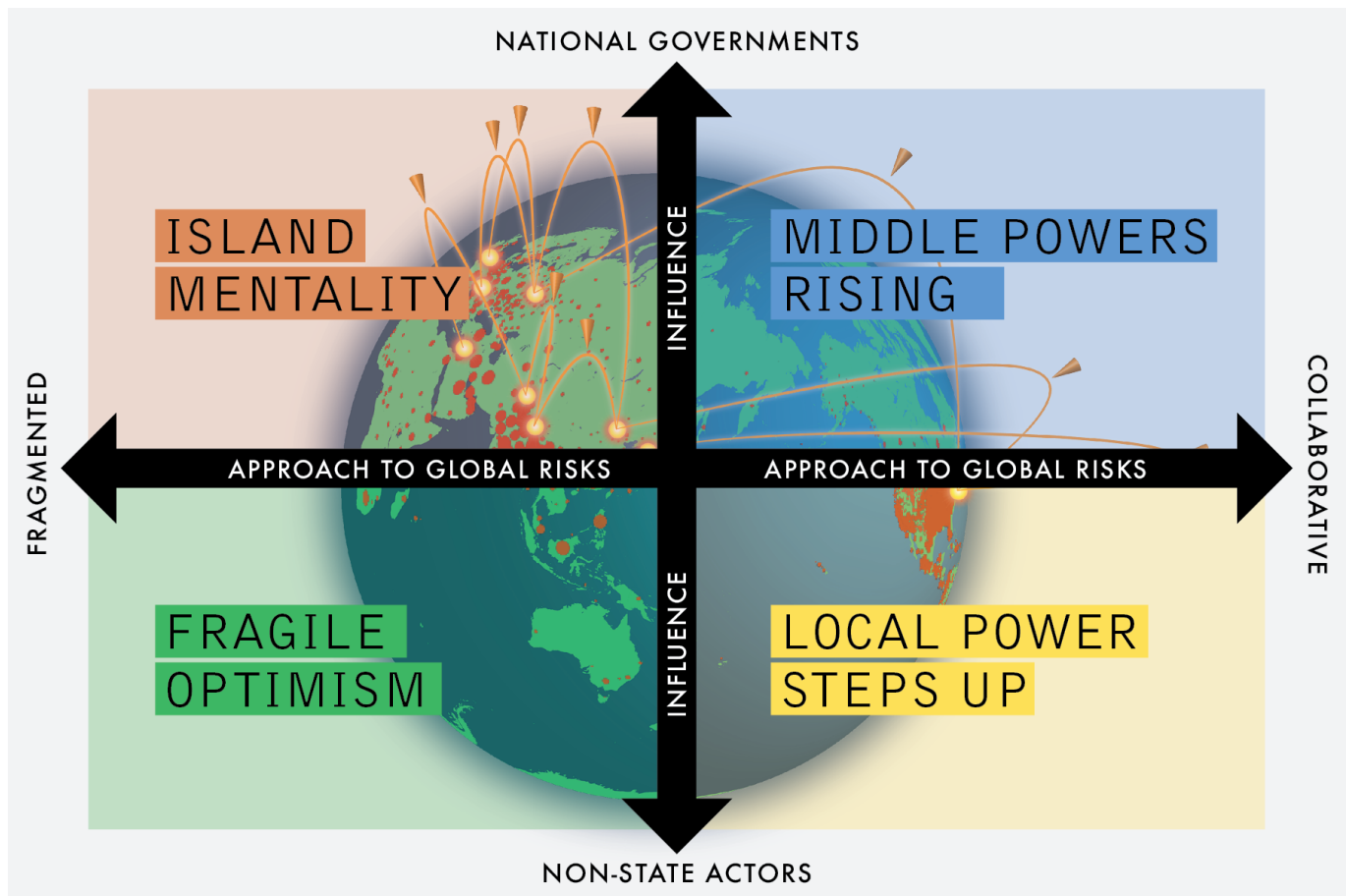
The vertical axis relates to where the locus of power and influence resides. On the top, decision-making and change is primarily driven by nation-state governments. On the bottom, non-state actors—including local communities, non-governmental organizations, companies, and illicit organizations—are the primary influencers of change.

The horizontal axis relates to whether the relationships and actions among actors are fragmented and isolated, or collaborative and cooperative. On the left side of the figure, the approach to shared challenges is fragmented and not highly coordinated. On the right side, the actors work collaboratively and coordinate their actions through shared programs, platforms, and agreements.

These two driving uncertainties provided the "scaffolding" around which the participants worked in small groups to create four scenario stories. Each story was framed by one of the four possible paired combinations of the two critical uncertainties.

Each group was asked to develop one scenario that occurs during the ten-year period from 2020-2030. Groups then prepared a succinct presentation showing how their scenario came about and sought to convince others that their imagined world is plausible, important, and internally consistent. Each group named their scenario and brainstormed headlines that encapsulated key events and decision points in each scenario narrative.

Through additional sessions, the groups explored what challenges and opportunities their scenarios could pose for those wanting to reduce the risk of nuclear war in the region. They were also asked to identify significant risks, levers, actions, and stakeholders to help flesh out their stories.

Participants were also challenged to ask the question: If we were certain this future is coming, what steps would we take today? The purpose was to identify the most promising measures that could be taken today to prepare for their scenario and to identify the most important findings that could help policymakers and other decision-makers.

Shaping the Scenario Narratives

Below are descriptions of the four scenarios developed, along with more fleshed-out narratives (written as if in the year 2030) that provide a vivid, detailed picture of how this future could evolve. These narratives are not meant to be predictive or exclusive. The future likely will contain elements of each scenario as well as driving forces and events not imagined in this process. The narratives are described with imagined details to help paint a realistic picture of the scenario, but the details are arbitrary and should not be overinterpreted for meaning or potential accuracy. The scenarios provide a logical structure that challenges the reader to imagine new ways of addressing nuclear risk reduction.

Middle Powers Rising

In this scenario, national governments function as the primary locus of power, and the approach to global risks is collaborative in nature. The COVID-19 pandemic leads to a new recognition of the critical role of global, multilateral collaboration for dealing with existential risks like pandemics and climate change. Traditional superpowers, however, have not been effective in managing these challenges, so "middle-power" countries have stepped in to fill the leadership void.

This story builds on how the pandemic has exposed the weakness of existing international institutions and posits that this condition could pave the way for new international structures to emerge, similar to how the League of Nations evolved into the United Nations. Another driver is that a group of states that have not traditionally been considered major actors on the global stage, such as New Zealand, Taiwan, and the ROK, have proved to be unusually effective in dealing with COVID, opening the door for these small state-actors to assume a more prominent role in responding to existential threats such as the pandemic.

The Story

Who knew it would take a virus to shake the world's nations out of their decades-long complacency on nuclear weapons? To the surprise of many, the COVID-19 pandemic of 2020-2021 had an enduring effect on the decades-long efforts for nuclear disarmament. It exposed the failings of so-called "superpowers" and laid the groundwork for new collaboration among "middle-power" nations who found new ways to work together to address increasingly dire challenges.

In early 2021, US pharmaceutical firms began to roll out a vaccine for COVID-19, but shortly after, Chinese scientists developed a cheaper version of the drug, which was swiftly distributed across Asia, Africa, and Europe and sold in the United States on the black market. Angry that American firms had been "ripped off," outgoing US President Donald Trump publicly questioned the quality of the Chinese vaccine (leading millions to refuse to take it), and he claimed that China should pay

reparations for spreading a "global bio-weapon" that weakened other nations' economies. The world watched warily as Trump's parting shot hardened the stalemate between the United States and China. Meanwhile, the New START Treaty, a nuclear arms reduction treaty between Russia and the United States, was extended safely as newly elected US President Biden started dialogue with Russia.

Thanks to swift distribution of vaccines through international collaboration, by the start of 2022, COVID-19 had been contained in most developed nations, and the scientific community lauded the international effort that had led to the vaccine's rapid development, noting it could serve as a model for other shared challenges, including climate change.

But the pandemic also made it clear that global health bodies like the World Health Organization (WHO) were in desperate need of restructuring. States like New Zealand and Taiwan, which had been effective in containing the spread of the disease, played leadership roles, and Japan, Korea, and Mongolia joined in committing to rebuild the WHO's Northeast Asia operations. Even as their economies struggled, these states demonstrated they were willing to invest in a shared public health infrastructure, an effort that attracted support from civil society, including large foundations, corporations, and individual donors. When a second strain of the coronavirus emerged in Mumbai in 2023, the newly reformed WHO proved to be highly responsive, and the outbreak was quickly contained. This success reinforced that countries no longer needed to rely on the traditional great powers to lead the way.

In Japan, the Liberal Democratic Party lost power following its failure to deal with the pandemic effectively, and a new coalition government formed in 2022, strongly backed by civil society. When a batch of plutonium temporarily went missing during transport from France to Japan, citizen protests led the coalition's leaders to agree to sign and ratify the Treaty on the Prohibition of Nuclear Weapons.

Attention continued to shift toward nuclear disarmament in 2025 following the "Taiwanese Missile Crisis," a frightening stand-off that unfolded over the course of two tense months. China's increasingly strong-handed posture toward Hong Kong and Taiwan—and its testing of a new Dongfeng missile capable of reaching Guam—led to a build-up of US forces in the region. When a new, artificial intelligence-based warning system aboard a nuclear submarine in the South China Sea sent a false alarm about an impending missile attack, a retaliatory strike was narrowly avoided. Adding fuel to the fire, a "deep fake" video suspected to be produced by Russian intelligence agencies purported to show the Taiwanese prime minister on a phone call with US President Biden, granting his approval for "whatever it takes to keep China out of Taiwan, including a nuclear strike."

Following a flurry of diplomacy, the Taiwanese crisis was resolved peacefully, but other governments were angry at the leaders of China, the United States, and Russia for their recklessness in bringing the world to the brink of apocalypse. Demonstrators marched in protest in cities across Asia, and in a fiery speech at the United Nations on the 80th anniversary of the atomic bombing of Hiroshima, Japanese Prime Minister Yukio Edano seized the moment to break with the past mold of the US-Japan security treaty, calling for "a new global network of nations" that would work together to reduce the possibilities of nuclear war. "For too long, the world order has been out of balance, and the supposedly global institutions we created in the last century placed power in the hands of too few nations," Edano said, in a thinly veiled attack on the imbalance of power within the United Nations itself.

No longer as economically dependent as they had been during the Cold War, Germany and some other European nations joined together with Japan, Korea, and other Asian nations to establish a new organization, the Global Solutions Bloc (GSB), an entity similar to the Organisation for

Economic Cooperation and Development (OECD), but with a narrower focus to develop solutions to shared global challenges. GSB member nations leveraged technology to build a nimble, decentralized bureaucracy, which was closely connected to "on-the-ground" civil society organizations already working on challenges like sea-level rise, deforestation, and air pollution.

In the wake of the Taiwanese Missile Crisis, GSB member-nations voted to impose economic sanctions on Russia, China, and the United States for "endangering the world" through their failure to act on nuclear weapons. Around the world, activist organizations rallied to the cause, activating their networks of supporters to boycott the three superpowers' goods and services. "It was a form of rebellion by non-nuclear and smaller nuclear states to exert pressure on nuclear states," explained Desmond Yam, who led Singapore's involvement in the initiative.

Surprising experts around the world, Kim Jong-Un supported the GSB, announcing that the DPRK (North Korea) would be willing to join the bloc if invited. (Kim was facing growing pressure following his government's failure to swiftly rebuild after a destructive earthquake that ensued from a nuclear test.) On January 1, 2028, representatives from the DPRK and ROK (South Korea) signed an official peace agreement that called for the removal of all nuclear weapons from the Korean peninsula. The DPRK was promised an initial investment of $5 billion per year over a decade by the GSB—to be invested with strict oversight—as an incentive to halt its nuclear weapons program and begin the process of liberalization.

The United States and Russia initially balked at the efforts of the GSB and pointed out the hypocrisy that nuclear states like France were calling for the reduction in nuclear arms. But these nations committed to reduce their own nuclear arsenals, and the superpowers eventually buckled to the economic and political pressure. Government leaders from all three superpowers returned to the negotiating table. There was concern about backsliding, of course, as well as concerns that the nations were not focusing enough on other threats, including bioweapons and chemical weapons. But the momentum favors disarmament, and it became obvious that the GSB's message was received loud and clear.

"The pandemic drove recognition of the critical role of global multilateral collaboration," said German Chancellor Wolfgang Andecher, who helped broker the deal with the DPRK. "The past ten years have rebalanced global power dynamics. If you bring enough middle powers together —especially with city governments and civil society—they become a superpower unto themselves. The United States had ceded influence, Russia lacked credibility, and China was not a model we wanted to follow. They were not providing leadership, and so we had no choice but to lead ourselves."

Strategic Implications

This scenario suggests a variety of future-oriented strategies, including:

- Taking strong action to ensure the integrity of vaccines and improve public awareness about the safety and effectiveness of vaccines.

- Expanding the permanent UN Security Council to include more "middle-power" nations, including from Northeast Asia.

- Building on the model of international scientific collaboration that led to the rapid development of a COVID vaccine to encourage improved collaboration on other challenges, such as climate change and areas that could lead to nuclear war.

- Drawing on the experience during the height of the COVID pandemic, curtailing military, especially nuclear, exercises.

- Ensuring that artificial intelligence is employed safely in military contexts, with sufficient oversight to prevent accidents.

- Improving methods for detecting "deep fakes" (artificial media) and ensuring governments have effective ways to communicate directly and verify information during a crisis.

- Building stronger bridges between global nation-state organizations (like the OECD and UN) and other sectors of civil society that are working to tackle challenges "on the ground."

- Assessing how economic levers could provide incentives to support denuclearization.

Local Powers Step Up

In this scenario, the locus of power and influence shifts toward non-nation-state actors, and the approach to challenges is collaborative. The scenario envisions a new role for local governments and civil society, who lead a bottom-up effort to address increasingly dire existential challenges that national governments prove incapable of tackling by themselves.

Key drivers of this scenario include the stagnation of nation-states and the improved capacity of local governments (city, state, and regional) to manage problems on their own. Northeast Asia in particular has thousands of cities that could benefit from a shared collaboration platform. Key challenges include establishing a structure that allows so many stakeholders (that is, thousands of cities) to meaningfully collaborate; tying cities together with other non-state actors, such as corporations and civil society; and translating cities' ability to collaborate on issues they can immediately manage, such as pandemics or natural disasters, to areas where they do not currently have a direct role, such as policy related to management of nuclear weapons.

The Story

The COVID-19 pandemic was supposed to end in 2021. But initial vaccines proved to be less effective than expected, and a new, vaccine-resistant strain of the virus (COVID-20) emerged. Many nations proved unable (or unwilling) to manage the worsening health crisis, as their economies were badly battered. With a lack of coordinated response at national levels, local governments stepped in to fill the void.

Today, in 2030, the Mayors' Response Network (MRN)—the organization of cities that first joined together to fight COVID-20—has become a global force in tackling shared challenges, including managing climate migrants, managing sea-level rise, providing public health resources, and even pressuring national governments toward nuclear disarmament.

The Mayors' Response Network first emerged during 2022—an economically difficult period for most cities. The repeated shutdown of businesses due to the COVID-19 and COVID-20 pandemics had led to sharp reductions in taxes, and cities and states were forced to drastically slash their budgets. Cities also saw their commercial real estate plummet in value as a growing number of firms decided their employees could work at home permanently. Still, cities proved more effective in containing the spread of the coronaviruses as citizens were more likely to trust their local leaders than their national governments.

Building on existing "sister city" networks, as well as organizations like Mayors for Peace, the MRN started out as an online forum for city leaders to share solutions to common problems. The organization helped ensure that cities played an outsized role in distributing vaccines, an effort that many national governments failed to coordinate. The MRN also created opportunities for friendly competition: In Busan, Korea, city officials won the "Vaccine Cup," setting a record by coordinating two million vaccinations over a two-day period. "Top-down leadership has not been as effective as it should have been," said Seongim Song, Mayor of Busan, in a celebratory speech delivered at a MRN celebration. "It is up to us cities to solve these problems by ourselves. There are many cities in the world, and great disparity in our size and power. But we must find ways to coordinate, communicate, and come to agreement on these issues."

The MRN made it easy for cities to learn from each other's innovative ideas. At the 2022 Olympics (delayed for two consecutive years), the city of Tokyo gained recognition for rolling out a mobile phone-based app that "gamified" behaviors that prevented the spread of COVID, including social distancing, mask-wearing, and handwashing. Boosted by Olympic athletes and influencers, the game became a sensation among Japanese citizens. Following international exposure during the Olympics, other cities followed the model and adopted similar versions of the game for their own citizens to shift behaviors around air pollution, crime, and other issues.

Seeking to capitalize on the network's growing influence, the Russia-based oil industry used a coordinated social media effort to elevate mayoral candidates to power who were outspoken about the advantages of fossil fuels. Such campaigns were thwarted, however, when a team of students in Korea developed a blockchain-based "fake news detector" that enabled the validation of news information and dissemination of authoritative reporting that slowed the corrosive effects of misinformation.

The threat of nuclear war was further brought to public consciousness in 2025 when a Russian vessel misfired a missile that inadvertently sank a Japanese fishing ship in the Sea of Okhotsk's "donut" of international waters. (This was also partly a result of climate change: the warming oceans, melting sea ice, and shrinking fishing stock meant that fishing vessels were restricted to increasingly limited space in the Sea of Okhotsk.) There was also growing concern about the rise of AI in the military. China's deployment of an unmanned submarine with sophisticated AI capabilities raised alarm bells around the world and prompted other nations to increase their military spending to upgrade their weapons systems.

MRN members shared their growing concern about the dangers of the use of AI technologies in the military, particularly in systems designed to detect a nuclear attack. Local government leaders were outraged at the increases in military spending at a time when so many of their own citizens were going without housing and food.

Partnering with software makers and a network of non-governmental organizations (NGO), the MRN in 2026 launched a highly effective social media campaign and virtual reality experience designed to bring awareness to "the number one threat to humanity: nuclear apocalypse, whether intentional or accidental." This campaign was buoyed by celebrity and grassroots influencers in countries around

the world, and in Northeast Asia, younger generations became energized about the nuclear issue as never before.

By 2027, municipal trade pacts became a major driver of economic growth, and the increased inter-city cooperation led cities to make greater demands for "human security" based on a framework of common *regional* security, instead of national security. While some countries cracked down on the "insurgent" cities, most countries welcomed the new governance model. In 2029, the MRN received the Nobel Peace Prize for its efforts to lead the charge in global challenges like climate change and disarmament.

"Collectively, the cities in our network have more citizens than the entire population of the United States," said Jai Patel, the New Delhi Mayor and 2029 President of the MRN. "There are many levers we can use to get the layers of government above us to better serve our citizens. A shared voice is stronger than speaking alone."

Strategic Implications

This scenario suggests a variety of future-oriented strategies, including:

- Developing improved organizational structures and communications platforms for city and regional government leaders to share best practices for common problems.

- Securing the economic future of cities in an era when companies may increasingly have employees work online from home to save money on commercial real estate.

- Using communications to build trust and awareness of city- and state-level initiatives among citizens.

- Exploring how friendly competition and creative incentives could lead to behavior change and stimulate action on global challenges.

- Ensuring that new and existing institutions aimed at tackling global threats cannot be compromised or corrupted by outside forces (for example, the oil industry infiltrating the green movement).

- Improving management of seafaring vessels to reduce accidents in an era when warming oceans may be shifting the locations of fishing stock.

- Using city-level voices to call attention to the need for increased spending on social issues by national governments.

- Explore mechanisms by which cities could work with other non-state actors, such as corporations or non-profits and grassroots campaigners, to exert pressure on the disarmament question.

Island Mentality

Axis Combination:
Locus of influence: Nation-states
Approach to challenges:
Fragmented

In this scenario, national governments are the primary drivers of influence, but their approaches to global risks like pandemics and nuclear deterrence are fragmented. Resurgent nationalism around the world has led to heightened tension and a sense of instability and fear of war. Climate change leads to the spread of migrants to neighboring nations, exacerbating tensions. Increased inequality within nations leads to civil unrest and marginalization along socioeconomic lines, resulting in reduced focus on the nuclear issue.

In the coming years, the need to contend with challenges on multiple fronts could lead countries to reduce their support for each other and adopt a "go our own way" mentality, which may produce the benefit of increased self-reliance and reduce international conflict. There may also be more rapid innovation if countries tackle challenges in their own way, and the fragmentation could also lead to new, otherwise unlikely bi-lateral agreements between nations.

The Story

The 2020s will not be missed. The decade that began with the COVID-19 pandemic has seen one challenge after another: economic crises, terrorist attacks, wildfires, drought, famine, floods, mass migration, and most recently, nuclear disaster.

The start of 2021 was supposed to bring about the end of the COVID-19 pandemic, but pharmaceutical firms over-promised how much they could produce, and the limited vaccine available was distributed to the wealthiest citizens in the wealthiest nations. International tensions rose when vaccine-manufacturing states could not agree on a global logistical plan to deliver vaccines to developing countries. The Organisation for Economic Cooperation and Development (OECD) and United Nations (UN) attempted to manage the vaccine distribution globally, but countries balked.

Meanwhile, the economic effects of the pandemic continued to worsen. The period between 2021-2023 saw the deepest economic depression in history. Governments ran out of resources, and social welfare programs were near collapse. Facing sharply reduced budgets, wealthier nations grew reluctant to provide international aid. At the same time, they faced an influx of COVID refugees from nations that had failed to manage the pandemic crisis. Nationalism surged in countries like Japan and China, which had to contend with a growing flow of climate and COVID refugees and migrants from Malaysia, Vietnam, and Indonesia where whole cities were sinking beneath rising seas. Some nations faced perpetual drought and food shortages. Others were pounded by hurricanes and flooding. The end result was a "feed yourself first" mentality as nations closed borders and ramped up efforts to localize production and bring back jobs.

The economic meltdown following the pandemic grew into near universal bitterness toward China's

initial handling of COVID-19. While Donald Trump lost his bid for re-election in 2020, the populist movement that brought him to power remained strong. Vladimir Putin continued to run the show in Russia. The intensity of misinformation grew worse than ever, and the "Splinternet" only became more fractured as nations continued to impose new regulations that isolated which parts of the "world wide web" their citizens could access.

In 2025, a major terrorist attack in the western Chinese city of Chongqing emboldened leaders of the Chinese Communist Party to expand its already extensive facial recognition and surveillance net. China avoided the spikes in crime that other countries experienced and the "China model" of governance—with a strong-handed national government using forceful central control—became increasingly attractive to other nations. Countries like Belgium and Italy, still reeling from the pandemic, elected authoritarian-style leaders who imposed new regulations on firms while introducing a new data surveillance platform. In Japan, mobile phone-based apps originally used for "contact tracing" were converted into behavioral adjustment tools to promote "social trust." This program backfired, however, after it was learned that hackers could manipulate the data.

In 2026, a new, vaccine-resistant strain of COVID emerged, adding to tensions. This time, there was little pretense of cooperation. COVID-20 was deadlier than COVID-19, and the new outbreak led the United Nations to reduce "peacekeeper" troops around the world in favor of remotely controlled drones and autonomous systems. The new COVID-restricted military movement led to a decrease in military exercises, but wary of appearing weakened, military leaders found other (potentially more dangerous) ways to show strength. China announced it was using "deep learning" to train drones to attack, but these systems were vulnerable to cyberattack.

In a world defined by national self-interest the threat of nuclear war loomed large, particularly as the United States and China expanded their naval nuclear armament deployed in the West Pacific. The 2028 meltdown of the Fangjiashan Nuclear Power Plant, near Shanghai, exposed that China's rush to grow its infrastructure over the past few decades was built on a shaky foundation. China initially denied the meltdown had occurred, but after a northeasterly wind blew a radioactive plume toward Korea and Japan, governments in the region demanded that China offer greater transparency, establish international early warning systems, and establish a strict regional regulatory framework for managing its nuclear power plants.

Civil society organizations tried hard to exert pressure on governments to strengthen ties and reduce the threat of nuclear weapons. But many NGOs and political parties found that amassing on-line armies of "slacktivists" who only posted on social media did not translate into effective organizing and political power.

In December 2029, representatives from Mongolia, Korea, and Japan attempted to negotiate a Northeast Asia Nuclear Weapon Free Zone Treaty. If adopted, this framework would eliminate the presence of nuclear weapons in the Korean Peninsula and Japan. Critics argue that the pact, which would ban all nuclear weapon states in the region from attacking or threatening to use their arsenals against non-nuclear weapon states, would not eliminate nuclear risks among nuclear weapon states, and they noted it would take time for the DPRK to eliminate its own nuclear arsenal. The agreement's supporters, on the other hand, argue that increasing tensions make the pact necessary as the continued rise of nationalism in the United States, China, and Russia—and the potential danger of autonomous weapons systems—have made the risk of nuclear war far too dangerous.

Given how tense and tumultuous the past ten years have been, such a pact would have been welcomed throughout the region. But especially with the DPRK now firmly established as a nuclear state, the proposed treaty is unlikely to be taken seriously by any of the superpowers.

"The pandemic and economic recession have forced countries to look after their own interests first, and not necessarily think as much about what the whole world needs," says Tak Yamamoto, an analyst for the Tokyo-based World Analysis Institute. "More and more countries are adopting dangerous weapons for their own deterrence. Nations today are islands unto themselves, increasingly disconnected from each other."

Strategic Implications

This scenario suggests a variety of future-oriented strategies, including:

- Providing stimulus to help nations build back their economies while also managing multiple simultaneous crises.
- Curbing surges in migration related to climate change, war, pandemics, or other causes, as this external pressure could lead nations to turn inward.
- Developing more unified approaches to technologies like the internet and finding ways to prevent the spread of "fake news."
- Improving cybersecurity and privacy controls to ensure that technologies intended to support positive outcomes (for example, contact tracing) are not used for surveillance or other nefarious ends.
- Establishing confidence-building measures in military and security domains, such as a regional nuclear weapons-free zone.
- Concentrating national resources to promote technological innovation to overcome crises and threats like pandemics, systemic risks, or nuclear failures.
- Learning lessons from COVID-19 and helping nations prepare for potential future pandemics.
- Understanding the role that "respatialization" could play in shifting the behaviors of existing institutions, including the military.

Fragile Optimism
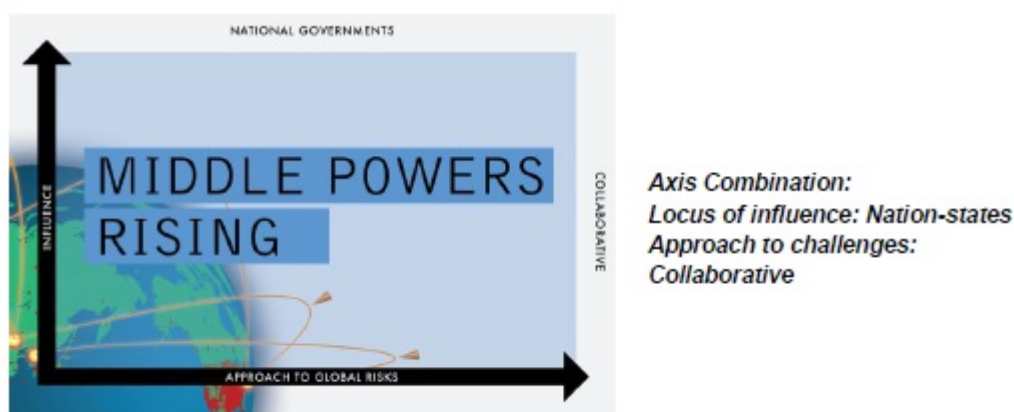
In this scenario, the role of nation-states has diminished and non-state actors— including cities and civil society organizations—have stepped in to fill the gap. But there is a lack of coordination among these groups, and they often find themselves working at cross-purposes.

In this future, the erosion of national (and international) governance leads to a resurgence of community-oriented solutions. In a world characterized by weak leadership and relentless crises, a patchwork of smaller institutions emerges to develop solutions on a more local level. Although their

efforts are sometimes at odds with each other—and far less effective than they would be through greater coordination—they are better than nothing.

The Story

Starting in 2020, the COVID-19 pandemic exposed the incompetence and institutional failings of most nations' governments. From China's initial lack of transparency about the virus, to the United States' disorganized response, the world's largest, most powerful countries were brought to their knees by wave upon wave of COVID. The roll-out of the vaccine in 2021 was slowed when production failed to keep up with demand, and the US government accused China of hoarding a critical ingredient.

Beyond COVID, other challenges exposed how ill-equipped most nations' governments were to handle major crises—including those caused by climate change. Although COVID temporarily led to a decline in CO2 emissions, the damage to the climate had already been done, and countries struggled to contend with regular flooding, hurricanes, and smoke pollution. These events led to a surge of "climate migrants," many of whom are moving from rural areas to cities.

In 2025, a new coronavirus emerged in Eastern Europe, but this time, rather than wait for another weak response from national governments, other institutions took charge. The World Health Organization received an influx of funding from the Jeff Bezos Foundation, which secured major donations from billionaires in India, Europe, and beyond. Thanks to the HealthyPlanet Foundation, medicine and vaccines for COVID-21 were distributed with unprecedented speed.

National governments further ceded influence as the world became increasingly borderless, thanks to the continued development of cyberspace. Advances in virtual reality have transformed everything from education to entertainment, and today's youth largely inhabit a space not clearly defined by geography. Younger generations in nations like Japan and Korea have adopted a shared virtual cryptocurrency, YenWon, that is increasingly being used in both countries—a trend that has raised eyebrows at institutions like the International Monetary Fund.

With little oversight due to weakened governments, corporations do what they want, and there is concern about rising income inequality. The slow degradation of national governments has also had dangerous consequences, including the spread of corruption and reckless handling of materials. In 2024, key components of a nuclear warhead were discovered during a routine inspection of a cargo port in western Russia. A few months later, a Chinese Snakehead trafficking syndicate was discovered auctioning fissile nuclear material on the "deep web."

At the same time, the role of official diplomacy has in some cases been taken over by non-state actors. After President Biden's nuclear disarmament talks with the DPRK collapsed in 2022, an international team of scientists reached out to engage Kim Jong-Un on a new front: environmentalism. Wildfires had become increasingly common in both the ROK and DPRK due to climate change, leading to cross-border ignition of forest fires and unbearable air pollution in Pyeongchang, as well as in Seoul and other cities in the ROK. Concerned that the toxic air crisis could weaken his government, Kim Jong-Un allowed firefighters from other Northeast Asian countries—as well as a group of provincial governors from the northern part of the ROK—to provide support.

The benefits of this new relationship were promising: 2027 saw the launch of a new "exchange program" through which students and researchers from the ROK and DPRK were allowed to cross-enroll in university online programs across their respective borders. And in 2028, with coordination from China and Japan, the ROK and DPRK officially ended their decades-long war. Looking back, it

may seem strange to say the COVID-19 pandemic had a silver lining, but the deadly disease that kicked off this tumultuous decade had unintended benefits.

The world's cities became increasingly self-sufficient. Recent years have seen a rapid increase in community efforts to restore degraded landscapes, bringing back ecosystems destroyed by statewide mismanagement of water that had resulted in widespread forest fires. Community and city-based efforts are emerging to create resilient cityscapes and landscapes to prevent and manage the effects of climate change. After the COVID-19 pandemic, urgent social needs are addressed with community gardens and farming cooperatives producing organic food, while leading to resilient landscapes and improved health. Communities are linked to each other in cyberspace where they share knowledge, experience, and ideas, but they are also increasingly going "off-grid" as energy production from local renewable sources has nearly surpassed traditional energy production.

Cities, communities, and international organizations have more responsibility than ever, and they are more trusted by citizens than governments when it comes to tackling big global challenges. But while "Build Back Better" became a global rallying cry following the COVID-19 pandemic, there has been too little effort to coordinate or standardize these efforts, and the increasingly "borderless" world is more fragmented than ever.

Strategic Implications

This scenario suggests a variety of future-oriented strategies, including:

- Ensuring the safety and further reduction of nuclear materials in an era of declining government resources and competence.

- Using the experience of the COVID-19 pandemic to further explore why some nations succeeded and others failed, and building new models based on findings.

- Creating opportunities for civil society to tackle emerging challenges and play a role in diplomacy and other roles traditionally held by governments.

- Adapting to an increasingly online world and ensuring that "cyberspace" can serve effectively as an area where individuals and organizations can connect and collaborate.

- Examining the potential for cryptocurrency and cyberspace to diminish the power and influence of national governments.

- Exploring new opportunities (outside of direct government) to soften ties with the DPRK.

Recommendations

The purpose of developing the scenarios is to imagine a range of possibilities—not to identify one right path forward, but to think broadly and understand what actions we can (and should) take today to be better prepared for whatever the future holds. Thus, the final part of the scenario planning process is to identify a variety of "robust actions" that could be taken today that would likely have benefits in more than one of the scenarios.

Following are descriptions of some of the "robust actions" that emerged from the scenarios:

Constituent Engagement

Engaging a broader base of non-state actors: An overarching message from the process of developing the scenarios is that we need to engage a broader base of potential stakeholders in nuclear issues. The conversation around nuclear disarmament has become calcified, and the debates

are stale. There are opportunities for non-traditional actors to work around the edges and to reform existing institutions (and potentially forge new kinds of institutions) that can bring a fresh approach to the challenge. It is important that governments feel pressure from the public—including from civil society activists, business sectors, and wider publics. Civil society and state actors alike can focus on helping more people recognize that nuclear disarmament matters as much as other challenges. There may be opportunities to connect our understanding of the nuclear issue with challenges like climate change and the pandemic, for example, by using an "umbrella" concept like "planetary health." It may also be possible to engage companies to take up the cause of nuclear disarmament as part of their corporate and social responsibility efforts.

Using digital media to build awareness among young people An awareness campaign that uses digital media (including "gamification," that is, transforming activity into an engaging game) could particularly help engage younger generations who currently are not as concerned about the issue of nuclear disarmament as were prior generations. The moral case against nuclear weapons, such as the slogans "No more Hiroshima" and "Let Nagasaki be the Last"—must be relentlessly sustained. Young activists can help persuade policymakers that any perceived "rational" benefits of nuclear weapons—for example, for superpower stand-offs or the benefits of small nuclear weapons—are far outweighed by the risks.

Engaging a broader base of nations: Driving change on the nuclear issue could come from a wider international community of states than it has traditionally. Just as the pandemic revealed differences in nations' approaches to managing the pandemic, expanding the number of states involved in the dialogue around disarmament could be valuable, particularly through mechanisms like the NPT review process, support for nuclear-free zones, or standard-setting initiatives. There could also be efforts to expand the role of middle-power nations (including those from Northeast Asia) in the United Nations Security Council and other bodies.

Geo-Strategic Actions

Solving the DPRK Puzzle: The scenarios revealed diverse approaches for addressing the challenge of bringing together the DPRK and the United States to meaningfully negotiate disarmament, a puzzle that, left unsolved, will be a major obstacle to nuclear security in the region. Civil society actors, along with cities and regional governments in ROK and other Northeast Asian nations, could play a greater role in the effort to bring DPRK and the United States to the negotiating table. It will also be important to think creatively about what incentives or cross-cultural programs could help soften the stance of both DPRK and the United States.

Advocating for budgets: The global economy has been upended by the pandemic and subsequent shutdown of businesses, and this experience will have an effect on budgets for years to come. Civil society actors should remain involved in budget-making in the coming years to ensure that national governments allocate sufficient resources to shared global and regional challenges—including issues related to nuclear security, safety, non-proliferation, and alternative energy.

Supporting international organizations: The pandemic exposed that, while not perfect, organizations like the World Health Organization play an important role in helping to coordinate international efforts in the midst of global challenges. Governments should invest resources to ensure these international organizations are well-supported as venues for international collaboration, but also work with them to make them more effective and nimbler.

Establishing city networks and regional cooperation networks: The potential for cities (and other local and regional) governments to work more closely with each other is a strategic opportunity for managing nuclear risk and other global threats. Organizations like Mayors for Peace

may play a more direct role, and new networks of cities and regions could be established. Cities could also increase their leverage with national governments and move them in a direction to establish a Northeast Asia-nuclear-weapon-free zone.

NEA Public Health Security Initiative: Cities in the region, perhaps led by Seoul Metro, could promote a Northeast Asian public health security initiative to respond to pandemics, similar to the Northeast Asia Cooperation Initiative for Infectious Disease Control and Pandemic Futures and Nuclear Weapon Risks 31 Public Health proposed by President Moon Jae-In.[7] This initiative could provide an opportunity to engage the DPRK on public health, and indirectly on the current pandemic, on a large scale as a co-equal partner in a regional context. This approach may also fit into a Biden Administration's attempt to reset the US-China relationship and promote a multilateral COVID-19 response at a regional level. A lesson can be learned from the experiences of regional and local efforts using digital technologies such as in the ROK, Singapore, and Taiwan (Chinese Taipei). A strong public health system in each country is also the best defense against deliberate weaponization of pathogenic agents, whether by a non-state actor or a state.

Nuclear Hotlines: Given the potential risks that nuclear commanders could be infected during the pandemic, it is incomprehensible that there is no standardized and routinized communication channel between nuclear commanders today. Such hotlines could be a common project in a regional security framework; or they could be championed most likely by a middle power in the region. To get the best hotline, it should be developed using open-source development. Market players may be able to contribute faster and better to such a project than large-scale government projects run by military or security agencies built on the principles of secrecy, control, and distrust. Successful development of shared hotline technology could also be a gift from this region to other nuclear-afflicted regions at the brink of nuclear war.

Slow and Reverse (Strategic) Nuclear Forces Deployments and Operations in Northeast Asia: Regional non-nuclear states, whether they are nuclear umbrella states allied with the United States (Japan, ROK, Australia) or nuclear prohibition states (Mongolia, Indonesia, Vietnam, Malaysia), should find common cause to bring pressure on the nuclear-armed states to undertake serious disarmament dialogue on the nuclear-prone conflicts in this region and to identify urgent risk reduction measures, such as agreements to avoid collisions at sea or in the air, to increase transparency of nuclear forces, to commit to not targeting nuclear commanders under any circumstances, etc. This approach could start with a summit at which leaders could declare that nuclear weapons should never be used again in this region, adopting the message from Nagasaki ("Let Nagasaki be the last")

Technological Solutions

Developing new approaches for AI safety and security: A recurring theme in the scenarios is the potential threat for AI-based systems to feed into the build-up toward nuclear conflict. AI systems that are based on machine-learning are likely to be used in a growing number of contexts, but such systems can have built-in biases. They are often "black boxes" that lack transparency, and they can be manipulated through various forms of cyberattack. Civil society and governments should collaborate to ensure that AI systems are designed for safety and security.

Supporting international scientific cooperation: The sharing of scientific information has been crucial in rapidly advancing treatments and vaccines for the pandemic. The international partnerships and institutions that led to this success—including data-sharing—could serve as a model for other areas, including oversight and reduction of nuclear weapons. There are also opportunities to improve the trustworthiness of scientific communication and to improve how communication is presented to policymakers and the public.

Taking advantage of the proliferation of sensors: The use of contact-tracing apps to manage the COVID crisis is a reminder of how modern digital devices could serve as sensors for "on-the-ground" actions that might come into play in the event of a nuclear crisis, while ensuring that authorities do not abuse these apps.

Developing ways to ensure the integrity of information: The spread of false information related to the pandemic has made it clear how disinformation could easily lead to a nuclear disaster. New methods will be needed to verify information, particularly as social media is used more widely and "deep fakes" become more sophisticated. Improving cybersecurity will also be important for ensuring the integrity of data in an increasingly digital world.

Developing new platforms for sharing emergency response information: A key challenge that emerged across the scenarios relates to the sharing of misinformation and its effect in degrading trust in institutions. This lack of trust could have catastrophic consequences in the event of a nuclear crisis. New platforms or approaches are needed that can help verify the source and accuracy of information necessary for the public to respond to an emergency.

Increasing monitoring and controls for nuclear materials: In a world in which nation-states lose their power and influence and face budget cuts, they may take shortcuts in the handling of nuclear materials. There may be a need for improved monitoring and oversight to ensure these materials are carefully tracked and do not fall into the hands of illicit actors.

Conclusion

The risk of catastrophic use of nuclear weapons—whether triggered by human error, machine error, or with intention—is as grave and immediate as it has ever been. We desperately need to shake up what has become a calcified approach to nuclear disarmament and find creative ways to overcome this challenge.

The purpose of this Nagasaki 75th Anniversary Pandemic-Nuclear Nexus Scenarios Project was to explore new ways to think about the issue of nuclear weapons in a world that has been re-shaped by the COVID-19 pandemic. In less than a year, the pandemic has exposed how, in an increasingly interconnected world, we are all vulnerable to deadly viruses, and how even the wealthiest nations may lack the capacity and will to manage a public disaster.

We have also witnessed the worsening effects of climate change, including increasingly frequent hurricanes, wildfires, drought, and flooding. Alongside these natural threats remains the perpetual and ominous specter of nuclear apocalypse. There are still more than 13,000 nuclear warheads around the world, while most treaties aimed at nuclear arms reduction have been stalled or abandoned. At the same time, the global stockpile of nuclear materials poses an unacceptable risk of nuclear proliferation and nuclear terrorism.

Pandemics, climate change, and nuclear war are all existential threats that could end our civilization as we know it. In the face of these shared global challenges, there is a greater need than ever for collaboration and cooperation. Instead, we see mounting tensions among major nations and a rise in nationalism and authoritarian governments. The lack of effective coordination and continued weakening of global and regional organizations could lead to disaster.

The objective of the Nagasaki 75th Anniversary Pandemic-Nuclear Nexus Scenarios Project workshop was not only to broaden our analytic understanding of the connections between the pandemic and nuclear threats—and the global and regional responses to them—but also to identify strategies that will be most productive in overcoming the nuclear threat. The workshop revealed a

number of pathways to re-imagine our approach to shared global challenges. What needs to be considered in greater depth is how the nexus between pandemic and nuclear risk, plus the nexus between existential threats, can be leveraged to prevent nuclear war. At the same time, efforts to prevent nuclear war should be designed to have parallel policy effects in preventing other public disasters.

The next step in this project will be to develop more concrete recommendations for policymakers who must now adopt and implement practical measures to manage existential risks posed by the nexus of pandemics with nuclear weapons.

Appendix 1: Papers

Links to download the papers can be found on the following websites:

[APLN](#)

[Nautilus Institute](#)

[RECNA](#)

List of Commissioned Papers

1. "The US Election and Nuclear Order in the Post-Pandemic World," Leon V. Sigal, September 30, 2020.

2. "The Effect of a Regional Nuclear Conflict between India and Pakistan: Two Views," G. D. Hess, September 30, 2020.

3. "Nagasaki's Voice: 75 Years' Experience," Masao Tomonaga, October 9, 2020.

4. "Pandemics," C G Nicholas Mascie-Taylor and Kasuhiko Moji, October 12, 2020.

5. "Extended Deterrence and Extended Nuclear Deterrence in a Pandemic World," Allan Behm, October 16, 2020.

6. "An Alternative to Nuclear Deadlock and Stalled Diplomacy—Proposals, Pathways, and Prospects for the Northeast Asia Nuclear Weapon-Free Zone," Michael Hamel-Green, October 20, 2020.

7. "Asia-Pacific Perspective on Biological Weapons and Nuclear Deterrence in the Pandemic Era," Richard Pilch and Miles Pomper, October 27, 2020.

8. "COVID-19 and Labor Demand, Migration, and Military Force Structure Implications in East Asia," Brian Nichiporuk, October 28, 2020.

9. "Nuclear Hotlines: Origins, Evolution, Applications," Steven E. Miller, October 29, 2020.

10. "The Role of Cities as First Responders to Pandemics: Focusing on the Case of the Seoul Metropolitan Government's Response to COVID-19," Changwoo Shon, October 29, 2020.

11. "Assessing the Modernization of Nuclear Postures," Petr Topychkanov, October 30, 2020.

12. "Equitable Access to COVID-19 Vaccines: Cooperation Around Research and Production Capacity is Critical," David Legge and Sun Kim, October 30, 2020.

13. "US Planning for Pandemics and Large-Scale Nuclear War," Lynn Eden, November 24, 2020.

14. "Post corona world order and geopolitical future of Northeast Asia," Chung-in Moon, Sam Gardner, and Sue Jeong (Forthcoming).

15. "Nuclear War in Northeast Asia: Nuclear Forces and Nuclear War Planning," Hans Kristensen and Matthew McKinzie (Forthcoming).

Appendix 2: Critical Uncertainties

During the workshop, participants were divided into four teams to brainstorm a variety of "critical uncertainties" that could have an effect in shaping the future of pandemics and nuclear weapons over the next ten years. Note that these questions were developed spontaneously by the different groups and then combined based upon category, so there may be overlap.

Social

- How can people be more informed and trust media and governments more?
- How might community mitigation measures change the structure of societies?
- To what extent will millennials take on nuclear as a critical cause?
- How might the younger generation respond to implications of resolving geopolitical tensions they did not live through?
- What might be the broader social consequences of an aging population?
- How might the shift from a unipolar to multipolar world reshape regional cooperation?
- To what extent might the rise of disinformation campaigns shape nuclear deterrence/use strategies?
- How might spatial distancing influence social movements and the way they operate?
- How might a re-spatialization of society affect nuclear strategies?
- Might the pandemic strengthen a sense of global community and shared humanity?
- What happens if the media loses total trust of the public, and people no longer have accurate understandings of what is happening with COVID-19 (or other issues)?
- Could the media play a negative role in perceptions of nuclear weapons, and could the lack of trust in media lead populations to the opposite idea and have a positive view of nuclear?
- How can we improve the ability to choose information about the pandemic, nuclear weapons, and other global issues?
- How can we use media influencers to affect general or widespread beliefs on nuclear issues?
- What if we face five to ten years of endless pandemics? How will this affect life and security, given the lack of connectivity?
- How do gender issues play a role in this pandemic?
- Is there any relevance between women's positions in society (gender gap index) and the spread of COVID-19?
- How can civil society be mobilized in the era of pandemics?
- How could global problems like the pandemic influence ethnic tensions or exacerbate regional disagreements/secession movements?
- How does a long-term pandemic affect people's everyday lives and mindsets, particularly given the

challenges of making friends and other connections?

- How can we increase media literacy to reduce the effect of mis/disinformation?
- To what extent will populations in cities decline due to unemployment or changes in economic downturn as a result of pandemics?
- How can we make use of information coming from enhanced surveillance systems, and how does this influence protections of human rights?
- What will be the effect on disinformation and fake news on encouraging antagonism between states?
- What will be the internal effect of prolonged COVID-19 pandemic on the economy, politics, and social security in each country?
- If pandemics continue, will that alter states' willingness to accept refugees/immigration?
- How might religious differences effect societies following the pandemic?
- What are the long-term consequences (for example, mental health) of social isolation measures implemented to reduce pandemic spread?
- How will the decreased social interactions implemented because of the pandemic affect the decision-making process in business or policymaking?
- After the pandemic, will businesses downsize, move out of cities, and let people continue to work from home?
- How might the rapid rise of conspiracy theory-fueled civil society groups influence or offer lessons for nuclear dis/armament?
- Will the aging population lead to intergenerational differences in salience to nuclear dis/armament?

Technological

- What are the implications of the increasing role of technology tools, for example, surveillance and artificial intelligence, that are driven by our digitized age?
- To what extent might social media algorithms drive hostility between nation-states?
- What effect might AI have on strategies for nuclear deterrence/use?
- How will technology development (such as AI and big data) change how people (particularly leaders) make decisions, mainly on the issue of nuclear weapons?
- How do we leverage the increased use of technologies such as Zoom to engage different communities in different countries on nuclear issues?
- How might the software and hardware you use effect your nuclear strategy?
- How will COVID-19 mitigation technology make people more comfortable with surveillance?
- How might intellectual property rights effect the way we cooperate on global issues such as public safety?
- How will people deal with the dilemma of security vs. privacy when it comes to surveillance, particularly with COVID-19 technology?

Economic

- To what extent might reduced budgets and other financial considerations affect disarmament or proliferation?

- How might rising economic inequality drive nuclear risk up or down?

- To what extent might living with pandemics be a "new normal"?

- Might the pandemic enable conditions that enable workers to fight for greater labor rights/protections?

- Might the pandemic pave the way for new laws/institutions to come into existence?

- What will be the varying economic effect on various populations and how may that affect the challenge of encouraging groups to agree on nuclear issues?

- What will the effect of the pandemic and nationalism on the supply chain mean for nuclear-related trade and controls?

- How will a global recession, and potentially a more divided society, effect action on nuclear disarmament?

- How does global and national wealth inequality and the wealth gap effect international issues such as nuclear risk?

- How does increasing government debt and slowing economic growth pose opportunities or challenges for international cooperation?

- How much of an economic recovery will we see by 2030?

- How will the unequal economic effect increase global tensions and risks between nations?

- How can we reduce inequality in the context of a global pandemic and climate change?

- Will the reduction in global trade as a result of pandemics lead to more isolationism and increased risk of warfare?

- How will a global recession (and potentially a more divided society) effect action on nuclear disarmament?

- How does the current global finance system affect international cooperation on global problems like pandemics and nuclear risk?

Environmental

- How will climate change affect nuclear risk?

- How might environmental advocacy and values support nuclear disarmament?

- Will we still be a single planet species in ten years?

- Might we move away from nuclear in light of nuclear accident risk?

- How might food shortages caused by climate change effect nuclear risk?

- To what extent will climate change lead to the adoption of nuclear power and what will that mean for perceptions of nuclear weapons?

- What kinds of climate effects will have direct effects on NE Asia by 2030?

- How will climate refugees effect global stability?

- To what extent will mass migration need to occur as a result of climate change?

- Will the new global leadership stand up to environmental change?

- Will renewable energy supply become readily available and affordable?

- Will there be any nuclear accidents related to nuclear power?

- Will food insecurity as a result of climate change drive increase risk of war?

- What will be the effect of natural resource exhaustion?

- How will climate change affect nuclear risk?

- How does climate change act as a threat multiplier for warfare due to simultaneous disasters occurring?

- How could the increased digital literacy sparked by the pandemic change civil society advocacy?

- How might our success/failure in dealing with climate change effect nuclear risk?

Political

- To what extent might the continuation of pandemics increase (or decrease) global cooperation?

- To what extent might the rise of authoritarianism in (historically) democratic states drive nuclear risk?

- How viable are liberal democracies as a model in ten years?

- Could the fragility of our mortality nudge leaders towards caution in use of force?

- To what extent has the withdrawal of the US from key international institutions created a vacuum driving nuclear proliferation?

- How might more intense global competition effect nuclear risk?

- What if there is greater nuclear proliferation in ten years? What effect might that have on the geopolitical status quo?

- Might there come a point when we use pathogen containment as justification for nuclear use?

- Might an awakened sense of global community drive leadership across sectors to consolidate international cooperation?

- What would happen if China makes a vaccine before any other country?

- How will relations between Japan and the ROK develop and how can they improve?

- How will global collaboration be effected if the US falls from global superpower status?

- If the pandemic continues for several years, how can we ensure that we also talk about other issues, such as non-proliferation?

- Are authoritarian regimes better suited to dealing with COVID-19?

- Are female leaders more adept at dealing with COVID-19?

- If COVID-19 continues, what would be the effect on democracy and human rights?

- Will democracy still be appreciated? Will there be a willingness to give control over to the government?

- How will COVID-19 change the way countries define individual rights vs public health?

- What opportunities do the pandemic and climate disasters provide for communicating and collaborating with the DPRK?

- What will be the effect of COVID-19 on the UN and other international agencies?

- In what ways will gender influence how the virus is fought?

- How does distrust (whether justified or not) in enforcement of nuclear treaties affect their veracity?

- How might rising domestic issues (for example, religious tensions in China) lead nations to seek enemies abroad?

- Does the weakening of international institutions reduce their legitimacy and ability to pressure and constrain powerful states?

- How will society respond if states do not take action to comply with Treaty on the Prohibition of Nuclear Weapons now that it is going to come into force Jan 2021?

- What will be the effects of the ideological divide between authoritarian and democratic regimes?

- How can we eliminate the grey zones where there are not currently international agreements, such as around cybersecurity and private military companies?

- How would the rate at which countries recover from pandemics affect their political power?

- How can we remove impediments to establish effective regional dialogue for security in East Asia?

Military

- To what extent does COVID drive nuclear deterrence when conventional forces may be compromised?

- To what extent might our pandemic- driven fear drive us to actual military war?

- How might bioterrorism risk increase in this decade amid the backdrop of pandemics?

- How might COVID lead to a shift of military budgets toward social/healthcare programs?

- Should we prepare for potential escalation/conflict between Taiwan and China or China and the US?

- What would be the best way to increase security in the Asia-Pacific and decrease the need for deterrence?

- Will countries adapt their nuclear command, control, and communication (NC3) systems, given prominent leaders succumbing to COVID-19?

- How might the continued development of drone and autonomous weapons change the nature of militaries and other domains?

- How might COVID influence the effect of deterrence and extended deterrence?

- If pandemics were to continue or this pandemic continue and evolve, would militaries be expected to adopt other operations besides defense and war?

- How can China/America's competition remain political and economic, and not military/ideological? Why does there have to be a competition at all?

- Could nuclear war start due to poor communication between adversaries and rapidly diminishing reaction times for checking on data before responding?

- What is the effect of increasing tensions in the South China Sea?

- To what extent do the blurring of boundaries between conventional and nuclear weapons increase

the possibility of nuclear warfare?

- Will the fragility of the extended deterrence doctrine based on the US stepping in to protect allies lead to countries acquiring their own nuclear capabilities?

- Will states trust the US to comply with the nuclear umbrella policy and step in to protect allies?

- What is the risk associated with nuclear power generation technologies being converted to military use?

- To what extent might we be in a psychological position of fear that is created from the pandemic, that it actually drives us to actual military conflict?

- What is the possibility of escalation from conventional warfare to nuclear warfare, especially in regions with historical tensions?

- What role will the media play in either stoking or de-escalating tensions?

- What would be the best method to increase security in the Asia Pacific and decrease reliance on deterrence?

- To what extent does lack of transparency between government institutions like the military about the planning for nuclear warfare preclude the possibility of the public being involved in political activism?

- Will the financial pressures of COVID-19 reduce government budgets for the military?

- How will COVID-19 affect the strategic personnel readiness of Northeast Asian militaries, and will this advantage those militaries with a greater emphasis on computer simulation and virtual reality?

- Will a nuclear incident (or a close call) galvanize a new peace movement?

- Is there a risk that a nuclear state in the region could mistake a natural pandemic or accidental biological release for an intentional biological weapon attack and respond with a nuclear strike?

Epidemiological

- Will a vaccine be created in time, and will COVID mutate and require multiple vaccines to be developed?

- What if COVID cannot be countered by vaccines, like HIV/AIDS?

- How will escalation of climate risk to human settlements effect nuclear risk?

- If the pandemic leads to more economic depression in the region, how will it affect the military budgets, especially as countries seek to develop new (nuclear) weapons?

- How does the current international finance system affect global cooperation on issues such as nuclear risk and pandemics?

- What would happen if the pandemic were widespread in North Korea, beyond anything that the government could control?

- How will the way the international community responds to the pandemic make it more or less likely that they will cooperate on other issues, such as nuclear disarmament?

- How will the response to COVID effect global collaboration?

- How will city leaders come together to build a stronger network for a nuclear free future?

- What would happen if a country makes a vaccine before any other country?

- What will the distribution of the vaccine look like and how would it affect global relations?

- What would happen with a dual pandemic?

- How will disagreements over distribution of a vaccine affect global relations?

- How much will the SARS- COV2 virus evolve?

- What happens if recovery takes longer than expected?

- Will states share resources or stockpile for their own use (for example, vaccines, medical supplies, food, technologies)?

- Will vaccines be effective in creating immunity to COVID-19?

- Will the public accept the need for novel vaccines, and will they allow themselves to be vaccinated? What happens if they say no?

- How might the implications of *cordon de sanitaire* lead us from traditional nuclear armament to new projects/ambitions?

Appendix 3: Roster of Participants

OPENING SESSION WELCOMING PRESENTERS

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III. ENDNOTES

[1] The opening session, featuring Nagasaki Mayor Tomihisa Taue, former Australian Foreign Minister Gareth Evans, and four expert presentations, was livestreamed and may be viewed here: https://youtu.be/qFrnkgrex0Q?t=135

[2] https://thebulletin.org/doomsday-clock/current-time/

[3] Data from the Johns Hopkins University & Medicine Coronavirus Research Center, https://coronavirus.jhu.edu/map.html, accessed December 3, 2020.

[4] See https://www.chathamhouse.org/about-us/chatham-house-rule

[5] The COVID-19 pandemic has erupted with such ferocity and speed that there is little public analyses of the geopolitical implications, but this will change soon. Here is one such early effort. T. Wright, "Stretching the International Order to Its Breaking Point, The greatest error that geopolitical analysts can make may be believing that the crisis will be over in three to four months," *The Atlantic*, April 4, 2020, at: https://www.theatlantic.com/ideas/archive/2020/04/pandemic-last--18-months-will-change-geopolitics-good/609445/?utm_source=nextdraft&utm_medium=email

[6] Geographers refer to how the pandemic has led to the "re-spatialization" of human affairs in all sectors and at every level, from the individual to nation-states. Some suggest that rather than merely increasing the velocity of existing change and bringing underlying conflicts to the surface, the pandemic heralds an epochal, global, and systemic transformation that will lead to a new distribution of power capacities in geo-political, geo-economic, and geo-ecological dimensions. This shift, they aver, is on a scale with the change wrought by the rise of European imperialism and the displacement of disconnected societies all over the world by colonialism, and the global bifurcation of the entire world into two competing blocs by the United States and the former Soviet Union after World War II. Such changes include spatial distancing at every unit level of human societies; border controls, mobility controls within and across borders, contracting supply chains and a reconfiguration of production and consumption location, changes in architectural and settlement density and design to reduce infection risk, slowing and reversal of human settlement intrusion into zoonotic-reservoir habitats, shifts in the forecast distribution of climatic effects over coming decades due to changes in greenhouse gas emissions and carbon uptake in sinks such as forests, etc. We sense this change and see indicators of this change, but we do not yet comprehend its

scale and magnitude, let alone its emergent properties as a new global system that redefines the local.

[7] In his address at the 75th session of the UN General Assembly on Sep. 23, 2020, ROK President Moon-Jae-in introduced a proposal for a regional public health initiative that would include all nations in the region, including DPRK. "Hoping that the international community views the issues surrounding the Korean Peninsula through the lens of more inclusive international cooperation, I propose today launching a Northeast Asia Cooperation Initiative for Infectious Disease Control and Public Health, whereby the DPRK participates as a member along with China, Japan, Mongolia and the Republic of Korea." See https://english1.president.go.kr/BriefingSpeeches/Speeches/881

IV. NAUTILUS INVITES YOUR RESPONSE

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