

WORLD LEADER

NTI



BUILDING A SAFER WORLD

A GLOBAL SECURITY ORGANIZATION FOCUSED ON REDUCING NUCLEAR AND BIOLOGICAL THREATS
IMPERILING HUMANITY • ENHANCING GLOBAL BIOSECURITY • PREVENTING USE OF NUCLEAR
WEAPONS • ENCOURAGING U.S.–RUSSIAN COOPERATION • ADDRESSING NUCLEAR TERRORISM •
EMERGING SCIENCE AND TECHNOLOGY • BUILDING POLITICAL WILL • PIONEERING INNOVATIVE,
REAL-WORLD SOLUTIONS THAT ADDRESS THESE CHALLENGES AND CREATE LASTING CHANGE

2019 ANNUAL REPORT

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**“Preventing and planning
for the unthinkable has
been at the heart of our
work since we launched.”**

*NTI President and COO Joan Rohlifing and Vice President
Laura S. H. Holgate (with microphone) at an NTI Seminar.*

Letter from the NTI Co-Chairs

July 2020

Ernest J. Moniz, Sam Nunn, and Ted Turner

As we write this letter during the ongoing health and economic crises brought on by the COVID-19 pandemic, the world has changed dramatically. We are heartened that millions of people are staying home to help protect their families and their communities, grateful for the medical professionals and first responders working on the front lines, and hopeful that the world's best scientists will develop an effective vaccine.

The costs of this deadly new coronavirus, however, already are staggering. More than 140,000 people have succumbed to COVID-19 through mid-July in the United States alone, and we know that many more deaths are inevitable both domestically and globally. Hospitals continue to be overwhelmed, life-saving medical equipment and protective gear are scarce, and access to testing remains limited. At the same time, millions are unemployed and economies are ravaged. This global crisis is a devastating illustration of how crucial prevention and preparedness are, in a world where new pathogens can emerge unexpectedly and cross borders in no time.

In 2019, NTI Vice President Beth Cameron and the NTI | bio team warned of just this kind of scenario in the inaugural edition of the Global Health Security (GHS) Index. This groundbreaking project, developed in partnership with the Johns Hopkins Center for Health Security and The Economist Intelligence Unit, is the first comprehensive assessment and benchmarking of global health security and related capabilities across 195 countries—and regrettably, its conclusions have proved prescient. As COVID-19 has so vividly and tragically demonstrated, countries are woefully unprepared for pandemic response, with every country having significant gaps.

The NTI | bio team is advising leaders across all levels of government, and we are gratified that the GHS Index is being used as a guide to improve epidemic and pandemic preparedness around the world. We know it will serve as an indispensable tool for governments and global health security professionals. Our intent is to issue a second edition in 2021, incorporating the lessons learned from the coronavirus pandemic and response.

Preventing and planning for the unthinkable has been at the heart of the Nuclear Threat Initiative's work since we launched the organization nearly two decades ago with a promise to bring fresh thinking to global threat reduction and pair it with practical, workable solutions. "We intend to match our thoughts with actions," Sam and Ted wrote in NTI's first annual report.

We are proud that our implementation of this unique model—a non-profit global security organization that collaborates with governments and partners worldwide on threat-reduction initiatives—has earned NTI an international reputation as an independent and trusted partner able to catalyze and deploy innovative solutions that yield systemic change for long-term safety and security.

In 2019, in an historic achievement for global nuclear security, an international low-enriched uranium (LEU) bank became operational in Kazakhstan. The LEU bank is designed to prevent nuclear proliferation by giving countries seeking nuclear power an assured fuel source, so that they don't develop the kind of enrichment technology that also could be used to build a bomb. NTI helped jump-start this project in 2006, in partnership with the International Atomic Energy Agency (IAEA) and with generous backing from our advisor Warren Buffett. Now owned and managed by the IAEA, the bank stands as a major contribution to global nonproliferation efforts. Looking forward, we know that the LEU bank must be a foundation on which we build additional structures to advance the Atoms for Peace vision of diminished nuclear proliferation risk, together with the positive application of nuclear technology.

In these pages, you'll read much more about our innovative work in 2019—including developing an approach toward future negotiations on denuclearization in North Korea; working with hospitals and research centers to eliminate dangerous radioactive sources and reduce the "dirty bomb" threat; and organizing a new public education campaign on nuclear policy, designed to raise the visibility of this issue in the 2020 elections.

We are pleased to report that our work is making a material difference in reducing global security threats. At the same time, we know that preventing the use of nuclear weapons by intention, mistake, or miscalculation is a never-ending job, and as we move into a new decade, we are facing a very challenging set of circumstances. Most of the internationally agreed treaties that served as guardrails to keep nuclear weapons stockpiles and delivery vehicles in check have been dismantled or are soon to expire; the threat posed by cyberattacks to nuclear facilities and weapons systems is real and growing; and countries are woefully unprepared to prevent and respond to a host of emerging biothreats, to name a few of the important challenges ahead.



**“Our work is making
a material difference
in reducing global
security threats.”**

*NTI Co-chair and CEO Ernest J. Moniz with NTI Co-founders
and Board Co-chairs Ted Turner and Sam Nunn (L-R)*

Meanwhile, relations with Russia, which together with the United States holds nearly 90 percent of the world's nuclear weapons, have devolved to a dangerous point, as Ernie and Sam laid out in September 2019 in an article for *Foreign Affairs* magazine titled, "The Return of Doomsday: The New Nuclear Arms Race—and How Washington and Moscow Can Stop It."

There's no question that the backdrop for our work ahead is daunting, but with our deeply experienced staff of experts, an exceptional Board of Directors, and generous supporters, we are tackling these challenges.

In 2019, our Board was strengthened with four new members: Ray A. Rothrock, who brings crucial expertise from his decades of leadership at U.S.-based technology and cybersecurity companies; Ambassador Alexa Wesner, a high-tech chief executive and entrepreneur who served as U.S. Ambassador to Austria from 2012–17; Laura Turner Seydel, an internationally recognized humanitarian and environmentalist with a deep commitment to global security issues; and Jill Hruby, former director of Sandia National Laboratories, who brings decades of expertise on nuclear weapons, cyberspace, and biological defense. Jill also served in 2018–2019 as NTI's inaugural Sam Nunn Distinguished Fellow, and our work will continue to be enhanced by her in this new role.

Sadly, we also mourn the passing of three remarkable leaders: former Senator Richard Lugar and former Undersecretary of State Ellen Tauscher, both of whom served on NTI's Board of Directors, and David Hamburg, former head of the Carnegie Corporation of New York and long-time partner to NTI. We are enormously grateful for their dedication and cherished friendship over many years.

Without the support of the foundations, families, and individuals who put their trust in NTI, we would not be able to do our important work. We are tremendously grateful to our new funders and our steadfast supporters, particularly Warren Buffett, Carnegie Corporation of New York, the John D. and Catherine T. MacArthur Foundation, the Open Philanthropy Project, and the Peter G. Peterson Foundation.

In the coming year, we will mark the 75th anniversary of the first and only use of nuclear weapons. As we address persistent as well as evolving and escalating threats, we are mindful that the world has avoided a global nuclear catastrophe since then, through a combination of vigilance, dedicated work, and luck.

In this new and more dangerous era, NTI will continue to make a difference in reducing nuclear and biological risks. We rededicate ourselves to the critical mission of building a safer world today and for future generations.



Ernest J. Moniz



Sam Nunn



Ted Turner

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**“Preventing the use of
nuclear weapons ... is a
never-ending job.”**

NTI | bio Advisory Group member Renee Wegrzyn, program manager with the DARPA Biological Technologies Office, and Ernie Moniz on a panel discussing “WMDs & Emerging Technologies: Assessing Threats and Opportunities.”

Remembering Three Extraordinary Public Servants

NTI mourned the passage in 2019 of three extraordinary public servants — champions for peace and global security, visionary leaders, cherished colleagues, and dear friends all.

Former Senator Richard Lugar was a founding member of NTI's Board of Directors and a trusted partner to Sam Nunn during their service together in the U.S. Senate and beyond. Their signature legislation, the so-called "Nunn-Lugar" program, was a bold initiative that helped former Soviet states eliminate, deactivate, and secure thousands of nuclear, chemical, and biological weapons following the dissolution of the Soviet Union. In a piece on Dick's passing in the *Washington Post*, Nunn urged those working to address today's critical issues, from security and climate threats to health care and income inequality, to follow the "Lugar Way" by building coalitions across party lines and treating colleagues with dignity and respect.

Former Undersecretary of State Ellen Tauscher, a devoted NTI Board member, worked tirelessly as a member of Congress and later at the State Department to strengthen U.S. and global security and played an indispensable role in ratification of the New START treaty, the last remaining nuclear arms treaty between the United States and Russia. Ellen brought tremendous energy, sound judgment, strategic wisdom, and a lively sense of humor to the mission of building a safer world for future generations.

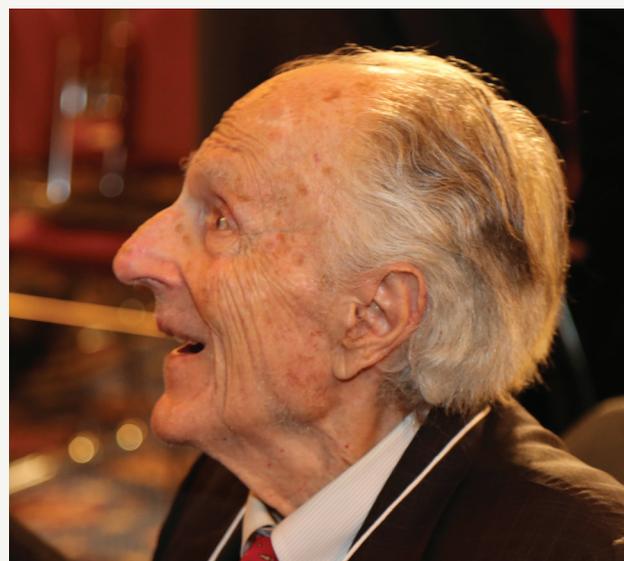
Dr. David Hamburg had deep ties to NTI. The former head of the Carnegie Corporation of New York was instrumental in the creation of the Nunn-Lugar program, and his accomplished daughter, Margaret A. Hamburg, is a founding vice president of NTI and now a member of the NTI Board of Directors. David was a towering intellect who dedicated his life to preventing violence and promoting peace and security around the world. In his later years, when he worked out of NTI's offices, he was a generous and enthusiastic colleague and a gentle, guiding presence for NTI's entire staff.



Former Senator Richard Lugar



Former Undersecretary of State Ellen Tauscher



Dr. David Hamburg



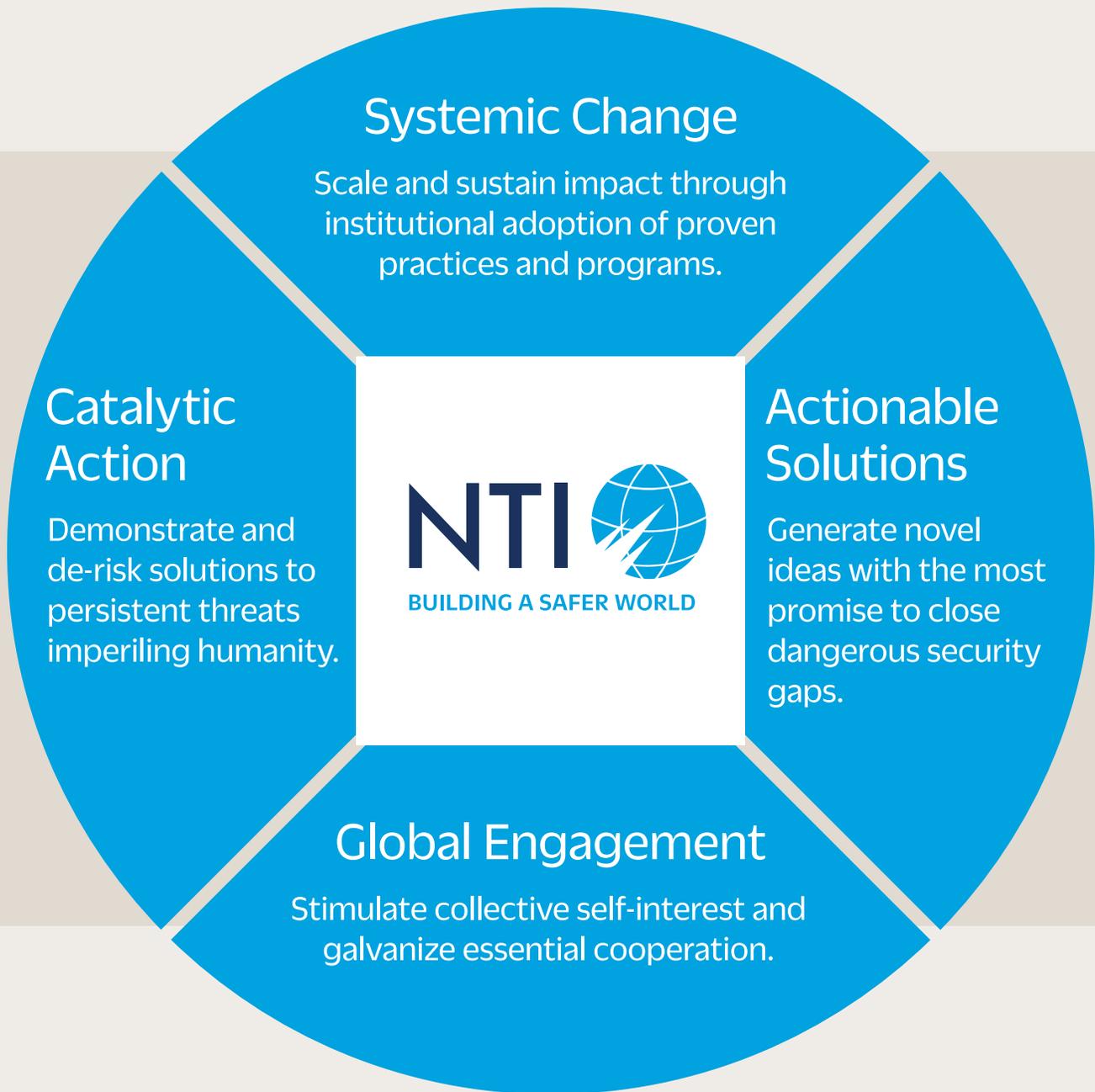
NTI President and COO Joan Rohlfing at the launch of the NTI Science and Technology Advisory Group.

How NTI Makes an Impact

The NTI impact model drives systemic change that creates a safer world by galvanizing large-scale institutional adoption of proven global security practices and programs.

Our expert analysis shines a bright light on critical security gaps and generates actionable threat-reduction solutions. By stimulating the collective self-interest of government and

private sector forces around the world, NTI then cultivates collaboration and momentum around those solutions. These partnerships forge pilot initiatives that demonstrate and de-risk the solutions to catalyze large-scale, enduring institutional adoption.





**\$5 Million Spurs
\$3 Billion
in Government
Investments**

NTI invested \$5 million in a partnership to secure 2½ bombs' worth of highly enriched uranium in Belgrade that resulted in the creation of the Global Threat Reduction Initiative. The initiative invested more than \$3 billion on nuclear and radiological security, removing or eliminating more than 200 bombs' worth of dangerous, vulnerable nuclear material from sites around the world.

NTI's Legacy of System Change

5,000+
Members
in 142 Countries

NTI helped create the World Institute for Nuclear Security (WINS), the first professional forum to discuss securing nuclear materials from theft, sabotage, or attack, or to share experiences about how to best implement the unique requirements for radioactive and nuclear materials. Ten years after its founding, WINS today has 5,000 members across 142 countries.

30 of 32 New York
Hospitals to Replace
Cesium-137

NTI spurred commitments and action in New York City, Atlanta, and California to replace blood irradiators that use cesium-137—a key ingredient needed to build radioactive “dirty bombs”—with safer, effective alternative technologies.

5,000



Enhancing Global Biosecurity

As COVID-19 has so vividly demonstrated, biological threats—whether natural, intentional, or accidental—have the potential to kill millions of people, cost billions in economic losses, and exacerbate political and economic instability. Today, the risk of a catastrophic biological event is magnified by a rapidly changing and interconnected world; increasing political instability; urbanization; climate change; and rapid technology advances that make it easier, cheaper, and faster to create and engineer pathogens.

NTI | bio works to identify solutions to address today's expanding and evolving risks and raise global visibility to make biosecurity a global priority. As Ernie Moniz said at the release of the inaugural Global Health Security Index: "Global biological risks are growing—in many cases faster than health systems, security, science, and governments can keep up. We need to ensure that all countries are prepared to respond to these risks."

Global Health Security Index

In October, just months before the first cases of COVID-19 would emerge in Wuhan, China, NTI | bio, in partnership with the Johns Hopkins Center for Health Security and The Economist Intelligence Unit, released the inaugural edition of the Global Health Security Index (GHS Index), the first comprehensive assessment and benchmarking of health security and related capabilities across 195 countries.

The GHS Index was developed over two years with an international panel of experts from 13 countries and includes individual country profiles.

Sadly, the COVID-19 crisis proves the GHS Index's key finding: National health security is fundamentally weak around the world, and no country is fully prepared for epidemics or pandemics. Other findings fill out the dire portrait: Most countries have not tested important health security capacities or shown that they would be functional in a crisis. Coordination and training are inadequate among veterinary, wildlife, and public health professionals and policymakers. Most countries have not allocated funding from national budgets to fill preparedness gaps.

As the *Washington Post* editorial board noted, "the world flunked." Press in more than 20 countries covered the GHS Index, including the United Kingdom's *Daily Mail*, Singapore's *Strait Times*, South Africa's *Herald*, and India's *Press Trust of India*. The Index has already become a critical resource for policy influencers in public health, finance, and security.

The GHS Index team developed 33 recommendations for action by individual countries and the international community and is working to advance them as it advises leaders across all levels of government about steps to address the COVID-19 pandemic.

Findings and recommendations—along with a downloadable Excel data model, maps and other visualizations, a score simulator, and much more—are available at www.ghsindex.org.

Reducing Biotechnology Risks and Maximizing Biosecurity Innovation

This year, the Biosecurity Innovation and Risk Reduction Initiative convened international scientific leaders and technical experts in April to develop global incentives for the adoption of biosecurity norms and standards. Participants explored a set of new ideas to reduce the likelihood of biotechnology catastrophe, and NTI | bio is now working with them to turn the ideas into action. "Biosecurity innovation and risk reduction is part of responsible stewardship," said Margaret A. Hamburg, NTI Board member and Foreign Secretary of the National Academy of Medicine, who participated in the event.



In addition, the team developed an important report with the World Economic Forum: *Biosecurity Innovation and Risk Reduction: A Global Framework for Accessible, Safe, and Secure DNA Synthesis*. Released in early 2020, in advance of the World Economic Forum in Davos, Switzerland, the report proposes standardized screening practices and a new global architecture to prevent catastrophic biological events caused by the manipulation of biological agents and systems.



Dr. Adiaratou Diakhon Ndiaye of Senegal and Dr. Wilhemina S. Jallah of the Republic of Liberia at NTI's 2019 Global Biosecurity Dialogue held in partnership with the Africa Centres for Disease Control and Prevention in Addis Ababa, Ethiopia; NTI Senior Program Officer Jessica Bell at the GHS Index launch.



40.2 of 100—
average overall
GHS Index score

The average overall GHS Index score for all countries, showing that collectively, international preparedness for epidemics and pandemics remains very weak.

GHS Index by the Numbers

75%

Countries that receive low scores on globally catastrophic biological risk-related indicators, the greatest vulnerability being lack of oversight of dual-use research.



26.4 of 100

The average score for the capacity of countries' health systems to handle epidemic and pandemic response.



Global Biosecurity Dialogue

Biosecurity is under-represented as a policy and financial priority among countries and international institutions working to address global health security. The Global Biosecurity Dialogue brings together senior officials from ministries of foreign affairs, health, defense, agriculture, and other relevant sectors to identify new and measurable actions to advance international biosecurity. In May, NTI | bio convened the second annual Global Biosecurity Dialogue, which brought together more than 80 senior officials from 43 countries, international organizations, and non-governmental sectors in Addis Ababa, Ethiopia, at the African Union to accelerate concrete actions to improve global biosecurity capabilities. As a major outcome of the Dialogue, the African Union Commission launched a new initiative to advance biosafety and biosecurity on the continent, which will be implemented by the Africa Centres for Disease Control and Prevention (Africa CDC). “If we start now, we can institute practices that reduce the risk of deliberate or accidental events while also bolstering capability to manage daily outbreaks and epidemics,” said Dr. John Nkengasong, director of Africa CDC.

NTI | bio in 2019 also partnered with Africa CDC for a series of regional biosecurity workshops to improve country capability to prevent deliberate and accidental biological events. In South Africa in June and in Gabon in October, nearly 100 experts from southern and central African countries gathered to address gaps.

Strengthening the Biological Weapons Convention and Reducing Future State Biological Weapons Risks

In 2019, NTI | bio launched new work focused on reducing the risk of future state biological weapons programs. As part of this effort, NTI partnered with the UN Office of Disarmament Affairs to establish a new mechanism for non-governmental donors to contribute to the Biological Weapons Convention (BWC) Working Capital Fund. As a result, in 2019 NTI pledged a \$50,000 contribution to the fund.

Dramatic Biosecurity Tabletop Exercise Uncovers Major Gaps

It was winter 2018 when the head of the World Health Organization called an emergency meeting in response to a request for assistance from the nation of Vestia, a country embroiled in civil unrest. Vestia's leaders were dealing with an unusual outbreak in an area of the country recently vacated by a terrorist organization. People with flu-like symptoms were dying fast, and the disease, which appeared to be pneumonic plague, was proving resistant to antibiotics.

This fictional scenario was the basis for a dramatic senior-level tabletop exercise held on the eve of the 2019 Munich Security Conference, nearly a year before the COVID-19 pandemic took hold. Produced by NTI in partnership with Georgetown University's Center for Global Health Science and Security and the Center for Global Development, the scenario addressed the global preparedness deficit for effectively responding to a potentially catastrophic biological event. The exercise uncovered major gaps in international coordination, information sharing, and attribution between health and security officials and it sparked disagreements among officials about the best way to address those gaps.

The resulting report, *A Spreading Plague: Lessons and Recommendations for Responding to a Deliberate Biological Event*, presents key findings and recommendations for urgent improvements to avoid future catastrophic consequences of a deliberate or other high-consequence outbreak. Of note, the report calls on the Office of the UN Secretary-General to appoint a standing facilitator or unit for high consequence biological events.



The 2019 winning team of NTI | bio's Next Generation for Biosecurity Competition—Gayatri Sanku, a PhD student at Georgetown University — National Institutes of Health; Jarjeh Fang, a master of public health candidate at George Washington University and a senior research analyst at Pharmert International; and Lucky Sunshine L. Go, a medical student at St. Luke's Medical Center, College of Medicine in the Philippines—will work to develop a new online community to facilitate biosecurity and biosafety discussion among a wide range of stakeholders.



**“The world flunked.
The index shows that
‘no country is fully
prepared for epidemics
or pandemics.’”**

WASHINGTON POST EDITORIAL ON THE GLOBAL
HEALTH SECURITY INDEX, OCT. 28, 2019

Preventing the Use of Nuclear Weapons

Nearly 75 years after the only use of nuclear weapons and three decades since the end of the Cold War, we face increasing risk that a nuclear weapon will be used by accident, miscalculation, or deliberately, amid regional tensions and instability in Europe and Asia, the erosion of trust between Russia and the West, tensions with a nuclear-armed North Korea, emerging cyber threats, and the persistent risk of nuclear proliferation to states and terrorist organizations. These escalating risks come as the nuclear nonproliferation treaty regime—the foundation for global efforts to curb the spread of nuclear weapons and materials—is under stress, and the international community is increasingly divided over how to address nuclear dangers.

Against this troubling backdrop, NTI worked in 2019 to develop new, creative, and workable policies and solutions to reduce reliance on nuclear weapons, to identify shared goals, and to urge governments to take concrete steps to protect and strengthen nonproliferation measures and reduce nuclear threats.

A Process for Cooperative Threat Reduction in North Korea

With a diplomatic opening between President Donald Trump and North Korean Leader Kim Jong Un in 2018, Sam Nunn and Richard Lugar, an NTI founding Board member, recommended that a policy pursued with former Soviet states following the dissolution of the Soviet Union offered lessons and a possible approach to future negotiation toward the denuclearization of the Korean Peninsula. The idea prompted NTI to form a high-level working group to explore how the successful Cooperative Threat Reduction program championed by Nunn and Lugar might contribute to a negotiating process in support of a comprehensive, verifiable, and enduring denuclearization of North Korea.

programs. As Ernie Moniz noted in releasing the report in June: “That the North Korean nuclear program has resisted 25 years of diplomatic processes designed to address it should keep us humble as we present these recommendations, but that history should not deter policymakers from pursuing creative ways forward today.” The report, which has been briefed to the Trump Administration, as well as to countries in the region, has been well received by practitioners and outside experts who believe the concept could contribute to a positive diplomatic outcome when conditions are ripe.

Advancing Nuclear Disarmament Verification

The International Partnership for Nuclear Disarmament Verification (IPNDV), NTI’s public-private partnership with the State Department and nearly 30 countries, completed Phase II of its work aimed at developing the expertise and know-how for verification of future arms-control treaties. In this phase of the multiyear project, participants took the Partnership’s work from “paper to practice” with multiple technical demonstrations and exercises.

They included a “walkthrough” tabletop exercise of the 14-step dismantlement process, a hands-on demonstration for teams from Australia, Canada, the European Union, Finland, Hungary, Japan, and Norway to investigate methods to verify the presence or absence of weapons-usable nuclear materials, and a Nuclear Disarmament Verification exercise sponsored by France and Germany to assess how chain-of-custody steps could be applied to nuclear warhead materials during and after dismantlement of a weapon.

The President and Nuclear Weapons: Authorities, Limits, and Process

There is no more consequential decision for a president than ordering a nuclear strike. In the Cold War, the threat of sudden nuclear annihilation necessitated procedures emphasizing speed and efficiency and placed sole decision-making authority in the president’s hands. Does this make sense in today’s threat environment? NTI commissioned and released a comprehensive review of the key legal issues related to presidential use authority with steps to improve the decision-making process for nuclear use and strengthen the role of Congress in terms of oversight, consultation, and authorization of the use of force.



The result: *Building Security Through Cooperation: Report of the Working Group on Cooperative Threat Reduction with North Korea*, which offers recommendations for how such a program could offer technical and financial assistance to incentivize North Korea to dismantle its nuclear weapons and potentially other WMD

BUILDING SECURITY THROUGH COOPERATION

REPORT OF THE NTI WORKING GROUP ON COOPERATIVE THREAT REDUCTION WITH NORTH KOREA



“The Korean Peninsula is one of the most volatile and heavily militarized places in the world, carrying tremendous risk of conflict and the potential for catastrophic nuclear exchange.”

ERNIE MONIZ AND SAM NUNN,
FROM THE FOREWORD TO BUILDING
SECURITY THROUGH COOPERATION

NTI Senior Director for Fuel Cycle and Verification Richard Johnson, Global Nuclear Policy Program Vice President Lynn Rusten, and Sam Nunn discuss North Korea's nuclear program.



Vishal Kapur of Global Affairs Canada at a meeting of the International Partnership for Nuclear Disarmament Verification.

Rebuilding Global Cooperation in Support of Nonproliferation and Disarmament

The Nuclear Non-Proliferation Treaty (NPT) is the essential foundation of the global nonproliferation regime. However, due to the continuing risk of nuclear weapons use and ongoing tensions among countries, the regime faces a number of challenges to its central goal of preventing proliferation, fostering the peaceful uses of nuclear energy, and nuclear disarmament. In the lead-up to the 2020 NPT Review Conference and the 50th anniversary of the treaty, NTI has regularly convened officials from more than 20 countries through our Global Enterprise to Strengthen Nonproliferation and Disarmament to work to strengthen the NPT by identifying practical commitments that demonstrate the ability of countries to work together to advance the treaty goals. In 2019, the group developed specific policy options aimed at improving transparency, strengthening risk reduction, and managing risks associated with fissile materials, and NTI is continuing to work with government officials from around the world to promote these ideas and strengthen the NPT.

Jimmy Carter on Negotiations in North Korea

Amid on-again-off-again denuclearization negotiations with North Korea in mid-2019, who could be more compelling to turn to for reflections and recommendations on a path forward than former President Jimmy Carter? In 1994, Carter became the first former U.S. president to visit the country and meet with then-leader Kim Il Sung, grandfather of North Korea's current leader Kim Jong Un.

In a video interview aired at NTI's spring Board meeting dinner and posted on NTI's website, Carter recommended a "step-by-step" process for negotiations that could eventually lead to a complete prohibition on nuclear weapons in the country and a guarantee from the United States that it would not attack North Korea as long as it remains at peace with its neighbors. Carter said such an agreement would be "a good bargain for the United States and North Korea—and the world."



Encouraging U.S.-Russian Cooperation

"For decades, strategic stability between the United States and Russia included a mutual recognition of vital interests, redlines, and the means to reduce the risks of accidents or miscalculations leading to conflict, and especially the use of nuclear weapons. Today, however, clashing national interests, insufficient dialogue, eroding arms control structures, advanced missile systems, and new cyberweapons have destabilized the old equilibrium. Political polarization in Washington has only made matters worse, undoing any remnants of a domestic consensus about U.S. foreign policy toward Russia. Unless Washington and Moscow confront these problems now, a major international conflict or nuclear escalation is disturbingly plausible—perhaps even likely." Ernie Moniz and Sam Nunn made a powerful case for renewed cooperation on nuclear security in *Foreign Affairs* in 2019, as they led a major effort across NTI to use our voice, our influence, and our expertise to encourage and facilitate the dialogue and engagement necessary between the United States and Russia to reduce catastrophic risks.

The Return of Doomsday

In an article in the September/October issue of *Foreign Affairs* titled, "The Return of Doomsday: The New Nuclear Arms Race—and How Washington and Moscow Can Stop It," Moniz and Nunn noted that against the challenging backdrop of tense U.S.-Russia relations, "all that is needed is a spark to light the tinder." The article has been widely circulated and its recommendations to change the current dangerous course have been cited as a foundation for needed policy changes and action.

Calling on Congress to Take the Lead on Russia

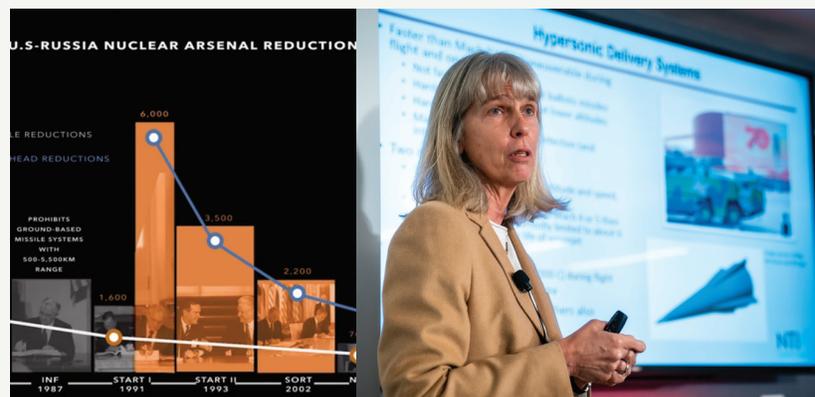
Moniz and Nunn also teamed up in February to pen a piece for *Politico* calling on Congress to take the lead on reengaging with Russia to avoid a mistake or miscalculation that could lead to nuclear catastrophe. In the op-ed, "The U.S. and Russia Are Sleepwalking Toward Nuclear Disaster," Moniz and Nunn say the "self-imposed paralysis" on Russia policy in the United States is exacerbating nuclear dangers and recommend that leaders from both political parties in Congress work together on an agenda to reengage with Russia on nuclear security issues before "an inadvertent collision—or a deliberate act of aggression, accident, or terrible miscalculation—could lead to the fatal use of nuclear weapons for the first time in nearly 75 years."

Nunn, Shultz, and Perry on Re-Engagement with Russia

In April, Nunn joined former Secretary of Defense and NTI Emeritus Board Member William J. Perry and former Secretary of State George P. Shultz on an op-ed in the *Wall Street Journal* urging the United States to reengage with Russia and prevent a military miscalculation that could lead to the use of a nuclear weapon. The authors write that growing bilateral tensions, the loss of international arms control agreements, an increased risks of cyberattacks, and the expansion of global terrorist networks increase the likelihood of an attack by miscalculation or mistake—and deterrence is not enough to protect against catastrophe. They make several recommendations, including proposing a joint declaration by Presidents Trump and Vladimir Putin emphasizing that "a nuclear war can never be won and must never be fought."

Assessing Russia's New Nuclear Weapon Delivery Systems

In an important contribution toward further analysis of how strategic stability between the United States and Russia is affected by Russia's race to develop new weapon systems, NTI in November released the first detailed, exclusively open-source assessment of the five new nuclear weapon systems announced by Russian President Vladimir Putin in 2018. Authored by Jill Hruby, NTI's inaugural Sam Nunn Distinguished Fellow and a former director of Sandia National Laboratories, the report, *Russia's New Nuclear Weapon Delivery Systems: An Open-Source Technical Review*, provides insight into the technical characteristics, deployment schedule, and military objectives for each of the five systems, plus one additional system that may be nuclear capable in the future. It was accompanied by a new NTI analysis underscoring the need to extend the New START Treaty based on the report's findings.



Jill Hruby, Sam Nunn Distinguished Fellow, discusses her report *Russia's New Nuclear Weapon Delivery Systems*.



**“All that is needed
is a spark to light
the tinder.”**

**ERNIE MONIZ AND SAM NUNN IN FOREIGN AFFAIRS,
“THE RETURN OF DOOMSDAY: THE NEW NUCLEAR
ARMS RACE—AND HOW WASHINGTON AND
MOSCOW CAN STOP IT”**

In November, Ernie Moniz travelled to Russia with Lynn Rusten, Laura Holgate, Richard Johnson, and Leon Ratz to speak at the Moscow Nonproliferation Conference. While in Moscow, Moniz met with Foreign Minister Sergey Lavrov and Deputy Foreign Minister Sergei Ryabkov, among other officials, to discuss NTI priorities for cooperation on nuclear risk reduction.

EASLG on Euro-Atlantic Strategic Stability and Cyber Threats

The Euro-Atlantic Security Leadership Group (EASLG)—led by Des Browne, Wolfgang Ischinger, Igor Ivanov, Ernest J. Moniz, Sam Nunn, and their respective organizations (the European Leadership Network, the Munich Security Conference, Russian International Affairs Council, and NTI)—is an independent, informal group that works with former and current officials and experts from a group of Euro-Atlantic states and the European Union to test ideas and develop proposals for improving security in areas of existential common interest. In 2019, the EASLG released two statements at the 2019 Munich Security

Conference: *Support for Crisis Management Dialogue and Strategic Stability in the Euro-Atlantic Region* and *Support for Cooperation among Governments to Address Cyber Threats to Nuclear Weapons Systems*. Signatories included nine former military leaders from six countries, three former Supreme Allied Commander Europe (SACEURs), four former Ministers of Defense, three former Foreign Ministers, one former Energy Secretary, and two former intelligence chiefs. In Munich, these proposals were shared with more than 70 high-level governmental, military, and former senior officials.

Nuclear Treaties at Risk

U.S.-Russia Arms Control in Peril
Threats to arms control agreements such as the INF Treaty imperil the foundations of global security and stability

INF Intermediate-Range Nuclear Forces Treaty
Eliminates land-based ballistic and cruise missiles with a 500-5,500 km range
These missiles, previously deployed in Europe, were intended to carry nuclear warheads
Collapse would end key elements of security and confidence-building in Europe
6-month withdrawal period leaves a chance for diplomatic resolution

Treaty Name	Entry into Force	Status
Anti-Ballistic Missile Treaty	October 3, 1972	U.S. withdrawal in June 2002 led to termination
Conventional Forces in Europe Treaty	July 17, 1992	Russia suspended participation in 2007
Intermediate-Range Nuclear Forces Treaty	June 1, 1988	Mutual accusations of non-compliance; U.S. gave notice of intent to withdraw
New Strategic Arms Reduction Treaty (New START)	February 8, 2011	Expires February 2021 unless U.S. & Russia agree to sign 5-yr. extension
Comprehensive Nuclear Test-Ban Treaty	Not in force	Russia signed and ratified; U.S. and 7 others must ratify for treaty entry-into-force

INF Treaty Timeline

- 8 DEC 87 Signature by Reagan and Gorbachev
- 1 JUN 88 Entry into force
- 2007 Russia threatens to leave over U.S. missile defense systems in Europe
- JUL 2014 U.S. accuses Russia of developing prohibited missile
- 20 OCT 18 President Trump announces U.S. plans to withdraw
- 28 JUL 14 Russia asserts U.S. MK-41 missile launchers are in violation
- 15 JAN 19 U.S. and Russian leaders unable to reach agreement
- 2 FEB 19 U.S. provides formal notice of intent to withdraw

Learn more at <https://www.nti.org/INF Treaty>

Think of them as guardrails—the nuclear treaties erected over decades to carefully step us back from a Cold War-era nuclear rivalry that resulted in a dangerous arms race. Today, nearly all of those treaties have been dismantled or soon will expire, the latest in 2019 with the U.S. decision to withdraw from the Intermediate-Range Nuclear Forces Treaty (INF) in response to concerns about Russian compliance. The result: an end to a 30-year ban on a class of weapons that the United States and Soviet Union together had determined were particularly dangerous and destabilizing.

NTI worked throughout the year to bring home the impact of the destruction of these guardrails: a powerful statement from Moniz and Nunn marking the end of the INF Treaty; a compelling new video highlighting the importance of the

GET THE FACTS NPT
The Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

What is it?
1970 treaty that is the cornerstone of the global nonproliferation regime

Categorizes States Parties as **nuclear weapon states (NWS)** and **non-nuclear weapon states (NNWS)**; a NWS must have **built and tested** a nuclear explosive device before 1 January 1967

A Grand Bargain: NWS must not share or transfer weapons technology, NNWS **must not acquire** nuclear weapons and all States Parties to the Treaty must work toward general and complete **disarmament** and may access **peaceful nuclear technology** under IAEA safeguards

Why is it important?
191 States Parties – only India, Israel, North Korea, and Pakistan, all of which have nuclear weapons, are not members
Dozens of other treaties and initiatives are based on the NPT; IAEA Comprehensive Safeguards Agreements exist to facilitate treaty **compliance**
USA, Russia, China, France, UK are the only **Treaty-recognized NWS**

What should I know?
North Korea is the only State Party to withdraw from the NPT in 2003 (some disagree whether they did so fully and properly)
Frustration with slow progress on disarmament and concern over **humanitarian consequences** of nuclear detonations led some states to successfully negotiate the **Treaty on the Prohibition of Nuclear Weapons (TPNW)** in 2017
Review Conferences are held **every 5 years** (2020 next); Treaty continues in perpetuity due to the 1995 RevCon consensus outcome
States Parties failed to adopt **consensus recommendations** for the 2020 RevCon during the 2019 Preparatory Committee meeting

November 2019 For more information, visit: www.nti.org

Created by CNSO and NTI

New Strategic Arms Reduction Treaty (New START), the last remaining agreement to limit deployed strategic nuclear warheads; and testimony in Congress from Joan Rohlfing advocating for a safer U.S. nuclear policy, and NTI Board member Adm. Michael Mullen about the importance of extending New START before it expires in 2021.



“Nations must begin the process of rebuilding trust.”

STATEMENT BY THE EURO-ATLANTIC SECURITY LEADERSHIP GROUP (EASLG)
AT THE MUNICH SECURITY CONFERENCE

At the Munich Security Conference, House Speaker Nancy Pelosi speaks to a lunch hosted by NTI and the EASLG.

Munich Security Conference
Münchner Sicherheitskonferenz

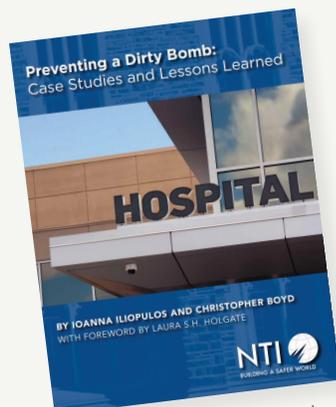


Addressing Nuclear Terrorism

Preventing nuclear terrorism has been at the heart of NTI's work since our founding. A terrorist nuclear attack would be catastrophic, and the consequences would reverberate around the globe: hundreds of thousands killed and injured, disruptions to markets and commerce, significant long-term implications for public health and the environment, and profound risks to our way of life. Even an attack with stolen radiological materials, although not catastrophic, would have huge repercussions. A radiological "dirty bomb" detonation would cause widespread panic, render sections of a city uninhabited for long periods of time, and cost billions of dollars to clean up. A cyberattack on a nuclear facility also could have consequences that would reverberate around the world.

Through partnerships with governments, industry, and civil society, NTI fosters innovation, facilitates dialogue, and engenders action to strengthen nuclear and radiological security worldwide.

Preventing a Dirty Bomb



Radiological sources are housed at thousands of sites in more than 100 countries and used to power batteries, industrial gauges, and blood irradiation equipment. In what seems a cruel paradox, the very same isotopes used for life-saving blood transfusions and cancer treatments in hospitals also can be used to build a radiological "dirty bomb." If detonated in the heart of a major city, such a bomb would trigger widespread panic, render areas uninhabitable for long periods of time, cost billions of dollars to clean up, and leave those exposed with a heightened cancer risk.

Steps can be taken, however, to reduce this risk. In 2019, NTI offered a blueprint for hospitals and research centers to replace the most lethal types of radioactive sources, cesium-137 blood irradiators, used globally in biomedical research and treatment. *Preventing a Dirty Bomb: Case Studies and Lessons Learned* details work in New York City, Atlanta, and California, and is informed by additional work NTI is engaged in with the United Kingdom and in Central Asia.



Removal of radioactive sources from Emory University Hospital in Atlanta; meeting of the NTI Nuclear Security Index international panel of experts.

41%
of total incidents

Occurred during transport



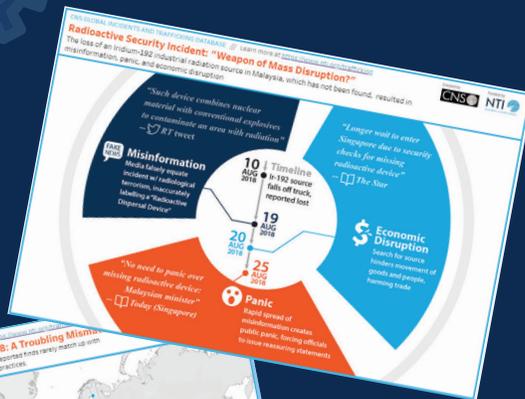
156 incidents
in 23 countries

Nuclear and other radioactive materials being lost, stolen, or out of regulatory control in 2018



Global Incidents & Trafficking Database

Created for NTI by the James Martin Center for Nonproliferation Studies



1g Weapons-Grade Plutonium

Lost by a university laboratory in Idaho



Cyber-Nuclear Forum

A cyberattack on a civilian nuclear facility's networks could lead to the loss of security-sensitive information and enable future attacks, including sabotage that could result in a radiological release. NTI's new Cyber-Nuclear Forum brings together nuclear-reactor operators and cyber-nuclear experts to share experiences and best practices to strengthen cybersecurity at nuclear facilities. The inaugural meeting of the Forum was held in Paris in June.

CYBER NUCLEAR FORUM

Global Dialogue on Nuclear Security Priorities

Now in its seventh year, NTI's Global Dialogue for Nuclear Security Priorities continued its important work to advance key priorities from the Nuclear Security Summits to better secure the world's most dangerous materials. The high-level international dialogues among government officials, experts, nuclear security practitioners, and other stakeholders continued in 2019 with meetings in Paris, France, and Velen, Germany, to address efforts to strengthen the International Atomic Energy Agency's role in nuclear security, political challenges to maintaining nuclear security as a top priority, an upcoming review conference related to a treaty requiring countries to protect nuclear materials and facilities, and additional topics. Government officials repeatedly have noted the value of being able to develop and test ideas in an informal setting, and NTI's efforts and analytic work have been recognized as influencing official discussions. For example, proposals reviewed at Global Dialogue meetings in 2019 were reflected in the consensus Ministerial Statement presented at the February 2020 International Conference on Nuclear Security.

Fuel Cycle of the Future

Because of their inherent dual-use nature, beneficial nuclear power programs and other peaceful uses of nuclear energy can create significant security and nonproliferation challenges for the international community. As part of our work to reduce these risks around the world, NTI for five years has been working with waste management experts in the Pacific Rim to develop collaborative solutions to shared spent fuel management problems. In 2019, we released *A Step-by-Step Approach to Regional Spent Fuel Management Cooperation in the Pacific Rim*, which addresses the security and proliferation implications of accumulating spent fuel stockpiles, describes the benefits of regional cooperation, and lays out a process to institutionalize and operationalize a research and development agenda for spent fuel management in the Pacific Rim.



Emerging Science and Technology

Today, we are in an era of transformative technological progress. Advances in computing and engineering put technology into the hands of people around the world in ways that were unimaginable just a few years ago. Advances in the biomedical sciences now offer treatment options for diseases once considered life threatening. Artificial intelligence already is controlling today's cars—and could control tomorrow's weapons. While such rapid advances have brought many benefits, they also raise serious concerns, including around dangerous cyberattacks and advances in artificial intelligence that could result in warfare at a pace and scale not previously possible. Nuclear facilities and command-and-control systems are neither immune to potentially devastating outcomes related to technological advances, nor are the world's top bio labs.

NTI is working to capture the benefits and address the peril of new technologies to reduce the risks of nuclear and biological attacks.

Detecting Proliferation with Public Data

Preventing the proliferation of nuclear weapons and technology is important for ultimately reducing the potential for nuclear weapons use.

In 2019, NTI and the Center for Advanced Defense Studies (C4ADS) began collaborating to explore whether publicly available trade data could be used to detect the illicit trade of dual-use nuclear technologies. By using a network analysis-based approach, we have been able to identify previously unknown entities, among millions of trade transactions, who have been engaged in the illicit trade of nuclear goods. We believe this tool, once scaled, has the potential to revolutionize how nuclear proliferation is detected and can enable governments to more effectively sanction and respond to illegal trade.

Reducing Cyber Risks to Nuclear Weapons

Today's advanced cyber threats put even highly secure systems at risk. Given the level of digitization of U.S. nuclear weapons systems and the pace of the evolving cyber threat, we cannot assume that systems with digital components—including nuclear weapons systems—are not or will not be compromised. It is now increasingly clear that technical security measures alone will not be enough, and that we must reconsider how best to ensure the security of these systems.

In late 2018, NTI issued the report, *Nuclear Weapons in the New Cyber Age*, which offered recommendations to address possible security gaps, including through international cooperation with Russia. In mid-2019, we convened a group of U.S. and Russian experts to address this issue and began the process of identifying collaborative measures to reduce global risk.

High-Level Science and Technology Advisory Group Launched

"Science and technology are moving faster than government policy," Ernie Moniz said at the launch of the prestigious new NTI Science and Technology Advisory Group. "Governments have yet to fully embrace the opportunities presented by emerging technologies, while at the same time managing the new risks." To address this deficit, NTI brought together some of the nation's leading experts from academia and the public and private sector to address the challenges and opportunities presented by new and emerging technologies to reduce the risks posed by weapons of mass destruction. The group held its first meeting in Washington, D.C., in July. (See the list of members on page 38.)



NTI Vice President for International Fuel Cycle Strategies Corey Hinderstein (left) and NTI Scientific and Technical Affairs Vice President Page Stoutland at the launch of the NTI Science and Technology Advisory Group.

Building Political Will

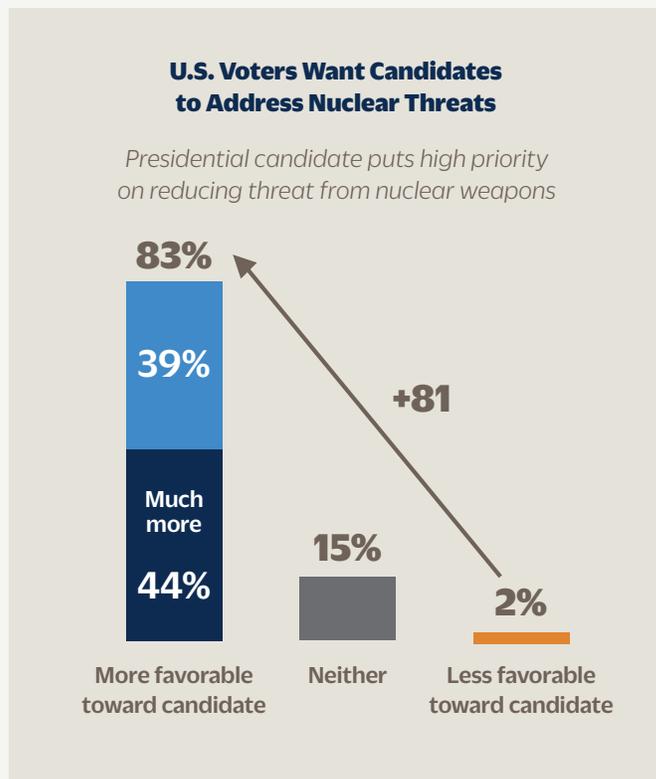
Preventing the spread and use of nuclear and other weapons of mass destruction is essential to the security of the American people—but far too many citizens, elected leaders, government officials, and members of the news media ignore or give short shrift to urgent security issues. Like climate change and pandemics, nuclear weapons pose an existential threat to the United States and the world. NTI is working across multiple fronts to educate and engage Americans about today's evolving and escalating risks and demand that our leaders take action to address them.

Safer World 2020

Voters can have a powerful voice both in raising important security issues and in discussions about how to address them—but because issues like nuclear nonproliferation, arms control, and cyber threats against nuclear weapons systems can seem complex and don't have a day-to-day impact on most people's lives, many voters don't feel compelled to demand action. That lets elected officials off the hook—and it makes public education crucial to the mission of building a safer world.

Presidential campaign years offer a critical opportunity to raise important security issues and hold candidates accountable for their answers. In fact, NTI polling by Hart Research conducted in 13 states found that 8 in 10 voters say it is "essential" or "very important" for a presidential candidate to have clear plans and policies to address the threat of nuclear weapons.

In addition, 83% of voters would feel more favorably toward a candidate who puts a high priority on reducing nuclear threats. And this is true across party lines. Of those polled, 87% of Democrats, 81% of Republicans, and 71% of independents said they would feel more favorably toward a candidate who puts a high priority on reducing threats posed by nuclear weapons."



That's why NTI in 2019 laid the groundwork to educate voters and candidates for the White House and Congress through public events, the news media, social media, and online resources about nuclear and other threats posed by weapons of mass destruction. In Iowa, New Hampshire, and California, NTI held on-the-ground events to encourage voters to demand plans from our leaders on how they will address the threats we face today and those we will pass on to future generations.



NTI Executive Vice President Deborah Rosenblum interviewed in Des Moines, Iowa; Canvassers at Drake University in Iowa.



“In our highly polarized political environment it can be difficult to **find areas of agreement** between Republicans and Democrats, but this survey identifies **nuclear weapons threats** to be **one such area.**” HART RESEARCH

NTI's Richard Johnson discusses prospects for denuclearization in North Korea with Eunjung Cho of the Voice of America's Korean service.

NTI Seminars

NTI's on-the-record seminar series continued to draw thoughtful, engaging, provocative speakers and big audiences throughout 2019.

- Jill Hruby, NTI's inaugural Sam Nunn Distinguished Fellow and former director of Sandia Labs, discussed "Safe, Secure, Reliable Nuclear Weapons and More."
- Former U.S. Deputy Secretary for the Department of Defense and Undersecretary of the Department of Energy John Deutch led a discussion on "U.S. Nuclear Posture: Past, Present and Future."
- Matthew Bunn and Rolf Mowatt-Larssen of the Harvard Kennedy School's Belfer Center for Science and International Affairs dived into "The Iran Nuclear Archive: Impressions and Implications."
- Dr. Ronald Schouten of Massachusetts General Hospital and Harvard Medical School explored "WMD and Insider Threats: Who Would Do Such a Thing?"
- R. Alta Charo, JD, Warren P. Knowles Professor of Law and Bioethics at the University of Wisconsin, explored the topic of "Genome Editing: Benefits, Risks, and Global Governance."
- Russian scholar and NTI Board Member Dr. Alexey Arbatov explored "Renewing Arms Control and Strategic Stability: A Russian Perspective."
- Georgetown Law's Mary B. DeRosa and Ashley Nicolas discussed "The President and Nuclear Weapons: Authorities, Limits, and Process."



NTI Seminar speakers Dr. Alexey Arbatov and Ernie Moniz (top) and R. Alta Charo (below).

Gender Champions in Nuclear Policy

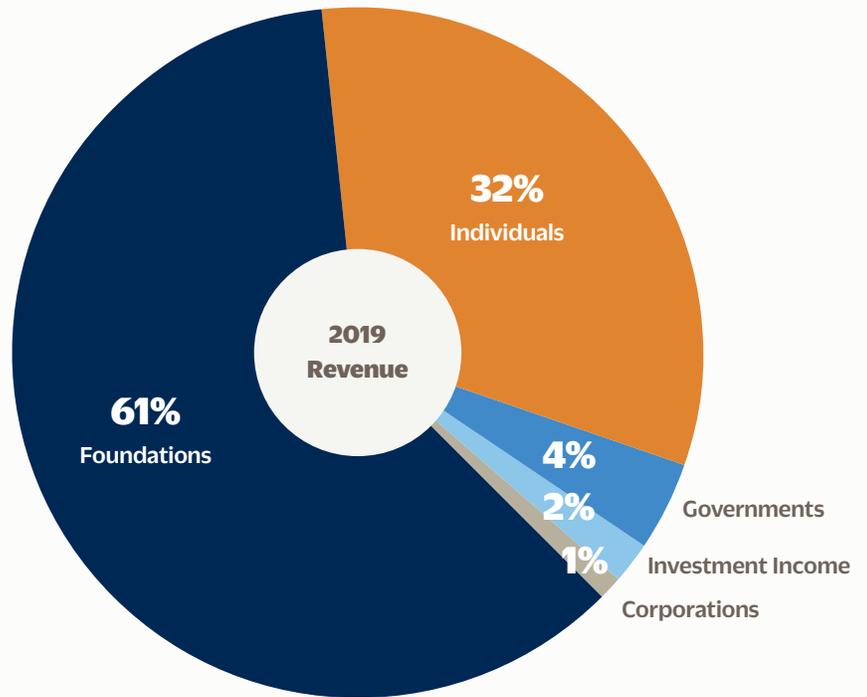
Celebrating its one-year anniversary in November, Gender Champions in Nuclear Policy (GCNP) announced it has commitments from 42 organizations around the world to take specific steps to break down gender barriers and make gender equality a working reality in the nuclear policy field. NTI's Vice President Laura Holgate, who co-founded Gender Champions in 2018, hailed the progress. "We are thrilled with the response and the commitment to increase the presence, voice, and impact of women in the nuclear policy community," she said. "That said, there is still a long way to go before women are adequately represented in the nuclear policy arena."



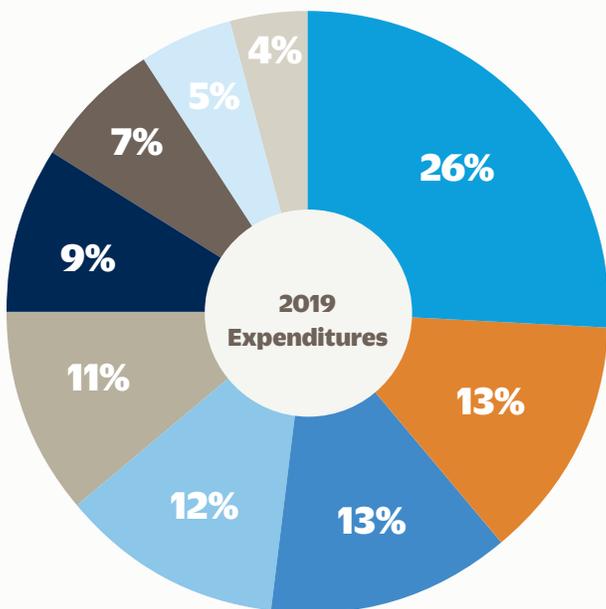
GCNP asks leaders of organizations to become "Gender Champions" by signing a Panel Parity Pledge to avoid whenever possible appearing on single-sex panels—aka "manels" when they don't include women. Champions also make additional pledges, such as pay equity and bringing gender diversity to their boards. NTI joined GCNP the day it was launched. "In nuclear policy, as in all fields, we need more women at the table," Ernie Moniz said, "Diversity of experience fosters innovative solutions to today's pressing security challenges."

2019 Financials

Where the Funds Came From



Where the Funds Were Spent



2019 Expenditures

Description	Amount
Global Biological Policy and Programs	\$ 6,316,856
Global Nuclear Policy Program	\$ 3,288,719
Communications and Public Education	\$ 3,273,475
Materials Risk Management	\$ 2,940,581
Management and General	\$ 2,734,776
International Fuel Cycle Strategies	\$ 2,185,157
Fundraising	\$ 1,637,000
Scientific and Technical Affairs	\$ 1,240,032
Other Program Services	\$ 909,365
Total	\$ 24,525,961

NTI is a tax exempt, public charity under Section 501(c)(3) of the U.S. Internal Revenue Code.

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We invite you to join NTI to combat the most urgent security threats of the 21st century by supporting our work. Your tax-deductible gift helps safeguard lives, livelihoods, and the environment, now and for future generations.

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Peggy Knudson, Chief Development Officer
(202) 417-4884 or knudson@nti.org • www.nti.org/donate

Our Growing Network of Friends

NTI donors can take part in a range of NTI events, including teleconferences, NTI Seminars, and dialogues with leading experts on the nuclear, biological, cyber, and radiological threats facing our world.

In 2019, Ernie Moniz and members of NTI's leadership held small, salon-style events in cities from New York to Los Angeles to discuss the increasingly chaotic—and dangerous—global security environment and what's needed to build a safer world. These events ranged from a fireside chat on "The Return of Doomsday?" with award-winning *New York Times* journalist

David Sanger to an evening with Peter Sellars, the internationally acclaimed stage director and librettist for *Doctor Atomic*, an opera about the Manhattan project scientists in the intense hours before the world's first atomic bomb test in 1945.

We are grateful to NTI Board members Ron Olson, Michael Peterson, and Alexa Wesner for hosting the first round of this friend-making series, and we look forward to expanding these opportunities to more cities.

Challenge Match 2020

NTI champion Warren Buffet is offering new donors an extraordinary opportunity: He'll match, dollar-for-dollar, all gifts from new donors up to \$2 million in 2020. Will you help us meet this remarkable challenge? For more information, please contact: Peggy Knudson, Chief Development Officer, knudson@nti.org, (202) 417-4884.



Actor Harry Hamlin and NTI Vice President Lynn Rusten; NTI Board member Elizabeth Sherwood-Randall.

Thank You!

We gratefully acknowledge all of our 2019 funders, including the following generous institutions and individuals who gave \$500 or more. Your gift to NTI makes the world safer. Thank you for your trust and for supporting this critical mission.

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“Per dollar expended, NTI is the best buy on earth for increasing the probability that humanity will reach its glorious potential.”

WARREN BUFFETT

Sam Nunn, Blaine and Alexa Wesner, and Ernie Moniz at an NTI friend-maker in Aspen, Colo.

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Peter Sellars, Jane Olsen, and Ernie Moniz at an NTI friend-maker in Los Angeles.

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As of December 2019



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