

Remarks by Joan Rohlfing at Effective Altruism Global: London 2021

EFFECTIVE ALTRUISM GLOBAL: LONDON 2021

BEYOND THE PRECIPICE:
A NEW NUCLEAR PARADIGM FOR SURVIVING THE ANTHROPOCENE

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MS. DHALIWAL: Okay. Welcome everybody to Beyond the Precipice: A New Nuclear Paradigm for Surviving the Anthropocene. Yes, so welcome everybody and welcome to those who are joining us virtually. A few announcements. So, please use the Swapcard app to submit questions and view the (inaudible) agenda. And the hashtag for sharing on social media is #eaglobal.

It's my pleasure to introduce Joan Rohlfing and Carl Robichaud. Joan will be doing the talk and then Carl will join us for Q&A. So, Joan is President and Chief Operating Officer for the Nuclear Threat Initiative. Prior to joining NTI, she's held senior positions with the U.S. Department of Energy and worked as an advisor to the U.S. Ambassador to India in the wake of nuclear tests in India and Pakistan. Earlier in her career, she oversaw nuclear security programs at the Department of Defense and the Department of Energy.

Carl is a foreign policy professional specializing in nuclear weapons policy and serves as an advisor to Longview Philanthropy. From 2008 until July this year, Carl led nuclear policy grant-making at the Carnegie Corporation of New York, where he worked to design and implement policies with the goal of reducing the risk of nuclear war, proliferation, and terrorism.

So please join me in welcoming Joan to the stage.

MS. ROHLFING: Thank you, Sim, and good evening. I appreciate the opportunity to share my perspective with you. And I hope that you'll join me in thinking how we can move beyond the precipice toward a new nuclear paradigm for surviving the Anthropocene. I want to share that my thinking on this topic has been shaped by 35 years working in this field. And I've worked on this from every conceivable angle, from a military, a diplomatic, a political perspective, a technical, and an academic perspective.

And the primary takeaway I want to leave you with this evening is that we are at a moment of great peril. We are at a point where the risk of a catastrophic nuclear event is as high as it has ever been and it's growing. And the consequences of such a catastrophic event could disrupt the long-term trajectory of civilization and could even threaten our survival. So, we're at a tipping point, some would say, a precipice. And we have a choice to make between whether we continue to adhere to status quo thinking and double down on a risky strategy that threatens annihilation and everything we value, or whether we can think beyond this moment and build a better paradigm.

This is about whether or not we take seriously our generational stewardship and can create a security system that is not premised on the mass annihilation of humanity, but one that embraces providing for a long-term future, one that gives us a chance to survive and gives humanity the opportunity to flourish and reach its full potential.

So, I hope to persuade you this evening that preventing a global nuclear catastrophe is important, that this is a field that has been entirely neglected for several decades, that the challenge is eminently tractable. And I want to leave you with some ideas for what we can do to greatly diminish the risks. Let me start with why preventing a global nuclear catastrophe is important. And I want to propose a definition and maybe we can come back to this in the Q&A.

A significant nuclear exchange with severe, lasting global consequences which has the potential to disrupt the trajectory of human civilization and threaten its long-term survival. I believe that we are at this moment where the potential of a global catastrophic nuclear event (GCNE) is real. By the way, throughout this brief, you're going to see this term come up a couple of times and even the acronym.

So, why is the risk of use high and growing? There's one principal reason. Our dominant strategy for preventing nuclear war, nuclear deterrence is an inherently risky -- risky by design. It has risk baked into its DNA. And it's an outdated strategy. I'm going to say a little bit more about this because I think this provides important foundational context.

The strategy of nuclear deterrence was developed in, roughly, 1950, give or take a couple of years. So, the first thing you should know is this is a strategy that was designed by my grandparents' generation, or for most of you here, your great grandparents' generation. And yet, it underpins the entire global nuclear architecture for preventing nuclear use. It's based on a big bet and the experts at that time who developed this theory, did it out of a recognition that there was no technical solution. There was no technical defense against nuclear weapons.

The thinking was, well, the best we can do is to raise the price of contemplation of use of a nuclear weapon to an unacceptable level. And the way to do that was to threaten mass retaliation of any nuclear attack with a nuclear counterattack. That is kind of the premise of the theory which we've built up our

forces around, and we have maintained this concept now for some 70 years. But here's the problem, this is an inherently risky strategy.

Why? Because it was premised on some conditions that no longer pertain, that we can't have confidence in—first and foremost, that there would be rational actors at the helm of this system and that they would be operating with perfect information, highly reliable, accurate information, and that the components in this system, the system of systems, thousands of weapons, on hundreds of missiles, with a very complex command and control system wrapped around it, would never fail. Hundreds of thousands of people around the world are part of this enterprise. It is an extremely complex system.

And it can never fail. It has to work perfectly in perpetuity to prevent a disaster. It also operates on the threat of annihilation as just described, which means that if the system fails, it's not a low consequence failure, right? It fails deadly for humanity. And we can debate exactly how deadly, but it fails deadly for humanity. And the last problem here is that this was designed for a completely different era, right? The 1950s world was a completely different world. This was designed to be able to provide some stability between two powers at that time, two nuclear powers, the United States and the Soviet Union.

This was designed for a different world in terms of the technology that pertained. We had slow flying bombers instead of hypersonic missile capabilities. And the system, the strategy has not adapted to the complexity of today's world.

So, I think there are four principal failure modes, and we've already talked about a couple of them. You can imagine an accident, a failure, a human error or a failure of a component. There are dozens of accidents that have happened with our nuclear forces over the many decades that we've had them. We've just been extremely lucky that it has not yet produced a mushroom cloud. I don't think we can assume that that's going to hold.

Nuclear terrorism, in and of itself, I think is unlikely to cause a civilization ending or even disrupting event. The problem with a nuclear terrorist event is that it could be a catalyst for a much larger nuclear exchange. And we can come back to the risks of nuclear terrorism separately.

Irrational leaders, when you think about the leaders or the recent leaders of the nuclear weapons states, you know, we have to worry about rash action.

Finally, and this is what I want to spend a moment talking about, I think the biggest risk of a catastrophic nuclear event will come from a very unfortunate, tragic miscalculation. It'll come because leaders have bought into this idea that we can maintain this complex system and that it will operate in a way that prevents an accidental or a misuse or a misperceived use.

Let me just give you one example—and I could stand here for half an hour and spin up different scenarios, but we don't have time for that—and that is the cyber vulnerability of our existing system. We have, as mentioned earlier, our system of systems, many digital components and an increasing number of digital components. We cannot have confidence that all of those components will operate the way they were intended to, nor can we have confidence that we're secure. And when I say we, I mean the global we, I don't just mean the United States.

Any country that has these weapons has digital components. And we know that cyber vulnerability is very real. I'll give you just one data point on that. In 2013, the U.S. Department of Defense conducted a study to better understand the vulnerabilities of all of its systems to cyberattacks. And the basic conclusion of the study was, for me, a quite chilling and frightening one, and that is that we cannot count on these systems working, that there was no comprehensive technical approach that would protect U.S. military systems to include nuclear.

So, let's talk about consequences, what happens if there's a failure and there is a massive exchange of nuclear weapons. I think the key takeaway here, contrary to popular understanding, is that we actually have no comprehensive understanding of the societal effects of a nuclear catastrophe. Now, you may be wondering, how can that be, right? We've had these weapons for a long time, we've studied them, we've studied their effects.

Let me explain. We do know, in fact, a lot about the prompt effects of nuclear weapons. And we know that because they've been used both in Hiroshima and Nagasaki. But there is also a long test history before atmospheric testing was stopped. Mostly, it was the U.S. and the Soviet Union that conducted more than 500 atmospheric tests. And they tested these weapons against a lot of different target sets, so we have a pretty good understanding of the effects of blast, radiation, fallout, EMP (electromagnetic pulse), et cetera. And we know that tens of millions, perhaps even hundreds of millions could die in a major exchange within a period of minutes to hours to days.

We have some good analysis that informs our understanding that there would be likely climatic consequences. And there are debates about, okay, how much soot really would be lifted into the atmosphere from the ensuing fires after a nuclear attack? We can debate whether it's seven-to-eight degrees centigrade, which is what some studies tell us, or whether it's less than that, and we can debate how bad the impact will be on agriculture.

One study looking just at a regional exchange between India and Pakistan where 100 weapons were used, projected more than 2 billion people would be threatened from famine. This is, you know, a very serious event. But here's what we don't know, which is an awful lot. There has never been any serious, comprehensive attempt to look at the cascade effects of the prompt effects of nuclear weapons.

So, for example, what happens when critical infrastructure is not just taken offline for some limited period of time but physically destroyed? What happens when we can't generate power and water? What happens to the economy? What happens to trade? Are people even going to continue going to their jobs? I mean, this is inconceivable to me in the midst of a mass catastrophe. We've seen how the pandemic has impacted our economy.

As our systems are collapsing, what does it do to our ability to govern? In the midst of chaos, what happens to democratic governance? And how does this disrupt the long-term trajectory of human civilization? By the way, there would be a lasting impact on public health. There's no time to go into all of it, but the bottom line, our leaders have their hands on the controls of a system that they don't understand. We are flying blind in terms of the potential consequences of use.

Martin Hellman from Stanford asked, I think, the fundamental question: "Can we responsibly bet humanity's existence on a strategy for which the risk of failure is totally unknown?"

There's a lot of work to do. This is an I-chart, and you're not going to be able to read it. But I'll explain, and what I hope you see is the trajectory of the curve on this graph. This is an excellent chart that was produced by Luke Muehlhauser, trying to illustrate the gains in human wellbeing as a result of the Industrial Revolution. We see, exponentially, rising life expectancy, exponentially rising number of calories ingested as a measure of health, people coming out of poverty, democratic governance, all of this exponentially increases. If we have a catastrophic nuclear event that pushes us back to the pre-era of the Industrial

Revolution, there are no guarantees that we get back on this trajectory easily or in any time at all.

Let me conclude this section with my own personal judgment about the nature of the risk we face. I know everyone has kind of their own calculation; we've seen people throw different numbers out. This is my considered judgment, and I think it's a very conservative one. I assign about a half percent risk per year to the potential for a global catastrophic nuclear event. And if one thinks about the cumulative risk over time, that means over the balance of this century, the remaining 79 years, there is a 40 percent chance that we suffer a catastrophic nuclear event.

That's not good news for my son. It's not good news for those of you who have children. It is not good news for the future. So, this might sound like a moment of despair in this talk, but not all is lost. I want to talk about why this is not inevitable, and we don't need to accept this. But first, let me just say a few words about how this field has become extremely neglected over time. It wasn't always true, but it is now.

There are two principal reasons. One is inadequate funding for preventing a catastrophe, and the second is, we see this dearth of innovation. There is an absence of intellectual capital invested in solving this problem. So, let me tackle these very quickly. You might be thinking, well, wait a minute, governments spend billions of dollars on this. How is it possible that this is an underinvested area? Well, because government spending is largely misplaced, almost entirely misplaced. Instead of spending money to reduce the catastrophic risks, we are doubling down.

I'm offering a U.S. number here because we have the best data and the most transparency into U.S. spending. But we know that the United States, Russia, China, pretty much every nuclear state is in the process of recapitalizing their nuclear forces. They're in the process of reinvesting in this old, antiquated, inherently risky strategy. There is a small amount. I don't want to make it sound like our governments aren't spending any money on risk reduction.

In the U.S., about 3 billion, annually, is spent on risk reduction. The balance of this it goes to important things, some of it material security, some of it supporting important institutional infrastructure like the International Atomic Energy Agency. But it's not nearly enough relative to the threat we face. And here's the real punch line: there's almost no investment in building a better system. We have an opportunity to design a better strategy, one that is not

inherently risky and one that can't threaten the long-term future of humanity, but we're doubling down on this obsolete, maladaptive strategy.

The story with civil society is really not any better. And this is a big problem because a lot of the transformation in this field in the past has come out of civil society. Unfortunately, philanthropic investment in this area for civil society is in free fall at the moment. There is a sense of crisis with this field. Since the end of the Cold War, we've seen kind of a steady exit of funders as they've turned their attention to issues that they consider to be more pressing, more current. And just in the last year, one major foundation, the MacArthur Foundation, has decided to exit funding from the field. By their own analysis, it's reducing the roughly \$85 million a year invested in civil society by 45 percent.

This is a really low point for those of us in civil society. Most disturbingly, we've seen a big fall off of recapitalization from an intellectual standpoint, a dearth of innovation and ideas. Young people are leaving the field. They don't see a career ladder. But let me focus on this dramatic decline in nuclear scholarship post-war, and I'm going to illustrate this with a graph. This is from a Google Ngram.

Looking at the words nuclear war, and how those two words show up in the literature over a multi-decadal period dating back to the beginning of the advent of nuclear weapons. And the main point on this chart, you see these two peaks, right? The first peak begins, roughly, 1950s. That first peak represents when we were figuring out nuclear deterrence, right? Big, intellectual investment, government money, private sector money, and trying to figure out a strategy for managing this technology. And then it begins to level off.

Then there's another big peak, and the innovation for that second peak is, we begin to realize this is dangerous. More nuclear weapon states are entering, we need to find ways to increase stability and to reduce risks, and we invest in arms control. Then you see a massive fall off and a flat lining, and that is, roughly, coincident with the end of the Cold War. So, the Cold War ends, and there's a big sigh of relief. and so many people around the world say, "Oh my God, we survived it. Thank God. You know, we can move on." And that's what happened. But the threat hasn't gone away, and it's become increasingly complex. So we're at this moment of disinvestment but the risk is going up like that.

Here's the good news. The threat is tractable. There's a lot we can do. And I think there are two potential investment areas. This is why I have a

sense of hope about this issue area. First of all, from a policy change standpoint, and policy change is vital, it's a small number of states we need to work with to incent a different kind of behavior.

There are nine nuclear weapon states today, and a few more states with the capacity to make nuclear weapons who haven't. This is not, frankly, the same level of challenge as climate change, where every state in the world needs to make changes in terms of their approach. But the real money is in the second category, game-changing disruption.

I am really encouraged when I look around and I see this moment that we're at in terms of the technologies that have matured over the 70 years since nuclear deterrence was created. Just in the last decade alone, there is tremendous potential inherent in big data, ML (machine learning), AI (artificial intelligence), in terms of its application to help us build a control system around nuclear technology that gives us confidence that we understand whether states are engaged in illicit behavior building nuclear weapons.

We can build a detection, a monitoring, a verification system that would never have been possible in the 1950s. Secondly, there is widespread public support for disarmament. That's true around the world, and the vast majority of states believe that we should have a world without nuclear weapons and have already signed onto treaties that commit them to that.

And the third, and this is where you all come in, this is really important, we're beginning to see an essential and much-needed shift in mental models. We're beginning to see a rising understanding that the long-term of humanity is threatened unless we begin operating differently.

We're beginning to see the long-term future prioritized over short-term economic incentives and the short-term thinking of individual states. I also want to just note, and we don't have time to go into these examples, but civil society also has a phenomenal track record of innovation in this space.

The first of these represents an investment made by the Carnegie Corporation of New York and some game-changing scholarship at Harvard at the end of the Cold War that created this concept of Cooperative Threat Reduction, which led to the dismantlement of 13,000 plus warheads, almost 1500 missiles, et cetera.

And just to put that in context, today in both the U.S. and Russia, our deployed arsenals are capped at 1,550 weapons. You see how big this is in

relationship to where we've come. So, what can we do to avoid a nuclear catastrophe? Two principal things. The most important thing we need to do is move away from a business-as-usual approach. We need to build a better system, and we should aspire to building a system that doesn't have a catastrophic failure mode. We need to design an innovative system that feels safe and not one that threatens the annihilation of the planet.

We need to invest in transformative application of technology to build this better system, and we need to expand beyond policymakers alone. Our nuclear community has mostly been pursuing a strategy of talking to policymakers. That's important but insufficient. In parallel, we have got to work to de-risk the existing system while we build the new system. These are near-term steps. They're within our grasp. We have to build the political will to do this.

What can you contribute? Expertise? This is a game that requires this challenge, that requires a lot of different kinds of expertise. It requires outside the box thinking. It requires pushing open further the Overton window, and it requires resources to enable all of this to happen.

I'm going to end where I started, which is that we are at a turning point. We're at a moment in time where we can continue with a business-as-usual approach and watch the risk increase or we can choose to build a world that extends the long-term potential for humanity and enables us to flourish. I invite you to join me on that journey. And I thank you very much for your attention. Thank you.

UNIDENTIFIED SPEAKER: Great. Thank you so much for that, Joan. I'm welcoming Carl to the stage also. So, focusing on the title of the talk, can you explain what nuclear weapons have to do with the Anthropocene?

MS. ROHLFING: Thank you for that question. Yes, I didn't have time to explain it in the talk itself. So, you all know what the Anthropocene is. But I find a lot of people I talk to don't realize that it's a marker of a geologic epoch. And what I didn't realize until recently is that the scientific community of geologists who actually study and have the authority to decide whether we have moved out of the Holocene, which is this geologic epoch that we've been in since the last ice age, essentially, have concluded, and this is remarkable, that we are in a new era, that we are in something called the Anthropocene where the earth itself is now being shaped by humans.

The marker that they're looking at as the demarcation point between these two epochs is actually the first nuclear weapon test in 1945 in the American desert. And the reason they've selected that is because test and the 500 plus tests that followed it left radionuclide deposits across the face of the earth, and that leaves an indelible, permanent record on the earth.

It's obviously not the only way in which we're shaping our environment, but that the Anthropocene was marked by the advent of nuclear weapons was interesting to me. It's the first technical challenge to our survival.

MS. DHALIWAL: Absolutely. And a question to both of you. The nuclear security field has been around for 70 years. What are the biggest developments of the past few years? I know that you touched on the funding situation changing.

MR. ROBICHAUD: Yes. So, 70 years, it's a long time but it's not a long time either, right? That's the time that we've had nuclear weapons. And we've entered, really, a new era in the past decade or so.

You have a renewed conversation about great power conflict and great power competition that is embedded in the national security strategy of the United States. And you're seeing a resulting arms race that is emerging. It's not only the United States, it's China, Russia, United States, India, Pakistan. All of these countries are rapidly modernizing their nuclear arsenals with new delivery vehicles.

Some of these are faster, they're more accurate. Some of it is in response to the deployment of missile defenses. So, you have this dynamic of technological change and competition that's happening right now. That's a big change and replaces what had been seen as a relatively benign security environment before that. You have the digitization and the increased integration of new and complex systems into command and control. You have immense increases in accuracy, in precision, and in speed, and the way that these weapons are delivered.

The ability to conduct surveillance on an unprecedented scale. And what you have is a really complex intermix of technological capabilities of which we are greatly uncertain. Ultimately, humans are in charge of making these decisions in the moment of crisis. Nuclear weapons are about leveraging risk in order to achieve your political goals. And we are asking a lot of our decision makers to make a decision within a few moments' time that has immense

consequences. We know that humans are not good at making decisions of this sort under duress.

The more we learn about the human mind, the more we are confronted with this reality that nuclear deterrence is inherently at conflict with our ability to make smart decisions. And that is becoming even more the case as we condense the decision-making time with faster and more accurate systems. Now, there are ways out of this problem, and there are a lot of smart people that are thinking about it. But right now, all of the incentives are in the other direction because we are entering this period of competition.

And the nature of war is speeding up as we automate things and as we prepare, as many of you know. So, that's the situation we find ourselves in.

MS. ROHLFING: Can I just build on the complexity case that you've created? Because it's absolutely right. Carl, this is a world that is, you know, rapidly growing complex beyond our ability to manage it in this domain, in the nuclear domain, in particular. And what I wanted to share was a quote I actually brought up here to the stage because I thought, "Oh my God, if he thinks that, then I guess it's good news at one level."

This is a quote from Admiral Charles Richard. He's the head of U.S. Strategic Command, and that's the command that's responsible for all U.S. nuclear weapons. He basically acknowledges that we're at this moment of complexity that's forcing them to rethink, and what he says is that we need to work on the basic theory. This is the quote: "We are in uncharted territory. We need to be far more humble. We are rewriting deterrence theory operationally, but is not something one command can do alone."

What I get from that is that even the commander of U.S. nuclear forces is struggling to figure out how to manage all of this complexity and apply this to the increasingly entangled domains of nuclear, and cyber, and AI, and conventional. I personally think it's folly to believe that we can safely control the existing system.

MR. ROBICHAUD: I think as Joan has mentioned, one of the fundamental changes in recent years is this risk is increasing but there is such little public awareness of that. You know, occasionally, there are headlines about new hypersonic systems that are tested or about cyber security flaws. But in general, we have moved on as a society. We have moved on. And we think that this problem is solved.

And in the backdrop, there are people who are showing up to work today in Montana and going down into missile silos and rehearsing, turning that key. There are people who are in the situation room preparing for a crisis. And we are completely, completely unaware of it, most of us, right? So how do we reawaken public interest in these decisions that are being taken in our name? That we are currently in a negative feedback loop. People don't know about this issue; the civil society is disempowered.

As a result, there is no political salience, and no political influence, and no funding. And as a result, there's no incentives for people to get involved. There needs to be a jolt to reinvigorate and create a positive feedback loop in which people see that we can create safer conditions. And by demonstrating that, we will create this positive feedback loop in which we move further and further away from that brink.

MS. DHALIWAL: And when you talk about a new system, can you expand on what you envisage as that new system and to what extent, Carl, do you agree with that?

MR. ROBICHAUD: Yes.

MS. ROHLFING: Yes. Thank you. Critical point. My vision of the new system is that it's not a system based on mass annihilation. It's a system that if a part of it doesn't work, it can't trigger civilizational disruption. That is the design principle. It is a system where nuclear weapons are legally prohibited. And the reason we should be confident moving to that kind of system is because we have the technology, today, to enable us to have confidence in the detection of illicit behavior and in the verification that states have actually disarmed and are not illicitly building weapons, hiding them in a cave.

I think you could argue even if that system was not foolproof and a country spent some period of time building, you know, one or two or even five bombs, that's still a much safer place to be because one or two or five bombs is unlikely to be civilization disrupting. It's unlikely to lead to an existential event. So yes, my idea is, essentially -- I'm reluctant to say just Global Zero because in most people's minds -- not that that's a bad goal, I fully support that -- but in most people's minds, it means, well, all we have to do is dismantle the weapons and we're done.

And I think the challenge of the new system is that it is a way of managing nuclear technology, which has many peaceful applications, nuclear medicine, nuclear power generation. We don't have the safeguards wrapped around that to give us confidence that the technologies aren't being misused. But I believe we can build those with the technological toolkit we have today. So that's just kind of a conceptual explanation of where we need to go.

MS. DHALIWAL: And are you in broad agreement with that, Carl?

MR. ROBICHAUD: In broad agreement, yes. I think that a lot of the systems we need to put in place are not about nuclear weapons at all. They're about communication between states to resolve tense issues without moving into a crisis situation. So only part of the solution is nuclear.

MS. ROHLFING: Yes.

MR. ROBICHAUD: But it doesn't help when you are taking positions to leverage the use of nuclear weapon, the possession of nuclear weapon to get what you want in a political standoff. And over the past six years, we've had leaders in both the U.S. and the Russia that have actively threatened the use of nuclear weapons in order to achieve certain political ends. We need to move away from that approach and that rhetoric.

And even before we get to a world free of nuclear weapons, we need to move to a world without nuclear threat -- without threats of first use of nuclear weapons and where -- if nuclear weapons can be used only to deter other nuclear weapons, they get pushed further to the margins and are not as active.

MS. DHALIWAL: And then to your risk number, do you think that it's the case that annual risk now is as high as it was in the peak in '60s, in the '80s, in the Cuban Missile Crisis, et cetera? Do you think that's true?

MS. ROHLFING: Yes. I believe it's at least as high. And people may say, "Oh my God, really as high as the Cuban Missile Crisis? That was a moment of great danger." And as Carl eloquently explained in his talk last year, we didn't even appreciate, until well after the fact, how close we came to nuclear war. But I believe we are at that moment again today.

And in a way, it's a more dangerous situation because we don't understand that we're at that moment, but the complexity of the nine nuclear

weapon states, the new technologies, and the disinvestment has created this incredibly dangerous moment.

MR. ROBICHAUD: The Cold War had a real ideological element to it and the stakes seemed higher, if that's possible, than some of the current political standoffs. What's different now is that we have a lot more nuclear weapons with a lot more potential megatonnage of destruction out there. The Cuban Missile Crisis was a moment of great crisis. But the consequences wouldn't have been as great as if there were a nuclear crisis today between the U.S. and Russia or the U.S. and China.

I am very concerned about a future Taiwan Straits Crisis and how that would play out. I'm very concerned about some of the scenarios you see in Eastern Europe and how that might play out, not to mention India and Pakistan. We've seen active crises there in the past couple years. And, as Joan mentioned, even a small, limited nuclear war could result in massive famine and cascading consequences that would be disastrous for humanity.

MS. DHALIWAL: With changes in the field, like funders leaving, what are the main lessons that we can learn there? Like are there some approaches that are less impactful than we might've thought? Or what are the key lessons there, do you think?

MR. ROBICHAUD: Yes. I wouldn't read too much into the MacArthur departure as being a repudiation of their grant-making strategy. If you read the report of the evaluators they hired to assess the program, they found that they were having significant, significant impact on the issue. What the evaluators also found was there was no clear line of sight towards the goal that MacArthur had set for itself.

Why is that? MacArthur set an extraordinarily ambitious goal to minimize and eliminate all fissile material within a 10-year timeframe which, unfortunately, was not going to happen, right? There are certain countries that want that fissile material and are never going to give it up, right? The board pushed the staff to set an extraordinary big bet that could be achieved within a delaminated timeframe.

Ultimately, that goal was not achieved, and they decided they wanted to move in a different direction. It sounds like I'm beating up on MacArthur here. They have been extraordinarily generous, and we should not be criticizing them. Rather than criticize, maybe we should be thinking about all the

other potential funders out there who have never invested in nuclear issues. MacArthur has been a very stalwart, long-standing funder of nuclear issues and should be given great credit for that.

There is a certain blind spot, I think, we have throughout the philanthropic community that there are these catastrophic risks. And yes, when you fund these issues, you're not going to see a decline in maternal fatalities or an improvement in the arts culture in Chicago. But they have repercussions that are difficult to measure. If you could reduce the risk of nuclear war by one percent, that would be a phenomenal contribution to all of humanity.

And I think MacArthur's investments over the past 10 years have done that, perhaps. It's hard to measure, of course. But they -- it's sad to see them move away from this portfolio. I think that I have some other thoughts about, you know, what works and what not, but I've spoken a lot.

MS. ROHLFING: Yes, the only thing I would add to that and you're right to remind us that we owe a debt of gratitude to the multi-decadal generosity of MacArthur, but I do think our community bears some responsibility for not being able to communicate effectively why leaders at foundations and the public should care about this issue. So one thing that we've been focusing on at NTI is helping to develop better communications tools so that people can understand why this issue is relevant to their day-to-day lives and not just some arcane military topic. It's not.

I would argue this is fundamentally a moral issue, a humanitarian issue, an issue about the future, an issue that impacts our economy. But that's not how we talk about it. We use totally obscure language that makes this issue less accessible to normal people. So, I think we do bear some responsibility. Also, I would just note that their decision to leave the field was coincident with a leadership change at the foundation.

And, you know, they decided to invest in social justice issues, more money in climate, worthy causes—and in the absence of someone making an understandable case for nuclear, it's not a surprise. But it's not an indictment of both the contributions they made, about the contribution civil society has made and can make and about the threat.

MS. DHALIWAL: So on threats, specific threats, what threats are you most worried about in the space and why? Particularly from a long termist's point of view?

MS. ROHLFING: Well, you heard my talk. It's blunder, it's miscalculation, it is a horrific civilization-altering tragedy, where a leader is operating on bad information. That's what I worry about most in terms of the likely pathway to nuclear use. But the other threat, if I could call it that, is just the stasis in our thinking. I cannot emphasize enough how deeply embedded in the bureaucracy and in all of our brains, to some extent, this idea that nuclear weapons keep us safe or make us safer, that nuclear weapons helped end the second world war. Well, yes, arguably, we can make the case for that.

I can even understand why President Truman made the decision that he did, but that was then. We're in a completely different world today in terms of our technologies, our capacity to destroy ourselves, the dangers, the complexities that we described. And we have a completely different toolkit, but it's considered, you know, challenging the sacred cow to say deterrence may be part of the danger and actually not part of the solution.

What I appreciate from this community is that you all are willing to challenge status quo thinking. And I think it's going to take that, this mental model shift, that we need a new toolkit to protect humanity for the long term.

MS. DHALIWAL: And what would you be most excited to see philanthropists supporting now in this space?

MS. ROHLFING: A mental model shift.

MS. DHALIWAL: Yes?

MS. ROHLFING: Yes. I would love to see philanthropists doing two things. One is, helping to invest in the level of resource to enable a new generation of intellectual capital. There is a tremendous breadth of experience in this room. This, by the way, should not just be considered a security problem. This is, as I said before, it's a human problem. It's a moral problem. It's a philosophical problem. It's an economic problem.

I think we need to approach the nuclear challenge from that perspective. This needs to be a whole-of-society effort. And let's design a better system, one that cannot fail catastrophically, that doesn't threaten the annihilation of humanity. I don't think that's too much to ask. I really hope that you guys will help turn up the level of ambition on the kind of world we need to create to survive.

MR. ROBICHAUD: I think this is the type of space in philanthropy I agree wholeheartedly with. I think that there is a role for modest and patient philanthropy in this sector to understand that we may not have all the answers. And just because we don't have a strategy that draws a clear line between where we are now and where we want to be, doesn't mean that it's not worth investing in talent, it's not worth investing in ideas, it's not worth investing in capacity-building.

These are the things we need to do now because right now, the political moment is not ripe for threat reduction issues. You have the U.S. and Russia and China who're in great tension. There's not a lot of things we can do right now in terms of arms control, et cetera. But we need those ideas now. We need that human capital now because there will be a moment when these ideas are needed. There will be a moment when we need people in government who understand the complexity of this issue.

And if we don't pave the way now, we won't have it when we need it. So, I think it's less about determining one set of outcomes that we want now and more about seeding a field. And I think there are some analogies here to what's being done, the extraordinary work that's being done in terms of AI safety and AI alignment, right? We may not know the exact answer for what it looks like, but that doesn't mean it's not worth investing in the capacity to find those answers.

MS. ROHLFING: Can I build on what you just said, Carl? Because I think I'm a little bit more optimistic about the potential --

MR. ROBICHAUD: Yes.

MS. ROHLFING: -- for making progress in the here and now between U.S., Russia, China, even on this really hard challenge and even given the high tensions between those states. You know, we're seeing some uptake at senior levels in terms of the strategic stability discussions between the U.S. and Russia. We're seeing an opportunity to think about policy steps and to try and push that door open. I think there --

MR. ROBICHAUD: Yes.

MS. ROHLFING: -- there are some signs of optimism.

MR. ROBICHAUD: Absolutely. Yes. I shouldn't overstate the pessimism. What I was trying to convey is that the solutions that have worked in the past are not the ones we can go to now. So, treaty-based arms control, which has been a staple of the risk reduction efforts over the past 40 years. It's really hard to imagine the U.S. Senate -- 60 U.S. senators couldn't agree that apple pie tastes delicious, right? So that's the world we're in. That's -- you need 60 senators for any kind of treaty.

So how do you move forward in a world in which treaties may not be possible but confidence-building measures and technical solutions might be? There are a lot of smart people who're thinking about this. But we're going to need some new approaches.

MS. ROHLFING: To build on that, it's really vital, our political leaders need to understand that people care about this issue. They need constituents who are asking them, what are you doing to make the world safer from this catastrophic risk? And that's been pretty much nonexistent, I would say, across virtually all of the nuclear weapon states. We know it's true in the United States. And that's a problem worthy of some investment to think about how we do that, to build greater awareness of the stakes that we all have in a different system, a safer system.

I think we need to, as a community, figure out how to add that to our toolkit. It's been hard because it's expensive and we're a community that is starving, that is shedding people, that's in the midst of a crisis. But I think that's really important. By the way, one data point I would share, I was so stunned to learn this. You heard me reference \$85 million, roughly, in civil society, that was the investment before MacArthur's withdrawal.

Nike spends about \$3.6 billion per year on advertising. That sort of frames it, right? Like, wow, this is just -- what's wrong with this picture? We're not serious about investing in this risk reduction. The United States government, I gave you that \$3 billion figure for nuclear risk reduction, that's less than what Nike spends on its annual advertising.

MS. DHALIWAL: And then to round this off, if you could kind of share with the audience one takeaway that you'd like them to take away from this session. Joan?

MS. ROHLFING: Yes, my punch line, we're in grave peril. I wish more people appreciated just how dangerous this moment is. But we don't have

to be, we can choose a better future. We just need to be bolder and more ambitious about the future we want to carve for ourselves. It's up to us to build a better future. But we need to lean into this problem.

MR. ROBICHAUD: Yes. And I think NTI and so many of the non-governmental organizations who have worked on this issue have an extraordinary track record of bringing in ideas that would not have been generated otherwise. I think we can look back and be proud of that but know that to move forward in this era of rapid technological change and political challenges, we are going to need to find some new tools in the toolbox. We're going to need new talent and new ideas. And it's a great time to be reinventing to solve the problems of the 21st century so that we can avoid this crisis.

UNIDENTIFIED SPEAKER: Okay.

MS. ROHLFING: Hear, hear.

UNIDENTIFIED SPEAKER: Thank you so much both. Please join me in thanking Joan and Carl.

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