INTERNATIONAL LUXEMBOURG FORUM ON PREVENTING NUCLEAR CATASTROPHE

RUSSIAN ACADEMY OF SCIENCES

THE INTELLECTUAL LEGACY OF ACADEMICIAN ANDREI SAKHAROV AND THE ISSUES OF STRATEGIC STABILITY

Special Session of the Online Conference of the International Luxembourg Forum on Preventing Nuclear Catastrophe

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This booklet contains statements made by the participants of the Special Session of the Online Conference of the International Luxembourg Forum on Preventing Nuclear Catastrophe "The Intellectual Legacy of Academician Andrei Sakharov and the Issues of Strategic Stability" that took place on July 15, 2020. The session was one of the first in a series of events to commemorate the 100th anniversary of the birth of Andrei Sakharov, the world-famous Soviet physicist, thinker and human rights activist. The Conference was attended by prominent scholars, experts, public figures and government officials dealing with nuclear safety, non-proliferation reductions and limitations of nuclear weapons.

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Viatcheslav KANTOR

President of the International Luxembourg Forum on Preventing Nuclear Catastrophe

Ladies and gentlemen, distinguished colleagues! Good morning, good afternoon and good evening!

In accordance with the Forum's plans, even before the pandemic struck, we intended to hold a special session on the intellectual legacy of Andrei Dmitrievich Sakharov as part of our conference on nuclear non-proliferation. This session forms part of the general preparatory plan for the 100th anniversary of Sakharov's birth in May 2021.

By way of information, let me tell you that yesterday [July 14, 2020] the online conference "The New Iranian Nuclear Crisis: Ending Escalation" was held. It resulted in the adoption of a rather robust declaration, which we traditionally present to the heads of the world's leading states, the UN Security Council and other organizations. You will have the opportunity to look at it.

Many hundreds, if not thousands of books, articles and films have been written or made about Andrei Sakharov's life and the fundamental and applied results of his work, and about his human rights activities. Everyone knows about his three Hero of Socialist Labor titles, the laureate awards he received and which were then stripped from him and then reinstated, about the Nobel Peace Prize, his tireless protection of convicted writers, poets, artists (Sinyavsky, Daniel, and others), about

his calls to end the war in Afghanistan, his exile in Gorki, his return, his draft Constitution, and his hard work in Moscow. And these are merely snippets of all that he did. His philosophical and social science articles were unique in the Soviet Union.

He penned the article *Reflections on Progress, Peaceful Coexistence and Intellectual Freedom*, in which he developed the ideas of convergence between socialism and capitalism, and which he sent to Brezhnev in the 1960s. But to no avail. That is a very powerful lesson for the government: you must heed scientists!

The depth and rigor of his scientific, philosophical and humanist convictions were so important, so powerful and central for Andrei Sakharov that he openly voiced his position, which fully contradicted the basic principles of the prevailing Soviet ideology and practice.

He clearly understood the consequences this would have on his fate, but did not attach any importance to them. Nevertheless, he had to endure an incredible amount of slander, mudslinging, accusations of treason, the damning article in *Pravda* written by forty academics, another one by Soviet writers in the same newspaper… etc.

He set out his humanist views in writing already in 1955, as nuclear weapons were being created:

> **The main thing for me was the inner conviction that this work was necessary.** *The monstrous destructive force, the tremendous efforts required for its development, the means taken from a poor, hungry war-torn country, the human victims of hazardous industries and forced labor camps – all this emotionally reinforced the sense of tragedy, it made one think and work in such a way that the sacrifices would not have been in vain.* **My most passionate dream is that thermonuclear weapons will deter war, but never be used.**

The last sentence is essentially a forerunner to the theory and principles of strategic stability.

Let me repeat once again – as a result of countless publications, almost everything is known about his childhood, his studies, his work during the war, his achievements in creating the hydrogen bomb,

his human rights activities, his participation in two Congresses of People's Deputies of the Soviet Union after his return to Moscow, his statements that were drowned out by "an aggressively obedient majority" (as the famous writer Afanasyev said), and about his draft Constitution.

But it is important and interesting to hear what the most famous and authoritative participants of our online session who knew Sakharov or the stories of his associates have to say about him today.

I am not one of them, but as an anecdote I can tell you how I stood next to him in a queue of 10-12 people in a store. He was recognized and invited to skip the queue, but he refused. I remember his conversation with the saleswoman, in which for some reason he repeatedly used the word 'coffee' in the neuter gender – which, strictly speaking, is a mistake in Russian. Then I thought – wouldn't it be wonderful if the only mistake we made in life were one like that.

Thank you for your attention.

Alexander SERGEEV

President of the Russian Academy of Sciences; Academician, RAS

If we talk about Andrei Sakharov as a multifaceted personality, he was, of course, a scientist, a thinker, and a human rights activist. And, perhaps, our today's conference will focus more on Academician Sakharov, a thinker. Naturally, Sakharov as a thinker is very important for us today, because he, as a thinker, saw far ahead, and now it would be very interesting for us to discuss the issues related to global strategic stability using projection of his vision for today and his thoughts. The essence of these issues might have remained the same, but the way in which we face these questions has clearly been changing.

After all, if we look at how the threats that we face today differ in a significant way in comparison to the period of time when Sakharov began to really reflect on the consequences of nuclear and thermonuclear war, then, of course, we should all admit that the swiftness, with which such a war would progress, has clearly increased. New types of weapons – faster, more accurate, less detectable – have emerged, and this, of course, brings a qualitative change to the existing situation. The missiles' flight time has been shortened, and it is becoming increasingly difficult to carry out retaliation measures. That is the first qualitative point.

The second qualitative point, in my opinion, has to do with the current situation when it probably must be admitted that everywhere in the whole world, and in the countries represented by the participants of this event as well, there has been a decrease in vigilance with regard to war. New generations of young people know nothing about war, and thus, the current situation differs significantly from the time – the 1950s and 1960s – when people had a direct memory of what war was like. Another point is that now a significant number of people see war as a computer game of sorts. Our digital life teaches us that it is not that big of a deal – you played, shot someone, dropped a bomb, and everything is fine. Real life is probably becoming like that as well, because we know that wars to a certain extent are already being fought using computers in various headquarters, while bombs are falling on completely different countries elsewhere. Therefore, there obviously are grounds for such rationale. But even politicians in many countries around the world belong to a new generation of politicians. The way they talk about war and its consequences is sometimes quite irresponsible. There are actual qualitative changes in society, which, in general, significantly reduce our immunity in this regard. And this, too, must be discussed. In our country, at the Academy of Sciences, we often say that now, in the light of new threats – technical and technological – it would be worthwhile to promote global movement that would be aimed at ensuring such stability.

And finally, a new trend that emerged recently is a philosophical change in the attitude to the situation, which is caused by the fact that factors of the fragility of human civilization have become clear and manifest themselves in a new light. I will give an example. Today, one of the topics of discussion in modern astrophysics is why the universe is silent. If we had lived in Sakharov's time, then the answer would have been clear – that the emergence of intelligent life on Earth is a unique phenomenon and that the conditions for it were completely and utterly unique. But now we know that it is not actually so, and we

know that there is panspermia – the spread of large organic molecules that are carried by comets and other astro bodies. We have discovered many thousands of exoplanets with conditions very similar to that of Earth. In these circumstances, it is extremely arrogant to consider ourselves the only intelligent form of life in the universe. It would be very strange if it was so. And why then is the universe silent?

This issue of fragility of civilization has to do with the fact that, perhaps, we increase the fragility of our civilization by creating more and more new technologies. Perhaps we need to discuss all these philosophical issues and issues associated with a change in mentality, as well as those related to the increase in the level of such danger of uncontrollable escalation of war. Everything we think about as well as the dangers we talk about definitely make us closer to each other, make us communicate and cooperate more.

William PERRY

Professor at Stanford University; Member of the Supervisory Board of the International Luxembourg Forum

When I think of Russians of the Cold War period who had the greatest influence on my thinking, the first three who come to my mind are Andrei Sakharov, Aleksandr Solzhenitsyn and Boris Pasternak. Although their careers were very different, they had one thing in common: a love of freedom, which they pursued eloquently and bravely, in the face of serious governmental opposition and personal danger. Solzhenitsyn and Pasternak were, of course, writers, while Sakharov was a physicist, but they were in many ways, kindred spirits.

Andrei Sakharov was a brilliant scientist who specialized in particle physics but is best known as the “father of the Soviet hydrogen bomb.” Indeed, although he always maintained his interest in particle physics, he was never able to devote enough time to it.

I am not going to speak today about his work on the bomb, which is well known, or his work in particle physics, which is outside of my competence, but his passion for the last several decades of his life, described by Henry Kissinger as follows: “Sakharov was a remarkable man whose heroic insistence on the preservation of human dignity in the Soviet Union was a seminal contribution to the cause of freedom in the world.”

My first-hand information about Sakharov came from my Stanford friend, Sidney Drell, who met Sakharov in 1974 at a conference of the Soviet Academy of Sciences. After the conference, Sakharov invited Drell to his apartment, where they talked on into the night, in spite of the language difficulties. This was to be the first of many such sessions, during which Drell developed a deep admiration of Sakharov. Drell has said, "Sakharov's defining characteristic was a selfless kindness that brought him the respect and admiration of all that knew him. If you meet a man like that, you never forget it."

Sakharov died too soon: he was only 68, younger than most of us at this conference. After his death, George Shultz and Sid Drell held a conference at Stanford in his honor. And they followed that with a book, *Andrei Sakharov: The Conscience of Humanity*. Some of my comments today are based on what was said of Sakharov at that conference.

Sakharov believed that nuclear weapons represented an existential threat to mankind and expressed the fear that they would someday be used in a catastrophic war. And he was a leader in the campaign to stop nuclear testing. So, it is not surprising that he was often asked why he had worked to develop the hydrogen bomb. His answer was straightforward. He said that he understood the terrible nature of the weapon he had helped create, but that the war that Russia had recently suffered had been excessively barbaric, and that the work he had on the bomb was of vital importance to ensure that the victory they had won at such a great cost would not be wasted. He later said, "After more than forty years, we have had no third world war, and the balance of nuclear terror… may have helped to prevent one. But I am not at all sure of this; back then, in those long-gone years, the question didn't even arise."

The major turn in Sakharov's political evolution came in 1967, when anti-ballistic missile defense (ABM) became a key issue in US-Soviet relations. In a secret detailed letter to the Soviet leadership of

July 21, 1967, Sakharov explained the need to "take the Americans at their word" and accept their proposal for a "bilateral rejection by the US and the Soviet Union of the development of antiballistic missile defense," because otherwise an arms race in this new technology would increase the likelihood of nuclear war. He also asked permission to publish his manuscript (which accompanied the letter) in a newspaper to explain the dangers posed by this kind of defense. The government ignored his letter and refused to let him initiate a public discussion of ABMs in the Soviet press.

The next year he became concerned about the adverse environmental effects of testing and began campaigning to end nuclear tests. In particular, he was an early supporter of the Partial Nuclear Test Ban Treaty, which would end above ground nuclear tests. When a date was set for the end of atmospheric testing, the Soviet government undertook a crash program to conduct as many tests as they could before the test moratorium took hold. These tests included the atmospheric test of the largest bomb ever tested: the monster bomb that detonated in the atmosphere with the destructive power of 60 megatons. Sakharov had strongly and bitterly opposed that testing, and his opposition was so vehement that it caused a major rift with the Soviet government. Here was a man that had won some of the Soviet Union's most prestigious awards, including the Order of Stalin, now alienated from the government on a matter of deep principle.

Sakharov then determined to express some of his ideas in writing, and in May 1968 he completed an essay entitled *Reflections on Progress, Peaceful Coexistence, and Intellectual Freedom*. Commenting on this essay he said:

> *I went into some detail on the threat posed by thermonuclear missiles – their enormous destructive power, their relatively low cost, the difficulty of defending against them. I wrote about the crimes of Stalinism and the need to expose them fully (unlike the Soviet press, I pulled no punches), and about the vital importance of freedom of opinion and democracy.*

This essay marked a critical turning point for Sakharov, from which he never turned back. He certainly knew that the government would have a very adverse reaction to it. In fact, after this essay was circulated and then published outside the Soviet Union Sakharov was banned from conducting any military-related research.

But at that point Sakharov simply doubled down. In 1970, he became a founding member of the Committee on Human Rights in the Soviet Union, which became active in several prominent human rights cases. He became the subject of KGB reports and came under increasing pressure from the government. In 1972, he married the human-rights activist Yelena Bonner, established a correspondence with Solzhenitsyn, and began meeting with Western correspondents. The Soviet government's media campaign began targeting both Sakharov and Solzhenitsyn, and only intensified after he won the Nobel Peace prize, which called him "a spokesman for the conscience of mankind."

Sakharov later said, "At first I thought, despite everything that I saw with my own eyes, that the Soviet State was a breakthrough into the future, a kind of prototype for all countries," and that it took "years" for him to "understand how much substitution, deceit, and lack of correspondence with reality there was" in the Soviet ideals.

Sakharov was arrested in 1980, following his public protests against the Soviet intervention in Afghanistan, and was sent to internal exile in Gorky, a city that was off limits to foreigners. Between 1980 and 1986, Sakharov was kept in Gorky under Soviet police surveillance. In his memoirs he mentions that their apartment in Gorky was repeatedly subjected to searches and heists. His period at Gorky is marked by a remarkable level of defiance, most notably in several hunger strikes where the government force-fed him to keep him alive.

Shortly after Gorbachev came to power, he decided to allow Sakharov to return to Moscow, where he was able to meet with his Russian friends as well as colleagues from abroad. During this period, he renewed his acquaintance with Sid Drell, who told me of the times he met with Sakharov in his apartment, resuming their pre-Gorky talks.

We were all shocked at his early death. Shortly after his death, Sid planned a conference at Stanford to reflect on his life. He also helped organize a special book where many of Sakharov's friends wrote essays honoring him. Sadly, Sid passed away about a year ago. Another person who could best describe Sakharov's unique significance was his colleague in the human rights movement, Lev Kopelev, who said about Sakharov,

> *And he suffered. He suffered the suffering of every man. I don't know if I can explain it, the soul of Sakharov who suffers for each suffering man. He loved his work; he loved his physics; he can't live without his physics. But when he got a phone call that someone is arrested or someone had been searched, he got up and got a taxi or trolley.*

Sakharov lived in an era where the Soviet Union was ruled by an authoritarian government, and where the hostility between the Soviet Union and the US was intense and dangerous. And he was a voice for sanity and decency at a time when it was desperately needed. At the time of the Stanford conference on Sakharov, we thought those days were behind us. But we were wrong. Today an authoritarian government rules in Russia and increasingly is being emulated in the US, as the Trump administration whittles away at our democratic institutions, especially the rule of law. And the hostility between our two countries has reached Cold War levels again. The danger of a nuclear confrontation has returned to Cold War levels; indeed, the Bulletin of the Atomic Scientists rates it as somewhat more dangerous than during the Cold War. But today we do not have Sakharov to speak of those dangers posed by our enormous nuclear arsenals, and of the need for our governments to respect human rights. So, as we look back at the remarkable life of Sakharov, it is not enough to admire him. We should also seek to **emulate** him.

I would like to end my remarks by quoting Kopelev on Sakharov, "The majesty of his spirit; the power of his intellect; the purity of his soul; his chivalrous courage and selfless kindness feeds my faith in the future of Russia and mankind."

Vladimir LUKIN

Deputy Chairman of the Federation Council Committee on Foreign Affairs of the Federal Assembly of the Russian Federation;
Member of the Supervisory Board of the International Luxembourg Forum;
Professor at National Research University – Higher School of Economics

Temporal and historical context of the Special Session of the Online Conference of the International Luxembourg Forum "The Intellectual Legacy of Academician Andrei Sakharov and the Issues of Strategic Stability" represents another attempt to resume, on a new basis and in new conditions, public dialogue between our two countries on such pivotal issue in their relations as multifactorial set of strategic problems. Such a dialogue took place in the most hectic times of the Cold War, and its usefulness and relevance today are unquestionable.

At the same time, this meeting is the first (or one of the very first) in a series of events dedicated to the 100th anniversary of the birth of Andrei Sakharov, a person who played an extremely important – it would hardly be an exaggeration to say – a unique role in how humanity has been evolving, and in no small part how the relations between our countries developed in the second half of the 20th century.

It is not easy to talk about such an outstanding and unique individual as Academician Sakharov – a person who was completely undeservedly awarded **only one** Nobel Prize, and even more undeservedly deprived of several nation's highest honors (I hope this issue will be successfully resolved in the near future), whose relatively short life was full of so many historically significant discoveries, initiatives and humanitarian actions – in my opinion, he was and remains one of the brightest personifications of the second half of the 20th century, the era of "bipolar world."

Sakharov's legacy should, in my opinion, be remembered through the prism of at least four major dimensions of his personal fate.

First, Sakharov, was a phenomenon of natural science and of physical science. I am not sure that humanists are able to fully grasp the scale of the contribution a **modern** physicist can make (in contrast to ancient and medieval synthetic scientists). It is only clear that this contribution is enormous both in theoretical and practical terms. Sakharov was not alone in his field but he was the cream of the crop.

Second, Sakharov was a political thinker. His extensive article *Reflections on Progress, Peaceful Coexistence and Intellectual Freedom*, as well as the Nobel Lecture "Peace, Progress, Human Rights" are among the fundamental rationales for "theory of convergence." And if we take a close look at the turbulent and contradictory events that are taking place in our world today – the world at the beginning of the third millennium – we will be able to quite clearly distinguish the elements that have not passed the test of time, as well as those that testify to the vitality and productivity of ideas of integration and globalization of the best sides of the "bipolar world," which is ideologically split into two parts and ready for irreconcilable confrontation.

Let us assume that some romantic-utopian element can be found in the theory of convergence. But, in truth, after half a century, the idea of a gradual but persistent strengthening of global and regional security structures (such as the UN and OSCE), in particular, proposals to strengthen the role of the UN Security Council based on the coordination of the positions of the five permanent members and the idea of advancing of the "three baskets" of the CSCE – despite all the difficulties and conflicts – still seem much more constructive and promising to me than the happy utopia of "The End of History" based on the

post-communist Ptolemaic flat unipolar world – even if it rests on three whales. “The future,” Sakharov emphasizes, “is in the paths of pluralistic convergence and controlled scientific and technological progress.”

Third, Sakharov was a human rights activist. His selfless, heroic work in this area hardly requires additional comments. It is a separate, huge topic.

Fourth, Sakharov was one of the pillars, one of the founding fathers of the global nuclear equilibrium, on which world of the second half of the 20th century rested, and, by and large, our planet and the humanity rest to this day.

Extremely interesting and instructive is his evolution from an outstanding nuclear scientist, carried away by his professional work, who looks at the world from a very tall, but his own, “departmental bell tower,” to an outstanding, strategic thinker who increasingly more clearly and deeply understands both the undoubted stabilization possibilities and the monstrous dangers of the proliferation of nuclear missile potentials, both horizontal and vertical. His following statement can be considered a final point in this area:

> *I believe that the issues of war and peace in the issues of disarmament are so important, that even in the most difficult situation they should have absolute priority, and it is necessary to use all the existing possibilities for their solution, to prepare the ground for further progress towards the future. In this, the goals of all responsible people on earth coincide, including, as I believe and hope, the Soviet leaders…”*

And further:

> *“…any negotiations on disarmament are possible only on the basis of strategic balance.”*

The modern world, of course, has changed a lot since the departure from the scene of such titans of the last century as Sakharov. Surprisingly, however, it is not the fact that it has changed. It is surprising how many problems of the past remain to be solved by the current generation.

I just want to say in the words of the poet of that past generation, “Everything is returning to its own circles, only these circles are changing.”

One of the most stable factors of strategic balance is the fact that 90% of the nuclear missile potential of the modern world is still under control of our two states. Apparently, the level of responsibility of Russia and the United States for maintaining global security in this area should also be recognized as comparable.

I think that a public dialogue on this range of issues with participation of authoritative representatives of all, without exception, nuclear powers would be useful right now. And in the future, it will become critically needed.

But let’s first “brush the dust off the past.” All the more, this past **bilateral** public dialogue was useful, and sometimes productive for nourishing the ideas of interstate dialogue. Let us, as Academician Sakharov put it, start looking for “pluralistic convergence” at the level of US-Russian scientists and experts.

For as Winston Churchill remarkably said in 1941, “If we win, nobody will care. If we lose, there will be nobody to care.”

And then the future will show.

Alexey ARBATOV

Head of the Center for International Security, Primakov National Research Institute of World Economy and International Relations, Russian Academy of Sciences; Academician, RAS; Deputy Chairman of the Organizing Committee of the International Luxembourg Forum

Vice-Chairman of the Special Session of the Online Conference of the Luxembourg Forum "The Intellectual Legacy of Academician Andrei Sakharov and the Issues of Strategic Stability"

Everyone knows that the Academician Andrei Sakharov went down in history as a great nuclear scientist, humanitarian, human rights activist and a fighter for peace. The latter sounds like a tired stamp that was awarded to multiple Soviet leaders, but often had nothing to do with reality. In the case of Sakharov, it was actually true, as he fought for peace not together with the "general line of the party and the government," but often against it. Under the guise of peace-loving rhetoric, the Soviet Union held the ironclad belief forged in multiple wars that peace was the stronger, the more variety of weapons – primarily, nuclear weapons – the state had. Academician Sakharov was the first in our country to challenge this axiom. His position was all the more shocking for the Soviet Union and surprising for the rest of the world because he was the one who contributed the most to the creation of the Soviet thermonuclear bomb.

It would be senseless to argue about which of the mentioned dimensions of Sakharov's life was the most significant. Nevertheless, one can say that it was his fight for peace that he waged not through rhetoric and declarations, but through treaty-based legal restrictions and reductions of nuclear weapons. All areas of his work were very important, but this one was dedicated to the most important issue in our lives: the prevention of nuclear war.

For most people, such problems are not present in everyday reality, which is only natural. But despite the importance of other concerns in a life of an individual, each nation and all humanity, none of them can as quickly and irreparably decide the fate of modern civilization as a nuclear war.

Sakharov famously said that it is necessary to ensure "that thermonuclear weapons deter war, but are never actually used." This idea, in our own country and in the West, became the basis for the doctrine of nuclear deterrence. But the Cold War showed that without restrictive measures established by treaties, nuclear deterrence fuels arms race, regularly exacerbates threat of nuclear war, causes crises (such as Cuban Crisis of October 1962) and incurs excessive material costs.

Based on this experience, the construction of a nuclear weapons control system began in the 1960s. Since the early 1970s, strategic arms negotiations have been based on the principle of parity ("equality and equal security"). However, after the end of the Cold War, since the early 1990s, it was necessary to establish a more extensive principle, and the principle of "strategic stability" was placed in the basis of agreements on the reduction of offensive strategic weapons. The concept of "strategic stability" was defined as the strategic relations of the parties **that would eliminate incentives for the first nuclear strike.**

It is important to emphasize that this concept was not a dream of a brighter future, but had clear military-technical parameters. It had served as a working blueprint for the treaties of the following 20 years, which had reduced the world's nuclear arsenals almost to order and minimized the possibility of nuclear war. The world stopped being worried about this threat… As it turns out, it was for nothing.

Another experience – the experience of the last decade has shown that good relations between nuclear powers and arms control is a

kind of “bicycle”: you cannot stand still, you can either move forward or fall. In the field of arms control, there has been an unprecedented stagnation since the conclusion of New START Treaty in 2010. At the same time, international tensions were increasing, the arms race was gaining momentum and the entire international legal system of nuclear disarmament was being dismantled. The nuclear world order is changing. Rapid military and technological developments have a powerful impact on strategic stability. New strategic and operational concepts are emerging that increase the risk of nuclear escalation in a possible local crisis situation.

It is unlikely that Sakharov could have anticipated that by his 100th anniversary, to be celebrated in 2021, his ideas and concerns would become more relevant than ever. And his political and intellectual courage and moral responsibility will once again be called upon to serve as an example to all those who seek to prevent thermonuclear demise of our civilization.

Ernest MONIZ

Co-Chair and Chief Executive Officer, Nuclear Threat Initiative; Member of the Supervisory Board of the International Luxembourg Forum

In the late 1950s, Andrei Sakharov became increasingly concerned about the effects of nuclear explosive testing on the health of the Soviet people and the environment, and persuasively documented these effects in scientific studies. He advocated for the moratorium on testing that the Soviet Union adopted in 1958, and of course was very disappointed when Chairman Khrushchev ended it in 1961, during the Berlin crisis. The Soviet Union then went on to conduct many tests, and the United States did as well.

In 1963, the Limited Test Ban Treaty was signed, but underground nuclear testing continued until the early 1990s. Today, as signatories to the CTBT, our countries are observing moratoria on explosive nuclear testing.

Everyone in this meeting is aware of the reports that the Trump administration may have recently considered a resumption of nuclear testing, in part linked to concerns about activities at Russia’s nuclear test site. Unfortunately, we do not have the level of dialogue, transparency, and problem-solving mentality today that is necessary to help resolve these issues and continue our mutual responsibility in terms of limiting nuclear dangers.

Today, scientists in all countries must be as courageous as Sakharov in advising their leaders against dangerous and

unnecessary nuclear activities, including a resumption of nuclear testing, and stressing the need for extending New START and entering into new arms control arrangements.

Regarding the CTBT, I participated in the 1999 United States Senate hearings leading to the extremely unfortunate outcome where the Senate soundly rejected ratification of the CTBT. At that time, there were concerns about the viability of the stockpile stewardship program and verification of the CTBT. Today, we have established that the stockpile stewardship program is effective without explosive testing, and the CTBTO has established an effective worldwide detection system for verification. It is time to revisit the CTBT in that context.

By the late 1960s, Sakharov had turned away from nuclear and scientific work and devoted himself to advocacy against the nuclear arms race and for human rights. He understood that the destructiveness of nuclear weapons necessitated cooperation between the West and the Soviet Union, because direct conflict would be suicidal. At Nuclear Threat Initiative (NTI) we are dedicated to improving the US-Russia dialogue on our shared responsibility as possessors of over 90% of the world's nuclear weapons.

This takes me back to Sakharov's indirect influence on my own career. I joined MIT's Physics Department in 1973. Victor Weisskopf, a veteran of the Manhattan Project, basically established the modern theoretical physics center at MIT, and my advisor at Stanford and Sid Drell were products of Viki Weisskopf's mentorship. But my real mentor at MIT for decades was another professor named Herman Feshbach. Inspired by Sakharov, who had become a dear friend, Feshbach became a leader in the physics community for human rights, helping to establish the Union of Concerned Scientists, establishing the Panel on Public Affairs of the American Physical Society (APS), establishing a specific activity on human rights of scientists in the APS, and eventually the APS creating a Sakharov Prize.

This influence was largely responsible for my entry as a scientist into the public arena. As Herman Feshbach told me when I was a very young professor, that if I did not get involved in issues like non-proliferation and nuclear safeguards, then I wasn't worth getting tenure at MIT. So, I took that advice very well, and I must say it was a very good advice in terms of really setting my own vector, including eventually as Secretary of Energy in 2013. In that same year, I signed with Sergey Kiriyenko a US-Russia nuclear R&D agreement that we would dearly love to still see put into practice today as part of the US-Russian responsibility to really work together in lowering nuclear dangers and advancing the peaceful nuclear enterprise.

I mentioned Sid Drell, and in an open letter to Sid Drell, Sakharov famously offered his view of the inadmissibility of nuclear war and of what we might call today "strategic stability." I quote from his letter: "In conclusion," Sakharov wrote,

> *the absolute inadmissibility of nuclear war, the collective suicide of mankind. It is impossible to win a nuclear war. What is necessary is to strive, systematically though carefully, for complete nuclear disarmament based on strategic parity in conventional weapons. As long as there are nuclear weapons in the world, there must be a strategic parity of nuclear forces so that neither side will venture to embark on a limited or regional nuclear war. Genuine security is possible only when based on a stabilization of international relations and repudiation of expansionist policies, the strengthening of international trust, openness and pluralisation in the socialist societies, the observance of human rights throughout the world, the rapprochement – convergence – of the socialist and capitalist systems, and worldwide coordinated efforts to solve global problems.*

As is often the case, Sakharov was brilliant in being ahead of his time making these statements. The world has evolved, obviously, considerably since then, but it's really incumbent upon all of us to remind world leaders of his wisdom, the inadmissibility of nuclear war, and our, especially the US and Russian, mutual responsibilities.

And today, at Nuclear Threat Initiative (NTI) we are working hard to try to encourage adoption of the Reagan-Gorbachev statement that a nuclear war can never be won and must never be fought. So, Academician Sakharov's intellect, vision, and courage continue to be a model and an inspiration for all of us, including we who are nuclear scientists.

Mikhail FEDOTOV

Ambassador Extraordinary and Plenipotentiary of the Russian Federation; Professor at National Research University – Higher School of Economics

I will try to focus on the question of the historical mission of Academician Andrei Sakharov as a great thinker and human rights activist. And I'll start with a quote from his famous Nobel lecture "Peace, Progress, Human Rights." His speech, read by Yelena Bonner in Oslo on December 10, 1975, began with the assertion that peace, progress and human rights are three goals that are insolubly linked to one another, "It is impossible to achieve one of these goals if the other two are ignored." The subsequent unfolding of events confirmed the absolute truth of this deeply moral and truly humanistic position. In fact, long before the emergence of the Sustainable Development Goals set by the United Nations in 2000, Sakharov expressed their main idea in the most concise form, which is the organic relationship of sustainable development with the preservation of peace and respect for human rights, including a right for healthy environment.

Both in the Nobel lecture and in his other articles and public speeches, Sakharov repeatedly referred to the Universal Declaration of Human Rights. And although he did not quote its preamble word for word, in it he found support for the conclusion about the need to respect human rights as a guarantee of progress and the preservation of world peace. Much of this declaration is explained by the fact that

it was adopted in 1948, when mankind's wounds from the horrors of World War II had not yet healed, terrible pictures of destruction, concentration camps, and the death of tens of millions of people were still fresh in our memory. And those intellectuals who created the draft of the Universal Declaration of Human Rights proceeded from the same humanistic ideals as Academician Sakharov, linking the preservation of peace with the observance of human rights. This is how the formula appeared, "Recognition of the inherent dignity and of the equal and inalienable rights of all members of the human family is the foundation of freedom, justice and peace in the world."

Developing this formula, Sakharov wrote,

> *I am convinced that international confidence, mutual understanding, disarmament, and international security are inconceivable without an open society with freedom of information, freedom of conscience, the right to publish, and the right to travel and choose the country in which one wishes to live. I am likewise convinced that freedom of conscience, together with the other civic rights, provides the basis for scientific progress and constitutes a guarantee that scientific advances will not be used to despoil mankind, providing the basis for economic and social progress, which in turn is a political guarantee for the possibility of an effective defense of social rights. At the same time, I should like to defend the thesis of the original and decisive significance of civic and political rights in molding the destiny of mankind.*

Let's think as to why Sakharov, a great physicist, a man of a brilliant and quite trouble-free scientific standing, abandoned the comfortable life of a three-time Hero of Socialist Labor, abandoned all privileges and preferred this dangerous and incredibly difficult mission of a human rights activist? I find the answer to this question in the works of Sakharov himself. He felt his moral responsibility, as a scientist, for the creation of thermonuclear weapons, which he considered a weapon of collective suicide. Anyone who possesses the weapon of collective suicide should treat it with utmost responsibility,

realizing his accountability before all of humanity and every individual. That is why Sakharov not only defended human rights as the highest and universal value, but also defended the rights of every person who was in trouble, defended the rights of specific individuals.

Perfectly understanding the totalitarian essence of the Soviet system, Academician Sakharov wrote in 1973,

> *I am convinced that under the conditions, obtaining in our country a position based on morality and law is the most correct one, as corresponding to the requirements and possibilities of society. What we need is the systematic defense of human rights and ideals and not a political struggle, which would inevitably incite people to violence, sectarianism, and frenzy.*

Sakharov not only stood up for an amnesty for political prisoners, but also signed letters in defense of each of these prisoners of conscience. In his famous Nobel lecture, he listed the names of several dozen dissidents who were being held in Soviet prisons and camps. He saw his duty as a person who felt responsible for the fate of humanity and for the fate of individuals in reminding humanity about the fate of specific human rights defenders and publicly calling for their immediate release.

Sakharov was also interested in the topic of searching for brothers of man in the universe. In his article *The World in Half a Century*, dated May 17, 1974, he wrote,

> *I envision an expansion of attempts to establish communication with alien civilizations. These are attempts to receive signals from them in all known types of radiation and at the same time to design and construct our own emitting installations. This is a search in space for informational projectiles of alien civilizations… Inaction here, despite the absence of any guarantees of success in the foreseeable future, would be unreasonable.*

Humanity in fact continued its scientific search in this direction, but "the universe is silent." And this silence suggests that alien intelligence simply does not believe that humanity is capable of taking

responsibility for the fate of the universe. Therefore, the universe is silent in anticipation of the moment when humanity will grow up to its answer. And I can understand it.

Technological progress does not make our world safer. Quite the opposite – now the flight time of missiles has become much shorter than it was 20 and 30 years ago, and therefore, the time for making political decisions has been critically reduced. But at the same time, the flight of these missiles now has no more sense than it had before – the weapon of planetary suicide has a reasonable purpose only while it remains holstered. This is what the people who make political decisions and those intellectuals, whose voices they listen to, must realize first of all. I am convinced that the struggle waged by Sakharov – for scientists to realize their responsibility for the results of research and discoveries – this struggle must continue. As part of the celebration of the centenary of the birth of Sakharov, the organizing committee plans to hold an international conference at UNESCO on the ethical responsibility of scientists. This topic concerns not only nuclear scientists, but also all those who are engaged in breakthrough research in the field of genetic engineering, information technologies, artificial intelligence, etc. Unfortunately, irreparable harm to humanity can be done in a variety of ways, and it is important that scientists have a responsible attitude towards the results of their intellectual search.

Sakharov was a great visionary. In particular, everything that he demanded in his note to the General Secretary of the Central Committee of the Communist Party of the Soviet Union (CPSU Central Committee) Leonid Brezhnev in 1971, eventually came true. He wrote about the need for an amnesty for political prisoners – this amnesty took place in the second half of the 1980s. He wrote about the need to bring under control the so-called compulsory psychiatry. And this was also implemented, although only in 1992. He wrote about the need for public control over the observance of human rights in prisons. And such a system has been operating in Russia since 2008.

He wrote, “to submit the draft law on the press and mass media for public discussion” – and this was also achieved. It was the discussion of our initiative original draft of the Soviet law on the press and other mass media that allowed me to personally meet Sakharov in 1989 at the House of Scientists in Moscow. This is how history linked his 1971 demand with the result of the implementation of that demand in 1990, when press freedom became law. Alas, the time allotted by history for the implementation of Sakharov’s social and human rights ideas is measured in decades. But it is gratifying that many of these ideas have already been implemented, and, therefore, there is hope for the implementation of all those that remained unfulfilled.

Sakharov was a great human rights activist. And I would like to end my speech with his words from the article *The World in Half a Century*, written in 1974 and dedicated, first and foremost, to the forecast of the scientific and technological development of human civilization. In his article, he tried to anticipate what the world will be like in 2024. Many of his predictions have already become reality. We have to wait just a little to be able to witness which of Sakharov’s forecasts have already become reality (for example, the world wide web), which of them remained on the horizon, and which ones completely fell off the radar. But the main thing has remained unchanged – the fact that “the struggle for human rights is the real struggle of today for peace and the future of mankind.”

Sam NUNN

Co-Chairman of the Board of Directors, Nuclear Threat Initiative; Member of the Supervisory Board of the International Luxembourg Forum

Sakharov's passion to reduce the threat of nuclear use was forged in his experience helping to create these weapons and in his keen understanding of their power to destroy God's universe. Like Siegfried Hecker, the former head of Los Alamos, I believe that Sakharov would agree that the United States and Russia are doomed to cooperate. 90% of the weapons belong to the two of us, and we certainly have a huge percent of the responsibility. And I also agree with his observation that we seem to be going in a circle. Unfortunately, along with non-nuclear weapon states, we have also now entered into a new cyber age where false warnings or attacks on nuclear command and control systems are increasingly likely. A nuclear war by blunder is, in my view, much more likely than pre-meditated nuclear attacks. And my suggestions flow from that basic assertion.

In 2007, George Shultz, Bill Perry, Henry Kissinger, and I called for reducing reliance on nuclear weapon globally as a vital contribution to preventing their proliferation and ultimately ending them as a threat to the world. With strained relations between the United States and Russia today, what can we do to move in that direction and to move away from the nuclear risks that Sakharov warned about repeatedly?

Let me give you a short list of suggestions. This is not a long-term vision as much as it is what can we do now. Seven suggestions:

First, Russia and the United States have 90% of the world's nuclear weapons, as we said, so we really are doomed to cooperate. We must move away from treating diplomacy as a reward for good behavior rather than an essential tool to reduce nuclear risk. We must work to improve security in the Euro-Atlantic region, which is essential for stability in Europe. And most importantly, we must rebuild communication and cooperation between Russia and the United States and other powers, but beginning with the two of us, which is required for progress in making nuclear use less likely.

Second, our presidents should jointly declare the baseline principle articulated by Ronald Reagan and Mikhail Gorbachev that a nuclear war cannot be won and must never be fought. The way to get China involved a nuclear negotiation, which seems to be the pursuit of the Trump administration, is not by delaying the extension of START, but by having China and other members of the P5 invited to join in this Reagan-Gorbachev-type statement.

Third, as a critical near-term step, the United States and Russia should extend the New START treaty and begin to discuss what comes next, to reduce nuclear risk and to reduce the number of weapons as well as their delivery systems.

Fourth, beginning with the United States and Russia, we must develop red-line understandings for cyber as well as for space. The lack of any type of rules of the road or understandings in these areas greatly increases the risk of miscalculation or blunder that could escalate to a nuclear catastrophe.

Fifth, President Trump and President Putin, or their successors, should mandate that their military and scientific leaders work out options to increase decision time for decision-makers. When God's creation is at stake, as it is, shouldn't we insist that our leaders have more than a few precious minutes to decide whether to pull the trigger when the warning could be a false warning? They could start

by agreeing to eliminate both the United States' and Russian fixed and vulnerable land-based ICBMs, as Bill Perry recommends. We all know these fixed land-based vulnerable ICBMs in both the Russian and United States strategic arsenals, we know they are perceived as first-strike weapons by the military, because you have to use them or you lose them early in a conflict.

Sixth, we must use technology to reduce and not increase risk. A huge challenge today, when reality in the last couple of years has moved in the opposite direction. Every nuclear- weapon state, not just the United States and Russia, should undertake a comprehensive review of its nuclear weapon systems and warning systems to reduce the risk of nuclear use as a result of false warning, an accident or cyber-attack. This should include developing the technical capability to destroy our own missiles armed with nuclear weapons, if they are launched by mistake, along the lines of the fail-safes we already use for satellite launches. We do have fail-safes on the missiles that launch satellites, but when you put a nuclear warhead on a missile, we don't have fail-safes.

Seventh, we should redouble our diplomatic efforts to address the regional proliferation challenges that are growing more dangerous, including North Korea and Iran. The fifty-year track record of the Non-Proliferation Treaty has been impressive: preventing large-spread proliferation of nuclear weapons, ensuring that the peaceful benefits of peaceful nuclear technology are widely shared, and facilitating reductions in nuclear arsenals. We must build on these achievements.

So, as we celebrate the remarkable legacy, courage, and vision of Andrei Sakharov and we mark the solemn anniversary of the devastation of Hiroshima and Nagasaki, we must all rededicate ourselves to continue to work towards Sakharov's vision of a world free from nuclear dangers, and we must demand that our leaders do the same.

Mikhail SHVYDKOI

Special Representative of the President of the Russian Federation for International Cultural Cooperation; Ambassador-at-Large

In 1987, Henrietta Yanovskaya, the theatre director of the Moscow Young Spectator's Theater, staged the play "Heart of a Dog." The premiere took place at about the same time that this novella was first published in the Soviet Union. At that time, I worked in the editorial office of the magazine *Teatr* [Theatre]. This is a "sizable" magazine dedicated to the problems of the theater. Back then it was headed by the playwright Afanasy Salynsky. And when we began to think, with whom we should place an order to write a review of this performance, Sergei Abramov, who was the deputy editor-in-chief, picked Andrei Sakharov, and everyone supported him. Sakharov returned from Gorky in 1987. We convinced him to see the play "Heart of a Dog" and asked him to write a review. To our surprise, he did not say no. And to my mind, this review was absolutely outstanding. It was a review written by a scientist who saw the most important ethical problems of science in Bulgakov's story.

I will briefly remind you of the main plot of the story. In the early 1920s, a Soviet genetics professor creates a semblance of a person from a dog, and this person with a dog's heart begins to do the most terrible, disgusting deeds and, by the end, becomes a zealous Bolshevik who is trying to establish Bolshevik order in the worst sense of the

word. And Professor Preobrazhensky, seeing his own creation, comes to the conclusion that this creature must be taken out of the human race and returned to its usual canine state.

Sakharov wrote a review of biblical proportions. It was short, but very deep and talked about Father's responsibility for the results of his own creation. This is a biblical story of the creator who suddenly realizes that his creation behaves in a completely unpredictable way, of his creation doing what he did not dare to imagine, of committing all possible sins. It was a review which said that while a scientist cannot always foresee the results of his work, the scientist is nevertheless responsible for what he did. And in this sense, the transformation of the inner path of Sakharov is a transformation not only of him, but also of other great scientists of the 20th century.

At this point we can recall the Pugwash Conferences on Science and World Affairs, which began with the well-known letter of eleven outstanding scientists who were not only creators of theories, like Einstein, but also practitioners, who created thermonuclear weapons and contacted with the most destructive things that could be imagined back then, after the Great Patriotic War and after the Second World War. And the Pugwash Conferences was a movement of scientists who understood what they had done. They understood that knowledge cannot be stopped and progress cannot be stopped. But how can the disastrous consequences of progress be contained? The curiosity of scientists and their creative power will still push them to places where there are ethical prohibitions, and taboos created by public consciousness. Think of the great play by Bertolt Brecht about Galileo Galilei, which posits that a scientist will move in the direction of truth, regardless. It does not matter whether the scientist renounces it or not. Galileo knew that the truth still exists, it is impossible to get away from it.

Sakharov was a genius not only in science; he was a genius of conscience. He was a man who understood all the ethical consequences of scientific discoveries and political repression, and of

any political transformations – consequences that can be expected, or can bring about the most incredible results. In the end, one can speak of a century-old experiment, which was carried out in Russia, as a kind of social utopia, which in the end turned into a catastrophe.

In this sense, Sakharov was, of course, a man who knew how to turn any particular case into an event of extraordinary importance and almost symbolic meaning. As you know, he looked like a very delicate man, almost meditative, as it seemed, but unusually firm in his convictions. I repeat, our acquaintance with him was very brief. When the issue of magazine *Teatr* came out, I took 5 issues due to him as the author, and together with my youngest son, who was then 7 years old, went to deliver them to Sakharov. He and Yelena Bonner were sitting in the kitchen drinking tea and we shared a short evening talk about theater and science.

This short review was the first censor-monitored publication of Sakharov after his return from Gorky. It was, of course, very important. This was not a theatrical review; it was a kind of philosophical reflection on the role and fate of a scientist in the world.

Currently, the word "war" has ceased to have a threatening tangible power. It is very difficult to strangle a person with bare hands, so people invented knives and guns. But in virtual reality ethical circumstances generally go away completely, the war turns into a kind of a game, and that is scary. It seems to me that today when we talk so much about artificial intelligence and rely on various kinds of cyber advancements, we must remember that in a sense they hollow out the psychophysiology of life and death, the understanding of this process. Sakharov felt this psychophysiology well and he wrote that, "Nuclear war might come from an ordinary one. The latter, as is widely known, comes from politics," and when politicians have no immunity to the word "war," then anything can happen.

And I will also give one more quote from Sakharov. We can quote him as much as we can, it is always useful, and this one applies to our life today. Unfortunately, when there are many threats, including

a pandemic threat, which each country tried to solve separately, and seemed like we were almost ended up in new Middle Ages, this Sakharov's idea is very important, "The division of mankind threatens it with destruction… In the face of these perils, any action increasing the division of mankind, any preaching of the incompatibility of world ideologies and nations is madness and a crime." This, I think, is a very important thought for today circumstances and should not be forgotten.

Today we are talking about the responsibility of scientists, but Sakharov always wrote about the responsibility of politicians as well. And it is no coincidence that one of Russia's initiatives lately was an important initiative of President Vladimir Putin to hold a summit of the leaders of the member states of the Security Council, of P5 that once established the UN.

And of course, today the voices of scientists on the most important problems of the world practice should sound louder. This is also important because we are witnessing the degradation of knowledge and understanding. People think that if they have Google and the Internet at their fingertips, they know everything. And this is a colossal mistake. Perhaps there is more information, but less understanding. And one of the colossal problems is the degradation of understanding. This is what Sakharov wrote about and what is extremely important today. That is why the voices of scientists should sound as loud as possible, breaking through the noise and interference of time.

Frank von HIPPEL

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Some personal memories of Andrei Sakharov and his contributions to strategic stability

I first learned of Sakharov when I read the translation of his great essay "Progress, Coexistence and Intellectual Freedom," in the *New York Times* on July 22, 1968.

I realized that the Soviet authorities had not succeeded in stamping out intellectual freedom in the Soviet Union and that here was a world-class intellect with a proposal for how to end the Cold War. I was very excited for several days.

Two decades later, thanks to Jeremy Stone and Evgeny Velikhov, I had the opportunity to discuss with Sakharov.

Stone had mounted a pressure campaign among US scientists for freeing Sakharov from Gorky. He invited me and my wife to meet Sakharov and Bonner on February 11, 1987 in their apartment, shortly after Gorbachev invited them back to Moscow.

Velikhov invited Sakharov and others, including me, to be on the board of the International Foundation for the Survival and Development of Humanity. As a result, I attended with other members of the Foundation board the meeting where Sakharov first met with Gorbachev. Sakharov brought with him a list of political prisoners, who he insisted Gorbachev should free.

At the meeting with Sakharov in his apartment, we discussed what Sakharov would say at the International Scientists' Forum on Drastic Reductions in Nuclear Weapons for a Nuclear-Free World that Stone and I had come to Moscow to attend.

Fortunately, the KGB recorded and transcribed our discussions in Sakharov's apartment for Gorbachev, and I obtained a copy of Gorbachev's marked up copy from Matthew Evangelista, the American historian of the US-Soviet transnational movement for nuclear arms control[1] after the Politburo files were thrown open by President Yeltsin.

We discussed two main topics: ballistic missile defense and deep cuts in offensive nuclear forces.[2]

Ballistic missile defense

At that time, US interest in ballistic missile defense was blocking progress in the negotiations that ultimately led to the INF and START treaties.

Sakharov felt, however, that the Reagan Administration's Strategic Defense Initiative would collapse under the weight of its technical infeasibility and that the US would not break out of the ABM Treaty if progress was being made on nuclear reductions.

That was the thrust of Sakharov's speech at the Scientists' Forum three days later. After his presentation, in a break between the sessions of the Forum, Andrei Kokoshin and Sakharov had a debate on the subject for the benefit of the press. The same arguments had been made years earlier by Sagdeev *et al* in a report by the Committee of Soviet Scientists for Peace and Against the Nuclear Threat,[3] and by Velikhov.[4] Perhaps, however, Sakharov making public the case for a

1 Matthew Evangelista, *Unarmed Forces: The Transnational Movement to End the Cold War* (Cornell University Press, 2002).

2 See also Frank von Hippel, "Sakharov, Gorbachev and nuclear reductions," *Physics Today*, April 2017, pp. 49-54, https://physicstoday.scitation.org/doi/10.1063/PT.3.3525.

3 R.Z. Sagdeev et al, *Prospects for the Creation of a U.S. Space Based Ballistic Missile Defense System and the Likely Impact* (1983).

4 E.P. Velikhov, "A Soviet Scientist's Dim View of Space Weapons," *Washington Post,* 24 June 1984, https://www.washingtonpost.com/archive/opinions/1984/06/24/a-soviet-scientists-dim-view-of-space-weapons/0490a8f1-66bb-4471-8213-41d7f577f2ad/.

change of the Soviet position at this particular time helped Gorbachev make that change.

Deep cuts

My own exchange with Sakharov during that visit at his apartment was about a paper some colleagues and I had written about the possibility of reducing the number of deployed strategic warheads on each side to 2,000.[5] Sakharov argued that an analysis of the impact on strategic stability of such large cuts could be done only with "thousands of analysts with computers." Fortunately, with the end of the Cold War, it did become possible to make such cuts without elaborate analysis.

It would be wonderful if we could have another such reduction. Today, however, we are again tangled in debates over possible first strikes and the potential effectiveness of US strategic defenses against a Russian or Chinese retaliation with their surviving strategic weapons after a US first strike.

In my view, the existential deterrence from nuclear weapons is robust and would continue to be robust at much lower levels.

What I worry about, however, is that fears about theoretical first strikes have created instabilities. One is the possibility of an accidental nuclear war due to the launch-on-warning postures the US and Russia have adopted. I also worry that US interest in ballistic missile defense is stimulating offensive buildups in Russia and China.

So, we have again two types of strategic instability to worry about today: crisis instability and arms race instability.

If Sakharov were still with us today, he would be speaking out about these dangers. In his absence, we lesser mortals must do so. I thank the Luxembourg Forum for its intellectual leadership in this area.

5 Harold Feiveson, Richard Ullman and Frank von Hippel, "Reducing U.S. and Soviet nuclear arsenals," *Bulletin of the Atomic Scientists,* August 1985, pp. 144-150, https://sgs.princeton.edu/sites/default/files/2019-10/feiveson-ullman-vonhippel-1985.pdf.

David HOLLOWAY

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Thanks to my friend and colleague Sidney Drell, I had the great good fortune to meet Sakharov twice, once in his apartment in Moscow in June 1987, when he spoke to me about the history of the Soviet atomic project, and again in August 1989, not long before his death, when he and Yelena Bonner gave a seminar at Stanford on the recent turbulent session of the Congress of People's Deputies of the Soviet Union.

I want to focus on three elements of Sakharov's thinking and relate them to our current situation. The first is his conception of strategic stability. Sakharov played a key role in the buildup of Soviet strategic nuclear forces. By the late 1960s, a relationship of strategic parity was being formed with the United States. Strategic stability had been created: neither side had an incentive to strike first because each knew that the other could retaliate in a devastating way. In July 1967 he wrote that the "period of approximate and unstable equilibrium," which had begun in 1957, would not last forever: it could be broken, and the illusion might arise that it could be broken.

Sakharov made this point in a letter to Mikhail Suslov (a member of the Politburo and the leading ideologist of the time) seeking permission to publish an article on the topic of anti-ballistic missile defense (ABM) in *Literaturnaia Gazeta*. In his letter he disagreed with earlier comments Aleksey Kosygin had made about the purely defensive character of missile defenses. Sakharov spelled out the ways in which ABMs could be both ineffective and destabilizing. He urged that the Soviet Union agree to an ABM moratorium with the United States. Nuclear weapons, in Sakharov's view, were an instrument of deterrence. In the article he sent to Suslov, he totally rejected the idea that Clausewitz's notion of war as the continuation of politics by other means could apply in the nuclear age. Such a war would be catastrophic for all. But strategic stability – the stability of deterrence relationships – was not permanent. It needed to be managed carefully.

The second point I want to take from Sakharov is the need for informed public dialogue about nuclear issues. In the article he sent to Suslov, Sakharov argued that the question of a moratorium on anti-missile defenses "belongs to the category of highly sensitive matters that are difficult to discuss openly, but it is more important than ever to begin such a discussion." Suslov denied Sakharov's request to publish the article. Sakharov was dismayed, and that dismay is reflected in the opening paragraph of the essay he wrote in the early months of 1968: *Reflections on Progress, Peaceful Coexistence, and Intellectual Freedom*. Here he noted that his views were formed in the milieu of the scientific-technical intelligentsia, which was very worried about the future of humankind. Their concern, he continued, was all the stronger because policy in key areas, including military affairs, was not grounded on "a profound study of facts, theories, views, presupposing unprejudiced and open discussion, which is dispassionate in its conclusions." Scientists had a crucial role in enabling humanity to deal with the challenges it faced, many of which have a significant scientific-technical dimension. He was making the point about the Soviet Union at the time, but it is a point that has more general application.

My third point comes from the opening paragraph of an article he published in 1974 on *The World after Fifty Years*. In words that have great resonance today, he wrote:

Everyone who starts to think about the future of the world after fifty years – about that future in which our grandchildren and great-grandchildren will live – is seized by powerful and contradictory feelings. These are despondency and terror before the tangle of tragic dangers and difficulties in the immeasurably complex future of the human race, but at the same time hope in the power of reason and humanity in the souls of billions of people, which alone can resist the approaching chaos.

Sakharov was greatly interested in the progress of science and technology, but his enthusiasm was balanced by trepidation about the future. "Scientific-technical progress will not bring happiness," he wrote, "if it is not complemented by extraordinarily profound changes in the social, moral, and cultural life of humankind."

How do these three elements relate to the problem of strategic stability today?

Strategic stability in the 1960s was based on the ability of both the US and the Soviet Union to retaliate in the event of a surprise attack by the other. The danger of a deliberate attack by one side on the other has diminished, but the danger of nuclear war by accident, inadvertence, or miscalculation has increased. The requirements of strategic stability have thus become more stringent. The US-Russia strategic relationship is more complicated than it was in the Cold War, for a variety of technological, doctrinal, and geopolitical reasons. This is a complex issue, but let me suggest, in very broad terms, an approach to dealing with it:

- New START should be extended with a commitment by the US and Russia to conduct negotiations for a new treaty that would:
  a) offer paths to accession for the other P5 nations, including China;
  b) cover nuclear warheads associated with non-strategic nuclear weapons;
  c) potentially add new technologies and weapons (or in a separate agreement), in the form of prohibitions on testing or fielding.

As the leading nuclear powers, the US and Russia should engage with each other and with other nuclear powers (either through the negotiations or in separate fora) on the following questions:

- approaches to strategic stability based on the need to minimize the risk of nuclear weapons being used while maintaining their deterrent role;
- a common agreement on the prevention of a nuclear war, similar to that signed by the US and the Soviet Union in 1973;
- organizational and technical measures aimed at eliminating the conditions of potential false warnings of a missile attack, including as a result of cyber intrusions;
- organizational and technical recommendations common to all nuclear-weapon states on ensuring cyber security of nuclear weapons command and control systems;
- initiatives to improve the coordination and security of space operations.

This approach would attempt to build on the aspects of Sakharov's intellectual legacy that I pointed to earlier. It would address the concept of strategic stability in new technological and geopolitical circumstances. It would have to draw on the scientific and technical expertise not only of governments but also of civil society, fitting into what Sakharov referred to as "the category of highly sensitive matters that are difficult to discuss openly," but require such discussion. And third, it would address – at least partially – Sakharov's concern that unless we change the way we think and act, scientific-technical progress will outstrip our capacity to use it for good.

A final point for our troubled world: When a journalist asked him why he persisted in his hopeless struggle for human rights in the Soviet Union, Sakharov answered: "Well, there is a need to create ideals even when you can't see any route by which to achieve them, because if there are no ideals then there can be no hope and then one would be completely in the dark, in a hopeless blind alley."

Vladimir DVORKIN

Chairman of the Organizing Committee of the International Luxembourg Forum; Major General (retired); Professor

Dear colleagues! I am extremely happy to see all of you. American colleagues, my good friends, Sam, Rose, Bill Perry and Bill Potter, everyone else and, of course, our Russian participants. Previously I thought that it was impossible to say anything new about Andrei Dmitrievich – in addition to what has already been said, what has already been published over the years, and only personal experiences, some of which I have heard today, are of interest.

My impression of Academician Sakharov is connected to what I heard about Andrei Dmitrievich from his closest colleagues, who were distinguished just as he was. I heard this in the distant Soviet years, at the time of, as I remember, Chernenko. After a big meeting, we had a private conversation. And so, I heard people talking about the reaction of Andrei Dmitrievich to the explosion of the Tsar Bomb on Novaya Zemlya, the bomb with a yield of 58 megatons. It was a time of frenetic testing; we also launched a missile from Severomorsk to Novaya Zemlya with a megaton-class nuclear warhead. And the reaction of Andrei Dmitrievich to the explosion of the Tsar Bomb, as his closest associates told me, was the following. They said he was excited as a kid, he was delighted, and then after a while he said,

"This power was given to us instead of reason." I am not sure how to translate it into English. As far as I know, "um" [mind] and "rasum" [reason] are often translated into English the same way, maybe I am wrong here, but I believe that there are many people with a gift of mind, much fewer with a gift of reason. So, what Andrei Dmitrievich said, when he stated that such power was given to us instead of reason, is such a broad definition, such a broad phrase, despite the fact that it is extremely short, that, of course, it refers not only to the yield of nuclear warheads.

I believe that a lot, if not most, of the contradictions, the confrontation, that exist now between Russia and the United States – may be due to a lack of reason in the face of the colossal threats, and associated with the threat of possible use of nuclear weapons. I think that this concept, expressed by Andrei Dmitrievich, is extremely broad, I want to emphasize this.

Roald SAGDEEV

Distinguished Professor at the University of Maryland; Member of the Supervisory Board of the International Luxembourg Forum; Academician, RAS

I was lucky to meet and get acquainted with Andrei Sakharov when I was still a student at Moscow University. I was sent with a small group of graduate students to Sarov, to the military nuclear laboratory, where Sakharov, Khariton, Zeldovich and a number of other major physicists were working. Sakharov's name could not be pronounced aloud – that is how classified he was. Life turned out in such a way, that on my life path I repeatedly met with Sakharov and explicitly or implicitly participated in projects associated with to his name and his work. And sometimes I had to make difficult decisions during that difficult time. At the beginning of my scientific career, I was involved in the development of his idea for a controlled fusion reactor 'Tokamak', that was during my time at the Kurchatov Institute. Now this initial idea of Sakharov and his mentor, Nobel laureate Igor Tamm, is being implemented in the form of a large prototype of the ITER thermonuclear reactor in France, not far from Marseille. Later I met with Sakharov at the sessions of the Academy of Sciences, after I was elected to become a member of the Academy. I witnessed how Sakharov was subjected to obstruction not only by the Soviet government, but also by a number of colleagues at the Academy, who signed letters condemning him. Then years passed, Sakharov ended up under house arrest in Gorky (Nizhny Novgorod). Gorbachev managed to bring him back to Moscow. And the very first thought that came not only to me, but also to my colleagues on the Committee for Nuclear Disarmament at the Academy of Sciences, and to our colleagues in the United States, was to invite Sakharov to participate in an important format of Soviet-US meetings. We met twice a year during the most difficult of times, when formal intergovernmental discussion channels were virtually non-existent until Reagan-Gorbachev summit period began. The idea of "star wars" – missile defense in space was a stumbling block to serious steps. We waited what Sakharov was going to say about this after his return from Gorky. There were some reasons to believe that maybe he would support the idea of "star wars" because not long before that, Yelena Bonner had made a medical trip to the United States, and there was a kind of "fraternization" with the US "father of the hydrogen bomb," Edward Teller. Will it turn out that Sakharov follows this path, and not the path that he had openly spoken about since 1967? And in January 1987, at an international forum Sakharov clearly formulated his position. From the very beginning, he became an opponent of the new concept of the strategic defense initiative, missile defense of the late 20th century.

In late 1988, I was fortunate enough to take part in Sakharov's first trip abroad. It was a trip to the United States organized by the International Foundation for the Survival and Development of Humanity. During that trip a historic meeting of the two fathers of hydrogen bombs, finally, took place. It was a reception in New York, specially organized on the initiative of Edward Teller. I did not attend it, but our colleagues told me in details about what happened. Sakharov came to the podium and talked his mind about "star wars," about the strategic defense initiative. And the celebration that Teller and his colleagues had planned was basically ruined. After finishing his speech, Sakharov apologized and said that he had plenty of other meetings to attend. He left the session, and after that Teller came to

the podium again and said his usual phrase, which, as my American friends told me, he repeated on several occasions: “If he (Sakharov) knew as much as we know about it, he would have changed his mind.” Thus, Sakharov returned to our normal environment and immediately became a very important member of our international committee. US colleagues who were looking forward to this meeting saw Sakharov for the first time and heard the way he spoke and argued with them during our meeting in 1987, in winter of 1987 in Tallinn, Estonia.

William POTTER

Director, James Martin Center for Non-Proliferation Studies; Member of the Supervisory Board of the International Luxembourg Forum

Strategic Stability

As a preface to the views of Andrei Sakharov about strategic stability, it is important to understand his fundamental belief that a nuclear war cannot be won and must never be fought – the same basic principle enunciated by Ronald Reagan and Mikhail Gorbachev. His views on this topic, as well as on strategic stability, are spelled out very clearly in his 1983 article in *Foreign Affairs*, *The Danger of Thermonuclear War: An Open Letter to Dr. Sidney Drell*. In the article, he dismisses as “meaningless” the notion that one can speak of victory in nuclear war, a folly he describes as “collective suicide.” Moreover, Sakharov agrees with Drell, who had written widely on the topic, that if the nuclear threshold is crossed, “the most probable result would be swift escalation leading from a nuclear war initially limited in scale or by region to an all-out nuclear war” and general suicide. In light of this premise, he concurs with Drell, and I am quoting from Sakharov’s *Foreign Affairs* article: “Nuclear weapons only make sense as a means of deterring nuclear aggression by a potential enemy, i.e., a nuclear war cannot be planned with the aim of winning it.”[1]

1 Andrei Sakharov, “The Danger of Thermonuclear War: An Open Letter to Dr. Sidney Drell,” *Foreign Affairs*, Summer 1983, pp. 1006-1007, https://www.jstor.org/stable/20041632?origin=crossref&seq=1.

While Sakharov acknowledged that a mutual balance of nuclear terror may have had "a certain restraining effect on the course of world events, as of the early 1980s, he argued that it "was a dangerous remnant of the past!" Based on this premise, he agreed with Drell (and his Stanford colleague Wolfgang Panofsky) that "it [was] necessary to restore strategic parity in the field of conventional weapons."

However, unlike Drell, and also somewhat at odds with his rejection of the balance of terror, he maintained that as long as nuclear weapons exist, "there must be a strategic parity of nuclear forces so that neither side will venture to embark on a limited or regional nuclear war." I cite this point, because although Sakharov sometimes is depicted as a modern-day Russian Don Quixote who tilted at the very nuclear windmills he had designed, he took a very realist and tough approach when it came to nuclear arms control, albeit one that regarded nuclear negotiations as indispensable in times of both good relations between the nuclear superpowers and during periods when relations were very strained. In his words, they must be "conducted with persistence, foresight, firmness and, at the same time, with flexibility and initiative."

A doomsday torpedo

The citation made by the Nobel Committee to Andrei Sakharov in 1975 proclaimed him "the conscience of mankind," and few would dispute that characterization. I will return to that dimension of his character in a moment in my closing remarks. Before I do so, however, I want to call attention to one of the paradoxes of Academician Sakharov's work as a nuclear weapons designer, convinced that in order to preserve mutual deterrence, one needed to build bigger and more effective nuclear weapons and delivery systems. As he notes in his *Memoirs*, following the 1961 test of the 50 megaton Tsar Bomba, he was concerned that the military couldn't use it without an effective and reliable delivery system. That led him to dream up "the idea of a giant torpedo, launched from a submarine and fitted

with an atomic-powered jet engine…"[2] The intended targets of these torpedoes, each carrying 100-megaton charges, which would explode both underwater, and in the air, were the enemy's harbors.

Sakharov indicates that after he discussed the idea with a senior Soviet admiral, who, in his words, was "shocked and disgusted with the idea of merciless mass slaughter," he himself "was utterly abashed, and never discussed the subject with anyone else." In his memoirs he writes, that he was "no longer worried that someone may pick on the idea as it [didn't] fit with current military doctrines, and it would be foolish to spend the extravagant sums required." Would that his optimism was justified. Regrettably, the idea for a gigantic unmanned, underwater vehicle or torpedo, has resurfaced in recent years, and is variously known as "Ocean Multipurpose Status 6," "Kanyon," and "Poseidon." Depending on the source, this weapon is being designed, developed, and possibly even tested. Although analysts disagree about the exotic weapon's status and characteristics, they generally agree that it is designed to travel long distances at high speed under water for the purpose of striking coastal cities and other targets with a nuclear warhead encased in a cobalt shell to maximize radioactive fallout. I suspect that Sakharov would be appalled at how the doomsday idea he dreamed up and then discarded has been resurrected in an even more grotesque form.

Courage of Convictions

The last point I wish to make concerns Sakharov's transformation from scientist to activist. While there are many inflection points in this transformation, a particularly early one occurred in 1961 at a meeting of atomic scientists and party and government leaders presided over by Nikita Khrushchev. At the meeting, Sakharov contested Khrushchev's claim that it was necessary to resume nuclear testing. According to Sakharov's recollection, Khrushchev publicly chastised him for "poking his nose where it [didn't] belong" and

2 Andrei Sakharov, *Memoirs* (Random House Value Publishing, 1995).

moving beyond science into politics.

Another major turning point in Sakharov's transformation into an activist occurred in 1968 when he took the decisive act of not only voicing his views to the Soviet leadership, but putting them in writing in the form of *Reflections on Progress, Peaceful Coexistence, and Intellectual Freedom*. In an epigraph to that work, he cites a line from Goethe: "He alone is worthy of life and freedom/Who each day does battle for them anew."

Some of you may be familiar with the powerful words of the German pastor Martin Niemoeller, who refused to be silenced by the Nazis. Niemoeller laments: "They came first for the Jews, and I didn't speak up because I wasn't a Jew. Then they came for the Catholics, and I didn't speak up because I wasn't a Catholic. Then they came for me, and by that time there was no one left to speak up." Andrei Sakharov, may or may not have been familiar with Martin Niemoreller, but he certainly was fearless in speaking up for fundamental principles of decency, human rights, and the rule of law.

As Serge Schmenemann has observed, "It was not a call to arms" or a declaration about the need for struggle and heroic exploits, but rather the assertion, in Sakharov's words, that they were worthwhile "only insofar as they enable other people to lead normal, peaceful lives." For him, "[t]he meaning of life [was] life itself, [and] that daily routine which demands its own form of unobtrusive heroism."

Siegfried HECKER

Senior Fellow, Center for International Security and Cooperation, Freeman Spogli Institute for International Studies, Stanford University

Andrei Sakharov had a significant influence on cooperation between the Russian and US nuclear weapons laboratories. We began that cooperation in 1992 with visits of each of us to the other laboratories, and we continued that for about twenty years. Cooperation was important because of the way the nuclear world changed and all the new dangers that faced us in 1992. However, both our governments, the Russian government and the American government, were not ready to let us tackle the really sensitive things – the issue of nuclear weapons safety, materials, et cetera. The only thing that they permitted was cooperation in basic science. And so, it turns out the scientific interest that we had and that we followed went all the way back to Sakharov's early years, and it was called magnetic flux compression. Sakharov, of course, was very good with explosives, but he was also good with explosives in essentially setting explosives off around the magnetic field and creating superlarge magnetic fields, with which we can study materials and do other interesting research and civilian things, including along the line what was called magnetized target fusion. And it turns out both Los Alamos and VNIIEF in Sarov had scientists who were so interested in this that they began to collaborate. And over the next twenty years, on those

ideas they worked together. We did dozens of experiments in each other's places, they wrote hundreds of scientific papers together, and all of that legacy goes back to Sakharov. Eventually, because of what we were able to do to build the trust in scientific collaboration, we tackled the other things – nuclear weapons safety, nuclear materials safety, et cetera. And so we cooperated, and we felt we were doomed to cooperate. All of that came crashing to an end with the difficulties between our governments, and so now we don't see each other anymore.

We were doomed to cooperate and we made the world a safer place; now we will be doomed if we do not cooperate.

Richard GARWIN

Emeritus Fellow, Thomas J. Watson Research Laboratory, International Business Machines Corporation (IBM); Member of the National Academy of Sciences; Adjunct Professor of Physics, Columbia University; Member, National Academy of Sciences

My relation with Andrei Sakharov was largely virtual, in a parallel universe in my work in experimental physics, both pure and applied, and specifically as consultant at the Los Alamos nuclear weapon laboratory throughout many summers beginning in 1950. At Los Alamos I was the architect of the "Mike" test on November 1, 1952 that answered Edward Teller's request to demonstrate that "radiation implosion" would enable a fission bomb to burn a separate large charge of fusion fuel – I used liquid deuterium in Mike, at a yield of almost 1000 Hiroshima bombs. In 1954 the same approach was used in US thermonuclear weapons with solid fuel, as was the case with Sakharov's design in 1955.

Later in the 1950s, I worked also with the US President's Science Advisory Committee and the National Academy of Sciences (NAS). I appreciated Sakharov's initiative and drive, under the difficult circumstances less than a decade after WWII, and welcomed his leadership in recognizing that nuclear war could destroy our societies. The NAS Committee on International Security and Arms Control – CISAC, created in 1980 to meet with Soviet scientists to avoid nuclear war – met in Estonia in 1989 with the corresponding group of the Soviet Academy of Sciences, where we had the benefit

of Sakharov's participation My close friend and colleague in work for the US government, Sidney Drell, is well known for his friendship with Sakharov and for their work together on human rights and arms control.

Members of our groups now pursue a vigorous interaction enabled by Zoom, but the perceptions shared by military officers and diplomats must be owned also by political leaders if the world is to avoid the nuclear catastrophe that Sakharov foresaw. The pandemic we are now suffering should focus efforts on the necessity to avoid the use of nuclear weapons, but it may instead distract from the meager such efforts under way.

Sakharov's ground-breaking open letter to Drell in 1982 includes,

> *On the whole I am convinced that nuclear disarmament talks are of enormous importance and of the highest priority. They must be conducted continuously in the brighter periods of international relations but also in the periods when relations are strained and conducted with persistence, foresight, firmness and, at the same time, with flexibility and initiative.*

Rose GOTTEMOELLER

Frank E. and Arthur W. Payne Distinguished Lecturer, Freeman Spogli Institute for International Studies, Center for International Security and Cooperation, Stanford University; Member of the Supervisory Board of the International Luxembourg Forum

I never met Academician Sakharov. First arrived in the Soviet Union in 1976 as a young exhibit guide on a US cultural exchange exhibit called "Photography USA," the book I had with me was *My Country and the World*, which had been published a year before, in 1975, and I was reading it to become acquainted with all of the situations that I would meet, the people I would meet in six months of working on a US cultural exchange exhibit in the Soviet Union. And I must say that it was a different kind of book from the ones we've been discussing today, the issues we've been discussing today, it was about the circumstances of those days in the Soviet republics and was very much an eye-opener for me. So I wanted to raise that aspect of Sakharov's legacy, and again, it was a formative experience for me to read that book, and helped to launch me on my six-months exhibit guide career in the Soviet Union.

But I also wanted to express my admiration for the work that scientists have done throughout the period of the nuclear age, and of course Academician Sakharov was extraordinarily important in that regard. I can applaud Roald Sagdeev, Siegfried Hecker, Richard Garwin, our colleagues at VNIIEF in Sarov, Frank von Hippel, and countless others who have contributed in this way from the scientific community.

But this is the year of the 65th anniversary of the Russell-Einstein Manifesto. And in that regard, I wanted to note that scientists working together on behalf of nuclear disarmament and control of nuclear weapons is a wonderful thing, but it is also wonderful when scientists team up with philosophers, in the case of Bertrand Russell, or with diplomats, with political scientists and politicians.

I think it is very important also that we think about continuing to combine our forces and work hard to press forward on these vital agenda items.

Rodric BRAITHWAITE

Honorary Doctor and Professor at the University of Birmingham

Andrei Sakharov was a patriot who defied his own government to bring peaceful change, at great personal cost. The Soviet election in March 1989 had just propelled him into public politics when I called on him with the offer of an honorary Oxford degree. He was campaigning vigorously to abolish the political monopoly of the Communist Party when he died nine months later. So, I next saw him in his open coffin, as I paid my respects with tens of thousands of others.

We in Russia, the United States and Great Britain are very privileged. But people around the world still die violently in their millions: these are not computer games. And the risk of nuclear catastrophe which so worried Sakharov has not gone away for any of us.

We all agree that the nuclear powers need to negotiate about an extension to New START Treaty, and about measures to control the new weapons they are developing.

But the pressing problem is: How do we get negotiations going at all, given the apparent reluctance of our political leaders to engage?

There are three obvious barriers.

First, there is the problem of trust. In their Cold War negotiations America and Russia both had secrets they were determined to hide.

Each accused the other of cheating. They nevertheless persevered because the stakes were so high. Washington and Moscow need to do the same today, even if they are not convinced of each other's good faith.

Second, people argue that any new agreement requires Chinese participation. But the Chinese are most unlikely to abandon their refusal to participate without a major cut in Russian and American forces. During the SALT talks the British and French also refused to let their forces be counted until the superpower arsenals were hugely reduced. The Russians believed with justification that this was inequitable, but reluctantly compromised in the interest of agreement. This time too, if there is to be a deal the Russians and Americans will have to settle for second best, and leave the Chinese on one side.

Finally, people call on governments to show political will. But political will doesn't come out of nowhere. During the Cold War it took the Cuban crisis to frighten our leaders into starting negotiations. Now dialogue has become a dirty word. The Russian and American governments prefer to score points rather than talk seriously about the nuclear threat. Ordinary people may still fear nuclear war, but they no longer mount mass protests against it.

We can't afford to wait for another Cuba crisis to get us talking. But how do we conjure up the necessary political will? Our instruments are limited. We can dramatize the arguments to catch the attention of governments, media and ordinary people. Organizations like Pugwash and the Luxembourg Foundation must continue to enable scientists, military men and politicians to meet, far from the political posturing, to prepare the ground for more formal exchanges between governments. That way perhaps we can inch towards our goal.

That's what Sakharov did. He insisted on the need for discussion between distrustful opponents. He balanced hope and realism, expertise and moral courage. Above all he fought to create political will where it did not exist. What he did is still entirely relevant today.

LIST OF PARTICIPANTS

Special Session of the Online Conference
of the International Luxembourg Forum
on Preventing Nuclear Catastrophe

Intellectual Legacy of Academician Andrei Sakharov and Issues of Strategic Stability

July 15, 2020

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3.	**Alexey ARBATOV**	Deputy Chairman of the Organizing Committee of the International Luxembourg Forum; Head, Center for International Security, Primakov National Research Institute of World Economy and International Relations (IMEMO), RAS; Academician, RAS (Russia).
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