IT IS 90 SECONDS TO MIDNIGHT
Our Mission
The Bulletin of the Atomic Scientists equips the public, policymakers, and scientists with the information needed to reduce man-made threats to our existence.

At our core, the Bulletin publishes a free-access website and a bimonthly subscription magazine. But we are much more. The Bulletin’s website, iconic Doomsday Clock, and regular events equip the public, policymakers, and scientists with the information needed to reduce man-made threats to our existence. The Bulletin focuses on three main areas: nuclear risk, climate change, and disruptive technologies. What connects these topics is a driving belief that because humans created them, we can control them.

The Bulletin is an independent, nonprofit 501(c)(3) organization. We gather the most informed and influential voices tracking man-made threats and bring innovative thinking to a global audience. We apply intellectual rigor to the conversation and do not shrink from alarming truths.
Christopher Nolan’s summer 2023 blockbuster movie ends with J. Robert Oppenheimer, a Bulletin founder and inaugural chair of our Board of Sponsors, despondent. His security clearances have been stripped. He and many of his brilliant Manhattan Project colleagues are marginalized, no longer central to the plot. Politicians now dominate how atomic weapons will evolve, and there is a heavy foreboding that they will exacerbate rather than reduce the risk of nuclear use. Oppenheimer is cast-off as a broken man. The audience, at least both times I watched it, leave the theater gloomy and pessimistic.

But here’s what the movie doesn’t show. Those same scientists didn’t simply fade from the narrative. Far from it. They poured their efforts into creating and strengthening new institutions such as the Bulletin of the Atomic Scientists, the Federation of American Scientists, and Pugwash, among others. Nobel laureate and Manhattan Project scientist Hans Bethe, who was prominently featured in the film, would go on to replace Oppenheimer as chair of the Bulletin’s Board of Sponsors. Many others featured in the film also served on our board, even Edward Teller, Oppenheimer’s nemesis, lest our founders be criticized for ideological and political in-grouping.

The platforms created by these scientists became the intellectual battlegrounds for debating and shaping the future global order. Epic fights over nuclear arms control versus abolition occurred, and continue to this day in the pages of the Bulletin. Back then, the Bulletin helped propel its authors into decision-making positions that led to some of the most hard-fought yet successful global agreements and confidence building measures of the last century. We continue to serve as an outlet for future leaders and a generator of policy ideas for managing the political and ethical questions surrounding advancements in science and technology.

It should therefore come as no surprise (although it always does surprise some people) that the Bulletin first started covering climate change in the early 1960s and published a cover story about humanity changing the climate as early as 1978. Oppenheimer and his colleagues didn’t opt out—as implied by Nolan’s made for Hollywood ending. They leaned in.

The platforms created by these scientists became the intellectual battlegrounds for debating and shaping the future global order.

We were proud to devote time and attention in 2023 to Oppenheimer, connecting lessons from the mid-20th century to today, and mapping what has been achieved and what still needs to be done. This is why we thought it fitting to feature the shadow of Oppenheimer on the cover of this year’s annual report. Today, the Bulletin continues to serve as the journal of record for the nuclear community, while at the same time covering newer areas of existential risk, or what our founding editor Eugene Rabinowitch termed the “dangerous presents of Pandora’s box of modern science.”

What you will see in the pages that follow is how we anticipated Nolan’s film and provided context and connection for global audiences. We created a specialized newsletter for Bulletin followers who wanted to dig deep into Oppenheimer’s history. The summer edition of our magazine, one that received record-breaking levels of attention, was devoted to new and archival analyses that the Bulletin was uniquely positioned to provide. We hosted sold out talkbacks at movie screenings in Chicago and supported similar events across the country. We hosted virtual webinars with Nobel Prize recipients who drew global audiences and placed op-eds in local and national outlets. We published new authors grappling with Oppenheimer’s legacy, one of whom received the Bulletin’s prestigious Rieser Award. And we were thrilled to feature Christopher Nolan as a keynote speaker at our annual event Conversations Before Midnight. We simply did whatever we could to meet audiences—new and returning—whose interests were sparked by the movie and who wanted to know more about nuclear weapons, nuclear history, its relevance today, and analog 21st century threats in the spheres of biosafety and artificial intelligence.

For example, in 2023 the Bulletin’s independent task force on pathogen research, which kicked off in early 2023, met virtually throughout the year and in person in Geneva, Switzerland. The goal of the Pathogens Project task force is to ensure that research with pandemic risks is managed as safely, securely, and responsibly as possible. The task force’s final report will be published before you receive this annual report.

We also published important works on AI, highlighting a community that in many ways is experiencing its own Oppenheimer moment, with creators calling loudly for regulation and better global governance.

We couldn’t do all that we did without your support. There is much more we hope to accomplish in 2024. Thank you for being the power behind our work. Let’s commit to working towards turning back the hands of the Doomsday Clock in 2025. That is certainly a tribute we can offer Robert Oppenheimer, all these many years later.

Rachel Bronson
This past year, the Bulletin leveraged the release of Christopher Nolan’s *Oppenheimer*, about Robert J. Oppenheimer, the “father of the atomic bomb,” and the first chair of the Bulletin’s board of sponsors, to increase public engagement on nuclear issues. The Bulletin dedicated its July magazine to Oppenheimer and the events of that time, which attracted over a hundred thousand readers.

This year’s annual Conversations Before Midnight included an extended conversation between Rachel Bronson, Bulletin President and CEO, and Christopher Nolan for our global audience of over 200 attendees.

The Bulletin co-hosted six sold-out *Oppenheimer* screenings across the country. Post-movie panel discussions with leading experts and activists explored the history of harm imposed by nuclear weapons, the policies that drive their purpose, and the implications of their existence. The events were in partnership with over 20 international organizations engaged in nuclear threat reduction and disarmament efforts.

The Bulletin’s wealth of historical and contemporary content on Oppenheimer, along with the massive popularity of the film, prompted the launch of our own special edition newsletter on all things Oppie. The newsletter helped promote new Oppenheimer content as well as our in-person and online events around the man and the movie. The effort attracted thousands of dedicated movie and history fans to our content, and converted many to long-term subscribers.
“The true challenge—and responsibility—that Oppenheimer bequeathed to future generations may be for them to put the genie back in the bottle, for good.”

What Oppenheimer can teach the new generations about nuclear weapons. 

“Oppenheimer’s strategy of persuading other scientists to join the project included his argument that the nuclear weapon would end not just the war in Japan, it would ‘end all wars,’ once people understood the enormity of the weapons. Today it seems an incredibly naïve idea: 80 years later, the United States is still spending a billion dollars every five days to maintain its nuclear weapons.”

*‘Oppenheimer’* depicts a man becoming powerful—and irrelevant. 

“Oppenheimer should remind the public that more nuclear weapons make us all less secure and that we must continue to demand our leaders to pursue the safer path through disarmament diplomacy and toward a world without nuclear weapons before it is too late.”

*‘Oppenheimer’, the bomb, and arms control, then and now.* 
“Beyond giving the audience an abbreviated history lesson, Nolan also displays an intricate tapestry that connects science with technology, with war, with power.”


“The very least we can say is that, looking ten years ahead, it is likely to be small comfort that the Soviet Union is four years behind us, and small comfort that they are only about half as big as we are. The very least we can conclude is that our twenty-thousandth bomb, useful as it may be in filling the vast munitions pipelines of a great war, will not in any deep strategic sense offset their two-thousandth.”

Over 350,000 readers dove in to explore Robert Oppenheimer, an enigma to all who knew him. By all accounts, Oppenheimer was a complicated figure; over the years, commentators have used words as disparate as “complex,” “contradictory,” “ambitious,” “charismatic,” “mystical,” and “flawed” to describe him.

About the only thing pundits seem to agree on is that Oppenheimer—hailed as the father of the atomic bomb before being vilified during the red scare of the 1950s for opposing the subsequent arms race—was brilliant.

The Oppenheimer effect on traffic to our website was perhaps best illustrated by “Collateral damage: American civilian survivors of the 1945 Trinity test” by award-winning journalist and author Lesley M.M. Blume. This chilling account of radiation impacts on people who lived near the site of the first atomic bomb test drew more than 185,000 views. Each story in the Oppenheimer issue—which included newly commissioned work and strategically chosen articles from the Bulletin’s archives—were well-read, with the majority earning 20,000+ views.

This special issue provided the context and details that those interested in Oppenheimer—the man or the movie—found nowhere else.
From the Editor in Chief
John Mecklin

A year of wide-ranging growth. And Oppenheimer.

When I learned that director Christopher Nolan’s film Oppenheimer would open in July 2023, I asked our editorial staff to assemble a themed issue of our bimonthly magazine that was eventually titled “OPPENHEIMER: The man. The movie. The legacy”. The film and the Bulletin, after all, have an inescapable connection: When Albert Einstein established the Bulletin’s Board of Sponsors in 1948, J. Robert Oppenheimer was chosen as its first chair, and Oppenheimer still led the board in 1954, when a panel of the Atomic Energy Commission’s Personnel Security Board effectively ended his government service. So, for the Oppenheimer issue, the Bulletin used Nolan’s film as a narrative anchor for analyses of the complex, fraught psychology of the so-called “father of the atomic bomb,” the equally complex and fraught “red scare” reality of the early decades of the nuclear age, and the relevance of Oppenheimer, the film and the man, to today’s strained international security situation.

Obviously, the Oppenheimer film—a global blockbuster—gained massive coverage in entertainment-oriented media. Some serious news outlets also made laudable efforts to connect the film to the reality of the nuclear age Oppenheimer helped birth. Just the same, I am convinced the Bulletin’s Oppenheimer issue provided a comprehensive, multi-layered view of Oppenheimer’s impact on the world unmatched by any other journalistic effort. Led by two in-depth interviews—one with Nolan and another with Kai Bird, co-author of American Prometheus, the Pulitzer Prize-winning book on which the film was based—the issue included a wide variety of newly commissioned pieces on Oppenheimer, along with exclusive Oppenheimer-related articles from the Bulletin’s archive (among them the famed scientist’s own response to efforts to strip him of his security clearance during the 1950s “red scare”). The issue, of course, has its highlights, including a chilling account of radiation impacts on people living near the site of the first atomic bomb test, written by award-winning journalist and author Lesley M.M. Blume, and a searing appraisal of Oppenheimer’s tortured psychology by renowned Columbia University psychiatrist Robert Jay Lifton. But all 16 pieces in the Oppenheimer issue were well-read, drawing more than 350,000 unique visitors to the Bulletin’s website and creating almost 2.9 million impressions on social media platforms. Widely referenced in major media, the Bulletin’s Oppenheimer issue explained, in a nuanced and in-depth way, both the man and the film and, more importantly, how they connect to the past and current threat that nuclear weapons posed and pose to the world.

Our Oppenheimer issue had an obvious effect on readership, which grew by about four percent last year above the record traffic tallied in 2022 as Russia’s invasion of Ukraine unfolded. But the wide range of other quality content our editors solicited and wrote also contributed significantly to our growth in 2023. In fact, the most-read article of last summer had only a tangential connection to Oppenheimer. “Counting the dead at Hiroshima and Nagasaki,” an in-depth piece by nuclear historian Alex Wellerstein, drew more than 220,000 pageviews this summer and fall—even though it was originally published in August 2020, some three years before the movie premiered. A story about a new US method of deploying weapons from military cargo planes (“Rapid Dragon: the US military game-changer that could affect conventional and nuclear strategy and arms control negotiations”) racked up almost 160,000 pageviews. A story debunking a “famous” early case of biological warfare involving the catapulting of plague victims over a fortress’s walls garnered another 40,000 views. And multiple articles from our September issue on artificial intelligence were viewed more than 20,000 times.

We also continued to expand our in-depth journalism offerings last year. In October, we published a significant project, “Black Swans from Mars?”, in which award-winning science journalist Valerie Brown looks at the relatively small (but as the scientists say, non-zero) chance that NASA’s plans to retrieve samples from the red planet may bring something back to Earth that is…alive. And an interview with Yoshua Bengio—a Turing Award winner and one of three experts known as godfathers of artificial intelligence—also drew more than 20,000 views on the Bulletin’s site and was simultaneously co-published (and credited to the Bulletin) in WIRED magazine.

Meanwhile, I was happy to learn late last fall that one of our in-depth projects from 2022, “Is the Next Pandemic Brewing on the Netherlands’ Poultry Farms?” by veteran magazine writer Paul Tullis, had won the Silver Award in the Magazine Category of the 2023 American Association for the Advancement of Science Kavli Science Journalism Awards competition. Paul is at work now on another project, an exploration of the multidimensional threats to kelp forests, which are important for carbon sequestration and coastal ecosystems around the world.

The media industry suffered an abysmal economic year in 2023, with high inflation, weak advertising, and other negative business trends leading to more than 20,000 job cuts at US news outlets and the closure of more than 130 American newspapers. In that dire landscape, the Bulletin of the Atomic Scientists stands out, thriving journalistically and financially. There are a lot of reasons for our success, including the collaborative nature of the Bulletin’s leadership, which has produced a shared, strategic, flexible, and inspiring vision for growing the organization across its dimensions. But all of our success is actually attributable, directly or indirectly, to you, our supporters, who believe in our mission and provide the means to carry it out. With your continued backing, we will find powerful and inventive ways to tell the stories of what I have long considered humanity’s most important and interesting pursuit: survival.

John Mecklin
Renewed interest in nuclear weapons

One event—or rather a non-event—stands out from this past year: Russia has not used nuclear weapons in Ukraine. This is not a trivial outcome. In 2022, concerns among experts and officials over this possible scenario were at their highest, with repeated, thinly veiled threats to use them and Russia's new policy to deploy nuclear weapons in Belarus. Prospects were so grim that UN Secretary-General António Guterres highlighted these nuclear concerns in opening his annual remarks to the United Nations General Assembly in New York.

Deterrence or warfighting?
The recent report by the Congressional Commission on the Strategic Posture of the United States encourages a new arms race and a nuclear buildup, Tara Drozdenko, the director for the Global Security Program at the Union of Concerned Scientists, said in a November article. And surprisingly, the risks of emerging technologies were not even fully explored, with a single brief reference that these emerging technologies shall be "carefully managed within ethical and operational boundaries and include deliberate incorporation of human decision-making" seeming like lip-service. The commission painted a bleak picture of the near-term international security environment, but its recommendation to expand the US nuclear arsenal would make a bad situation worse, Drozdenko argued.

Precarious safety of Ukraine's Zaporizhzhia Nuclear Power Plant
Russian and Ukrainian officials making decisions about the Zaporizhzhia Nuclear Power Plant are challenged by a complex safety and security profile, explained Mark Hibbs, a nuclear expert and senior associate in Carnegie's Nuclear Policy Program. No single reactor-management option will address all hazards as long as the war continues, Hibbs argued. Choices for moving forward may require a balancing act that takes into account the interests of regulators and safety experts, managers and operators, diplomats, and, ultimately, military commanders. The most significant impact of their decision making might not become apparent immediately but instead if and when violence at and around the nuclear plant intensifies.

Mycle Schneider on the COP28 pledge: 'Trumpism enters energy policy'
In an interview with the Bulletin, nuclear expert Mycle Schneider reviewed the status and trends of the world nuclear industry and argued that it is impossible to triple nuclear energy capacity by 2050, not-withstanding what countries pledged at December's UN Climate Summit in Dubai. "This pledge is completely, utterly unrealistic," Schneider said. "We are talking about a target date of 2050, which is 27 years from now. In terms of nuclear development, that's tomorrow morning." Schneider pointed out that, "you'd have to start building, operating, grid connecting 10 reactors per year, starting next year. In the past two decades, the construction rate has been of five per year on average."
@thebulletin
Climate Change

From rural Pakistan, to the fjords of Chile, to a glittering volcanic lake outside of Rome, the Bulletin's climate coverage this year was truly global. These stories honed in on the expansive relevance of hyperlocal events: how climate crisis is leaving vulnerable farmers behind; the environmental impacts of intensive aquaculture; and the fraught challenge of water use in an increasingly drought-prone world.

But the Bulletin didn't stop there. Our authors also tackled a wide range of issues, from tipping points in the Earth system to rapid hurricane intensification to the challenges of protecting endangered and threatened species amid climate crisis.

**Climate change strains farmers in Pakistan**
Based on hundreds of interviews Zafar Imran conducted in rural Pakistan as part of his fieldwork, his February article described the havoc that climate upheaval—from hailstorms, to devastating floods, to unforeseen heatwaves, to name just a few examples—has unleashed upon Pakistani farmers. Amid these drastic weather changes, the government has been of little to no use, failing to provide accurate forecasts (if it provides forecasts at all) or to share evidence-based adaptation techniques. The uncertainty within the country's agricultural sector threatens to make food security even more widespread in the country.

**Patagonian paradise lost?**
Earlier this year, Bulletin editor Jessica McKenzie accompanied a group of environmental activists on a nine-day expedition to survey the salmon farms that have proliferated in Chilean Patagonia over the past few decades. Scientists, fishermen, and Indigenous residents described the many ways the industry is harming the region's unique ecosystems and wildlife. The harmful algal blooms in 2016 and 2021 that killed millions of salmon—as well as many wild fish, shellfish, sea birds, and marine mammals—were made more likely by warmer ocean temperatures. Now that El Niño has returned, the conditions are ripe for another explosive algal bloom. Over a dozen Chilean farms have already activated contingency plans for algal blooms this year, and thousands of fish have died prematurely. Meanwhile, the less-visible impacts of salmon farming—the nutrient and chemical pollution, the dead zones on the ocean floor caused by eutrophication—continue to mount. Is it all worth the cheap and easy access to this popular protein?

**Otis teaches a terrifying lesson**
The day before Hurricane Otis made landfall, experts believed it would do so as a relatively sedate, category 1 hurricane. Instead, in less than 24 hours, it morphed into a monster 165 mile-per-hour category 5 cyclone. This kind of rapid intensification is increasingly likely with warmer sea surface temperatures due to climate change and short-term climatic variations like El Niño, meteorologist John Morales explained, and it is undermining the ability of experts to accurately warn communities about approaching storms.
Avian flu can cause neurological symptoms in birds, such as the loss of balance this barnacle goose in the Netherlands displayed in May. (Photo: Roy Slaterus)

"Hōsō taiji no zu" | "Defeating smallpox". (Photo: Shungyō, Courtesy of UC San Francisco, Special Collections)

Can new AI technologies help would-be bioterrorists plot an attack or design a biological weapon? As avian influenza continues to wreak havoc on bird populations, what are the chances it morphs into the next human pandemic? Is the public health sector staffed up and prepared for another health crisis? These are some of the questions Bulletin writers and experts have addressed over the last year.

**Bulletin investigative piece wins 2023 AAAS Kavli Science Journalism Silver Award**

The Bulletin’s investigative piece, “Is the next pandemic brewing on the Netherlands’ poultry farms?” by Paul Tullis, won a 2023 AAAS Kavli Science Journalism Silver Award in the category for magazine publications, a prestigious honor. The article investigates the spread of highly pathogenic avian influenza (HPAI) from captive birds to wildlife, and its subsequent risk to humans. In the award’s announcement, judge Llewellyn Smith said that the article was “an eye-opening story of Dutch researchers up against extreme odds to keep highly pathogenic avian influenza from becoming the next pandemic. The science of prevention is fascinating, and the conundrum it delineates deeply disturbing.”

**An illustrated history of the world’s deadliest epidemics, from ancient Rome to Covid-19**

In January, as President Biden announced that the formal emergency for the Covid pandemic would end after at least six million deaths worldwide, we published a look back at history’s most lethal epidemics. Associate multimedia editor Erik English’s illustrated history of the world’s deadliest epidemics makes tracking key events of the two millennia easy and captivating.

**Catapulting corpses?**

There’s an oft-told tale about the history of biological weapons. An army of the Mongol Golden Horde began to fall ill from a mysterious pestilence as they laid siege to an Italian trading fort in modern-day Crimea. Despondent, the Mongols catapulted their dead over the fortress walls, thereby spreading the plague to the traders within. As they fled on ships to ports west, the Italians spread the bubonic plague, initiating the infamous Black Death pandemic that crippled Europe in the late 14th century. The tale, though repeated in encyclopedias, documentaries, and elsewhere, is apocryphal, expert Jean Pascal Zanders said. In his captivating feature, associate editor Matt Field talked with the noted scholar of weapons of mass destruction about his research, which shows that the medieval bioweapons attack most likely did not occur.

**Public health work promises low pay, burnout and harassment**

After several rough COVID years, one might assume that governments and society were better prepared for another pandemic. But a look at the on-the-ground situation in US public health departments could leave the impression that officials have taken the opposite bet. Funding and resources have dwindled, and the agencies are hemorrhaging the workers who will be critical for “disease surveillance, vaccination campaigns, and assistance in natural disasters like wildfires or hurricanes,” Bulletin editorial fellow Kimberly Ma wrote. Pandemic burnout and intimidation are big issues in the field, but there are also structural problems with the way departments hire and nurture workers, Ma argued.

**AI soon developing new dangerous pathogens?**

In response to rapidly improving AI technologies, the Biden administration unveiled an executive order that dealt in part with how to reduce the biosecurity risks associated with advances in artificial intelligence. Allison Berke, an expert in chemical and biological weapons nonproliferation at the Middlebury Institute, wrote that while researchers can use “biodesign” tools to develop biological constructs such as proteins, they can also have the AI “produce designs for a variety of chemical weapons.” Berke wrote that managing the rapidly advancing AI tools will “require assessment and risk mitigation tools with the flexibility to apply to AI models with as-yet-unimagined capabilities.”
In 2023, AI took up a generous amount of real estate in the digital pages of the Bulletin, where authors and editors worked to break through the noise, explain how these applications work, and examine what the risks and possibilities of the tech really were.

Disinformation also made headlines as it continued to spread on social networks, with X, formerly known as Twitter, taking the crown as the biggest offender. The effects of disinformation, which plagued public health and elections over the last several years, have been especially pronounced with the Israeli-Hamas conflict that began in October. False videos, images, and narratives are influencing people’s opinion and perhaps even shaping the war.

The Bulletin also focused on how drones are shaping and reshaping warfighting. The proliferation of off-the-shelf inexpensive drones is leveling the playing field in conflicts to some degree. But the types of drones, how they are used, and under what conditions they are deployed are important factors in how they are changing the battleground.

The war in Ukraine shows the effects of drones depends on how and when they are used

The Russia-Ukraine war and the recent Hamas attack that penetrated Israel’s famous Iron Dome, are both examples of how drones have changed, and continue to alter, warfare. Increasingly, new types of unmanned aerial vehicle are called game changing. But using Russia’s invasion of Ukraine as a case study, emerging technology researcher Dominika Kunertova argued that not all drones are created equal in their usage and abilities and their game changing abilities depend on the specific battle they’re being used for.

Popping the chatbot hype balloon

Chatbots seem like a technological marvel. Ask them a question and you have an answer within seconds. Need a cover letter written for a job application? Boom! ChatGPT can draft you one in no time. It’s like magic. But is it? In associate editor Sara Goudarzi’s piece, she explored how these systems work; if they are really magic (they aren’t) or can think on their own (they can’t); the threats they pose; and the hundreds of thousands of humans behind the scenes who help make them run smoothly.

How creatives can stop AI from stealing their work

The Writers Guild of America (WGA) strike against the Alliance of Motion Picture and Television Producers began in May and lasted 148 days. The 11,000 writers of the guild were asking chatbots not be used to write source material. For more dispersed creatives, such as freelance illustrators and writers, unions might not exist or be as robust as the WGA or the Author’s Guild. But there are ways creatives can fight back when developers use their text and images in training AI models—without permission or compensation. In his October piece, computing science researcher Nick Vincent worked through some of the ways creatives can fight the unauthorized use of their work.

Black swans from Mars?

Valerie Brown’s deep dive into NASA’s mission to bring back samples from Mars stood out from the variety of magazine-style features we published this year. Brown’s report weaved details of NASA’s plan to deliver Martian soil to Earth with a history of the space agency’s past Mars missions (and failures), illustrated throughout with archival images and renderings of imagined future space travel designed by Thomas Gaulkin, multimedia editor, and with video by Erik English.

1. Turkey’s military drone program has ballooned in the past few years. It has a fleet of about 94 Bayraktar TB2 drones. (Photo: Bayhaluk (cropped). Creative Commons.)

2. “Writer’s Guild of America East Solidarity Rally in Washington Square” (Photo: John Edwards 2008 is licensed under CC BY-SA 2.0.)

3. Quarantined in a modified Airstream trailer after returning from the Moon on July 24, 1969, the Apollo 11 astronauts exchange “a-OK” signs with President Nixon. (Photo: NASA/AFP/Getty Images)
Advancing the work of the Pathogens Project taskforce

In 2022, the Bulletin launched "The Pathogen Project: Creating the Framework for Tomorrow’s Pathogen Research," an international taskforce of scientists and public health leaders focused on the growth in high-risk pathogen research around the world. This followed the World Health Organization’s (WHO) release of the "Global guidance framework for the responsible use of the life sciences: mitigating biorisks and governing dual-use research."

On April 19-20, 2023, the task force convened a public-facing conference in Geneva, Switzerland, that included task force members, policy leaders, journalists, scientists, and civic leaders. Over 100 international experts gathered in Geneva for the in-person conference, while more than 2,000 participated online.

The conference generated significant international interest and exposure. Best-selling science writer and essayist Davie Wallace-Wells, writing in the New York Times pointed out that current governmental attempts at understanding, monitoring and mitigating biorisk from pathogens research has often, and continues to, run up against issues of regulation, scientific integrity, politicization of the issues, and other governmental drags that prevent progress. Wallace-Wells pointed to the Bulletin's efforts as a potential path forward.

The opening day of the conference focused on future biorisks, existing tools and mechanism available to address risks, and the gaps and limited capacity to undertake biorisk management.

Conversations continued with a focus on how China manages biorisk with remarks by former head of the Chinese CDC, George Gao. Gao was interviewed by Vanity Fair during the conference, helping his remarks find an even wider audience.

Further sessions focused on current studies tracking risk, an assessment of future risk, and a focus on how Sub-Saharan Africa views biorisk, by the former President of Mauritius and task force cochair Ameenah Gurib-Fakim. The conference's final sessions focused on the roles and responsibilities of governments and international organizations, and the responsibility of science communicators in responsibly shaping the narrative around biorisk.

The task force launched its final report in February 2024 at the United Nations.
The Magazine
Growing a Global Audience

One of the Bulletin’s most distinctive contributions is its global reach. In the fast-changing world of media and content delivery platforms, innovation and experimentation reign supreme. The Bulletin’s newsletter is the most effective way to engage with our global audience, sharing new research and content twice a week, and converting a steady stream of readers to Magazine subscribers. With more than 100,000 newsletter subscribers and growing, Magazine subscriptions continue to rise. The Magazine can be found in nearly 10,000 libraries around the world, with individual subscriptions available through the Bulletin’s website.

Each Magazine is a deep-dive into a particular question or statement about the urgent health and security of our planet. For example, the January issue focused in part on the Inflation Reduction Act, which directs $370 billion in investments to cut carbon emissions. It looked at possible winners and losers in the development of renewable technologies. The July issue “Oppenheimer: The Man, the Movie, the Legacy” was timed to publish alongside the opening of the movie Oppenheimer. “The hype, peril, and promise of Artificial Intelligence,” the September issue, featured an article by ChatGPT-3.5, and explored the early (to the public anyway) thoughts and warnings of the future of AI.
Welcoming new staff
The Bulletin continues adding staff in 2023

In 2023, the Bulletin welcomed new Chief Advancement Officer, Stephanie Carper, who brings significant experience to our fundraising team. The Bulletin also welcomed Anne Puotinen as Director of Individual Giving, a position newly created at the Bulletin. Strong and rapid financial growth is necessary to support our significant editorial content growth, and expand our outreach efforts to reach new audiences, support our global network of advocates, and drive impact.

1. Stephanie Carper
2. Anne Puotinen

11.7M PAGEVIEWS
11.7 MILLION PAGEVIEWS

6.4M UNIQUE VISITORS
6.4 MILLION UNIQUE VISITORS

43% YOUNGER THAN 35
43% OF OUR AUDIENCE IS YOUNGER THAN 35

45% OUTSIDE US
45% OF OUR AUDIENCE COMES FROM OUTSIDE THE UNITED STATES

33% FEMALE
33% OF OUR AUDIENCE IS FEMALE
2023 Rieser Award recipient
Emily Strasser

The Bulletin was delighted to announce Emily Strasser as the 2023 Leonard M. Rieser award recipient for her August 2023 piece, “My grandfather helped build the bomb. ‘Oppenheimer’ sanitized its impacts.”

“In her piece, Emily Strasser explains, with grim elegance, how the movie Oppenheimer sanitizes the atomic bombings of Hiroshima and Nagasaki, and why such vague abstraction is inappropriate to the specific, horrific slaughter wrought on those two cities,” Bulletin editor John Mecklin said. “Her powerful piece is precisely the type of well-argued, well-written, and deeply principled journalism the Rieser Award is meant to honor.”

The Rieser Award, named for former Bulletin board chair Leonard M. Rieser, is the capstone of the Bulletin’s Next Generation Program. The program was created to ensure new voices have a trusted platform to address existential challenges posed by nuclear risk, climate change, and disruptive technologies. The award includes the opportunity to speak at the Bulletin’s marquee event, Conversations Before Midnight, and a $1,000 prize.

The Bulletin was pleased to announce an honorable mention that goes to Louis Reitmann and Sneha Nair for their essay “Queering nuclear weapons: How LGBTQ+ inclusion strengthens security and reshapes disarmament.”

“The authors made an exceptionally compelling and substantive case for including queer people in nuclear policy discussions,” Bulletin contributing editor Dawn Stover said. “They explained several ways in which the perspectives of queer people can make essential contributions to reducing nuclear risks and security threats.”

About the authors
Emily Strasser’s first book, Half-Life of a Secret, traces her journey to reckon with the legacy of her grandfather’s work building nuclear weapons in Oak Ridge, Tennessee. Her writing has appeared in Ploughshares, Catapult, Guernica, Colorado Review, Gulf Coast, and The Bitter Southerner, among others, and she was the presenter of the 2020 BBC podcast, “The Bomb.” Her work has been honored by awards and fellowships including the Ploughshares Emerging Writer’s Contest, the W. K. Rose Fellowship, the Olive B. O’Connor Fellowship in Creative Writing, the McKnight Writing Fellowship, and grants from the Minnesota State Arts Board, the Jerome Foundation, and the Metropolitan Regional Arts Council. Emily is based in Minneapolis, Minnesota.

Louis Reitmann is a research associate at the Vienna Center for Disarmament and Non-Proliferation (VCDNP), focusing on export controls; nuclear disarmament; and diversity, equity, and inclusion in the nuclear field. He is a board member of the Emerging Voices Network, organized by the British American Security Information Council (BASIC). Previously, he served as an export control officer at Imperial College London and worked with the European Union’s Special Envoy for Disarmament and Non-Proliferation in Brussels. Louis holds an MSc in International Relations from the London School of Economics.

When the piece was published, Sneha Nair was a research analyst with the Nuclear Security Program and Partnerships in Proliferation Prevention Program at the Stimson Center and Coordinator for the International Nuclear Security Forum, where she focused on nuclear security; insider threats; chemical, biological, radiological, and nuclear disinformation; and domestic violent extremist threats to national security and critical infrastructure. Before joining the Stimson Center, she worked at the Comprehensive Nuclear-Test-Ban Treaty Organization and at the Organisation for the Prohibition of Chemical Weapons. She has a master’s degree in geography and international relations from the University of St Andrews in the United Kingdom.

Leonard M. Rieser
Rieser was the Bulletin’s board chair from 1984 until his death in 1998. He was a graduate student at the University of Chicago when he worked on the Manhattan Project and went on to a distinguished academic career as a professor and provost of Dartmouth College.

Rieser championed emerging scientists and policy leaders and believed in their ability to play a critical role in the resolution of persistent global security problems. We continue to work with his family, and other longtime friends and donors, to extend his legacy.
My grandfather helped build the bomb. ‘Oppenheimer’ sanitized its impacts
Rieser Award-winning essay

At the theater where I saw *Oppenheimer* on opening night, was a handmade photo booth featuring a pink backdrop, “Barbenheimer” in black letters, and a “bomb” made of an exercise ball wrapped in hoses. I want to tell you that I flinched, but I laughed and snapped a photo. It took a beat before I became horrified—by myself and the prop.

Today is the 78th anniversary of the bombing of Hiroshima, which killed up to 70,000 people and came only three days after the bombing of Hiroshima that killed as many as 140,000 people. Yet still we make jokes of these weapons of genocide.

*Oppenheimer* does not make a joke of nuclear weapons, but by erasing the specific victims of the bombings, it repeats a sanitized treatment of the bomb that enables a lighthearted attitude and limits the power of the film’s message. I know this sanitized version intimately because my grandfather spent his career building nuclear weapons in Oak Ridge, Tennessee, the site of uranium enrichment for the Hiroshima bomb. My grandfather died before I was born, and though there were photographs of mushroom clouds from nuclear tests hanging on my grandmother’s walls, we never discussed Hiroshima, Nagasaki, or the fact that Oak Ridge, still an active nuclear weapons production site, is also a 35,000-acre Superfund site. At the Catholic church in town, a pious Mary stands atop an orb bearing the overlapping ovals symbolizing the atom and, until it closed a few years ago, a local restaurant displayed a sign with a mushroom cloud bursting out of a mug of beer.

*Oppenheimer* does not show a single image of Hiroshima or Nagasaki. Instead, it recreates the horror through Oppenheimer’s imagination, when, during a congratulatory speech to the scientists of Los Alamos after the bombing of Hiroshima, the sound of the hysterically cheering crowd goes silent, the room flashes bright, and tatters of skin peel from the face of a white woman in the audience. The scene is powerful and unsettling, and, arguably, avoids sensationalizing the atrocity by not depicting the victims outright. But it also plays into a problematic pattern of whitewashing both the history and threat of nuclear war by appropriating the trauma of the Japanese victims to incite fear about possible future violence upon white bodies. An example of this pattern is a 1948 cover of John Hersey’s Hiroshima, which featured a white couple fleeing a city beneath a glowing orange sky, even though the book itself brought the visceral human suffering to American readers through the eyes of six actual survivors of the bombing.

The Oppenheimer film also neglects the impacts of fallout from nuclear testing, including from the Trinity test depicted in the film; the harm to the health of blue-collar production workers exposed to toxic and radiological materials; and the contamination of Oak Ridge and other production sites. Instead, the impressive pyrotechnics of the Trinity test, images of missile trails descending through clouds toward a doomed planet, and Earth-consuming fireballs interspersed with digital renderings of a quantum universe of swirling stars and atoms, elevate the bomb to the realm of the sublime—terrible, yes, but also awe-inspiring.

**A compartmentalized project**

The origins of this treatment can be traced to the Manhattan Project, when scientists called the bomb by the euphemistic code word “gadget” and the security policy known as compartmentalization limited workers’ knowledge of the project to the minimum necessary to complete their tasks. This policy helped to dilute responsibility and quash moral debates and dissent. Throughout the film, we see Oppenheimer move from resisting compartmentalization to accepting it. When asked by another scientist about his stance on a petition against dropping the bomb on Japan, he responds that the builders of the bomb do not have “any more right or responsibility” than anyone else to determine how it will be used, despite the fact that the scientists were among the few who even knew of its existence.

Due to compartmentalization, the vast majority of the approximately half-million Manhattan Project workers, like my grandfather, could not have signed the petition because they did not know what they were building until Truman announced the bombing of Hiroshima. Afterward, press restrictions limited coverage of the humanitarian impacts, giving the false impression that the bombings had targeted major military and industrial sites—and eliding the vast civilian toll and the novel horrors of radiation. Photographs and films of the aftermath, shot by Japanese journalists and American military, were classified and suppressed in the United States and occupied Japan.

**The limit of theory**

Not only is it dishonest and harmful to erase the suffering of the real victims of the bomb, but doing so moves the bomb into the realm of the theoretical and abstract. One recurring theme of the film is the limit of theory. Oppenheimer was a brilliant theorist but a haphazard experimentalist. A close friend and fellow scientist questions whether he’ll be able to pull off this massive, high-stakes project of applied theory. Just before the detonation of the Trinity test bomb, General Leslie Groves, the military head of the project, asks Oppenheimer about a joking bet overheard among the scientists regarding the possibility that the explosion would ignite the atmosphere and destroy the world. Oppenheimer assures Groves that they have done the math and the possibility is “near zero.” “Near zero?” Groves asks, alarmed. “What do you want from theory alone?” responds Oppenheimer.

Can the theoretical motivate humanity to action?

One telling scene shows Oppenheimer at a lecture on the impacts of the bomb. We hear the speaker describe how dark stripes on victims’ clothing were burned onto their skin, but the camera remains on Oppenheimer’s face. He looks at the screen, for a few moments, gaunt and glassy-eyed, before turning away. Americans are still looking away. As a country, we’ve succumbed to “psychic numbing,” as Robert Jay Lifton and Greg Mitchell call it in their book *Hiroshima in America*, which leads to general apathy about nuclear weapons—and pink mushroom clouds and bomb props for selfies.

On this anniversary of Nagasaki, the world stands on a precipice, closer than ever to nuclear midnight. The nine nuclear-armed states collectively possess more than 12,500 warheads; the more than 9,500 nuclear weapons available for use in military stockpiles have the combined power of more than 135,000 Hiroshima-sized bombs.

If Oppenheimer motivates conversation, activism, and policy shifts in support of nuclear abolition, that’s a good thing. But by relegating the bomb to abstracted
images removed from actual humanitarian consequences, the film leaves the weapon in the realm of the theoretical. And as Oppenheimer says in the film, “Theory will only take you so far.” Today, it’s vital that we understand the devastating impacts that nuclear weapons have had, and continue to have, on real victims of their production, testing, and wartime use. Our survival may depend on it.
Doomsday Clock Announcement
Continued threats and growing concerns of AI

On January 23, 2024, live from the National Press Club in Washington, D.C., the Bulletin’s Science and Security Board kept the clock at 90 seconds to midnight as the world continues to face unprecedented dangers. Global threats – including the Russia-Ukraine war and deterioration of nuclear arms reduction agreements; the Climate Crisis and 2023’s official designation as the hottest year on record; the increased sophistication of genetic engineering technologies; and the dramatic advance of generative AI, which could magnify disinformation and corrupt the global information environment – remain on an all-time high alert.

As Bulletin President and CEO Rachel Bronson stated, “Make no mistake: resetting the Clock at 90 seconds to midnight is not an indication that the world is stable. Quite the opposite. It’s urgent for governments and communities around the world to act. And the Bulletin remains hopeful—and inspired—in seeing the younger generations leading the charge.”

Bronson led the opening discussion of the announcement with panelists Asha M. George, Alex Glaser, Herb Lin, and Ambuj Sagar. Their roundtable highlighted the continuing threats the planet faces, noting the rapidly expanding use and potential effects of AI. Following their roundtable, Science and Security Board Chair Daniel Holz talked with science educator Bill Nye on what efforts we can all make to turn back the hands of the Doomsday Clock.

“For decades, scientists have been warning us of the dangers facing humankind. We could be facing catastrophe unless we better manage the technologies we’ve created. It’s time to act.”

– Bill Nye
Doomsday Clock Announcement
And how we can turn back the Clock

Global engagement
The Doomsday Clock was included in featured posts by BBC World, Reuters, Washington Post, Associated Press, CNN, Al Jazeera and more (all with followings over 15M), accounting for six of the eight largest news outlets in the world.

A TikTok video featuring Bill Nye went viral with nearly 1 million views and 130,000 likes.

DAY OF EARNED-MEDIA STORIES OF THE ANNOUNCEMENT
4,038

DAY OF LIVE STREAMING OF THE ANNOUNCEMENT
102,400

FIRST WEEK FOLLOWING THE ANNOUNCEMENT PAGEVIEWS
825,071

Amplifying the Clock Statement
The Bulletin’s Digital Team engaged nearly 50 mission-aligned groups again this year, with pre-announcement briefings and visual assets for their own social media postings. Featured social media and websites postings were from leading organizations like the Elders, Norway ICAN, Abolition 2000, Physicians for Social Responsibility, Friends Committee on National Legislation, Outrider, PSR Greater Boston, PSR Washington, Council for a Livable World, European Leadership Network, and more.

What you can do to turn back the clock
The January issue of the Bulletin’s magazine explained how you can help turn back the hands of the Doomsday Clock. Its emphasis is on actions that citizens can take, individually and together, to help reduce major global threats. With the Clock still the closest it has ever been to striking midnight, the Bulletin removed the paywall on this issue of its premium magazine.

In Magazine Executive Editor Dan Drollette, Jr’s introduction, he wrote, “Each year, after the Clock is set, Bulletin staffers receive a flood of reader correspondence that asks some version of the same question: “But what can I do to turn back the hands of the Clock?” The issue emphasizes actions that citizens can take, individually and in concert, to help reduce major global threats. This issue focuses on people who have been working to effect positive changes, whether in the local, state, or national arena, such as 15-year-old Sneha Revanur from California, the “Greta Thunberg of AI.” Sneha read about the use of biased AI-generated algorithms that threatened the justice process in her home state of California. She enlisted her peers—all in high school or just entering college—in contacting voters, creating informational content, partnering with community organizations, and running phone banks. Together they helped defeat an electoral proposition that would have enshrined the use of such algorithms in the legal system across the state. Revanur subsequently founded an organization, Encode Justice, to carry on work related to limiting the negative effects of artificial intelligence.

At age 18, Sneha Revanur was named one of Time Magazine’s “Time100 AI”—one of the youngest on their list. (Photo: courtesy of Sneha Revanur; modified by Thomas Gaulkin)
Doomsday Clock Announcement
A world in a precarious state

Worldwide media sampling:

The Washington Post
Doomsday Clock at 90 seconds to midnight amid nuclear and AI threats

USA Today
Doomsday Clock 2024 time update has dire warnings of nuclear war, climate change and AI

The Guardian
Wars and climate crisis keep Doomsday Clock at 90 seconds to midnight

BBC
Doomsday Clock stays at 90 seconds to midnight

Al Jazeera
Doomsday clock stays at 90 seconds to midnight: What we know

Time
Doomsday Clock Says Humanity Is as Close as Ever to Destruction

Hindustan Times
Doomsday Clock 2024 as close to midnight as ever: What scientists predict

Irish Independent
Doomsday Clock remains at 90 seconds to midnight

“The hands of the Doomsday Clock again point to a world in a precarious state [...] Global leaders must set aside differences and meet the urgency of this moment with boldness and long-view leadership that prioritizes cooperation and goes beyond short-term interests.”

Juan Manuel Santos
in an Elders statement on the 2024 Clock Statement

“As though on the Titanic, leaders are steering the world toward catastrophe—more nuclear bombs, vast carbon emissions, dangerous pathogens, and artificial intelligence. Only the big powers like China, America, and Russia can pull us back. Despite deep antagonisms, they must cooperate—or we are doomed.”

Gov. Jerry Brown
Executive chair of the Bulletin

“We need innovation by experts to identify new solutions. We need bold political leadership to implement solutions. And ultimately all of us need to be the catalysts. Scientific, economic and political leaders need the informed support—and at times, constructive criticism—of the people.”

Rachel Bronson and Daniel Holz
in an op-ed for USA Today, January 23, 2024
The 2024 Clock Statement
A moment of historic danger: It is still 90 seconds to midnight

Ominous trends continue to point the world toward global catastrophe. The war in Ukraine and the widespread and growing reliance on nuclear weapons increase the risk of nuclear escalation. China, Russia, and the United States are all spending huge sums to expand or modernize their nuclear arsenals, adding to the ever-present danger of nuclear war through mistake or miscalculation.

In 2023, Earth experienced its hottest year on record, and massive floods, wildfires, and other climate-related disasters affected millions of people around the world. Meanwhile, rapid and worrisome developments in the life sciences and other disruptive technologies accelerated, while governments made only feeble efforts to control them.

The members of the Science and Security Board have been deeply worried about the deteriorating state of the world. That is why we set the Doomsday Clock at two minutes to midnight in 2019 and at 100 seconds to midnight in 2022. Last year, we expressed our heightened concern by moving the Clock to 90 seconds to midnight—the closest to global catastrophe it has ever been—in large part because of Russian threats to use nuclear weapons in the war in Ukraine.

Today, we once again set the Doomsday Clock at 90 seconds to midnight because humanity continues to face an unprecedented level of danger. Our decision should not be taken as a sign that the international security situation has eased. Instead, leaders and citizens around the world should take this statement as a stark warning and respond urgently, as if today were the most dangerous moment in modern history. Because it may well be.

But the world can be made safer. The Clock can move away from midnight. As we wrote last year, “In this time of unprecedented global danger, concerted action is required, and every second counts.” That is just as true today.
A moment of historic danger: It is still 90 seconds to midnight
The many dimensions of nuclear threat

A durable end to Russia’s war in Ukraine seems distant, and the use of nuclear weapons by Russia in that conflict remains a serious possibility. In February 2023, Russian President Vladimir Putin announced his decision to “suspend” the New Strategic Arms Reduction Treaty (New START). In March, he announced the deployment of tactical nuclear weapons in Belarus. In June, Sergei Karaganov, an advisor to Putin, urged Moscow to consider launching limited nuclear strikes on Western Europe as a way to bring the war in Ukraine to a favorable conclusion. In October, Russia’s Duma voted to withdraw Moscow’s ratification of the Comprehensive Nuclear Test Ban Treaty, as the US Senate continued to refuse even to debate ratification.

Nuclear spending programs in the three largest nuclear powers—China, Russia, and the United States—threaten to trigger a three-way nuclear arms race as the world’s arms control architecture collapses. Russia and China are expanding their nuclear capabilities, and pressure mounts in Washington for the United States to respond in kind.

Meanwhile, other potential nuclear crises fester. Iran continues to enrich uranium to close to weapons grade while stonewalling the International Atomic Energy Agency on key issues. Efforts to reinstate an Iran nuclear deal appear unlikely to succeed, and North Korea continues building nuclear weapons and long-range missiles. Nuclear expansion in Pakistan and India continues without pause or restraint.

And the war between Israel and Hamas in Gaza has the potential to escalate into a wider Middle Eastern conflict that could pose unpredictable threats, regionally and globally.

Chinese President Xi Jinping meets with Russian President Vladimir Putin in Moscow on March 21, 2023. US experts fear China may provide military aid to Russia in exchange for help in quickly building up its nuclear forces. (Photo: Vladimir Astapkovich, RIA Novosti via Kremlin.ru)
A moment of historic danger: It is still 90 seconds to midnight
An ominous climate change outlook

The world in 2023 entered uncharted territory as it suffered its hottest year on record, and global greenhouse gas emissions continued to rise. Both global and North Atlantic sea-surface temperatures broke records, and Antarctic sea ice reached its lowest daily extent since the advent of satellite data. The world already risks exceeding a goal of the Paris climate agreement—a temperature increase of no more than 1.5 degrees Celsius above pre-industrial levels—because of insufficient commitments to reduce greenhouse gas emissions and insufficient implementation of commitments already made. To halt further warming, the world must achieve net zero carbon dioxide emissions.

The world invested a record-breaking $1.7 trillion in clean energy in 2023, and countries representing half the world’s gross domestic product pledged to triple their renewable energy capacity by 2030. Offsetting this, however, were fossil fuel investments of nearly $1 trillion. In short, current efforts to reduce greenhouse gas emissions are grossly insufficient to avoid dangerous human and economic impacts from climate change, which disproportionately affect the poorest people in the world. Barring a marked increase in efforts, the toll of human suffering from climate disruption will inexorably mount.
A moment of historic danger: 
It is still 90 seconds to midnight 
Evolving biological threats

The revolution in life sciences and associated technologies continued to expand in scope last year, including, especially, the increased sophistication and efficiency of genetic engineering technologies. We highlight one issue of special concern:

The convergence of emerging artificial intelligence tools and biological technologies may radically empower individuals to misuse biology.

In October, US President Joe Biden signed an executive order on “safe, secure, and trustworthy AI” that calls for protection “against the risks of using AI to engineer dangerous biological materials by developing strong new standards for biological synthesis screening.” Though a useful step, the order is not legally binding. The concern is that large language models enable individuals who otherwise lack sufficient know-how to identify, acquire, and deploy biological agents that would harm large numbers of humans, animals, plants, and other elements of the environment. Reinvigorated efforts this past year in the United States to revise and strengthen oversight of risky life science research are useful, but much more is needed.
A moment of historic danger: It is still 90 seconds to midnight
The dangers of AI

One of the most significant technological developments in the last year involved the dramatic advance of generative artificial intelligence. The apparent sophistication of chatbots based on large language models, such as ChatGPT, led some respected experts to express concern about existential risks arising from further rapid advancements in the field. But others argue that claims about existential risk distract from the real and immediate threats that AI poses today (see, for example, “Evolving biological threats” above). Regardless, AI is a paradigmatic disruptive technology; recent efforts at global governance of AI should be expanded.

AI has great potential to magnify disinformation and corrupt the information environment on which democracy depends. AI-enabled disinformation efforts could be a factor that prevents the world from dealing effectively with nuclear risks, pandemics, and climate change.

Military uses of AI are accelerating. Extensive use of AI is already occurring in intelligence, surveillance, reconnaissance, simulation, and training. Of particular concern are lethal autonomous weapons, which identify and destroy targets without human intervention. Decisions to put AI in control of important physical systems—in particular, nuclear weapons—could indeed pose a direct existential threat to humanity.

Fortunately, many countries are recognizing the importance of regulating AI and are beginning to take steps to reduce the potential for harm. These initial steps include a proposed regulatory framework by the European Union, an executive order by President Biden, an international declaration to address AI risks, and the formation of a new UN advisory body. But these are only tiny steps; much more must be done to institute effective rules and norms, despite the daunting challenges involved in governing artificial intelligence.

The XQ-58A Valkyrie “loyal wingman” pilotless combat aerial vehicle, seen here deploying an Altius-600 small unmanned aircraft system, is powered by artificial intelligence and can identify, track, and prosecute targets without human oversight. (Photo: US Air Force. Design: François Diaz-Maurin/Erik English)
A moment of historic danger:
It is still 90 seconds to midnight
How to turn back the Clock

Everyone on Earth has an interest in reducing the likelihood of global catastrophe from nuclear weapons, climate change, advances in the life sciences, disruptive technologies, and the widespread corruption of the world’s information ecosystem. These threats, singularly and as they interact, are of such a character and magnitude that no one nation or leader can bring them under control. That is the task of leaders and nations working together in the shared belief that common threats demand common action. As the first step, and despite their profound disagreements, three of the world’s leading powers—the United States, China, and Russia—should commence serious dialogue about each of the global threats outlined here. At the highest levels, these three countries need to take responsibility for the existential danger the world now faces. They have the capacity to pull the world back from the brink of catastrophe. They should do so, with clarity and courage, and without delay.
IT IS 90 SECONDS TO MIDNIGHT
The Bulletin’s Next Generation Initiative was created to ensure that new voices, steeped in science and public policy, have a trusted platform from which to address the world’s most pressing challenges. It includes the well-regarded Voices of Tomorrow column, annual Leonard M. Rieser Award, Editorial Fellows Program, and Board Fellows Program, among other activities.

Our Next Generation Initiative is part of an organizational commitment to Diversity, Equity, and Inclusion (DEI). Authors of varied age, ethnic, racial, gender, and social backgrounds pursue stories that are likewise varied—and therefore inherently more interesting than the journalism a less diverse group might produce.

**Editorial Fellows**

Editorial Fellows have experience in one of the Bulletin's three main areas: nuclear risk, climate change, and disruptive technologies. They have an established record of publishing quality work or have been identified as an emerging leader in their respective fields. Paired with a Bulletin editor serving as both colleague and mentor, Fellows produce a regular column, for which they are compensated. The program is a one-year commitment with the opportunity to renew.

Since the program’s inception, Editorial Fellows have published over 20 columns on nuclear risk, disruptive technology, and climate change. In 2023, Chad Small and Kimberly Ma joined current Fellows in their second year, Lauren Sukin and Trenton Ford. Newly-minted alumni of the program have served as featured experts in Bulletin programs and continue to contribute to the Bulletin's publication.

**Board Fellows Join the Bulletin**

The Board Fellows Program offers rising leaders the opportunity to contribute to the Bulletin's board work, while “pulling back the curtain” on the regular workings of a governing board. Fellows receive first-hand experience in governance, finance, fundraising and strategic oversight.

The Board Fellows program is designed in partnership with Women of Color Advancing Peace, Security and Conflict Transformation, and is a direct outgrowth of the Bulletin's participation in Organizations in Solidarity, a partnership among more than 300 organizations and individuals combating racism and discrimination in all of its manifestations.

2022 Board Fellows April Arnold and Haneen Khalid renewed their roles in 2023. In 2024, the Bulletin will announce its second class of Board Fellows.

“Throughout the fellowship...the hands-on editorial approach and careful attention to both style and substance puts the Bulletin a class above its competitors. By allowing me to translate my research to a wider and more policy-focused audience, this fellowship opened several meaningful career opportunities for me. I am deeply grateful for the platform, advice, and experience that this fellowship has provided.”

— Lauren Sukin, assistant professor of international relations at the London School of Economics and Political Science, Bulletin Editorial Fellow

1. Kimberly Ma
2. Chad Small
Arts Science Initiative
Can art kill the bomb?

In November, the Judd Foundation of New York presented an exhibition and programming in partnership with Artists Against the Bomb in support of the Treaty on the Prohibition of Nuclear Weapons. The Bulletin’s Rachel Bronson presented a panel discussion with Artist Pedro Reyes exploring the intersection of art and science and the power that might have in moving back the hands of the Doomsday Clock. The Bulletin has been partnering with Reyes since 2020 on the commissioned work, “Amnesia Atomica,” a world-traveling public art installation with programming.

Artists Against the Bomb is organized by Estudio Pedro Reyes in collaboration with the International Campaign to Abolish Nuclear Weapons (ICAN). It is a collective of more than a hundred artists calling for universal nuclear disarmament.
Conversations Before Midnight 2023
Featuring Academy Award Winning Director Christopher Nolan

The Bulletin’s marquee annual event featured Academy Award-winning director Christopher Nolan in a keynote conversation with Rachel Bronson. Nolan’s insights spanned behind-the-scenes commentary on the movie and Nolan’s masterwork as a director, but also the relevance and importance of keeping a global focus on demanding a stop to the threat of nuclear weapons. The highly successful evening raised $175,000 in support of the Bulletin’s mission. 2022 Rieser Awardees Haydn Belfield and Christian Ruhl shared remarks on their award-winning essay published in the Bulletin, “Why policy makers should beware claims of new ‘arms races’.”

Over 200 attendees at this year’s event were able to choose from several high-level breakouts with world-renowned experts on topics including nuclear risk, climate change, AI, and biosecurity.

Conversations Before Midnight artwork
created by Molly Hurley

For over seven decades, the world has come to know the mushroom cloud as the nuclear emblem and a sure sign that dark and serious discussions are about to begin. The graphic for this year’s Conversations Before Midnight aimed to redirect and engender new understandings of the issues facing us.

From a black and white background reminiscent of the landscape around Oppenheimer’s Los Alamos facility, we see a burst of color. Sunflowers, which were originally cultivated by American Indigenous groups in Arizona and New Mexico, spread around the world becoming a staple crop – and symbol of peace – in Ukraine. The red spider lilies are sometimes used atop gravesites in Asian cultures to prevent scavenging from animals who avoid their poisonous bulbs. The falling leaves represent the ginkgo tree, a species that has survived unchanged for millions of years, while related species died out. In Hiroshima that tale of survival continued when the ginkgo tree was one of the first plants to grow back after the bomb.

Instead of destruction, fire, and death, ginkgo trees deliver possibilities of brightness, hope, and recovery grounded in the memory of loss and survival. They remind us that mushroom clouds are not our only option for the future.

Director Christopher Nolan (r) directs Cillian Murphy (l)—the actor portraying J. Robert Oppenheimer in the film—on the set of Oppenheimer. (Image courtesy of Melinda Sue Gordon/Universal Pictures)

1. Art by Molly Hurley
2. Molly Hurley
## 2023 Sponsors

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In Memoriam
Visionaries at the forefront of change for good

Daniel Ellsberg, 
Bulletin contributor
Dan Ellsberg was a brave man. In an effort to end the Vietnam War, he risked spending the rest of his life in jail by leaking the Pentagon Papers. In so doing, he changed history—and our knowledge of our own history.

Stanford Professor Martin Hellman, a friend of Ellsberg for over 40 years, called him, “an activist who is trying to save humanity from our self-created nuclear Doomsday Machine.” When Ellsberg revealed that he had been diagnosed with pancreatic cancer and had been given less than six months to live, Hellman had a conversation with him so he could tell all what he would like to say now and to future generations, upon his death. Their conversation appeared in the Bulletin.

Sharing some of the reasoning behind his most famous act, Ellsberg told Hellman, “From the very beginning I was aware that nuclear weapons had been discussed as a possibility in Vietnam. The whole basis for my copying The Pentagon Papers was news I got from Mort Halperin, who was working for Henry Kissinger, that Nixon did not mean to get out of Vietnam on any terms that had a realistic chance of being accepted by the North Vietnamese, and thus, that the war would continue and would get larger and would ultimately lead to the use of nuclear weapons.”

Highlighting their conversation on today’s nuclear risk issues, Ellsberg decried the American nuclear establishment for giving “no importance whatever to expressing in public what their actual aims and interests and options are.” He also noted that Russia does roughly the same thing and that this refusal to acknowledge reality has to change.

Lowell Sachnoff, past Governing Board member
In her tribute to Lowell Sachnoff, former Bulletin Publisher and Executive Director, Kennette Benedict wrote, “He was a remarkable and true friend to the Bulletin of the Atomic Scientists. His commitment to nuclear disarmament was rooted in practical actions, like his work to have Chicago declared a Nuclear Weapon-Free Zone in March 1986, and in his long-time support of the Bulletin.”

Benedict shared her thoughts on his significant support of the Bulletin, adding, “he loved participating in the annual Doomsday Clock announcements and helped raise the profile of the Bulletin as we reinvigorated this venerable institution beginning in 2005 when I arrived as executive director. He was particularly wise in recruiting new board members with expertise in financial and legal matters and helped fight off challenges to our trademarked Doomsday Clock from other media companies. His generous spirit, good humor, and wise counsel helped lift the staff and board as we pursued our mission of informing the public about existential threats to the planet. He is greatly missed.”

Paul Berg
Board of Sponsors member
Nobel Prize-winning biochemist Peter Berg died at age 96 in his home on the Stanford University campus. Berg created the first recombinant DNA molecule by combining DNA from two different organisms. Berg’s pioneering work was the precursor to modern genetic engineering like the messenger RNA vaccines to treat COVID-19. Berg also served on the Bulletin’s Board of Sponsors.

In a statement from Stanford Medicine, Lloyd Minor, MD, dean of the Stanford School of Medicine said, “I cannot overstate Paul’s brilliance, compassion and enthusiasm for discovery. The joy of discovery motivated Paul throughout his career, and he generously gave his time to instill that joy in countless many. His death is a huge loss for the scientific community, Stanford Medicine and the fortunate among us who called him a colleague and friend.”

In the early 1970’s it was unclear how manipulating DNA could affect health and the environment, and Berg was keen to lead efforts in the scientific community to promote safety and responsibility. In 1975, at the International Congress on Recombinant DNA Molecules, Berg was instrumental in efforts to ensure there were strict guidelines on genetic work, but that research should continue. This led to life-long advocacy for public discussion of science policy.
Philanthropy
Supporting the importance of science to effect policy

Joan and James Shapiro
For Joan and Jim Shapiro, supporting the Bulletin has become a family affair. Joan was drawn to the Bulletin by a friend, who happened to be a physicist on the Bulletin’s Science and Security Board. At the time, the Bulletin needed a boost in structure, and Joan, a former banker and leader in non-profit governance, was more than happy to help. Joan contributed to forming the first governing board, and soon after joined the board, believing with all that crisis the world may face, “the Bulletin is in the category of hope.”

Although Jim had been aware of the Bulletin’s work since his undergrad years at Harvard, it may have been Joan’s true enthusiasm – “I’m not a scientist,” she says, “but it’s vital that readers know we all have the capacity to understand what the Bulletin is saying” – that saw them partner as Einstein Circle donors.

Jim, a pioneering bacterial geneticist, says the Annual Clock Statement continues to drive both of their interests in the Bulletin. “It’s a fantastic barometer that looks at how our species is doing,” Jim says. “We’re on the precipice; it’s chilling. The clock emphasizes the urgency of what needs to be done. The climate situation is particularly critical, and it’s something future generations are going to have to deal with for a long time.”

Continuing the family tradition of contributing to the Bulletin, Joan and Jim’s son, Jacob Shapiro, a Professor of Politics and International Affairs at Princeton University, has written a dozen articles for the Bulletin. Jacob’s work on global mis- and disinformation surrounding the coronavirus, are some of the most well-read Bulletin pieces on the topic.

*Joan and Jim have been tremendous supporters over the years, and the Bulletin is lucky to have their longstanding partnership in so many different ways,* said Rachel Bronson, President and CEO.

Joan and Jim hope that through their own philanthropy the Bulletin will continue to reach more and more readers and, as Joan emphasizes, “increase its influence among citizens, scientists, and policymakers—and especially young people.”

Seeing the growing tendency for war around the globe – harking back to schoolday drills of hiding under a desk – they hope their efforts will help, as Jim says, “push the clock back.” Joan and Jim have certainly done their part in advocating for peace and security. With their support, of organizations like the Bulletin, their contributions are amplified.

The Legacy Society
Our Legacy Society was created to recognize and honor friends who have provided for the Bulletin’s future through their estate plans. By including the Bulletin in your will or trust, or by naming the organization as a beneficiary of a life insurance policy, IRA or other financial vehicle, you can make a significant gift that will cost you nothing during your lifetime.

Einstein Circle
The Einstein Circle honors Albert Einstein, a man whose name is synonymous with genius and social responsibility. The Bulletin was founded, with his help, more than 70 years ago to acknowledge and respond to the public’s disorientation around the advancement of powerful science and technology.

Each year, we recognize leadership gifts of $1,000 or more with membership in the Einstein Circle, which celebrates and honors those who offer their financial support at the highest levels. Einstein Circle membership is recognized annually and is based on the total of gifts, pledge payments, and matching gifts received in a single fiscal year.
With gratitude
For our generous donors

The *Bulletin of the Atomic Scientists* is thankful for our community of donors who believe science should serve humanity, not threaten it. For more than seven decades, this dedicated network of donors has generously sustained the *Bulletin*.

We extend our deepest gratitude to the board leaders, individuals, and institutions that made contributions between July 1, 2022, and June 30, 2023. Their names are listed here, with our sincere thanks for making everything we do possible.

**Key:**
- @ - Legacy Society
- + - Deceased

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Colin Mackay
With gratitude
For our generous donors

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Financial Overview
Management Discussion and Analysis

This Management Discussion and Analysis (MD&A) aims to help readers of our financial statements make reasonable inferences about the Bulletin's progress in accomplishing our mission in a financially responsible way. We recognize the trust our supporters place in our management of their contributions and sound fiscal policies and procedures are a top priority for the Bulletin. This narrative expands on that statement and supplements the financial statements presented on the following pages.

Individual and foundation contributions continued to be the core support for the Bulletin's mission-critical work in 2023. We present examples of this throughout the pages of this annual report. I am pleased to share that those contributions provided over $2.8 million to support our work. The charts on the following page, labeled "New Individual Gifts and Corporate Support" and "Foundation Support," show a comparative analysis of contributions over the past two years (note that 2021 was excluded as a third year of comparison as we converted fiscal year ends and it was a "short" year).

The spike in 2022 includes significant contributions supporting our work on bio-risk and more general capacity building. These contributions were intended to be utilized over several years to enable growth in these crucial areas. They provide a foundation for the Bulletin to build upon in the years ahead to seek additional support. A spike in expenditures for specific initiatives, such as our conference in Geneva this past April, accompanied these increased revenues and offset their net effect. These multi-year grants and commitments are reported as revenue in the fiscal year when pledged as required by Generally Accepted Accounting Principles (GAAP).

The upfront recognition required by GAAP occurs even when funds may not be received or used until the later years of the grant’s disbursement. These requirements continue to make the annual presentation challenging as their operational use spans over multiple years. Note that the deferral of such revenue for future operations occurs before our financial reports calculate net revenue for the year. Our ability to secure multi-year support is a strong endorsement of our efforts, notwithstanding the required accounting treatment, as multi-year commitments provide external validation of our strategy, governance, and impact.

In addition to temporarily restricting contributions for future periods and initiatives, the Bulletin uses surpluses of unrestricted net assets to support future operations when results end positively. The Bulletin ended 2023 with an operating surplus that was added to our unrestricted net assets at the end of the year and is available for use in 2024. Higher interest rates on money market funds and fixed-income assets boosted this surplus. The Bulletin also submitted claims related to the Employee Retention Tax Credit (ERTC) for over $200,000 that will be reserved for operations in future years.

Readers will notice that the Bulletin maintained a strong Statement of Financial Position or balance sheet in 2023. Most assets are investments reserved for future use due to multi-year grants received upfront and board-approved operating and strategic reserves. The Bulletin invests in a conservative portfolio of assets spread among numerous classes of investments. Such amounts are released from restriction into normal operations to meet requirements. As in the past, the Bulletin has no long-term debt and maintains minimal short-term liabilities, which rarely exceed thirty days.

We design our financial reporting to provide donors and the public with a transparent overview of our finances, which Miller Cooper LLP audits. As in prior years, Miller Cooper LLP provided the Bulletin with an "unmodified" opinion, the highest assurance level given. The complete audited financial statements for 2023 are available by request or on various public reporting websites. If you have any questions about this report or need additional financial information, please do not hesitate to contact the Bulletin at finance@thebulletin.org.

Thank you for your generous and sustained support.
We could only do this with you.

Sincerely,

Rachel Bronson, PhD
President and CEO
# Financial Overview

## Charts and Statements

### STATEMENT OF ACTIVITIES
FOR THE YEAR ENDED JUNE 30, 2023

<table>
<thead>
<tr>
<th>Revenue and Other Support</th>
<th>2023</th>
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<tr>
<td>Magazine</td>
<td>186,435</td>
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<tr>
<td>Individual gifts and corporate support</td>
<td>928,956</td>
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<td>Foundation grants</td>
<td>203,620</td>
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<td>ERTC Credit</td>
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<td>Other revenue</td>
<td>91,035</td>
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<td>In-kind*</td>
<td>713,094</td>
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**Total revenues and gains without donor restrictions:** 2,323,340

**Revenue released from restrictions:** 1,620,156

**Total revenues, gains and support without donor restrictions:** 3,943,496

### OPERATING EXPENSES BY FUNCTION

<table>
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<th>Function</th>
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<td>Publication and website program</td>
<td>2,551,532</td>
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<tr>
<td>Fundraising</td>
<td>369,310</td>
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<tr>
<td>Management and general</td>
<td>153,057</td>
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<tr>
<td>In-kind*</td>
<td>681,527</td>
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</table>

**Total operating expenses:** 3,755,426

**Net income:** 188,070

**Board designated transfer (transfer into reserves)/utilization of reserves**

**Net income from Ordinary Operations:** 188,070

*In-Kind is further categorized as follows: $574,861 for writers contributions to our publications, $106,666 for professional services

### STATEMENT OF FINANCIAL POSITION
FOR THE YEAR ENDED JUNE 30, 2023

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<td>Cash and investments</td>
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<td>Accounts receivable, net of allowance</td>
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<td>Pledges receivable</td>
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</tr>
<tr>
<td>ERTC Receivable</td>
<td>200,200</td>
</tr>
<tr>
<td>Prepaid expenses</td>
<td>81,888</td>
</tr>
</tbody>
</table>

**Total current assets:** 3,302,713

**Pledges receivable, less current portion:** -

**Property and equipment, net:** 20,636

**Website improvements, net:** 39,425

**Total noncurrent assets:** 60,061

**Total assets:** 3,362,774

### LIABILITIES AND NET ASSETS

<table>
<thead>
<tr>
<th>Liabilities</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts payable and accrued expenses</td>
<td>160,230</td>
</tr>
<tr>
<td>Deferred subscription revenue</td>
<td>22,887</td>
</tr>
<tr>
<td>Retirement payable</td>
<td>-</td>
</tr>
</tbody>
</table>

**Total liabilities:** 183,117

### NET ASSETS

<table>
<thead>
<tr>
<th>Net Assets</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without donor restrictions</td>
<td>1,982,286</td>
</tr>
<tr>
<td>With donor restrictions</td>
<td>1,197,371</td>
</tr>
</tbody>
</table>

**Total net assets:** 3,179,657

**Total liabilities and net assets:** 3,362,774

### CHANGE IN UNRESTRICTED NET ASSETS

<table>
<thead>
<tr>
<th>Change in Unrestricted Net Assets</th>
<th>2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net assets, beginning of the year</td>
<td>1,794,216</td>
</tr>
<tr>
<td>Revenues with donor restrictions</td>
<td>3,362,774</td>
</tr>
<tr>
<td>Net Income</td>
<td>188,070</td>
</tr>
</tbody>
</table>

**Net assets, end of the year:** 1,982,286
Financial Overview
Charts and Statements

OPERATING REVENUE
Donor support* 928,956 66%
Foundation grants* 203,620 14%
Earned revenue 277,470 20%
*After restriction adjustments 1,410,046

OPERATING EXPENSES
Program 3,126,393 83%
Fundraising 369,310 10%
Management and general 259,723 7%
*After restriction adjustments 3,755,426

NEW INDIVIDUAL GIFTS AND CORPORATE SUPPORT
2019-2023

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>733K</td>
</tr>
<tr>
<td>2020</td>
<td>996K</td>
</tr>
<tr>
<td>2022</td>
<td>1.2M</td>
</tr>
<tr>
<td>2023</td>
<td>928K</td>
</tr>
</tbody>
</table>

FOUNDATION SUPPORT
2019-2023

<table>
<thead>
<tr>
<th>Year</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>1,478,000</td>
</tr>
<tr>
<td>2020</td>
<td>484,215</td>
</tr>
<tr>
<td>2022</td>
<td>4,231,328</td>
</tr>
<tr>
<td>2023</td>
<td>203,620</td>
</tr>
</tbody>
</table>

- Foundation grants new
- Foundation grants after restriction adjustments
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* Nobel laureate

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Pentagram