

Multidisciplinary teams seek ways to mitigate existential threats

Nuclear winter, climate change, bioterrorism, AI. Those and other threats are growing in potential impact. What can we do?

By **Toni Feder**

What's your worst nightmare? For astrophysicist Martin Rees, it's an engineered pandemic or the breakdown of global networks for electricity and the internet—events that could produce a catastrophe on the global scale and even threaten human existence. “You can detect if someone is building a nuclear weapon,” he says, “but a lone person in a lab can create a pathogen. I worry about how to eliminate the risk without intrusive surveillance.”

Seeking ways to prepare for and prevent such global catastrophes, Rees, philosopher Huw Price, and Skype cofounder Jaan Tallinn started the Centre for the Study of Existential Risk (CSER) at the Uni-

versity of Cambridge in 2012. A few years later, physicist Daniel Holz founded the Existential Risk Laboratory (XLab) at the University of Chicago.

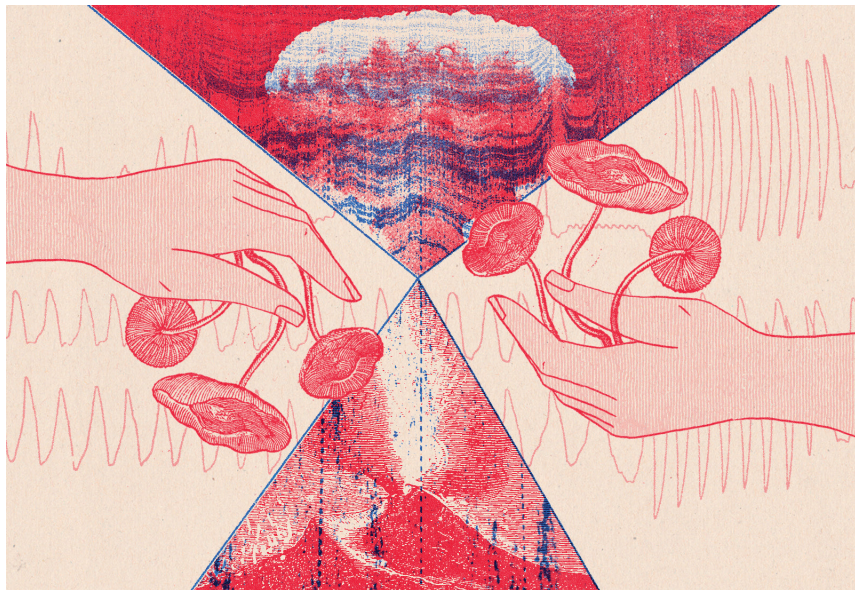
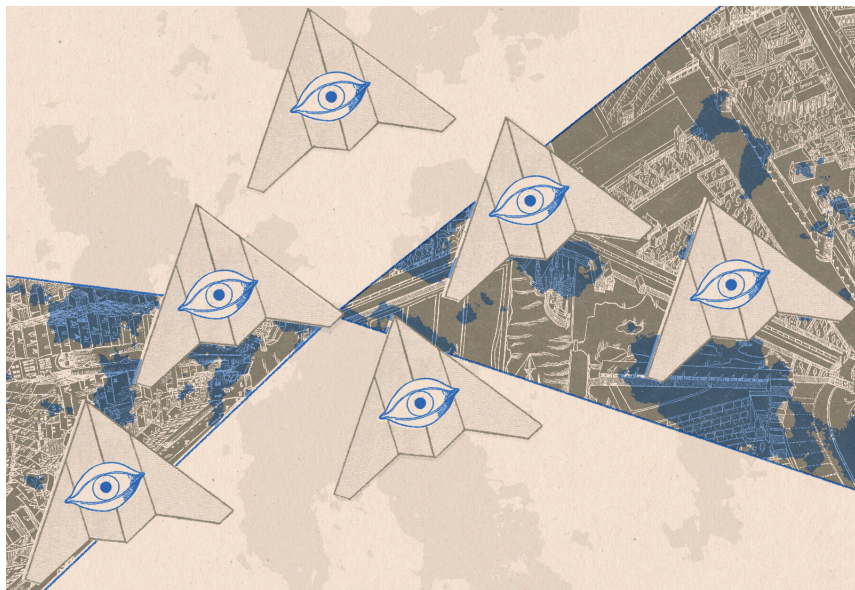
“Physicists have a moral responsibility to engage with potentially catastrophic risks associated with scientific advancement,” says Holz. “And I think that cosmologists, given their familiarity with the size and age of the universe, are predisposed to see the big picture and perhaps to have a unique perspective on humanity’s fragility.” (One of XLab’s funders is the Future of Life Institute, a nonprofit organization concerned with existential risks. The institute was started by MIT’s Max Tegmark, who, like Rees and Holz, has roots in cosmology.)

CSER and XLab are among a handful of centers that address multiple existential risks; it’s more common to focus on a single one, such as climate change or nuclear war. In addition to those topics, the centers variously take on AI, engineered biology, other new technologies, mis- and disinformation, and natural disasters. Both centers bring together multidisciplinary teams that include physicists, epidemiologists, computer scientists, political scientists, economists, and social scientists.

“The effects and implications of different risks spill over and can be intertwined,” says CSER director S. M. Amadae. As an example, she notes that a volcanic eruption, events caused by climate change, and a nuclear winter can all lead to food



▲ At the Existential Risk Laboratory at the University of Chicago, researchers consider how to prepare for and mitigate global threats. This image greets visitors to the lab’s website. (Screenshot courtesy of UChicago XLab.)



▲ Stark depictions intended to show the complexities of different existential risks were created by an illustrator and by a researcher with the Cambridge University Centre for the Study of Existential Risk. The top picture shows how defense technologies can be used for both protection and surveillance; the bottom one represents the ways humans can both respond to and create hazards. (Images courtesy of the Centre for the Study of Existential Risk.)

insecurity. Considering multiple global threats “enables a broader-minded analysis than focusing on one risk at time,” she says. “Interventions and strategies to build resilience at all levels of governance can be helpful for multiple risks.”

“When you worry about the risks of AI,” says Holz, “it’s generally AI

plus something else: AI and nuclear command and control. AI and infrastructure. AI and cyberattacks. AI and disinformation.” But if you want to truly understand the threats and how to mitigate them, he says, “you have to look at their interconnections.” What’s more, he says, students involved in XLab

want to be broadly informed. “It’s not satisfying to them to be told, ‘Pick only one threat that you’re worried about, and go work on that.’”

“We look for concrete ways to mitigate the risks,” says Amadae. One CSER researcher developed a bond-index research project to help big investors monitor where their money is going and to, for example, choose against investing in fossil fuels or AI. Other CSER researchers have embedded in government agencies to convey to civil servants and policymakers findings for mitigation approaches on arms control, online regulation, and other areas. The center also has participated in role-playing exercises with military leaders “to help them understand how easily they can make decisions that increase the risk of conflict,” says Amadae. “It was eye-opening how easy it was to convince them to buy more types of weapons.”

Future leaders

Last year, CSER launched a one-year master’s degree program in global risk and resilience with the aim of educating future leaders to play a role in the analysis and mitigation of existential risk. The first cohort consisted of about 30 students from 14 countries; their backgrounds are in math, philosophy, medicine, politics, and other areas. They graduated in July, and they are moving into jobs in finance, the civil service, think tanks, and more. Some, says Amadae, are interested in the center’s planned PhD program, which will welcome its first students in fall 2027.

XLab plans to eventually offer a degree program. “The ultimate goal is to create a new discipline that holistically addresses existential threats,” Holz says. For now, XLab offers an undergraduate class called “Are we doomed?,” runs a



▲ The inaugural class of the global risk and resilience master's degree program at Cambridge University graduated in July. (Photo courtesy of the Centre for the Study of Existential Risk.)

10-week summer research fellowship, supports undergraduate and graduate students doing research year-round, and organizes conferences (including, for example, the conference highlighted in *PT*'s 2025 story "Nobel laureates issue declaration for the prevention of nuclear war"). More than 100 students from across the globe have participated in the summer program since it began

in 2022, says Holz. Examples of past research topics include strategies for deterring a nuclear weapons-capable Iran, climate consequences of nuclear winter, wastewater-based surveillance techniques for monitoring pandemics, and situational awareness and deception in AI agents.

Jo Jiao is a University of Chicago math and philosophy double major. She co-initiated an undergraduate

XLab AI safety group that hosts speakers, runs AI strategy and research groups, and offers a fellowship for students to learn about AI governance, security, and safety research. AI presents two main areas of risk, she says: misuse ("How do you prevent malicious actors from using AI to bad ends?") and super-intelligent AI ("You would be worried about a smart system conspiring against humans"). University students are at the start of the talent pipeline, she notes: "We are trying to get students interested in AI safety and to help them orient their careers to make sure that AI is developed safely and to mitigate potential catastrophe."

Be prepared

"There are many steps we can take to reduce threats. Engagement is very important," says Stephen Luby, a public-health physician and Stanford University professor who cofounded the Stanford Existential Risks Initiative. He is involved in designing a bioreactor that captures waste methane and converts it to protein to support aquaculture. "If we can make it efficient and profitable, it would offer scalability and resilience in the face of a food supply shortage," he says.

More broadly, says Luby, "there are huge technical agendas for figuring out what humanity can do to lower risk."

CSER and other centers are "a small step," says Rees. In an ever-more interconnected world, he says, a catastrophe stemming from "error or terror" can cause devastation and societal breakdown that cascades globally. Such threats are growing in potential impact as AI and biotechnology advance. Minimizing their likelihood should be higher on the agenda of governments, he says. "We need to be more prepared."

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