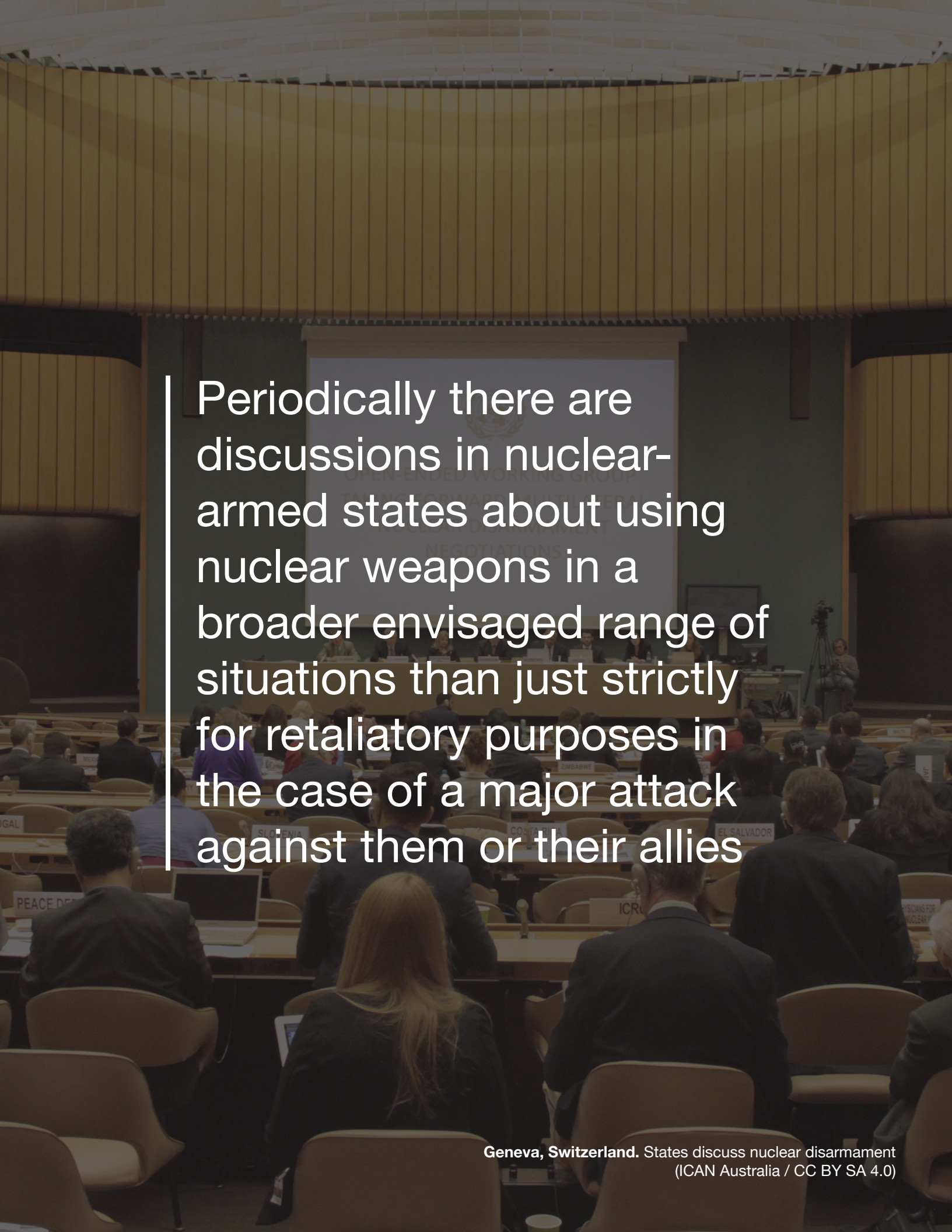


Periodically there are discussions in nuclear-armed states about using nuclear weapons in a broader envisaged range of situations than just strictly for retaliatory purposes in the case of a major attack against them or their allies

Geneva, Switzerland. States discuss nuclear disarmament
(ICAN Australia / CC BY SA 4.0)

Nuclear Weapons with 21st Century Technology

A Conversation with John Borrie

Interviewed by FSR Staff

Fletcher Security Review: To begin, could you describe your current role at the UN?

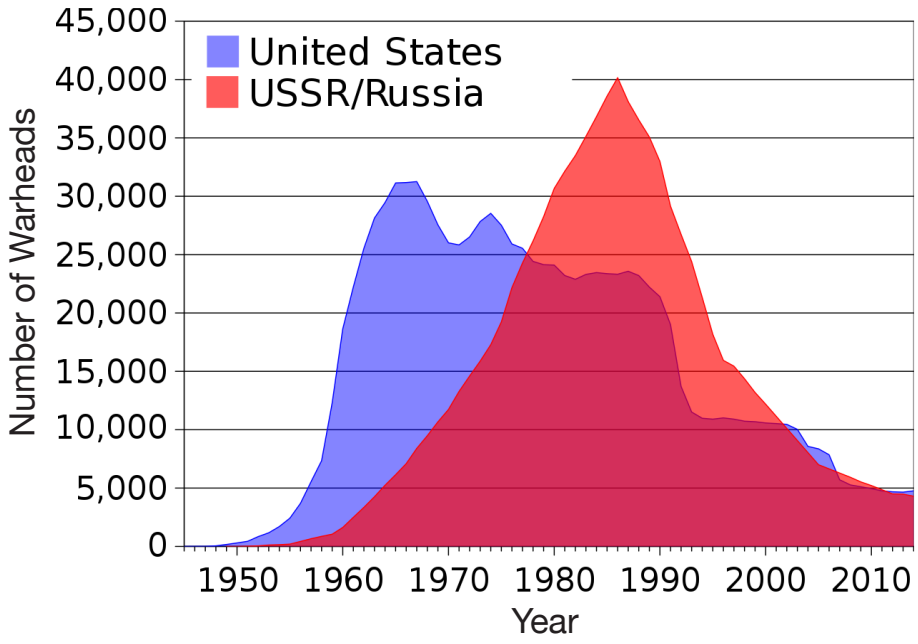
John Borrie: Sure. Well, I'm the chief of research at the UN Institute for Disarmament Research or UNIDIR. We're a voluntarily funded autonomous research institute within the UN family. We carry out independent research on all aspects of disarmament and arms control. My job here is to advise the director, oversee the development of the research program, carry out quality assurance on our research as well as to do my own research.

FSR: What is your research currently focusing on?

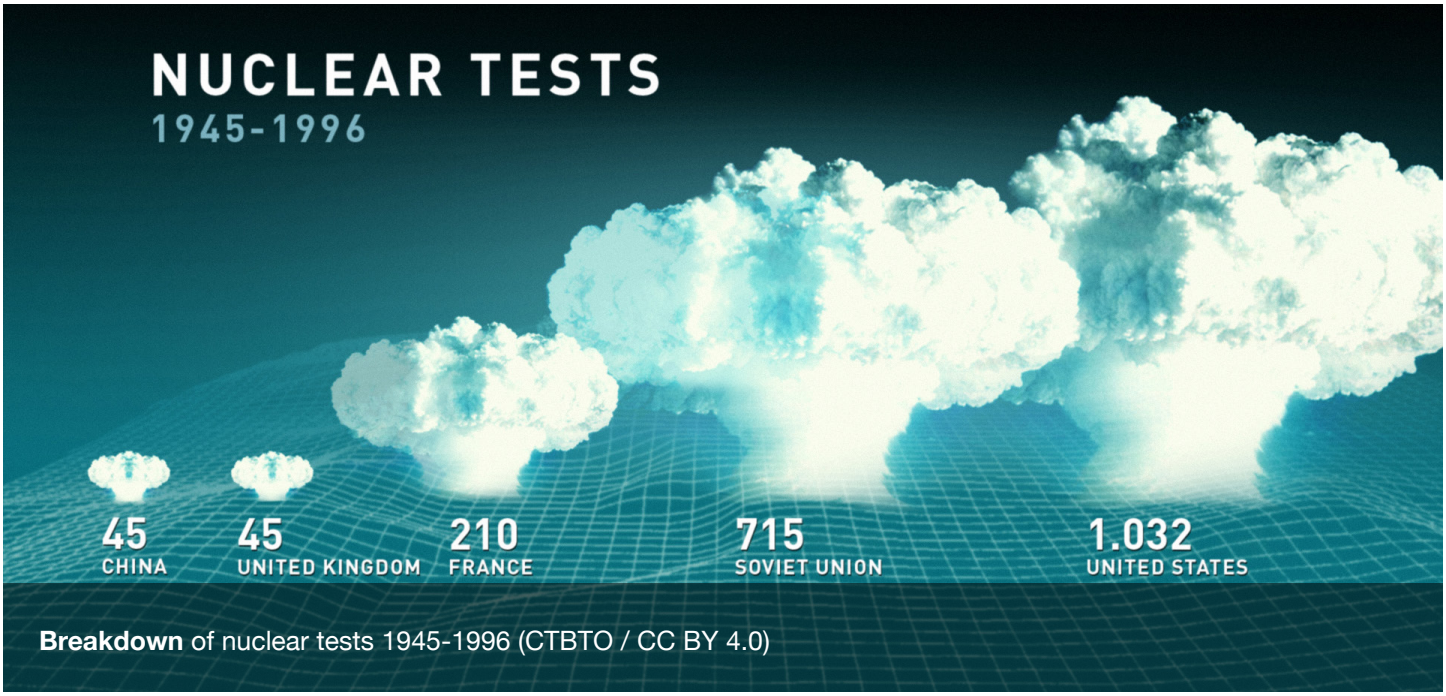
JB: Well, I focus on different things at different times. My major interests at the moment include issues around nuclear disarmament and deterrence policies, and technology such as a hypersonic missiles, which could have an impact on nuclear stability. I've been doing some work in the context of oversight and accountability mechanisms for the use of armed un-crewed aerial vehicles (UAVs)—drones—including their implications for stability. I've also been involved in a project here on gender and disarmament. Lastly, I also have an interest in research that is aimed at informing efforts to try to enhance civilian protection from the use of explosive weapons in populated areas. I do all sorts of stuff, but nuclear is sort of my "bread and butter."

FSR: So for countries like the United States or Russia, what conditions do you think would need to be created for them to make steps in the direction of a nuclear-free world?

JB: Well, it depends. I think that there are some, such as Professor Nick Ritchie, who argue that nuclear weapons need to be devalued in their policies, practices and doctrines. Nuclear weapons are seen as politically very important by quite a few states at the moment—not just states that have them, but some other states who want them or might like to have them in the future. Nuclear weapons are associated with status. And periodically there are discussions in nuclear-armed states (such as Russia and the United States) about using nuclear weapons in a broader envisaged range of situations than just strictly for retaliatory purposes in the case of a major attack against them or their allies.



Source data from: Robert S. Norris and Hans M. Kristensen, "Global nuclear stockpiles, 1945-2006," *Bulletin of the Atomic Scientists* 62, no. 4 (July/August 2006), 64 - 66



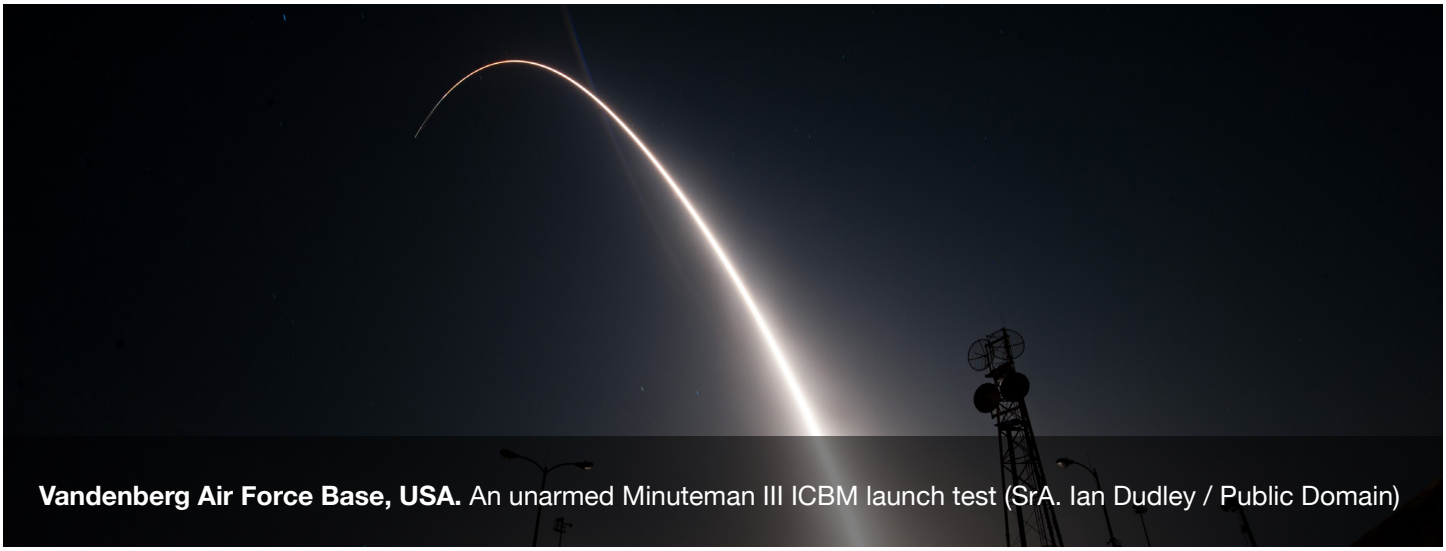
Breakdown of nuclear tests 1945-1996 (CTBTO / CC BY 4.0)

Personally, I think that if we are going to move away from nuclear weapons, then it will demand a change of perception and minds of policymakers about the utility of these weapons, as well as other elements such as strengthening of the norm against their use. That could come about in a number of different ways, but it's going not going to be easy. One of the issues with nuclear weapons is that this technology is more than 70 years old, and some of the ways policymakers have of thinking about those weapons and nuclear deterrence are almost that old, and are very deeply embedded. During the Cold War we essentially had a bipolar confrontation between the US and the Soviet Union and their respective allies, and now we have a much more complicated world in which we have a number of technologies that call into question the continued applicability of nuclear weapons for deterrence purposes because of the ambiguity they create in crisis situations. For example, cyber offensive capabilities, which are difficult to attribute to any particular actor, may not necessarily physically damage to a society's infrastructure or kill anyone. But offensive cyberoperations might be very damaging—even crippling—in terms of theft of money or intellectual secrets or personal data about people. It's challenging to see how nuclear weapons can be used coherently to deter that.

At UNIDIR, we're also looking at implications of other technologies which are becoming entangled with nuclear weapons and nuclear doctrines. For example, space-based infrastructure is pretty crucial to some modern nuclear command and control systems. Attacks on or threats to that infrastructure might be taken by certain countries like the US, China and Russia as demanding a response with nuclear weapons before they lose the capability to do so. Then there are also new advanced conventional missile capabilities that are specifically designed to overcome missile defenses to destroy high value targets, which might include nuclear command and control. All of these create ambiguity in terms of nuclear doctrines and practices. These are headaches for nuclear policy makers, not to mention the fact that we have nine nuclear states, not five, and crisis communication between these states…It's not especially good.

FSR: In terms of new technologies, which do you see or have you already seen becoming entangled with nuclear technologies? Is AI going to be a part of the nuclear conversation?

JB: A lot of current discussion about AI is largely speculation. I mean, I've just mentioned space. We can already see it because we've got at least three states that have already tested anti-satellite capabilities. The United States, China, and Russia all have tested surface-based capabilities that could knock out satellites, some of which are important for nuclear command and control. So, this entangles it further. And if countries start militarizing space to an even greater extent than is already the case, for example, by placing weapons there, then



Vandenberg Air Force Base, USA. An unarmed Minuteman III ICBM launch test (SrA. Ian Dudley / Public Domain)

that will create further entanglement with new missile capabilities as I just mentioned. Then there are missile defenses themselves, which incrementally are improving in some ways. This can create fears, for example, in China or Russia, that the US won't be vulnerable anymore to nuclear retaliation, at which point nuclear deterrence breaks down for them. Then you've got cyber. We've already seen evidence presented by people like David Sanger, the New York Times journalist, and others, of cyber hacking of very important systems, for example, in North Korea by the US as well as North Korean hacking of economic targets like Sony Pictures. Earlier we saw Stuxnet impacting the Iranian centrifuges. It's not inconceivable that nuclear command and control systems might be vulnerable to cyber offensive operations. All of these things can introduce ambiguity about nuclear command and control chains. They can potentially create "use it or lose it" situations.

And then you've got so-called autonomous weapons or increasing autonomy in weapon systems as we tend to think about it in UNIDIR. You've got autonomy-in-motion systems like loitering munitions or in increasingly autonomous drones. And then on the other hand, you've got autonomy-at-rest systems. These latter capabilities might come to play a role in nuclear command and control systems because of the speed of warfare and the huge amount of sensory information coming in. It means nuclear decision makers may come to rely on "machine learning" or other technologies described as "AI" to help triage and sort information in order for them to make timely decisions. Now the issue with that is you can't necessarily see how these systems are operating in real time and what assumptions they were operating on, so that can potentially create some issues since its difficult, among other problems, to instill contextual understanding into algorithm-based systems.

A RAND study from earlier this year said that some of these AI techniques will make it easier, potentially, to find mobile ICBM launches. That can create "use it or lose it" situations. If you're in China and you think that the United States knows where all of your nuclear missiles are and could attack them, then you might be tempted to use them before they're destroyed. Conversely, if you're on the other side you might feel very tempted in a crisis situation to strike preemptively to take those launchers out of commission. All of these prospects would create ambiguity, and ambiguity, when we're dealing with crisis escalation, is bad. But right now, we're right at the outset of the "AI age" and it's hard to predict how these technologies and related military capabilities are going to evolve.

John Borrie

John Borrie is the research coordinate and program lead at the United Nations Institute for Disarmament Research. He's currently working on continuing and expanding dialogues about disarmament and the impact of nuclear weapons on humanitarian affairs. He previously worked on weapons control for both the International Committee of the Red Cross and as a New Zealand diplomat. Borrie holds a doctorate in philosophy from the University of Bradford.