# 1

#### Text: States except for the Republic of India ought to ban the appropriation of outer space for mining activities by private entities. The Republic of India ought to increase funding for the appropriation of outer space by private entities.

#### India space participation is crucial to India’s soft power – independently Indian norm setting curbs Chinese militarization

Castro ’17. [Bhavani Castro Fellow of Indian Studies at the Getulio Vargas Foundation in São Paulo, 03-03-2017, "Why India Should Help Shape Norms for Outer Space Activities," The Diplomat, <https://thediplomat.com/2017/03/why-india-should-help-shape-norms-for-outer-space-activities/>] TDI

The past years have been groundbreaking for the Indian Space Program. In 2014, its first interplanetary mission, Mangalyaan, entered into Mars orbit, putting the Indian Space Research Organization (ISRO) into the select group of space agencies to reach Mars, and the first one to succeed entering its orbit in the first attempt. In 2015, the agency launched its first space observatory, Astrosat, aimed to observe distant planets and astronomical objects, a first-class technology mastered by few countries. Last year, India also set a record by launching 20 satellites at once, many from other countries. However, India could go one step further in the space business and engage in a much more rewarding activity for its ambitions: taking the lead in shaping norms for outer space activities.

As the ISRO achieved a new world record in February – the launching of 104 satellites on a single rocket – Prime Minister Narendra Modi should consider giving new focus to the diplomacy surrounding the use of space. India has not been very active in the ongoing international efforts to update the outer space regime. It has not supported the European Union’s proposal for a Code of Conduct for Outer Space Activities, and it also watched silently while China and Russia joined efforts to issue a draft for a treaty on the prevention of the placement of weapons in outer space. However, if India aims for greater recognition in the international scenario, it is about time to take a more proactive stance on the creation of new norms and rules in global governance.

The existing international space regime includes several outdated treaties – mainly the Outer Space Treaty from 1967 and the Moon Treaty from 1979. These documents do not deal with urgent issues for today’s space exploration, including the prohibition of non-nuclear weapons tests in space and the creation of risky debris from the destruction of old satellites. The entrance of new actors, specifically in the space communications industry, makes it increasingly difficult to coordinate the positioning of new satellites in an already overcrowded orbit. Moreover, it is still unknown how those new actors – including China and India – will behave in space: whether they will choose to follow the peaceful use of space, or whether militarization will be their path.

It is crucial for India to work actively for new norms in the current scenario because of a variety of reasons. First, India needs to consider its national security interests. The vacuum created by the slow growth of the US and Russia on space capabilities is being filled by China, whose intentions are not entirely clear. In 2007, Beijing launched an anti-satellite weapon (ASAT) to destroy an old satellite. This move, not previously notified to the international community, not only produced thousands of harmful debris in orbit, but also evidenced China’s growing military capacity. If India wants to curb potentially harmful Chinese activities in outer space, it needs to endorse rules that fit its national interests.

India also needs to promote the regulation of space activities to enhance its cooperation with other space-faring nations – possibly including China, if the two countries decide for cooperation instead of competition. Vital sectors of the economy, as finance and communications, are dependent on space technologies, which makes cooperation essential for countries in a globalized world. India is proud of the indigeneity of its space technology, but it is about time to engage in technology sharing and commercial agreements with other countries. Space technologies are economic stimulants and useful tools in communication, resource management, and disaster prevention activities, all of which are essential assets for emerging economies like India.

More importantly, engaging in and committing to the creation of a new space governance framework would project India as an agenda-setter in a field of increasing importance for international relations. As in other realms of global governance, the future of space research is in the hands of Asia.

India can promote the creation of a more comprehensive regime for the use of outer space in a variety of ways. It is possible, for example, to start discussions within organizations like the BRICS (Brazil, Russia, India, China, and South Africa), IBSA (India, Brazil, South Africa), and the Shanghai Cooperation Organization. India can also actively engage with existing forums, such as the UN Committee on the Peaceful Use of Outer Space and ongoing discussions held by the European Union on the creation of a code of conduct.

The Outer Space Treaty will be celebrating its 50th anniversary this year; 2017 might be a good year for India to start an active campaign for an upgrade in the space regime. It might be difficult for India to build a new international institution or create legally binding treaties, but it can work on the promotion and creation of new conventions, cooperation agreements, and consensual norms.

#### Private sector is key

Rajagopalan ’20 [Dr Rajeswari (Raji) Pillai Rajagopalan is the Director of the Centre for Security, Strategy and Technology (CSST) at the Observer Research Foundation, New Delhi., 5-24-2020, "India’s Space Programme: A role for the private sector, finally?," ORF, <https://www.orfonline.org/research/indias-space-programme-a-role-for-the-private-sector-finally-66661/>] NChu

India’s finance minister Nirmala Sitharaman announced last week that India’s private sector will play a key role in augmenting India’s space programme, and that the government intends to share the facilities of the Indian Space Research Organisation (ISRO) with the private sector. This announcement was part of the Narendra Modi government’s call for new and bold reforms in an effort to promote its ‘self-reliant India’ mission. It is the fourth segment of the Rs 20 lakh crore Aatma Nirbhar Bharat Abhiyan special economic stimulus.

Sitharaman’s announcement entails a role for the private sector, possibly with the goal of greater investments in technology development and acquisition, capacity-building and space exploration, including planetary exploration. The minister, while announcing these reforms, appeared to understand that the private sector can help augment India’s space capability. While praising the work done by ISRO, she also pointed out that the private sector is also doing a lot of work in developing space technology. She also acknowledged that the existing regulations prevent private entities from using or even testing their products.

Therefore, to level the playing field, the government “will make a provision for the private sector to benefit from the assets which are available to ISRO and for India (in general) to benefit from.” The minister also said the new reforms would allow the private sector to play an active role in “satellites, launches and space-based services”.

But as always, implementation is key. Properly executing these reforms will require enabling policies and appropriate regulatory frameworks.

That the new reforms will allow private sector players to use ISRO facilities is a big deal. This indeed must be music to the ears of commercial players who have been seeking to get a fair share of the pie in terms of manufacturing of satellites and propellant technologies, among other areas. It should not be too difficult for India’s private space sector because there is a sizeable talent pool available outside ISRO. More importantly, the entry of the private sector, as in the telecom sector, can bring several advantages in terms of cost and access.

Following the announcement, ISRO tweeted that it will follow the government’s guidelines to allow the private sector to undertake space activities in the country. Though this did not seem particularly welcoming of the government’s initiative, ISRO’s support is critical to making it a success.

ISRO has in the last few years been opening up to the Indian private space sector in a gradual manner – mostly as a matter of compulsion because ISRO simply does not have the in-house capacity to address India’s growing requirements. Today, the Indian space programme is not just about civilian applications for remote-sensing, meteorology and communication, as in the early decades. India’s space sector and its requirements have grown enormously in the last decade to include television and broadband services, space science and exploration, space-based navigation and, of course, defence and security applications.

Among others, Ambassador Rakesh Sood has articulated the need for legislation to facilitate ISRO’s partnership with industries and entrepreneurs. Narayan Prasad and Prateep Basu, two prominent faces in the Indian space start-up segment, have argued that despite ISRO’s successes, “India’s space competitiveness has suffered from the absence of a globally reputed, private space industry.”

The private sector, especially the NewSpace industry and start-ups, have an advantage in terms of low-cost operations, which itself should be a big incentive for the government to make it an active stakeholder. A certain amount of democratisation of space technology with the participation of the private sector can ensure costs are kept low. And expanding the number of stakeholders will also ensure more transparency and better accountability and regulatory practices. This has been missing in India’s space sector. The same agency has undertaken promotion, commercialisation and regulatory functions – which is not healthy.

Following the minister’s announcement, I spoke to a few key players in the private sector to capture their sense of the reforms in the pipeline. Sadly, the general mood is not one of excitement but rather to wait and watch. To them, as stated earlier, the key is implementation. One of them, who did not wish to be named, argued that unless there is a conducive structure for the private sector to engage with, the announcement is more lip service. Narayan Prasad said that there need to be basic changes for the reforms to be effective. The private sector is particularly concerned about issues such as sharing intellectual property for products developed by the private sector. Prasad argued that IP-centric policymaking has to be taken for real reform.

Right now, ISRO thinks they will use the suppliers only as manufacturing or services partners. So all IP is controlled by ISRO and suppliers just replace ISRO technicians and production facilities. This means most suppliers have no real IP of their own, and just depend on cost plus contracts from ISRO for business. The only way to change that is to create reforms where local industry can invest in building their own IP and/or products that can match global standards.

This in turn means that policymakers will need to view industry as more than sweatshops and look at what steps can be taken for IP/product development by private industry. This is the only way to integrate India’s private sector into the global supply chain. Prasad adds that if ISRO is serious about partnering with the private sector, it must spell out the requirements and select the best available. Several private-sector actors have articulated the need for an independent regulator.

This is an area that has been a common thread in many of my conversations with Indian entrepreneurs. Rohan M. Ganapathy, CEO and CTO of Bellatrix Aerospace in Bengaluru, also made a strong case for an autonomous regulator, and acknowledged a need for the government to clarify R&D risk funding, which is crucial to realise new technologies.

It is not that ISRO has not engaged the private sector. ISRO has long been associated with private firms like Larsen & Toubro, Godrej and Walchand Nagar Industries. It is just that the mode of participation envisaged through the new reforms is very different. The current mode of work, more of an outsourcing model, is becoming inadequate. In the last few years, because of significant capacity deficit, ISRO began to work with a few in the private sector such as the Bengaluru-based Alpha Design Technologies, contracted to build satellites. Similarly, Bellatrix Aerospace began to work with ISRO on advanced in-space propulsion systems. But these remain exceptions.

But ISRO does recognise the new compulsions and has been trying to change. The newly formed commercial enterprise called the NewSpace India Limited (NSIL), under the Department of Space, is an initiative to engage the private sector. NSIL is meant to help the private sector with transfer of some technologies to the private sector, especially the small satellite launch vehicle that is being developed and even the older PSLV. But the pace of ISRO’s engagement with the private sector needs to quicken.

Followed up effectively, the new government initiatives could help. Indeed, ISRO needs to expand its operations significantly if it has to remain competitive, both from a domestic and international outlook. The Indian space programme has several advantages, the most important being cost: the ability to provide reliable launches in a cost-effective manner is a big advantage. The Polar Satellite Launch Vehicle remains a tried and tested launch vehicle and has managed to remain the cheapest for launching small satellites into space. But competition in this sector is picking up.

Jeff Bezos’ Blue Origin, Elon Musk’s SpaceX and start-ups from China want a share of the global commercial market, estimated to be worth around $350 billion (Rs 26.46 lakh crore). If ISRO does not improve its launch infrastructure and increase the number of launches, it will be at a disadvantage. And despite India’s cost advantages, it has a mere 2% share of this, worth $7 billion. India can gain significantly if ISRO and the country’s private space sector can cooperate effectively and synergistically. This requires the government to actually act on the initiatives it announced.

#### The plan tanks the mining industry

Mohan ’21 [C. Raja Mohan is Director, Institute of South Asian Studies, National University of Singapore, and contributing editor on foreign affairs for 'The Indian Express', 7-27-2021, "India will need pragmatism, diplomatic skill in shaping new rules for regulation of outer space," Indian Express, https://indianexpress.com/article/opinion/columns/mission-shakti-anti-satellite-weapon-isro-drdo-india-space-missions-5701517/] SC SD

Second, the challenge of the **rapid expansion of** commercial space and the growing role of the **private sector. India’s national space programme has been quite successful in mobilising an advanced technology for development.** The Indian Space Research Organisation has also been conscious of the need to draw industry, both public and private sector, to participate in the space endeavour over the decades. While its capabilities for the construction, launch and delivery of satellite services are impressive, India must now wrestle with the exponential growth of the space market. Today’s global space business is estimated to be $350 billion and according to some estimates it could nearly triple in the next two decades. **Delhi must promote a massive expansion of the private sector’s role in space to ensure that India gets a reasonable slice of the growing global space business.** In the early decades of space technology development, private sector companies worked for and with the government programmes. Today in the US and more broadly the West, **the private sector is taking the lead**. Consider for example, the business of launching satellites that has been a government monopoly until recently. As the private sector seeks a larger share of the launch business, Elon Musk’s Space X has already made a big impression in the US. Other private companies like Blue Origin (US), OneSpace (China), and Interstellar technologies (Japan) are all joining the fray. Meanwhile, the idea of deploying a constellation of small satellites is gaining great traction. Space X and Amazon have announced plans to put hundreds of satellites in low earth orbit to provide broadband internet around the world. Besides launching rockets and satellites, **private sector companies are driving innovation and contributing to the transformation of the space business. Their ambitions now extend to space tourism and the mining of asteroids.** Third, as space becomes the site for expansive commercial enterprise, national space agencies are under pressure to redefine their role. Until recently, the national agencies were the researchers, investors, developers and champions of the space programme at the political level. This all-encompassing role of the national agencies was necessary when space technology was in its infancy. It was a precondition for countries like India that embarked on the space journey with limited resources and capabilities. As the knowledge and capabilities begin to spread and the number of actors in the space domain grows rapidly, the national space agencies must necessarily redefine their role. While NASA has gone through multiple reinventions, the structure remains essentially unaltered in India. Instead of trying to do everything, the national agencies could focus on a few critical objectives — to promote a dynamic national ecosystem for space research and development both within and outside the government, lay out a long-term vision for space policy, identify priorities, anticipate potential challenges, and become the face of the space programme at home and abroad. Fourth, the need to promote effective domestic and international regulatory frameworks for the development of space programmes. After the ASAT test, **many in India pointed to the importance of Delhi having the capabilities to shape the security order in outer space. They recall that India’s inability to conduct an atomic weapon test** before the Nuclear Non-proliferation Treaty was finalised in 1968 had **severely undermined India’s position in the global nuclear order**. In the near term, though, it is even more urgent to develop commercial space laws at home that attract investment, clarify property rights, limit liability for space operators and set standards for space products and operations. Externally, India must prepare for the inevitable evolution of the global space regime centred around the 1967 Outer Space Treaty that insisted on peaceful uses of outer space, barred the national appropriation of celestial bodies, and declared outer space to be “common province of mankind”. As technological innovation, commercial competition and geopolitical rivalry put great strain on the old order in space, Delhi will need all the strategic pragmatism, legal acumen and diplomatic skill in shaping new rules for the regulation of outer space. Above all **it needs collaboration with allies and partners in outer space.**

#### China is ramping up aggression in outer space

Broad 21 [(William J, is a science journalist and senior writer.) "How Space Became the Next ‘Great Power’ Contest Between the U.S. and China," 1-24-2021 updated 5-6-2018, https://www.nytimes.com/2021/01/24/us/politics/trump-biden-pentagon-space-missiles-satellite.html] TDI

For years, the Chinese studied — with growing anxiety — the American military, especially its invasions of Afghanistan in 2001 and Iraq in 2003. The battlefield successes were seen as rooted in space dominance. Planners noted that thousands of satellite-guided bombs and cruise missiles had rained down with devastating precision on Taliban forces and Iraqi defenses.

While the Pentagon’s edge in orbital assets was clearly a threat to China, planners argued that it might also represent a liability.

“They saw how the U.S. projected power,” said Todd Harrison, a space analyst at the Center for Strategic and International Studies, a Washington think tank. “And they saw that it was largely undefended.”

China began its antisatellite tests in 2005. It fired two missiles in two years and then made headlines in 2007 by shattering a derelict weather satellite. There was no explosion. The inert warhead simply smashed into the satellite at blinding speed. The successful test reverberated globally because it was the first such act of destruction since the Cold War.

The whirling shards, more than 150,000 in all, threatened satellites as well as the International Space Station. Ground controllers raced to move dozens of spacecraft and astronauts out of harm’s way.

The Bush administration initially did little. Then, in a show of force meant to send Beijing a message, in 2008, it fired a sophisticated missile to shoot down one of its own satellites.

Beijing conducted about a dozen more tests, including ones in which warheads shot much higher, in theory putting most classes of American spacecraft at risk.

China also sought to diversify its antisatellite force. A warhead could take hours to reach a high orbit, potentially giving American forces time for evasive or retaliatory action. Moreover, the speeding debris from a successful attack might endanger Beijing’s own spacecraft.

In tests, China began firing weak laser beams at satellites and studying other ways to strike at the speed of light. However, all the techniques were judged as requiring years and perhaps decades of development.

Then came the new idea. Every aspect of American space power was controlled from the ground by powerful computers. If penetrated, the brains of Washington’s space fleets might be degraded or destroyed. Such attacks, compared with every other antisatellite move, were also remarkably inexpensive.

In 2005, China began to incorporate cyberattacks into its military exercises, primarily in first strikes against enemy networks. Increasingly, its military doctrine called for ~~paralyzing~~ early attacks.

In 2008, hackers seized control of a civilian imaging satellite named Terra that orbited low, like the military’s reconnaissance craft. They did so twice — first in June and again in October — roaming control circuits with seeming impunity. Remarkably, in both cases, the hackers achieved all the necessary steps to command the spacecraft but refrained from doing so, apparently to reduce their fingerprints.

#### Chinese aggression makes escalation inevitable – draws in other powers

Fabian 19 [Christopher David Fabian, Bachelor of Science, United States Air Force Academy. (“A Neoclassical Realist’s Analysis Of Sino-U.S. Space Policy”, *University of North Dakota Scholarly Commons*, January, Available Online at: <https://commons.und.edu/cgi/viewcontent.cgi?article=3456&context=theses>]

Second, Chinese strikes on U.S. space assets must not result in uncontrolled escalation. The advantage of possessing soft-kill technology is the suitability for low-intensity conflicts, while the use of destructive/non-reversible attacks will not be constrained during high-intensity conflicts.234 The use of exclusively non-lethal versus a combination of lethal and non-lethal capabilities can serve as strategic signaling about the phase of combat. However, due to a capability and vulnerability gap, combined with a lack of credible retaliatory threat, a tit-for-tat strategy along a clearly defined escalation ladder may not be a legitimate strategy for the Sino-U.S. relationship. 235 Counterspace action intended to have a tactical/operational effect may cross American strategic red lines, resulting in unintended escalation. For example, an attack on American overhead persistent infrared (OPIR) sensors would degrade their capability to detect conventional medium range ballistic missiles, with targets in the first island chain also interfering with the early detection of nuclear capable ICBMs launched against the U.S.236 Concerningly enough, there is evidence that the implication of interfering with or destroying strategically important U.S. capabilities has only been appreciated on the tactical and operational levels within the Chinese military.

237 Similarly, a Chinese attack on U.S. space systems at the outset of a low-grade conflict could raise the likelihood of a “space Pearl Harbor,” which could, in turn, provoke the United States to contemplate pre-emptive attacks or horizontal escalation on the Chinese mainland.238 In addition, commercial-military integration and combined efforts may result in escalation with third parties. A significant portion of U.S. military communication and imaging capabilities are purchased from commercial companies or provided by allied nations, meaning that to adequately degrade U.S. military capabilities, an attack on non-military and/or non-U.S. assets is required.

# 2

#### India private sector is key to space success - thats the same Rajagopalan evidence from the CP.

Rajagopalan ’20 [Dr Rajeswari (Raji) Pillai Rajagopalan is the Director of the Centre for Security, Strategy and Technology (CSST) at the Observer Research Foundation, New Delhi., 5-24-2020, "India’s Space Programme: A role for the private sector, finally?," ORF, <https://www.orfonline.org/research/indias-space-programme-a-role-for-the-private-sector-finally-66661/>] NChu

#### The plan tanks India’s private space industry and undermines India’s position in the global order - thats the Mohan evidence from the CP

Mohan ’21 [C. Raja Mohan is Director, Institute of South Asian Studies, National University of Singapore, and contributing editor on foreign affairs for 'The Indian Express', 7-27-2021, "India will need pragmatism, diplomatic skill in shaping new rules for regulation of outer space," Indian Express, https://indianexpress.com/article/opinion/columns/mission-shakti-anti-satellite-weapon-isro-drdo-india-space-missions-5701517/] SC SD

#### Indian soft power and international leadership key to global cooperation and tolerance through cultural diplomacy

**Gupta 20** [(Arunima, Arunima Gupta is Principal at Network of Indian Cultural Enterprises (NICE). She holds a Master’s in International Relations from Leiden University), “Celebrating Indian Soft Power”, USC Center on Public Diplomacy, <https://uscpublicdiplomacy.org/blog/celebrating-indian-soft-power>] KZ

India is a culture-driven soft power. One example is availability and appreciation of Indian cinema as a source of recreation in the conflict-ridden Afghanistan. Another major cultural export is Indian gastronomy, be it turmeric latte sold in cafés, jackfruits used in gourmet preparations or the Australian PM Scott Morison’s display of Samosa diplomacy. Arts, fashion and handicrafts, literary works, and performing arts and tourism are other key aspects of Indian soft power. To realize and maximize the potential of such traditions and practices, it is important to develop a robust cultural creative economy, giving more and more opportunities for creative entrepreneurs to take Indian culture across the globe. This can also lead to cross-cultural cooperation and mutual learnings between cultural experts, entrepreneurs and enthusiasts from across the world.

Dinesh Patnaik, the Director-General of ICCR speaking at Namaste 2020 [observed that](https://www.softpowermag.com/inaugural-session-namaste-2020/) “the soft power of a country is when its cultural assets become a subject of aspiration and admiration by the global community. India is blessed with immense cultural assets, be it Yoga, Ayurveda, literature, arts, heritage, culinary practices, sports and much more, along with being the largest democracy and, having strong institutions and leaders. When the propagation of soft power is done with the idea of fostering mutual respect, shared understanding and joint collaborations for cultural advancements between countries, it becomes the essence of cultural diplomacy.”

Beyond cultural and civilizational heritage, India has been recognized for its role in addressing global challenges and being at the forefront of various development-related initiatives. Though India’s international engagement is guided by its security and strategic interests, it is also underpinned by the values of inclusivity, plurality and welfare for all. The establishing of International Solar Alliance, for example, demonstrated India’s commitment towards mitigating environmental risks through multilateral cooperation. Similarly, Indian offers humanitarian aid to smaller mainland and island economies in times of calamity, while its contributions to the UN Peacekeeping forces are amongst the highest in the world. The country’s cooperation at bilateral and multilateral forums for fighting COVID-19 through supplying hydro-chloroquine to the world as well as directing R&D efforts towards vaccine development highlight India’s contribution in the global pharmaceutical and wellness sector.

Owing to these and many other contributions towards the greater good for all, India is ranked 44th out of 160 countries in the [Good Country Index](https://www.goodcountry.org/) (GCI). According to Anholt, the creator of GCI, the underlying idea is that in the ongoing contest for soft power in the world where countries increasingly seek to lead and steer conversations around power dynamics, there is an increasing desire and necessity to connect with each other’s culture and communities. Speaking on the theme India’s Global Connect at Namaste 2020, Anholt [explained that](https://www.softpowermag.com/event/indias-global-connect/) the ‘goodness’ of a country is determined by its multilateral engagement and cooperation in addressing common global challenges. Higher levels of involvement build positive perceptions about the country that in turn invite greater foreign investment and visitors, thus contributing to the country’s soft power and reputation in the eyes of common citizens.

#### International cooperation key to solving bioterror and health crises

**Roffey et al 02** [(Roger, Swedish Defence Research Agency, Division of NBC-Defense, Umeå. Kurt Lantorp, Department of Infectious Disease Control, Jönköping. Anders Tegnell, Center for Microbiological Preparedness, Swedish Institute for Infectious Disease Control (SMI), Solna. Frederik Elgh, Swedish Defence Research Agency, Division of NBC-Defense, Umeå.) “Biological weapons and bioterrorism preparedness: importance of public-health awareness and international cooperation”, ScienceDirect, 8/2002 [https://www.sciencedirect.com/science/article/pii/S1198743X14626410#](https://www.sciencedirect.com/science/article/pii/S1198743X14626410)!] KZ

Coordination and communication also need to be strengthened, to minimize response times. If a bioterrorist event is suspected, established communication must be among hospital personnel, local and central healthcare departments, specialized laboratories, central and regional authorities for disease surveillance, and police and rescue services. A biological attack will also require of preservation evidence (at the scene of a crime), a unified command system, and the need to protect emergency responders against possible secondary devices intentionally placed to maim or injure them [19,20]. The management of the disease might not follow normal procedures, since diagnostic laboratory confirmation might take too long. Instead, it will be necessary to initiate a response based on the recognition of high-risk syndromes. Epidemiologic principles must be used to assess whether a patient’s presentation is typical of an endemic disease or is an unusual event that should raise concern [21]. There should also be specialist teams on standby that can rapidly analyze any potential threat and give recommendations to responsible authorities. After an incideSic. xnt, there might be a need for decontamination of the affected area, depending on the type of agent and the quantity released; this is also an area for international cooperation, as expertise is not always available in the country under attack. From a European perspective, it can be questioned whether each country can afford or be motivated to set up qualified rapid response teams that could, at short notice, be deployed to the scene of a bioterrorist attack. Perhaps this could be one area for cooperation between countries. What could be a realistic goal for such teams in a European context? In the area of research and development, to enhance our knowledge of agents of concern and to develop rapid methods for identification and detection of agents, international cooperation is vital, given today’s scarce economic resources. Another area for cooperation across borders is the training of personnel in handling situations involving the threat or use of biological warfare agents.

#### Bioterror causes extinction

Millett 17. Millett, Ph.D., Senior Research Fellow, Future of Humanity Institute, University of Oxford; and Snyder-Beattie, M.S., Director of Research, Future of Humanity Institute, University of Oxford. 08-01-2017. “Existential Risk and Cost-Effective Biosecurity,” Health Security, 15(4), PubMed

In the decades to come, advanced bioweapons could threaten human existence. Although the probability of human extinction from bioweapons may be low, the expected value of reducing the risk could still be large, since such risks jeopardize the existence of all future generations. We provide an overview of biotechnological extinction risk, make some rough initial estimates for how severe the risks might be, and compare the cost-effectiveness of reducing these extinction-level risks with existing biosecurity work. We find that reducing human extinction risk can be more cost-effective than reducing smaller-scale risks, even when using conservative estimates. This suggests that the risks are not low enough to ignore and that more ought to be done to prevent the worst-case scenarios. How worthwhile is it spending resources to study and mitigate the chance of human extinction from biological risks? The risks of such a catastrophe are presumably low, so a skeptic might argue that addressing such risks would be a waste of scarce resources. In this article, we investigate this position using a cost-effectiveness approach and ultimately conclude that the expected value of reducing these risks is large, especially since such risks jeopardize the existence of all future human lives. Historically, disease events have been responsible for the greatest death tolls on humanity. The 1918 flu was responsible for more than 50 million deaths,1 while smallpox killed perhaps 10 times that many in the 20th century alone.2 The Black Death was responsible for killing over 25% of the European population,3 while other pandemics, such as the plague of Justinian, are thought to have killed 25 million in the 6th century—constituting over 10% of the world's population at the time.4 It is an open question whether a future pandemic could result in outright human extinction or the irreversible collapse of civilization. A skeptic would have many good reasons to think that existential risk from disease is unlikely. Such a disease would need to spread worldwide to remote populations, overcome rare genetic resistances, and evade detection, cures, and countermeasures. Even evolution itself may work in humanity's favor: Virulence and transmission is often a trade-off, and so evolutionary pressures could push against maximally lethal wild-type pathogens.5,6 While these arguments point to a very small risk of human extinction, they do not rule the possibility out entirely. Although rare, there are recorded instances of species going extinct due to disease—primarily in amphibians, but also in 1 mammalian species of rat on Christmas Island.7,8 There are also historical examples of large human populations being almost entirely wiped out by disease, especially when multiple diseases were simultaneously introduced into a population without immunity. The most striking examples of total population collapse include native American tribes exposed to European diseases, such as the Massachusett (86% loss of population), Quiripi-Unquachog (95% loss of population), and the Western Abenaki (which suffered a staggering 98% loss of population).9 In the modern context, no single disease currently exists that combines the worst-case levels of transmissibility, lethality, resistance to countermeasures, and global reach. But many diseases are proof of principle that each worst-case attribute can be realized independently. For example, some diseases exhibit nearly a 100% case fatality ratio in the absence of treatment, such as rabies or septicemic plague. Other diseases have a track record of spreading to virtually every human community worldwide, such as the 1918 flu,10 and seroprevalence studies indicate that other pathogens, such as chickenpox and HSV-1, can successfully reach over 95% of a population.11,12 Under optimal virulence theory, natural evolution would be an unlikely source for pathogens with the highest possible levels of transmissibility, virulence, and global reach. But advances in biotechnology might allow the creation of diseases that combine such traits. Recent controversy has already emerged over a number of scientific experiments that resulted in viruses with enhanced transmissibility, lethality, and/or the ability to overcome therapeutics.13-17 Other experiments demonstrated that mousepox could be modified to have a 100% case fatality rate and render a vaccine ineffective.18 In addition to transmissibility and lethality, studies have shown that other disease traits, such as incubation time, environmental survival, and available vectors, could be modified as well.19-21 Although these experiments had scientific merit and were not conducted with malicious intent, their implications are still worrying. This is especially true given that there is also a long historical track record ofstate-run bioweapon research applying cutting-edge science and technology to design agents not previously seen in nature. The Soviet bioweapons program developed agents with traits such as enhanced virulence, resistance to therapies, greater environmental resilience, increased difficulty to diagnose or treat, and which caused unexpected disease presentations and outcomes.22 Delivery capabilities have also been subject to the cutting edge of technical development, with Canadian, US, and UK bioweapon efforts playing a critical role in developing the discipline of aerobiology.23,24 While there is no evidence of state-run bioweapons programs directly attempting to develop or deploy bioweapons that would pose an existential risk, the logic of deterrence and mutually assured destruction could create such incentives in more unstable political environments or following a breakdown of the Biological Weapons Convention.25 The possibility of a war between great powers could also increase the pressure to use such weapons—during the World Wars, bioweapons were used across multiple continents, with Germany targeting animals in WWI,26 and Japan using plague to cause an epidemic in China during WWII.27