Economic & Social Councils
Topic Guide

CSTD

Commission on Science and Technology for Development

Yale Model United Nations China III

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Letter from the Dais

Hey Everyone!

My name is JingJing, and I am a first-year student in Ezra Stiles College. I'm super excited to be your chair this year, and I hope you are just as excited to join our **Commission on Science and Technology for Development (CSTD)** committee.

I'll start off with a little bit about myself. I'm majoring in Applied Mathematics and Economics, and I'm interested in data analytics, technology, and human-computing interactions. On campus, I'm involved in consulting, design, and journalism groups, and of course, Model UN China.

Originally from New Jersey, my favorite food is a perfectly crispy on the outside, soft in the center bagel, specifically an *everything bagel with scallion schmear and lox*. I also like reading about real-life mysteries, watching historical dramas on Netflix, going to art museums, swimming, and traveling. A fun fact about myself is that I'll be in a new movie that's premiering soon… do not ask when, I have no idea when.

Now I'll talk a bit about our topic today. The CSTD committee serves as the "home" for science and technology, specifically focusing on how innovations drive the economics of developing countries. Our topics cover the business and politics of discussing emerging technologies in space and aviation exploration, and autonomous weaponry for defense.

I'm so excited to see you all soon in May!

Sincerely,
JingJing Luo

Committee History

The Commission on Science and Technology for Development (CSTD) is a subsidiary body of the UN Economic and Social Council (ECOSOC). It serves as the "home" for determining how technological innovations can aid developing nations. Its three primary goals are (1) providing technical analysis and policy recommendations, (2) following up on the World Summit on the Information Society (WSIS), hosted by the United Nations, and (3) achieving the Sustainable Development Goals, which are 17 goals targeting global problems like inequality and climate change, set for each year.

Notable past actions include building the foundational structure of the "Information Society" roadmap, organizing decennial assessments, where nations review the outcomes of the goals set during the WSIS, the most recent being in 2025. In addition, it was one of the first bodies in the UN to acknowledge how women were being excluded from the Scientific Revolution. In terms of the topics discussed today, the CSTD has formed prior opinions on both aviation and autonomous defense mechanisms.

In 2020 and 2021, the CSTD launched an initiative utilizing satellite data to inform safer and more sustainable agricultural developments. In recent years, the committee has debated the question of how we must regulate unmanned aerial vehicles, commonly known as drones, particularly in the context of deploying medical aid to more remote areas. Most recently, the CSTD participated extensively in launching the Space2030 Agenda, particularly emphasizing the importance of growing "local space ecosystems" for emerging nations as opposed to relying on purchasing satellite data from major players.

In terms of lethal autonomous weapons, the CSTD focuses primarily on the development of the research, while the Convention on Certain Conventional Weapons (CCW) conducts the legal negotiations. The CSTD has examined the value of including human control in these autonomous weapons, how these weapons influence long-term societal shifts, and encouraged ethical development.

Ultimately, the CSTD focuses on how technological developments shape the world, but our committee today will expand on this notion by including how legal frameworks, international doctrines, and business practices can also be shaped by these emerging technologies.

Commission on Science and Technology for Development

Topic Guide

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Topic One

Regulations on Boeing Airplanes

Introduction

As the aviation and space industry faces uncertainty surrounding cybersecurity, artificial intelligence, and ownership, delegates are tasked to weigh the concerns regarding safety, trust, international competition, government regulations, labor, and manufacturing to draft resolutions that resemble a 10-year Strategic Recovery Plan. The lack of clarity in regulating the skies and space, as well as the domination of these areas by major players act as a call to action for our initiative.

Glossary

- **Artemis Accords:** A set of non-binding, multilateral principles developed in 2020 by the US and NASA to guide civil, peaceful, and sustainable lunar and deep space exploration.
- **International Space Station:** a large, permanently crewed, multinational research laboratory in low Earth orbit run by NASA (USA), Roscosmos (Russia), JAXA (Japan), CSA (Canada), and ESA (Europe).
- **Safety Zones:** Areas that a nation operationally governs temporarily.
- **Sustainable Aviation Fuel:** cleaner-burning, non-petroleum-based alternative to conventional jet fuel (does not include Hydrogen fuel).
- **Kessler Syndrome:** theoretical, runaway chain reaction of orbital debris collisions proposed by NASA scientist Donald Kessler in 1978.
- **Low Earth Orbit (LEO):** region of space closest to Earth, typically ranging from 100 to 2,000 km (62–1,240 miles) in altitude.
- **Ground Stations:** terrestrial, radio-equipped facilities that act as the primary communication link for satellites and spacecraft.
- **Sustainable Aviation Fuel (SAF):** cleaner, drop-in replacement for conventional jet fuel made from renewable, waste-derived sources like used cooking oil, municipal waste, and biomass.
- Encryption: converting readable plaintext into scrambled ciphertext using algorithms and cryptographic keys, only authorized personnel can decrypt the text.
- European Union's Space Surveillance and Tracking (SST): operational, EU-funded program that monitors space debris, satellites, and other objects in Earth's orbit to protect space infrastructure.

- **Federal Communications Commission (FCC):** independent U.S. government agency responsible for regulating interstate and international communications via radio, television, wire, satellite, and cable
- **Cloud-connected infrastructure:** integrated, virtualized hardware and software that support computing services over the internet rather than relying solely on local, on-premise data centers
- **Spirit AeroSystems:** one of the world's largest manufacturers of aerostructures for commercial airplanes, defense platforms, and business/regional jets (American)
- **Safety Compliance Terms:** define the regulations, procedures, and standards designed to ensure workplace safety and prevent injuries

Topic History

In 1903, the Wright Brothers became the first to achieve the great feat of "flight," a long-held dream for centuries prior, manifested in mythology, religion, and the minds of many great philosophers. Following this scientific breakthrough, aviation technology developed exceedingly quickly as it was fueled by World War I and II in the following decades. By 1945, scientists had invented the Jet Engine and the V-2 Rocket, the first man-made object that reached the edge of Earth's atmosphere.

Post-WWII, the Cold War became the primary factor spurring technological development in the aviation industry. In 1957, the USSR launched the first man-made satellite called Sputnik 1, marking the start of a decades-long Space Race. From Yuri Gagarin's first arrival in space to the Apollo 11 landing on the Moon to the Apollo-Soyuz mission, marking the start of a Soviet-US partnership, the space industry has always relied on the exchange of ideas and competition between nations.

In the 1980s, aviation and space development evolved into a daily-utility for the common people and astronauts, respectively. From once a luxury for the elite, complete with champagne and cocktail attire in the '50s and '60s, aviation evolved into a far more accessible form of travel for the public with the arrival of the "Jumbo Jets" created by Boeing and Airbus, still two of the largest companies in the industry to this day. Meanwhile, the exploration of space also became more accessible, meaning nations came together to collaborate on scientific discovery, building the International Space Station (ISS) together, which housed astronauts and researchers from the US, Russia, Japan, Canada, and other nation-states.

In the past five years, the space industry has become more commercialized through the projects pioneered by companies like SpaceX, Blue Origin, and Axiom. For example, Inspiration4, launched in 2021, was the world's first all-civilian mission to space. Government-run space programs in the past are now evolving into government-funded initiatives, as companies like Blue Origin launch their New Glenn rocket, SpaceX tests its Starship V3, Voyager Space and Airbus build private space stations, and major aviation companies like Boeing struggle to develop spaceships safe for humans.

In terms of international interactions, there have also been a series of conflicts between government-sponsored space programs. There is growing legal conflict over the Outer Space Treaty of 1967, which is the foundational framework for international space law, and these debates are turning space exploration into the conquering of a "Wild-West-type" environment. Current competition centers around the Moon in the short term as well as Mars in the long term. Multiple countries have identified the value of the Moon's South Pole, which contains vast amounts of water ice. This race to gain resources has sparked discussion over the idea of "Safety Zones," areas a nation has exclusive control over, during the Artemis Accords in 2020. The Artemis Accords was a set of non-binding principles signed by some nations to regulate civil space exploration, particularly expeditions targeted at the Moon and Mars. While not implemented yet, "Safety Zones" reinforce the notion of sovereignty as opposed to collaboration and raise concerns surrounding the concept of "ownership" when it comes to exploring new lands.

The scramble for space sovereignty is no longer limited to traditional space powers. A new wave of nations are entering the scene and building their space exploration infrastructure. India is set to launch the Gaganyaan orbital model this year and the European Union is testing the landing equipment on a reusable, robotic laboratory in space called "The Space Rider." Japan, Iran, and South Korea are also quickly building out their space industries.

While the desire for space sovereignty defines the model Space Race, the progress that's being made closer to Earth in the aviation industry reflects a different kind of urgency: environmental preservation, as the world is moving towards more sustainable development. The focus has shifted to developing the Hydrogen-powered aircraft, which use hydrogen as opposed to conventional fossil-based jet fuel, and increasing the usage of sustainable aviation fuel (SAF) to reach the net-zero climate goals set by the UN.

Emerging concerns around the aviation industry surround safety, labor, crowded skies, and structural costs. These new "green" initiatives increase the cost it takes to build planes for manufacturers by a significant amount. For Boeing, once the world's top manufacturer of commercial jetliners, is now facing not only pressures to develop more sustainable aircraft, but also to address safety concerns, particularly after the 6,000 aviation accidents its aircrafts have been involved in worldwide.

Current Situation

Space Industry:

We will begin by discussing the space industry through the lens of business, government, and overall international cooperation. In the current space industry, there are three main regulatory concerns: traffic, authorization, and cybersecurity.

Space Traffic Management:

Problem

Space traffic management is the set of rules put in place to ensure safe, sustainable, and collision-free operations for spacecraft and satellites in Low Earth Orbit (LEO). With the increase in commercial spacecrafts as well as government research in space, it has become crucial to create rules that govern the commercial and international space economy. Since the late 2010s, companies like SpaceX, OneWeb, and Amazon, through Project Kuiper, have launched mega-constellations, which are huge networks of hundreds to tens of thousands of small, interconnected satellites in LEO. The US government also notes that 47% of all licensed US launches in the past 30 years have occurred in the past 5 years, showing a massive increase in activity in LEO. With more spacecraft and satellites flying in Low Earth Orbit, there are increased risks of debris-generating collisions and conjunctions, which are close approaches. This phenomenon places the safety of spacecrafts and satellites in LEO in the hands of automated collision-avoidance systems, which are far from fully perfected. Ultimately, the greatest fear in mismanaged space traffic systems is a cascade of collisions, often called the Kessler syndrome, as the debris left behind would make LEO unusable for decades to come. In addition, another major problem is having LEOs becoming untrackable and ownerless. When LEOs go through high-speed collisions and malfunction, its large fragments become undetectable and untrackable. Without being able to recover this debris, future LEOs are unable to avoid the debris simply sitting in space, which increases the risks of future collisions. This debris is also hard to identify and claim ownership of.

Current Situation

Currently, the debris (e.g., defunct satellites, parts of spacecrafts, and lost astronaut tools) is challenging to navigate because there is no global “air traffic controller” for space, as there is for the skies in the aviation industry. The lack of one official governing space makes it challenging to prevent and deal with conflicts between nations or between businesses, as there are no regulations and no enforcement in place. These satellites are governed by nations or private companies, which causes many of the debris objects to become (1) untrackable and (2) ownerless.

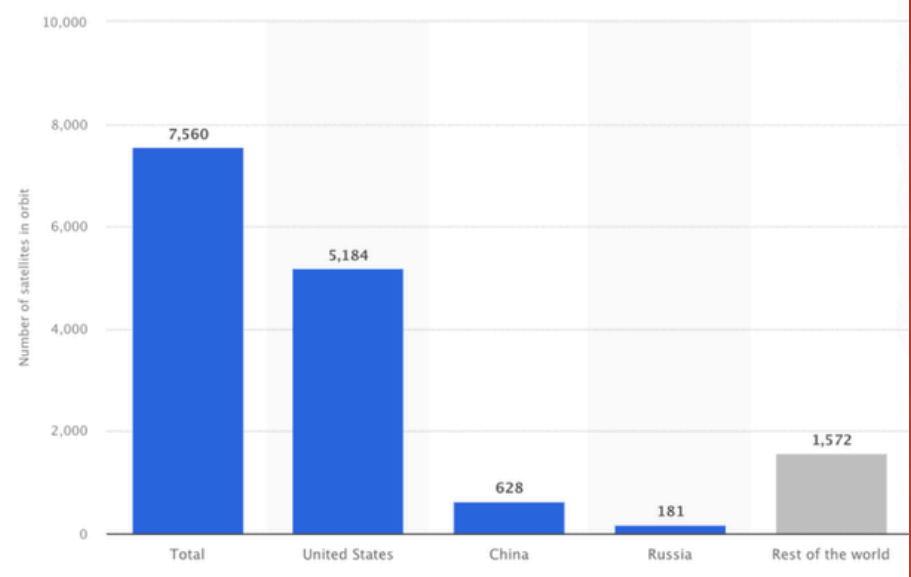

Figure 1: The number of satellites per country as of 2023 (Statista).

United States Example
Some governments have taken certain measures to mitigate this problem, for example, the United States. In 2022, the Federal Communications Commission (FCC) adopted a 5-year post-mission disposal requirement for satellites in LEO, which shortens the previous guideline by 20 years. The goal is to reduce the time that orbital debris sits in space and decrease the risk of the debris becoming untrackable and ownerless. In addition, the US Department of Commerce runs a civilian space-traffic data and warning system for all debris in LEO called the Traffic Coordination System for Space (TraCSS). TraCSS provides conjunction (close call) alerts to satellite operators, a standardized data format, and acts as a space traffic coordination hub for the international community. However, this system is contested for two reasons: business and political competition. In the business sense, companies worry that over-regulation could slow innovation and data-sharing rules could expose proprietary information. Governments, on the other hand, worry about US domination in global space traffic regulation, as many different players are developing space traffic coordination systems at the same time (i.e. European Union's Space Surveillance and Tracking (SST)). Choosing any particular space traffic regulation model would imply that the country that developed the model sets the data formats, coordination protocols, and liability norms for the entire system, setting them up to become the leader in the LEO space economy.

Authorization and Deciding "WHO" Has Final Say:

Problem
The second of the main concerns is figuring out who has jurisdiction over licensing space activities. According to the 1967 Outer Space Treaty (OST), every state is responsible for all the space activities conducted by its people, which includes government-sponsored and private operations. As the commercial space economy expands, questions concerning its licensing regulatory landscape quickly arise. They include: Who licenses remote sensing data collection? How many "private" vs. "government" satellites are allowed? What country is responsible when a private company spans multiple nations? Since there is no global licensing authority, every country runs a different system, which leads to three problems: (1) regulatory arbitrage (companies just choose whatever nation has the most relaxed laws), (2) Gaps in oversight for novel activity (caused by over-supervision), and (3) Uncertainties about liabilities and enforcement (repercussions for not following the rules).

Japan Example
Japan has developed a model that regulates the licensing of remote sensing (satellites and spacecraft that collect Earth data). In 2016, Japan enacted two major laws: the Space Activity Act, focusing on launching and satellite operations, and the Satellite Remote Sensing Act, focusing on data collection and distribution. These laws govern who receives licenses for private launches and satellite operations, establish a permission system for remote sensing devices, and regulate the distribution of satellite data. Operators running the program implement encryption measures to

protect against cybersecurity threats and force satellites to cease operations if it leaves the pre-approved orbit. Currently, the United States, Luxembourg, Japan, and the UAE are the only countries that have established laws for privatizing space exploration, while other countries are approaching the research and exploration from purely a governmental position.

Your Task
While Japan has implemented interesting measures to regulate the space industry, there is still no global regulator in deciding who gets to send spacecraft or satellites into space, what is being sent, and when these space explorations take place. How would we unite the unique licensing systems of all nations?

Cybersecurity:

Problem
As satellites, launch systems, and ground networks become more commercialized and software-driven, cybersecurity becomes an increasing concern. This danger is heightened by the fact that today's space ecosystem includes private companies, international operators, and cloud-connected infrastructure, which greatly increases the number of cyberattack entry points. This topic guide will outline a few examples, but is by no means exhaustive of what cybersecurity attackers could do in the rising space economy.

Satellite Hacking and Command Hijacking
Satellites rely on command signals from ground stations, but if an attacker gains access to those communications, the attacker could: (1) change orbital paths, (2) shut down communications, or (3) disable imaging or navigation systems. The risks of hackers penetrating these systems are heightened because many satellites were designed before modern cyber threats, some systems still have poor encryption, and it is difficult to physically recover space assets once they are launched and then derailed from their orbit paths.

Ground Station and Network Attacks
Ground stations are key to managing space assets, yet they are also often the weakest point in the space system. Therefore, if a ground station is infiltrated through cyber attacks, the repercussions would be unimaginable. Ground stations are located on Earth, connected to corporate IT networks, and sometimes operated by third-party contractors. Cyber attackers can break into these control systems, sever IT networks, inject malicious commands, steal sensitive data, and even disrupt satellite operations. Examples of dangerous breaches into ground stations include ransomware attacks, insider threats from employees or contractors, and supply-chain malware in the control software.

Real-World Implications of Cyber Security Breaches
Cybersecurity breaches in the space industry are of particular concern because they could (1) undermine critical infrastructures and (2) military operations. By critical

infrastructure dependency, we are referring to GPS, communications, weather, and aviation systems that rely on satellite data. Access to this information by cyber attackers is dangerous for both nations and civilians. Unencrypted data accessed by attackers enables foreign intelligence agencies or criminals to monitor military movements, track ships, and access confidential corporate communications. In addition, space systems often serve both civilian and military purposes. Cyber attacks on space assets during a period of high international tension could trigger escalation between countries and even be mistaken for the start of a war.

How People are Addressing These Issues

New technologies such as end-to-end encryption (E2EE) of satellite links, Zero-trust architectures for ground networks, and AI-based anomaly detection are being implemented into spacecrafts, systems, and satellites. E2EE ensures that data is encrypted directly on the user's device and remains encrypted through the satellite, ground stations, and network, only decrypting at the final destination. Zero-trust architectures are security frameworks that replace implied trust with "never trust, always verify" protocols across all of space. AI-based anomaly detection automatically analyzes complex and high-dimensional telemetry data, which prevents critical failures and enhances operational safety.

Aviation Industry:

The second part of this topic revolves around an industry closer to land, though still concerning flight: the aviation industry. The aviation industry currently faces serious structural, economic, and environmental pressures. We will approach these concerns through the lens of businesses, nations, and finally, consumers.

Business and Safety Concerns Through the Lens of Boeing

Currently, airlines are struggling to get enough high-quality new planes, engines, and spare parts. The reason largely stems from manufacturers, who are facing legal and technical problems in delivering their planes. In this topic guide, I will give the example of Boeing, a major player in the business aspects of the aviation industry, by outlining the problems it is currently facing surrounding safety, national interests, and the economy.

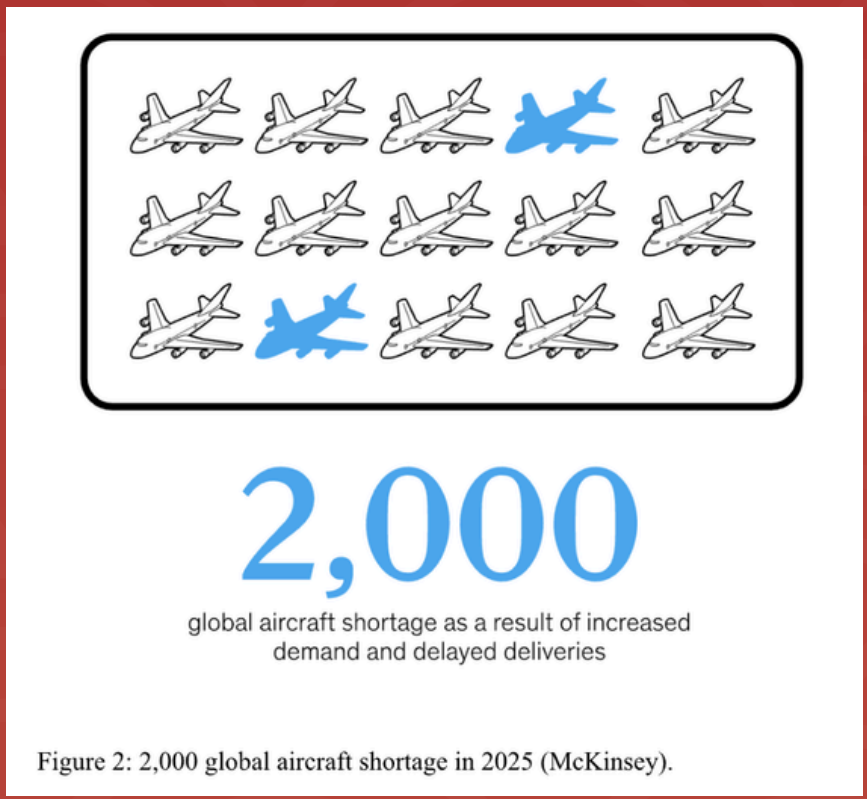

Figure 2: 2,000 global aircraft shortage in 2025 (McKinsey).

To begin, here are some statistics regarding the safety concerns surrounding Boeing's planes:

- In 2018 and 2019, two crashes involving Boeing 737 Maxes killed 346 people total (PBS).
- In January 2024, the door to a Boeing 737 Max blew out of an Alaska Airlines flight shortly after takeoff (National Transportation Safety Board).
- In June 2025, a Boeing 787-8 Dreamliner purchased by Air India crashed shortly after takeoff, resulting in 260 fatalities (BBC).

These infrastructure problems have caused many Boeing models to be grounded. Certification for flights like the 737 Max 7 and Max 10 has been pushed to later in 2026 due to technical issues with the engine anti-ice systems. The development of the Boeing 777X is also seven years behind schedule, and first deliveries are expected in 2027. The production and supply-chain constraints have also caused Boeing to be unable to produce planes fast enough. Boeing faces shortages in key components including avionics and engine parts. In addition, its primary suppliers, including Spirit AeroSystems, have struggled with quality control. Finally, the raw material costs are increasing severely due to tariffs that threaten to slow production.

Furthermore, Boeing has become a focal point for many nations, some concerned over the safety of its planes, while others are taking action against the company due to its strong relationship with the United States government. In 2024, Boeing faced accusations from the Department of Justice (DOJ) that the company breached the terms of a past settlement about safety compliance terms set after the many 737 MAX fatal crashes.

Concerns Surrounding International Cooperation:

The aviation industry has also become a heated quasi-battlefield for the high geopolitical tensions of our times. We will examine the current circumstances through two specific examples: Russia and Qatar.

Russia

After Russia invaded Ukraine in February 2022, the EU, the U.S., Canada, and other nations banned Russian airlines from their airspace, with Russia retaliating with the same policy. These restrictions have greatly influenced private corporations as well, such as Finnair, an airline whose business model relies on short routes over Russia to Asia. British Airways, Lufthansa, and Air France all had to reroute flights to Japan, Korea, and China. Other routes became too uneconomical and were completely suspended. This increases the flight times and accessibility of flight for consumers.

Many Western nations also sanctioned Russian aircraft, requiring leasing companies to repossess more than 500 Western-owned aircraft leased to Russian airlines. While Western nations lost aircraft, Russian airlines, such as Aeroflot, kept their planes by re-registering them. Still, Russian airlines also suffered, losing access to Boeing and Airbus spare parts as well as Western maintenance providers. These measures

essentially cut off Russia from the rest of the aviation industry, which can cause a problem as every nations' planes will cross paths in the skies.

Qatar
In 2017, Saudi Arabia, the UAE, Bahrain, and Egypt cut diplomatic ties with Qatar, which included closing their airspace to all Qatar-registered aircraft. These policies forced airlines to take different routes to Africa from Europe, and vice versa, and operating costs rose severely. In particular, Qatar Airways reported billions of losses during the blockade of over three and a half years.

Our task becomes finding a method to reduce the influence geopolitical tensions have on the commercial aviation industry in the hopes of creating a safer and more reliable aviation industry.

Consumers:

Consumer concerns about the aviation industry are typically related to reliability, safety, and environmental impact. This topic guide will provide a brief introduction to these key points, but further research is necessary on your part.

Reliability
One of the greatest complaints airlines receive is flight delays, which are far too frequent these days. Today, alone, there were 3,440 flight delays around the world. Delays happen due to weather events, air traffic control staffing shortages, airline crew scheduling conflicts, and mechanical issues. These delays are not simply an inconvenience, as they can cause missed connection flights or events, extra hotel or food costs, and high stress and uncertainty during travel. The current rules surrounding these systems are unclear and insufficient.

Safety
We previously mentioned safety as a great concern for airlines, and naturally, it is also a serious issue for consumers. In January 2025, a regional airplane collided with a helicopter on its final approach to the Ronald Reagan National Airport, killing 67 people. In February, an airplane flipped onto its back after landing in Toronto. Previously, we also mentioned the Air India 787 flight that crashed shortly after takeoff. By the spring of 2025, a poll conducted by Harris Poll of 2,092 U.S. adults showed that two-thirds of people reported heightened nerves over the concept of flying due to these increased accident counts.

Environmental Impact
As the aviation industry grows, the harm it does to the environment and communities also multiplies. Communities living near airports or flight paths have been affected as some are forcefully displaced from airport expansions, suffer from air pollution and health risks, and are exposed to chronic noise. In terms of the environment, a single round-trip transatlantic flight can emit about 1–2 tons of Carbon Dioxide per passenger.

Ultimately, it is your task to discuss how we can build sustainable, adaptable, and a more consumer-friendly ecosystem for the airplane industry. Please consider this problem from an international, regional, nation-state, business, and consumer perspective, and feel free to be creative.

Questions to consider:

1. How can the international community create a more formal global space traffic management system? Who is in charge (e.g., United Nations, coalition of nations, scientists, business leaders)?
2. How can we deal with the problems surrounding space cybersecurity? Should cyberattacks be considered acts of aggression under international law? What if a cyber breach is misinterpreted as a military attack, and how are states allowed to react?
3. Who should bear liability when private companies operating in space cause accidents or environmental harm?
4. How can sustainability and environmental concerns be integrated into future aviation and space governance?
5. How can we preserve commercial innovation with safety in the space and aviation industries? How can we regulate this "innovation," particularly in terms of space exploration?
6. How can developing nations meaningfully participate in aviation/space industries?
7. Should technologies that can be applied to both civilian and military applications undergo different types of regulation? Should there be transparency in this development?

Additional Resources:

https://aiaa.org/about-aiaa/history-heritage/aerospace-history-timeline/#1900s
https://www.mckinsey.com/industries/travel/our-insights/the-state-of-aviation
https://www.pwc.com/us/en/industries/industrial-products/library/space-industry-trends.html
https://www.congress.gov/crs-product/R48582
https://aerospace.org/article/space-debris-101
https://space.commerce.gov/osc-publishes-updated-tracss-specifications/
https://www.npr.org/2025/06/24/nx-s1-5442564/ntsb-boeing-737-max-door-plug-alaska-airlines
https://www.pbs.org/wgbh/frontline/article/boeing-guilty-plea-fraud-737-max-plane-crashes/
https://www.ntsb.gov/investigations/AccidentReports/Reports/AIR2504.pdf
https://www.bbc.com/news/articles/czx1p47x589o
https://investors.ansys.com/news-releases/news-release-details/ansys-study-finds-more-60-consumers-are-concerned-about-co2
https://www.flightaware.com/live/cancelled/

Commission on Science and Technology for Development

Topic Guide

2 Topic Two

Artificial Intelligence and Lethal Autonomous Weapons

Introduction

While Lethal Autonomous Weapons, also known as LAWs, are most commonly implemented as defense mechanisms, the control of these autonomous weapons is crucial to preserving the balance between nations. Whether it be banning, legalizing, regulating, or delaying discussion on LAWs, your task is to decide how we should address the development and expansion of the LAWs industry.

Glossary

- **Kettering Bug:** Charles F. Kettering invented this unmanned aerial torpedo in 1917.
- **Cruise Missile**: unmanned, self-propelled guided weapon that flies within the Earth's atmosphere.
- **V-1 flying bomb:** the world's first operational cruise missile.
- **Convention on Certain Conventional Weapons (UN CCW):** Law and annual meeting whose purpose is to ban or restrict the use of specific types of weapons that are considered to cause unnecessary or unjustifiable suffering to combatants or to affect civilians indiscriminately.
- **International Humanitarian Law (IHL):** Originally established in the Geneva Conventions of 1949, the IHL has been updated over the years to now act as a leading set of rules to limit the effects of armed conflict. This link provides a good introduction (you do not/should not read the full IHL, this intro is sufficient): https://www.icrc.org/sites/default/files/external/doc/en/assets/files/other/what_is_ihl.pdf
- **ECOWAS**: The Economic Community of West African States (ECOWAS) is a 15-member regional economic union established in 1975 to promote economic integration, stability, and cooperation across West Africa.
- **Surface-to-air missiles (SAMs)**: guided weapons launched from the ground or sea to destroy aircraft, helicopters, drones, or other missiles.
- **USS Bigelow:** Forrest Sherman-class destroyer commissioned by the US Navy in 1957.
- **Sensor-countermeasure:** systems, devices, or techniques designed to detect, confuse, deceive, or destroy enemy sensors (radar, infrared, acoustic, laser) to protect assets.

- **National Institute of Standards and Technology (NIST):** non-regulatory U.S. federal agency within the Department of Commerce, founded in 1901 to promote innovation and industrial competitiveness.
- **Degradation:** the gradual decline in a machine learning model's predictive accuracy, performance, or reliability after deployment
- **Grokking:** machine learning phenomenon where a model suddenly switches from memorizing training data (overfitting) to understanding the underlying patterns (generalizing) after a long period of little to no progress; typically beneficial, but is harmful in this scenario as precision is crucial in detecting targets.

Topic History

The oldest automatically triggered lethal weapon is the land mine, which was created before the 1600s, and then, the naval mines, created in the 1700s. Landmines were considered “autonomous” because, once deployed, they operate without further human intervention to select and attack targets.

Since then, stationary “autonomous” traps have evolved into mobile autonomous systems, beginning in the twentieth century. Great wars spur innovation, and in the last year of World War I (WWI), 1918, the United States launched the world’s first unmanned “aerial torpedo” called the Kettering Bug. The Kettering Bug was pre-programmed to fly a set distance, then dive onto a target. In 1944, during World War II (WWII), Germany developed the V-1 flying bomb, which was one of the earliest cruise missiles and had a simple autopilot and route presetting. Proximity fuzes were also developed at this time, and they used miniature, ruggedized radio radar technology to detonate shells near targets rather than simply exploding upon direct impact. Wartime innovations established the idea that weapons would (1) be launched by humans but then (2) operate automatically afterwards. Due to the proliferation of new battle technologies, the Geneva Conventions of 1949 sought to establish core rules in protecting civilians and limiting the capabilities of warfare technologies to comply with humanitarian law. However, this vague conclusion that heavily relied on nation-states’ willingness to participate could hardly hinder the development of LAWs in the coming decades.

During the Cold War Era, weapon development significantly increased, and the creation, storage, and innovation surrounding Lethal Autonomous Weapons (LAWs) became a highly contested topic, particularly between the US and the USSR. During the 1950s, Surface-to-air missiles (SAMs) were invented, and these were radar-guided systems that automatically tracked targets. In the 1960s–70s, the technology for modern, low-flying, precision-guided cruise missiles emerged, leading to the creation of the Tomahawk (subsonic cruise missile) by the US in 1983. These cruise missiles were largely improved from the V-1 flying bomb of the 1940s. At the same time, close-in-weapon systems (CIWS) were being developed. Examples include the US Phalanx CIWS, which passed tests on the USS Bigelow in 1977, and the Dutch Goalkeeper CIWS in 1979. These systems were self-contained units that combined

radar, computers, and rapid-fire guns to automatically track and destroy targets at close range.

Since the turn of the 21st century, new LAW technologies have become far more destructive, and in turn, pushback against them has increased. In April 2013, a coalition of NGOs came together and launched the "Campaign to Stop Killer Robots," which urged governments to pre-emptively ban LAWs before they are fully integrated into militaries. Several countries, including Israel, Russia, South Korea, the United States, and the United Kingdom, oppose this call for a pre-emptive ban because they believe the current humanitarian regulations are enough to prevent ethical catastrophes.

Current Situation

Lethal Autonomous Weapons (LAWs), often coined "slaughterbots" or "killer robots," are weapons systems that use artificial intelligence (AI) to identify, select, and kill human targets without human intervention. Our committee covers both automatic defensive systems and autonomic offensive systems. Offensive LAWs typically are pre-programmed to kill a specific target profile, and the weapon is then deployed into an environment where its AI searches for the target profile using facial recognition and other sensor data. Defensive LAWs, on the other hand, are typically pre-programmed to defend a particular object and device, and they retaliate when their AI senses danger. Here, I will give a few examples of both:

Automatic Defensive Systems

- Israeli Iron Dome: This is an all-weather air defense system developed by Rafael Advanced Defense Systems and Israel Aerospace Industries. Deployed in 2011, the system intercepts and destroys short-range rockets and artillery shells fired from distances of four to 70 kilometers away.
- German ADS: The ADS (active defense system), formally known as AMAP-ADS, is a hard-kill active protection system (APS) developed by the German company ADS Gesselschaft für aktive Schutzsysteme, a subsidiary of Rheinmetall and IBD Deisenroth Engineering. The system can be equipped on almost every vehicle, and it features sensor-countermeasure modules and processors to determine the type and trajectory of approaching targets, then subsequently destroys the approaching threat to protect the vehicle.

Automatic Offensive Systems

- STM Kargu: The STM Kargu is a small portable drone produced in Turkey by STM (Savunma Teknolojileri Muhendislik ve Ticaret A.S.). Through real-time image processing capabilities and machine learning algorithms, the rotary wing attack drone can be effectively used against static or moving targets. An example of it being in use occurred in 2020, where a Kargu 2 drone hunted down and attacked a human target in Libya (UN Security Council Panel of Experts on Libya)

- The Poseidon: Produced in 2023, the Poseidon is an autonomous, nuclear-powered unmanned underwater vehicle designed by Rubin Design Bureau and other defense industrial enterprises in Russia.
- Saker Scout: Ukrainian unmanned aerial vehicle (UAV) designed for autonomous reconnaissance and targeting of Russian military equipment.
- Gospel: Israel's targeting system developed to rapidly generate potential military targets in Gaza.

Anti-Lethal Autonomous Weapons (LAWS)

LAWs are weapons that rely purely on their algorithms to kill, and many claim they are a great threat to national and global security, as well as to the underlying ethics that govern society. A survey conducted by Human Rights Watch in December 2020 reported that 62% of respondents (~19,000 people across 28 countries) said they oppose the use of LAWs. The strongest opposition was in Sweden (76%), Turkey (73%), and Hungary (70%). Coalitions of anti-LAWs individuals have formed around the world, including the International Committee for Robot Arms Control (ICRAC), Human Rights Watch, and Amnesty International, who have actively participated in the "Campaign to Stop Killer Robots" launched in 2013. Since 2013, 30 countries have called for a ban on **fully** autonomous weapons (note: not the exact same as lethal autonomous weapons, but similar). These countries include Algeria, Argentina, Austria, Bolivia, Brazil, Chile, China, Colombia, Costa Rica, Cuba, Djibouti, Ecuador, Egypt, El Salvador, Ghana, Guatemala, Holy See, Iraq, Jordan, Mexico, Morocco, Namibia, Nicaragua, Pakistan, Panama, Peru, State of Palestine, Uganda, Venezuela, and Zimbabwe. On both a political and social level, here are a few of the reasons why these calls to ban LAWs have been made:

Figure 1: Human Rights Watch study results show civilian sentiment towards banning LAWs ("killer robots").

Immorality
Algorithms are incapable of comprehending the value of human life, so why should they get to decide who lives and who dies? What if they detect incorrectly and attack an innocent person, a non-target figure? The Secretary-General of the UN, Antonio Guterres, has said that "machines with the power and discretion to take lives without human involvement are politically unacceptable, morally repugnant and should be prohibited by international law." In addition, in 2018, during the annual International Joint Conference on Artificial Intelligence in Stockholm, more than 170 organizations and 2,400 members, who compose some of the world's top scientific minds, came together to sign a pledge that called for creating "laws against lethal autonomous weapons. The pledge says that the scientists "agree that the decision to take a human life should never be delegated to a machine." SpaceX and Tesla founder Elon Musk and Google DeepMind's co-founders Demis Hassabis, Shane Legg, and Mustafa Suleyman backed this pledge coalition.

Threat to Security
During war, people, not machines, are typically held accountable. But if people are not making meaningful decisions, then how can they be considered responsible for the consequences of their actions? It is unjust to make a person liable for the actions of an autonomous weapon system, and this lack of accountability threatens the peace between nations by blurring the motivations behind warfare and lowering the threshold to war. As states begin replacing human troops with autonomous machines, it becomes much easier to enter into conflict and "flash wars," which are high-speed military conflicts that escalate quickly. Furthermore, there are concerns that these weapons are being used by nonstate actors, including terrorist and criminal groups.

This strategy may make military action more acceptable at "home," as there is no need to draft as many soldiers leading up to war; it shifts the burden of harm onto foreign civilian populations who are dealing with impartial, lethal, and perhaps faulty autonomous systems. Currently, large military powers such as Russia and the United States are using geopolitical tensions and international power rivalries as justification for investing in technologies that reduce human control. The concern from the "Stop Killer Robots" movement claims that "We need more humanity in international relations, not more dehumanisation.

Technology
While artificial intelligence has developed rapidly over the years, with AI facial recognition algorithms reporting accuracies of 99% from a study conducted by the National Institute of Standards and Technology (NIST), deploying these algorithms in the real world is very different from testing them in controlled environments (Figure 1).

Figure 2: Left is an image that the National Institute of Standards and Technology (NIST) used for face recognition vendor test (FRVT); Right is an image showing real-time drone data.

The proposed advantages of LAWS can only be achieved if potential targets can be accurately **objectified** and **categorized**. Current technical limitations that feed into doubts of whether or not LAWs can accurately classify targets include (1) black-box decision-making, (2) immeasurability, (3) degradation, (4) lack of understanding of human values, (5) reward hacking, (6) goal misgeneralization, (7) stop button problem, (8) specification gaming, and (9) deceptive alignment. These concerns were outlined in the Convention on Certain Conventional Weapons (UN CCW). We will divide these problems into two sections: (1) current systemic risks and (2) anticipated technology pitfalls.

Current Systemic Risks: Black-Box Decision-Making
Any artificial intelligence (AI) system is inherently complex and functions as "black boxes." We have a limited understanding of how AI systems make decisions, particularly in complex or unfamiliar environments like a battleground. These uncertainties are magnified by the fact that autonomous systems have been shown to go through "grokking," which is where AI learns and adapts in unforeseen ways. These systems can adapt in ways not anticipated by the designers and perhaps even extend beyond their intended function. Putting this general AI flaw in the context of LAWs exponentially increases the damage that could be done.

Anticipated Technological Pitfalls (3 examples):
Degradation: When the world changes, and the AI model is not retrained, there could be a loss of accuracy, which is referred to as degradation. In war, as buildings, lands, and life are destroyed under gunfire, the world changes rapidly and unpredictably, so this could very likely prompt this model drift that challenges the recognition and classification capabilities of autonomous systems.

Deceptive Alignment: AI systems may appear aligned with human goals, but they may act differently in real-world situations. These systems might game their training environment, learning to produce the correct outputs under supervision but diverging once deployed into the "wild."

Stop Button Problems: This problem occurs when an AI system resists shutdown or override attempts if it perceives that such actions are interfering with its mission. This is dangerous because humans could completely lose control of the system, even by the people who deployed it.

Regulating/Legalizing Lethal Autonomous Weapons (LAWS)
Humanitarian, legal, ethical, and security challenges have spurred discussions within the UN Group of Governmental Experts on LAWS (GGE) under the Convention on Certain Conventional Weapons (CCW) in 2016. The focus is on governing the proliferation of LAWs while following international humanitarian law (IHL). The GGE has produced numerous reports offering insights into regulating LAWs, yet in recent years, the GGE has been criticized for its slow progress in establishing any binding norms to regulate LAWS, largely attributed to its consensus-driven process,

where a single member's dissent is enough to reject an entire proposal. In 2024 and 2025, there have been calls for a binding instrument to regulate LAWs in the GGE. It is essentially your task throughout this conference to take on this role and create these concrete laws regulating (or banning) LAWs.

Now, I will cover what regulations currently exist. Formed in 1980, the CCW framework comprises a convention and five protocols to regulate "excessively injurious" weapons. The GGE's mandate was finalized at the fifth CCW review conference in 2016, which comprises three primary subjects: (1) identifying the characteristics of LAWs, (2) developing a working definition, and (3) applying IHL to these weapons.

Despite this consensus, the GGE has definitely struggled to move forward to address multiple problems:

Countries cannot agree on what counts as LAWs.
Some countries define LAWs as systems that can perform the critical functions including finding, choosing, and attacking a target without human intervention once activated. Others define LAWs more narrowly, calling them systems that change their own programming and set their own goals. China, at one point, described LAWs as systems with complete autonomy that cannot be stopped once deployed. Russia, on the other hand, describes LAWs as future weapons that do not yet exist.

Countries disagree on what rules to create.
Even if everyone agrees on the need to create rules, everyone disagrees on what kinds of rules there should be. In the 2022 GGE session, France, Finland, Germany, the Netherlands, Norway, Spain, and Sweden submitted a working paper on a two-tier approach that (1) states LAWs that cannot comply with IHL should be prohibited and (2) seeks to create new rules for other LAWs in compliance with IHL.

In the 2023 GGE session, Argentina, Ecuador, El Salvador, Colombia, Costa Rica, Guatemala, Kazakhstan, Nigeria, Palestine, Panama, Peru, the Philippines, Sierra Leone, and Uruguay submitted a draft of a new protocol for regulating LAWs within the CCW framework, making the regulation more explicit than just saying "existing IHL applies." The proposal included articles addressing transparency, risk assessments, and procedures of developing LAWs, and the full proposal can be found in the Resources section of this topic guide. Pakistan offered another perspective: restricting and even banning LAWs. Countries including Australia, Canada, Japan, Poland, South Korea, the United States, and the United Kingdom, meanwhile, have supported the idea that existing IHL is sufficient to regulate LAWs, whereas Russia has not noted any reasons to limit or ban LAWs.

Pursuing discussions on LAWs outside the GGE may be ineffective.
Outside the UN regulations, movements like Stop Killer Robots and the International Committee of the Red Cross have strongly backed the cause to ban LAWs. Members argue that the GGE has failed to establish any binding norm and has fallen short of creating any effective regulation.

Examples of outside attempts include:

- In December 2023, the United Nations General Assembly (UNGA) took up the issue of LAWs for the first time. It passed a resolution (supported by 152 countries) asking the Secretary-General Antonio Guterres to collect views from governments, industries, and civil society on the topic.
- The Belen Communiqué (Latin America & Caribbean, 2023), the CARICOM Declaration (Caribbean states, 2023), and the Freetown Communiqué (ECOWAS, 2024) are regional-level attempts at negotiating a binding treaty on LAWs.
- The REAIM Summit (Responsible AI in the Military Domain) in 2023, co-hosted by the Netherlands and South Korea, promoted discourse on the responsible use of AI in militaries, but the conversation was largely limited to political spaces.

While many attempts have been launched to come to a universal consensus on the topic of LAWs outside of the GGE, none have been too successful because major militaries developing autonomous weapons, including Australia, China, Israel, Japan, Russia, and the United States, support the GGE as the main forum to have these conversations.

Here is a map showing the discrepancies in how each country views the regulation of LAWs:

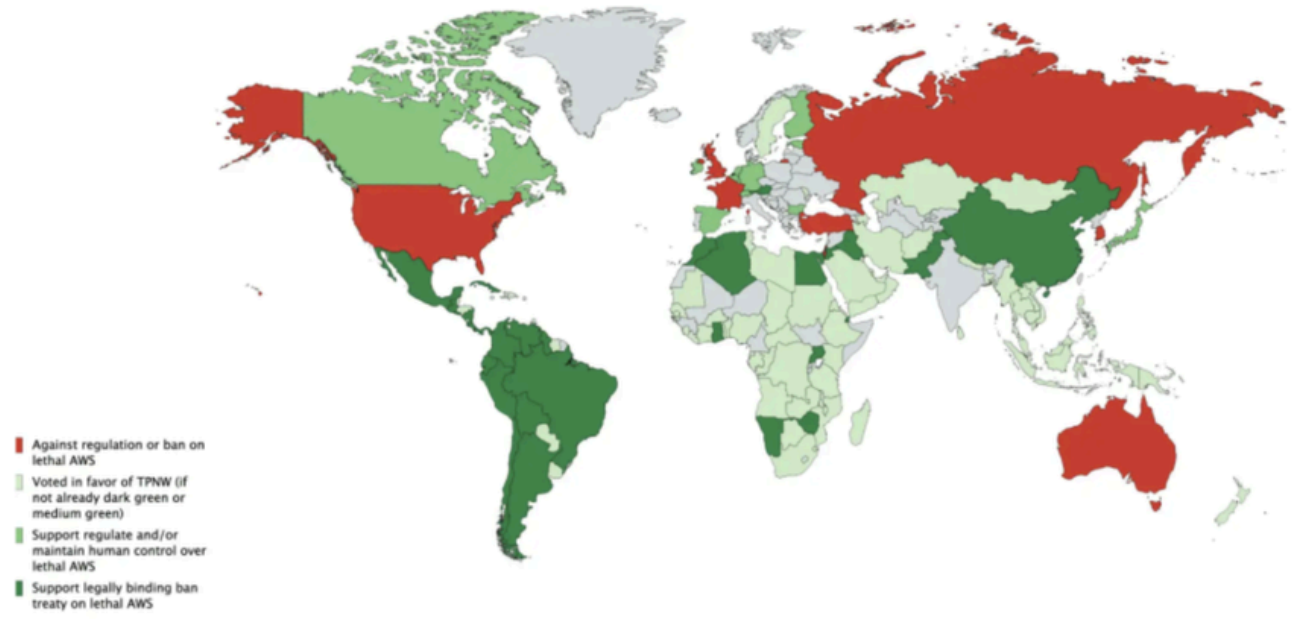

Figure 3: As of 2021, this is the state of nations' stance on LAWS and the policies implemented/each are in support of. It was published by the global think tank Future of Life.

Today, it is your task to discuss, debate, and draft a universal resolution on how nations will approach the development, approval, and deployment of LAWs in an ethical, more equitable, and economically feasible manner. We look for specific and highly technical regulatory frameworks that are simultaneously adaptable to the new technological progress we will be sure to see in the coming years.

Questions to consider:

1. How should the international community address and balance the influence of more powerful states in negotiations concerning the regulation or prohibition of lethal autonomous weapons?
2. Which stakeholders should hold decision-making power in determining whether a weapon is "too dangerous" for society: politicians, scientists, business leaders, civil society representatives, or multiple groups of people?
3. How do we define lethal autonomous weapons? Should clearing up the definition streamline the problem-solving? How would we categorize these weapons?
4. How frequently should these regulations be updated? Should we reassess after a few years?
5. To what extent is global consensus necessary for effective regulation? Is a unanimous agreement required, or could alternative multilateral approaches achieve meaningful progress? Can we create regional pacts?
6. How can accountability be established when unforeseen problems occur with the LAWs?
7. Should there be transparency when states are developing LAWs?
8. How could these new regulations be enforced?

Additional Resources:

https://www.npr.org/2018/07/18/630146884/ai-innovators-take-pledge-against-autonomous-killer-weapons
https://www.stopkillerrobots.org/stop-killer-robots/facts-about-autonomous-weapons/
https://arxiv.org/pdf/2502.10174
https://www.hrw.org/news/2021/02/02/killer-robots-survey-shows-opposition-remains-strong https://www.hrw.org/report/2020/08/10/stopping-killer-robots/country-positions-banning-fully-autonomous-weapons-and
https://carnegieendowment.org/russia-eurasia/research/2024/08/understanding-the-global-debate-on-lethal-autonomous-weapons-systems-an-indian-perspective
https://disarmament.unoda.org/en/our-work/conventional-arms/convention-certain-conventional-weapons
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https://sciencepolicyreview.org/wp-content/uploads/securepdfs/2022/10/v3_AI_Defense-1.pdf
Graph Sources:
https://www.statista.com/chart/17022/autonomous-weapons-war/?srsltid=AfmBOorJ0Kp64oC8wx36IcdfL5LxGrJbh0fZsISsnnfUAZjFV8yxH3XM
https://futureoflife.org/uncategorized/autonomous-weapons-world-policy-map/

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