Main Model United Nations Conference
Frankfurt am Main, Germany
22nd Session
26th of February to 1st of March 2026

Daring Democracy

Background Guide

Commission on Science and Technology for Development

Written by: Alesia Babich, Nicolas Geschwinde and Ahmed Taha El Gourch

www.mainmun.de

1. Introduction

Honorable Delegates,

We are delighted to welcome you to the Commission on Science and Technology for Development (CSTD) at the 22nd edition of MainMUN, held in Frankfurt am Main, Germany, from the 26th of February to the 01st of March 2026, under the bold and timely theme: ***"Daring Democracy."***

Over four days of immersive diplomacy, critical reflection, and spirited debate, the CSTD will serve as a platform for you to explore how science and technology intersect with democratic governance, development, and global cooperation. In an era defined by rapid innovation and shifting power dynamics, the CSTD challenges delegates to think critically about how emerging technologies can strengthen democracy, foster inclusion, and address humanity's most urgent challenges, from disaster response to sustainable development.

This committee stands at the crossroads of progress and responsibility: it is where ideas meet ethics and where the next generation of leaders envisions a future in which technological advancement serves people, not the other way around.

Now, allow us to introduce ourselves :

Hello everyone! My name is Ahmed Taha, and I am honored to serve as one of your CSTD Chairs for MainMUN 2026. My academic and professional interests lie at the intersection of digital innovation, governance, and international cooperation. Having participated in several MUN conferences, I've learned that diplomacy and technology share a common essence; both seek to connect people and solve problems across borders. Outside MUN, I enjoy design, communication, and exploring new tech trends. I'm thrilled to meet all of you and to chair discussions that promise to be as thought-provoking as they are inspiring.

Dear delegates, I am honoured to welcome you to MainMUN 2026! My name is Alesia Babich, and I am delighted to serve as your Chair for the CSTD. As this is a beginner committee, I am thrilled your Model United Nations journey is starting in Frankfurt, just as mine did at MainMUN 2024. Since then, I have participated in conferences in Karlsruhe, Gießen, Geneva, and New York. After extensive experience as a delegate, I am excited to step into the role of Chair for the first time. I am 23 and studying Sociology and Political Science at Goethe University, with interests in international relations, finance, and technology. I look forward to seeing your cooperation, expertise, and passion in what I'm sure will be a weekend of thoughtful debates!

I'm Nicolas, and together with my co-chairs, I have the honor of chairing the UNCSTD, a commission I've always wanted to chair. I'm 26 years old and in the midst of my master's in International Peace and Conflict Studies at Goethe University.

Furthermore, I started my MUN journey here in Frankfurt and have been a member of my university's delegation to NMUN many times, as well as organizing our very own home conference, MainMUN. I've taken up a lot of positions at MUNs, but what always keeps me coming back for more is chairing. I'm eager to add yet another exciting chairing experience with you and can't wait to get started!

We look forward to witnessing your creativity, negotiation skills, and bold ideas as you collaborate to craft solutions that bridge digital divides and promote equitable access to innovation.

Warm regards,

Ahmed, Nicolas, and Alesia

2. The Commission on Science and Technology for Development (CSTD)

2.1. Overview

The United Nations Commission on Science and Technology for Development (CSTD) serves as the primary UN forum for dialogue and cooperation on how science, technology, and innovation **(STI)** can drive sustainable development. It brings together governments, experts, and stakeholders to discuss new trends, challenges, and opportunities at the frontier of technology, ensuring that scientific progress benefits all nations equitably.

The CSTD explores key questions such as:

- How can we use technology to advance sustainable and democratic development?
- How do we govern and ethically apply emerging innovations, from artificial intelligence and biotechnology to data analytics and the Internet of Things?
- How can developing countries be empowered to bridge the digital divide and benefit from technological transformation?

2.2. Historical Background

The roots of the CSTD trace back to the United Nations Conference on Science and Technology for Development, held in Vienna in 1979 (UNGA 34th session, Agenda item 70. 1979), where an Intergovernmental Committee on Science and Technology for Development was first established.

Recognizing the growing importance of science and technology in global policymaking, the UN General Assembly, in 1992, transformed this committee into a functional commission of the Economic and Social Council (ECOSOC), thus creating the CSTD.

The Commission held its first session in April 1993 in New York, and since then, the United Nations Conference on Trade and Development (UNCTAD) has hosted its secretariat in Geneva, Switzerland.

2.3. Mandate and Role

The CSTD's mandate is to provide high-level policy advice and analysis on science, technology, and innovation to:

- Guide the future work of the United Nations and ECOSOC
- Develop common policies among member states
- Recommend actions that ensure the inclusive and ethical use of technology for development.

Each year, the Commission identifies two priority themes. For example, the 28th session (2025) focuses on:

Diversifying economies in a world of accelerated digitalization, and

Technology foresight and assessment for sustainable development.

Beyond these themes, the CSTD reviews progress on global frameworks such as the **World Summit on the Information Society (WSIS)** and the implementation of the 2030 Agenda for Sustainable Development.

2.4. Structure and Stakeholders

The CSTD is composed of 43 member states, elected by ECOSOC for four-year terms, representing all geographic regions. However, its deliberations extend well beyond governments; the Commission actively engages with civil society, academia, private sector actors, and other UN entities such as UNESCO, ITU, and the Commission on the Status of Women.

This multi-stakeholder structure allows for dynamic exchanges and collaborations that reflect real-world diversity in innovation and governance. The CSTD thus acts as a bridge between policy and practice, translating technical insight into inclusive global strategies.

2.5. Functions and Impact

The Commission acts as a platform for policy dialogue, foresight, and coordination among member states, international organizations, and non-governmental actors. It helps map global trends in science and technology, share best practices, and promote collaboration among countries and regions.

Its discussions often touch upon normative and ethical issues related to data governance, digital rights, frontier technologies, and capacity-building for developing countries. The CSTD also assists in identifying technological solutions that can accelerate progress toward the **Sustainable Development Goals (SDGs)**.

The Commission's impact lies not only in shaping policy but also in bridging divides between innovation and inclusion, between global North and South, and between rapid progress and responsible governance.

2.6. Relevance Today

In a time when technology evolves faster than policy, the CSTD serves as the ethical compass and policy laboratory of the United Nations. It identifies emerging challenges, such as data privacy, algorithmic bias, or unequal access to digital infrastructure, and works toward frameworks that promote fairness, transparency, and shared benefit.

The Commission's discussions and reports have informed key international dialogues on artificial intelligence governance, data sharing for development, and innovation-driven recovery following global crises.

Its guiding mission remains clear:

Science and technology must serve humanity, ensuring that innovation empowers rather than excludes.

3. Topic I: Enhancing Global and Regional Cooperation in Data and Technology Sharing for Effective Humanitarian and Disaster Response

3.1 Introduction

In an increasingly interconnected world, the speed at which information travels can determine whether a humanitarian operation succeeds or fails. From earthquakes and floods to pandemics and armed conflicts, the ability to collect, analyze, and share data in real time has become a central pillar of effective humanitarian and disaster response. According to the United Nations Office for Disaster Risk Reduction (UNDRR) (Mizutori and Guha-Sapir, 2019), the number of recorded disasters has more than tripled since the 1980s, driven by climate change, urbanization, and complex emergencies. In this context, data and technology cooperation is no longer a luxury; it is an operational and ethical necessity.

The global response to major crises has shown both the potential and the shortcomings of technological collaboration. During the 2014 Ebola outbreak, digital contact-tracing and SMS awareness systems helped local authorities contain contagion in some West African regions. In contrast, during the 2023 Sudan humanitarian crisis, incompatible data platforms and security concerns prevented humanitarian agencies from coordinating effectively, leading to duplicated efforts and delayed delivery of aid. These contrasts illustrate the urgent need for shared standards and trust frameworks that allow responders to exchange critical information securely and swiftly.

Modern humanitarian response depends on a wide array of data types: geospatial imagery, biometric registries, logistics information, health statistics, and more. Yet, data silos persist among UN agencies, national authorities, NGOs, and private partners. Each actor often uses different formats, collection tools, and privacy protocols. The result is a fragmented ecosystem in which valuable information remains locked within institutions, hindering situational awareness and reducing the effectiveness of aid distribution. Technical incompatibilities are compounded by political and ethical barriers: some governments restrict data sharing across borders for national-security reasons, while others lack the infrastructure to safeguard the personal data of vulnerable populations.

At the heart of this issue lies a tension between speed and responsibility. The faster data moves, the greater the potential risk of misuse, breaches, or loss of public trust. Delegates in this committee must therefore grapple with a double imperative: first, to enable seamless technological interoperability among humanitarian actors; and second, to establish ethical and legal safeguards that protect privacy and human rights in times of crisis. Achieving both simultaneously is a challenge that demands international cooperation, capacity-building, and transparent governance.

The Commission on Science and Technology for Development (CSTD), as the United Nations' principal forum on the relationship between innovation and development, is uniquely positioned to lead this discussion. It can facilitate coordination between states, promote equitable access to technological resources, and encourage the adoption of open yet secure data systems. Furthermore, the CSTD's cross-cutting mandate allows it to bridge the gap between policy dialogue and practical implementation, connecting humanitarian actors with experts in data science, cybersecurity, and information ethics.

As disasters grow in scale and complexity, the question is no longer whether data and technology should be shared, but how they can be shared effectively, ethically, and inclusively. Strengthening global and regional cooperation in this domain will determine how resilient our societies can become in the face of future crises. Delegates are thus invited to consider innovative solutions that address both the technological dimension, creating interoperable systems and open standards, yet respecting the human dimension, building trust, accountability, and respect for the dignity of those whose data is collected. The answers forged in this committee could shape the next generation of humanitarian coordination and reaffirm the UN's commitment to ensuring that technological progress serves humanity above all else.

3.2 Developing Ethical Frameworks for Sensitive Data in Crises

Key Challenge: Trust

In every humanitarian crisis, data is a lifeline. Whether it is the biometric registration of displaced populations, the GPS coordinates of aid convoys, or health records collected during a pandemic, data enables coordination, accountability, and precision. Yet, the very same information that helps save lives can also put lives at risk if mishandled. The challenge of building trust between affected populations, humanitarian actors, and governments lies at the heart of developing ethical frameworks for crisis data.

During emergencies, vulnerable communities are often asked to share deeply personal details under stressful circumstances. When an earthquake destroys homes or when war displaces thousands, people provide information about their identity, location, family, and medical status to receive assistance. This data can later be misused intentionally or inadvertently by authorities, private contractors, or even hostile actors. The Rohingya refugee crisis in Bangladesh illustrated this danger vividly: biometric data collected by international agencies for aid distribution was reportedly shared with the government of Myanmar, raising fears of surveillance and persecution upon refugees' potential return. Such incidents undermine humanitarian neutrality and make communities hesitant to engage with relief organizations in future emergencies.

The lack of a coherent, global standard for data ethics in humanitarian action has created significant disparities in protection and accountability. While the European Union's General Data Protection Regulation (GDPR) has influenced many international norms, it is not designed for crisis contexts. Humanitarian operations often involve multiple jurisdictions, temporary infrastructures, and rapidly changing conditions. What is needed is a flexible yet principled framework, one that can adapt to the urgency of disaster response without compromising on human rights or dignity.

In response to these challenges, several initiatives have emerged. The UN Office for the Coordination of Humanitarian Affairs (OCHA) introduced its Data Responsibility Guidelines (2021) (OCHA Center for Humanitarian Data, 2021), establishing core principles such as *"do not harm,"* informed consent, and context sensitivity. The International Committee of the Red Cross (ICRC) has been at the forefront of calling for a form of *"Digital Humanitarian Law"* arguing that the protection afforded to civilians in armed conflict must extend to their digital data.

The UN Secretary-General's Roadmap for Digital Cooperation (2020) (United Nations Secretary-General ,(A/74/821), 2020) also envisions a global digital compact, where human rights are embedded into every stage of technology governance. Yet despite these efforts, implementation remains fragmented and often limited to well-resourced organizations.

The trust deficit remains a major obstacle. Many governments hesitate to share crisis-related data across borders due to fears of espionage, reputational risk, or loss of control. Meanwhile, local populations typically distrust humanitarian organizations, particularly when foreign actors collect their data using opaque or foreign-designed systems. Restoring this trust requires both transparency and participation. Affected communities must have a voice in determining what data is collected, how it is stored, and who can access it. Ethical data management is not merely a technical process; it is a question of power and consent.

Another layer of complexity comes from the involvement of private technology companies. Increasingly, humanitarian agencies partner with firms that provide cloud storage, satellite imagery, and data analytics. While these collaborations bring technical expertise, they also introduce new ethical risks. For instance, commercial vendors may retain control of servers or algorithms used in crisis zones, raising questions about ownership, liability, and profit motives. Without clear ethical standards, humanitarian data can easily become another commodity. The CSTD can play a pivotal role in promoting responsible partnerships, ensuring that technological innovation aligns with humanitarian principles rather than market incentives.

To build an ethical framework that fosters trust, three key dimensions must be addressed:

1. Normative clarity: Establishing a globally recognized set of ethical principles for data collection and use in emergencies, possibly codified under UN guidance or through the CSTD's policy recommendations.

2. Institutional accountability: Creating oversight mechanisms such as independent review boards that monitor data practices during and after crises.

3. Capacity-building: Assisting developing countries and local NGOs in building secure digital infrastructures and training staff in data ethics, privacy law, and cybersecurity.

Such measures would prevent abuse and enhance international cooperation. When states and organizations trust one another's data practices, they are more likely to share information promptly and accurately during crises. Ethical integrity thus becomes an enabler of effectiveness, not an obstacle to it.

Delegates in the CSTD should consider how to integrate these ethical frameworks into a global strategy that transcends regional regulations. Should the UN adopt a "Humanitarian Data Charter" defining universal principles for data responsibility? Should states agree on an international protocol that limits data exploitation in crisis contexts? How can technology companies be incentivized to uphold these standards?

Ultimately, the credibility of humanitarian action depends on trust. Without it, even the most advanced data systems will fail to protect those they are meant to serve. The challenge before the CSTD is to help ensure that the digital transformation of humanitarian work upholds the oldest humanitarian value of all: the protection of human dignity.

3.3 Building Interoperable Early-Warning and Response Systems

Key Challenge: Technology

When disaster strikes, every second counts. The speed and accuracy of an early-warning system **(EWS)** can determine whether an at-risk community has time to evacuate or not. The United Nations estimates that early-warning systems could reduce disaster-related losses by up to 30%, yet more than half of the world's countries still lack adequate coverage. While the technology to detect hazards has advanced rapidly, the systems that should connect these tools across governments, regions, and institutions often fail to "speak" the same digital language. This problem of interoperability is one of the central barriers to effective global and regional disaster response.

Humanitarian data comes from diverse sources: national meteorological offices, UN agencies, NGOs, military logistics units, private-sector satellites, and increasingly from citizens themselves through mobile applications or social media. Each entity may use distinct software, data formats, and security protocols. When a tropical cyclone forms in the Indian Ocean, for instance, the World Meteorological Organization (WMO) may issue alerts through its Global Telecommunication System. Regional centers such as the Indian Ocean Tsunami Warning System (IOTWS) or national agencies like Indonesia's BMKG use different platforms. If these systems are not aligned, warnings risk being delayed, misinterpreted, or never reaching local responders at all.

The CSTD's examination of interoperability must therefore begin with the recognition that technology is not neutral; it reflects the infrastructure, policies, and priorities of its creators. High-income states often possess sophisticated early-warning tools, satellite networks, and predictive models, while developing countries struggle with outdated sensors or unreliable internet connectivity. As a result, technological inequality becomes a humanitarian inequality. Bridging this gap requires not only data sharing but also technology transfer, training, and investment in local capacities.

3.3.1 Standardization and Open Data

To achieve interoperability, technical standardization is essential. The Sendai Framework for Disaster Risk Reduction (2015–2030) emphasizes the need for "multi-hazard early-warning systems" that integrate local, national, and global networks. **The WMO's Unified Data Policy (2021)** (World Meteorological Organization, 2021) is a landmark effort to make meteorological and climate data openly available, ensuring that countries with limited resources can still access vital information. However, compliance remains voluntary, and disparities in data quality persist. Moreover, open data alone is not sufficient; countries must have the digital literacy and analytical tools to interpret and act on it.

Open-source technologies offer promising solutions. Platforms like **OpenStreetMap** and the **Humanitarian OpenStreetMap Team (HOT)** allow volunteers worldwide to map affected areas within hours, improving logistics and situational awareness. These initiatives demonstrate how community-driven, transparent technologies can complement official systems. The challenge is to integrate them into formal response mechanisms without compromising data accuracy or security.

3.3.2 Public-Private Partnerships

Private technology companies increasingly play a crucial role in early-warning efforts. Telecommunications providers transmit emergency alerts; satellite companies offer high-resolution imagery; and tech giants like Google and Microsoft deploy artificial-intelligence models to predict floods or wildfires. **The Google Flood Forecasting Initiative**, for instance, now covers much of South Asia and Sub-Saharan Africa, providing early alerts via mobile phones. However, dependence on private infrastructure raises governance questions: Who owns the data? What happens when commercial interests conflict with humanitarian imperatives? Ensuring that partnerships are guided by transparent contracts, open standards, and clear accountability is vital to preserving the humanitarian purpose of these technologies.

3.3.3 Regional and Local Integration

Regional organizations have demonstrated how shared systems can strengthen preparedness. **The European Union's Copernicus Emergency Management Service** integrates satellite data across member states to support rapid mapping during floods and forest fires. In Africa, the **Climate Prediction and Applications Centre (ICPAC)** provides climate information services to 11 countries in the Greater Horn of Africa, enabling coordinated drought response. Yet, these success stories highlight a global imbalance; similar networks are rare in the Global South due to funding and institutional constraints.

At the local level, the sustainability of early-warning systems depends on community engagement. Technology must be accessible and understandable to those it aims to protect. A satellite alert or automated message is of little use if people on the ground do not trust it or cannot interpret it. Integrating indigenous knowledge and local communication channels, such as radio networks or community leaders, can ensure that warnings translate into action.

3.3.4 Artificial Intelligence and Future Trends

Emerging technologies are redefining disaster forecasting. Machine-learning models can analyze decades of climate data to predict hazards with unprecedented accuracy. Drones and IoT sensors provide real-time imagery and environmental data, while blockchain systems can secure information sharing among humanitarian partners.

The Internet of Things (IoT) refers to networks of interconnected physical devices, such as weather stations, water-level gauges, mobile phones, air-quality sensors, and even agricultural equipment, embedded with sensors and connected to the internet. These devices continuously collect, transmit, and sometimes analyze environmental data without the need for human input.

With the emergence of the Internet of Things (IoT), disaster management is undergoing a real revolution. These technologies enable **hyper-local and real-time** monitoring of conditions on the ground and security systems. At the heart of this evolution, connectivity solutions linked to connected sensors play an essential role in collecting valuable data and continuously monitoring the performance of security systems. Thanks to the IoT, risk management is becoming more proactive, efficient, and responsive, ensuring optimal protection for risk zones and occupants, allowing authorities and humanitarian actors to issue faster, more accurate alerts and allocate resources with greater precision.

Yet these tools also raise concerns about algorithmic bias, data ownership, and the risk of digital dependency. Delegates must weigh the benefits of innovation against the need for transparency and inclusivity.

3.3.5 Toward Global Interoperability

To move forward, the CSTD could encourage the creation of a UN-endorsed global platform that consolidates standards and promotes interoperability between humanitarian and governmental systems. Such an initiative might draw from existing networks like the **Global Multi-Hazard Alert System (GMAS)**, coordinated by the **WMO**, but expand its mandate to include digital ethics, open-data governance, and equitable access to technology.

Ultimately, building interoperable early-warning and response systems is not only a technical challenge, but it is also a diplomatic one. It requires sustained cooperation between states that may have different levels of capacity, priorities, or trust. Delegates in this committee are invited to explore how the international community can harmonize technical standards, secure financing for least-developed countries, and promote data sharing grounded in solidarity rather than competition. The ability to prevent the next disaster depends on how well humanity learns to share what it already knows.

3.4 Relevant UN Bodies and Stakeholders

The international landscape of humanitarian data and technology sharing is vast and complex. No single institution possesses all the expertise, mandate, and infrastructure required to manage disaster information effectively. Instead, a web of interdependent actors, ranging from United Nations agencies to regional organizations, NGOs, and private-sector partners, collectively forms the backbone of global disaster-response systems. Understanding how these entities interact is crucial for delegates seeking to propose realistic, cooperative solutions.

3.4.1 The United Nations System

Within the UN framework, several bodies play central and complementary roles in advancing the use of science, technology, and data for humanitarian action.

Office for the Coordination of Humanitarian Affairs (OCHA)

OCHA serves as the operational nerve center of international humanitarian coordination. It leads the Humanitarian Data Exchange (HDX), a global open-data platform that hosts thousands of datasets from UN agencies, NGOs, and governments. OCHA also provides the Centre for Humanitarian Data in The Hague, which develops data standards,

conducts training on responsible data management, and promotes the “not harm” principle in information sharing. However, OCHA’s effectiveness still depends on the willingness of other actors to adopt common standards and share timely information.

United Nations Office for Disaster Risk Reduction (UNDRR)

UNDRR leads global efforts to reduce disaster risk through policy and strategy. It is the custodian of the Sendai Framework for Disaster Risk Reduction (2015–2030), which emphasizes early-warning systems, multi-hazard risk assessment, and regional collaboration. UNDRR’s annual Global Platform for Disaster Risk Reduction brings together governments and experts to review progress and exchange practices. Yet, despite its broad convening power, its recommendations often rely on voluntary national implementation rather than binding commitments.

World Meteorological Organization (WMO)

The WMO is responsible for coordinating the Global Observing System and the Global Telecommunication System, which form the backbone of international weather and climate data sharing. Its Unified Data Policy (2021) expanded access to meteorological and oceanographic data to support humanitarian operations. The organization also manages the Global Multi-Hazard Alert System (GMAS), which aggregates alerts from national weather services into a single, harmonized feed. Nonetheless, many developing countries still lack the infrastructure to fully benefit from WMO’s data resources.

International Telecommunication Union (ITU)

As the UN agency for digital communication, the ITU develops the technical standards that enable emergency telecommunications and satellite coordination. It assists governments in establishing Early-Warning Broadcast Systems (EWBS), ensuring that alerts can reach populations through multiple channels, including mobile networks and radio. The ITU also supports the AI for Good initiative, which promotes the responsible use of artificial intelligence in crisis prediction and management.

United Nations Institute for Training and Research (UNITAR) – UNOSAT

UNOSAT provides satellite imagery analysis and geospatial intelligence to governments and humanitarian actors. It has supported responses to floods in Libya, earthquakes in Türkiye, and typhoons in Southeast Asia by mapping affected zones and assessing damage within hours. This capacity demonstrates how remote sensing can bridge information gaps, especially in inaccessible or conflict-affected regions.

World Health Organization (WHO)

The WHO coordinates data collection and information-sharing during health emergencies through its Health Emergencies Program (WHE) and platforms such as EIOS (Epidemic Intelligence from Open Sources). These systems help detect disease outbreaks early and mobilize cross-border responses, an essential function underscored by the COVID-19 pandemic.

United Nations Conference on Trade and Development (UNCTAD) and the CSTD

Finally, as the secretariat for the Commission on Science and Technology for Development (CSTD), UNCTAD provides a policy space for analyzing how technology and innovation can enhance global cooperation. The CSTD’s cross-sectoral nature allows it to integrate insights from all the aforementioned bodies, serving as a bridge between technical expertise and policy formulation.

3.4.2 Other Key Stakeholders

Regional Organizations

Regional cooperation mechanisms often complement UN efforts by tailoring approaches to specific geographic and cultural contexts. The African Union's African Risk Capacity (ARC) combines satellite data and insurance mechanisms to finance rapid disaster responses. In the Asia-Pacific, the ASEAN Coordinating Centre for Humanitarian Assistance (AHA Centre) and the Pacific Disaster Center (PDC) foster cross-border collaboration on risk assessment. The European Union's Copernicus Emergency Management Service provides real-time geospatial mapping for member states and international partners. These examples show that regional frameworks can act as laboratories for innovation, demonstrating scalable models of interoperability.

Non-Governmental Organizations (NGOs)

Humanitarian NGOs are typically the first responders on the ground and possess vital contextual knowledge. Organizations such as the International Federation of the Red Cross and Red Crescent Societies (IFRC), Médecins Sans Frontières (MSF), and CARE International rely heavily on field data to allocate resources efficiently. The Humanitarian OpenStreetMap Team (HOT) exemplifies how NGOs and volunteers can contribute to global data ecosystems through participatory mapping and open-source tools.

Private Sector and Academia

The private sector contributes through innovation, infrastructure, and analytics. Technology companies such as Google, Microsoft, Palantir, and Planet Labs provide AI models, cloud platforms, and satellite imagery that enhance situational awareness. However, their involvement raises concerns about data ownership, profit motives, and dependency on proprietary systems. Academia also plays a crucial role by developing methodologies for risk modeling, data ethics, and impact assessment.

Civil Society and Local Communities

Ultimately, effective humanitarian technology depends on trust and participation at the community level. Local radio networks, community-based early-warning systems, and citizen science initiatives ensure that technology aligns with real-world needs. Building resilience requires local ownership of data and technology, not only top-down coordination.

3.4.3 Challenges in Coordination

Despite the wide range of actors, cooperation is often hindered by overlapping mandates, fragmented data architectures, and competition for visibility or funding. There is no single UN mechanism that fully coordinates the flow of humanitarian technology and data across agencies. The CSTD thus occupies a strategic position to foster coherence, promote shared standards, and advocate for inclusive governance that bridges the gap between global frameworks and local realities.

3.5 Case Studies

Examining real-world examples allows us to understand how cooperation in data and technology sharing can either strengthen or hinder humanitarian and disaster response. Each case below demonstrates a unique dimension of collaboration, regional, institutional, or financial, and highlights both the potential for innovation and the challenges of implementation in diverse contexts.

Case Study 1: The Pacific Early-Warning Network – Regional Solidarity and Shared Standards

The Pacific region faces some of the world's most frequent and destructive natural hazards, including cyclones, tsunamis, and volcanic eruptions. For many of its small island developing states (SIDS), the combination of limited resources, geographical isolation, and climate vulnerability makes regional cooperation essential. **The Scale-up Inclusive Early Warning and Action in the Pacific (SIEWAP)**, a project supported by the **Pacific Disaster Center (PDC)**, the **Pacific Community (SPC)**, and the **World Meteorological Organization (WMO)** illustrates how shared technology and open data can dramatically improve preparedness.

Through this network, participating states pool meteorological, seismic, and oceanographic data to generate region-wide alerts for cyclones, floods, and tsunamis. Using the Pacific Disaster Center's **DisasterAWARE** platform, governments and humanitarian organizations access real-time information, risk maps, and logistics models. This system integrates satellite data with local observations, ensuring that alerts reach communities through multiple channels, including radio, SMS, and local disaster committees.

The success of the Pacific model lies in its multi-layered collaboration. Regional organizations provide technical coordination, while local authorities ensure community-level dissemination and feedback. This balance between high-tech solutions and grassroots communication has proven vital. During Cyclone Harold (2020), for instance, data shared through the project allowed for timely evacuations in Vanuatu and Fiji, significantly reducing casualties compared to previous storms.

However, the Pacific experience also reveals limitations. Many island nations remain dependent on external funding and expertise from Australia, New Zealand, and international partners. Data infrastructure maintenance expenses are high, and power outages or undersea cable disruptions can quickly paralyze systems. Nevertheless, the Pacific model remains a powerful example of regional interoperability grounded in solidarity, demonstrating how collective investment in open platforms can yield tangible humanitarian benefits.

Case Study 2: The Humanitarian Data Exchange (HDX) – Building a Global Data Commons

The Humanitarian Data Exchange (HDX), managed by the **UN Office for the Coordination of Humanitarian Affairs (OCHA)**, represents the UN's flagship effort to create an open, centralized platform for humanitarian data.

Launched in 2014, HDX hosts more than 20,000 datasets from over 270 organizations, covering topics such as population displacement, infrastructure, logistics, and health emergencies. Its mission is to make humanitarian data "easy to find and use for analysis."

The HDX platform embodies the ideals of transparency, interoperability, and collaboration. It allows humanitarian agencies, NGOs, and governments to upload and access standardized datasets, facilitating coordinated responses during emergencies. During the 2023 Türkiye- Syria earthquake, HDX data on road accessibility, population density, and shelter availability helped NGOs and UN agencies identify priority zones for aid delivery within hours of the disaster.

Another key innovation is the Humanitarian Exchange Language (HXL), a simple data-tagging standard that ensures compatibility between different datasets. HXL allows information systems, whether run by a government, NGO, or private partner, to integrate seamlessly without requiring complex software adjustments.

Yet, HDX also faces challenges that reflect broader tensions in humanitarian data governance. Many organizations remain hesitant to share sensitive or potentially politically charged information, fearing that open publication could expose vulnerabilities or violate privacy. In some cases, national authorities restrict data release for sovereignty or security reasons. Furthermore, despite its open design, HDX relies heavily on voluntary participation; it has no enforcement mechanism to compel cooperation.

The Centre for Humanitarian Data in The Hague has sought to address these concerns by publishing ethical guidelines and providing data responsibility training for humanitarian professionals. Its Data Fellows Program supports research on bias mitigation, predictive analytics, and digital inclusion. However, sustaining these initiatives depends on continuous funding and political commitment.

HDX demonstrates that open data can transform humanitarian coordination, but only when underpinned by ethical safeguards and institutional trust. The platform's future will hinge on its ability to balance transparency with protection, ensuring that the drive to share does not come at the expense of those whose data it contains.

Case Study 3: Africa Risk Capacity (ARC) – From Data to Action

While most humanitarian data initiatives focus on information exchange, the **African Risk Capacity (ARC)**, a specialized agency of the **African Union (AU),** offers a model that links data directly to financial action. Established in 2012, ARC uses satellite weather data and climate modeling to provide parametric insurance for African countries vulnerable to droughts, floods, and other climate-related disasters.

Under this mechanism, payouts are triggered automatically when data thresholds (such as rainfall levels or vegetation indices) indicate that a disaster has occurred. This approach eliminates the delays typical of post-disaster aid appeals and allows governments to mobilize funds within days rather than months. The ARC's data-driven insurance model has already enabled over $150 million in payouts to 15 African countries, supporting food assistance for well over 3 million people.

Beyond financial innovation, ARC has fostered a culture of regional cooperation and data transparency. Member states jointly develop risk models and share meteorological data through the Africa RiskView software, ensuring that assessments are standardized across borders. This collaboration enhances resilience and builds institutional capacity for long-term climate adaptation.

Still, the ARC model is not without challenges. Some critics argue that reliance on complex satellite-based indices can oversimplify local realities, potentially excluding communities that suffer losses but fall outside model parameters. Others question the sustainability of premium financing in low-income countries, especially when donor support fluctuates. These debates highlight the need for a balanced integration of scientific precision and social inclusiveness in humanitarian technology.

Key Lessons

Across these three examples, several patterns emerge:

- Collaboration works when technology is paired with governance structures that promote mutual trust and accountability.
- Open platforms such as HDX and regional systems like SIEWAP enhance transparency, but they require sustainable funding and strong data ethics.
- Innovation must serve people first. The ARC model proves that data-driven mechanisms can accelerate response, but inclusivity and contextual sensitivity remain essential.

3.6 Further Reading & Guiding Questions

To deepen understanding of the issues surrounding data and technology sharing in humanitarian and disaster response, delegates are encouraged to explore the following reports, frameworks, and digital resources. These materials provide both the conceptual foundations and the practical insights necessary to approach this topic with an informed and solution-oriented perspective.

Key UN Frameworks and Publications :

United Nations Office for Disaster Risk Reduction (UNDRR).

Sendai Framework for Disaster Risk Reduction 2015–2030

United Nations Office for the Coordination of Humanitarian Affairs (OCHA).

Data Responsibility Guidelines (2021)

International Committee of the Red Cross (ICRC).

Lost in digital translation? The humanitarian principles in the digital age

United Nations Conference on Trade and Development (UNCTAD) - CSTD Reports.

UNCTAS - CSTD Publications

Regional and Case-Specific Resources :

Pacific Disaster Center (PDC) – DisasterAWARE Platform:

Pacific Disaster Center (PDC) – DisasterAWARE Platform

Humanitarian Data Exchange (HDX) by OCHA:

Humanitarian Data Exchange (HDX)

African Risk Capacity (ARC):

ARC Agency

Humanitarian OpenStreetMap Team (HOT):

Humanitarian OpenStreetMap Team

ITU “AI for Good” Initiative:

AI for Good

Academic and Policy Reading :

Harvard Humanitarian Initiative (2022). The Signal Code: A Human Rights Approach to Information During Crisis.

United Nations Global Pulse (2021). Responsible Data Innovation Toolkit.

Chatham House (2020). Technology and the Future of Humanitarian Response.

OECD (2023). AI, Data and Development Cooperation.

Guiding Questions for Debate

To frame research and discussion, delegates should reflect on the following guiding questions, grouped by key thematic areas:

Ethics and Governance :

- How can humanitarian actors ensure respect for privacy, consent, and data protection in crisis settings?
- Should the United Nations adopt a Humanitarian Data Charter outlining universal ethical standards for data use?

- How can accountability be ensured when data misuse results in harm or discrimination?

Technology and Interoperability :

- What mechanisms can make national and international data systems compatible and secure?
- How can open-source technologies, AI, and satellite tools improve early-warning systems without deepening digital inequality?
- Should the CSTD advocate for a centralized UN platform for real-time disaster data exchange?

Equity and Capacity-Building :

- What role can developed nations play in supporting the digital infrastructure of least-developed countries?
- How can regional organizations foster capacity-building and technology transfer?
- What incentives can encourage private-sector partners to prioritize humanitarian rather than commercial objectives?

Global Cooperation and Trust :

- How can data-sharing agreements balance state sovereignty with global solidarity?
- What structures can the CSTD propose to coordinate ethical, technical, and financial aspects of digital humanitarianism?
- Can trust be institutionalized through new international norms, or must it be built case by case?

Closing Reflection

The effective use of data and technology in humanitarian action ultimately depends on two elements that no algorithm can guarantee: trust and cooperation. Delegates are encouraged to consult these resources, evaluate existing frameworks, and think critically about how the CSTD can guide the global community toward systems that are not only smarter but also fairer, safer, and more inclusive.

Reference list:

A/RES/34/218 - United Nations Conference on Science and Technology for Development (1979, General Assembly 34th session, Agenda item 70. : New York)

Mizutori and Guha-Sapir - UNDRR : The human cost of disasters: an overview of the last 20 years (2000-2019) , 2019

OCHA Center for Humanitarian Data, OCHA Data Responsibility Guidelines : October 2021, 2021

United Nations Secretary-General ,(A/74/821) Road map for digital cooperation: implementation of the recommendations of the High-level Panel on Digital Cooperation , 2020

World Meteorological Organization, The WMO's Unified Data Policy , 2021

African Risk Capacity (ARC) (2023) Available at: African Risk Capacity : About ARC

International Committee of the Red Cross (ICRC) (2024) International Review of the Red Cross. Available at: Lost in digital translation? The humanitarian principles in the digital age

Office for the Coordination of Humanitarian Affairs (OCHA) (2021). The Hague: OCHA Centre for Humanitarian Data. Available at: OCHA Data Responsibility Guidelines

Pacific Disaster Center (PDC) (2024) Available at: DisasterAWARE: Multi-Hazard Early Warning, Risk Analytics, and Situational Awareness | Pacific Disaster Center

United Nations (1979) United Nations Conference on Science and Technology for Development. General Assembly Resolution A/RES/34/218. New York: United Nations.

United Nations Office for Disaster Risk Reduction (UNDRR) (2015) Sendai Framework for Disaster Risk Reduction 2015–2030. Geneva: United Nations. Available at: Sendai Framework for Disaster Risk Reduction 2015-2030 | UNDRR

United Nations Office for the Coordination of Humanitarian Affairs (OCHA) (2014) Available at: Humanitarian Data Exchange

United Nations Secretary-General (2020) Roadmap for Digital Cooperation: Implementation of the recommendations of the High-level Panel on Digital Cooperation. Report A/74/821. New York: United Nations. Available at: Roadmap for Digital Cooperation | Office for Digital and Emerging Technologies

United Nations Conference on Trade and Development (UNCTAD) (2024) CSTD-related publications. Geneva: UNCTAD. Available at: Publications | UN Trade and Development (UNCTAD)

World Meteorological Organization (WMO) (2021) WMO Unified Data Policy. Geneva: World Meteorological Organization. available at: WMO Unified Data Policy Resolution (Res.1)

Humanitarian OpenStreetMap Team (HOT) (2024) Available at: Humanitarian OpenStreetMap Team (HOT)

4. Topic II: Harnessing Emerging Technologies for Sustainable and Democratic Development

4.1 Introduction

Rapid advancements in technologies are restructuring economies, societies, and governments globally. Technologies such as Artificial Intelligence (AI), blockchain, renewable energy technology, and up-and-coming digital platforms are beginning to play a key role in how a country grows economically, delivers public services, and engages its citizens (UNCTAD, 2021). These innovations are especially promising for developing countries as they can potentially expedite their progress towards the Sustainable Development Goals (SDGs), broaden their horizon in the education and healthcare sector, and strengthen their institutions' infrastructure (United Nations, 2020). On the other hand, improper deployments of such innovations can lead to weakening of democratic practices, create power vacuums, and further expand inequality amongst members of society (UNDP, 2021).

According to the United Nations Conference on Trade and Development (UNCTAD), influential technologies will have an impact on the majority of global economic activity in the coming years; however, their ownership remains highly concentrated in the hands of a few countries and corporations (UNCTAD, 2021). This inequality has contributed to the ever-growing digital divide, i.e., many developing countries lack the know-how, skill set, infrastructure, and regulatory framework to benefit from such a technological innovation (UNCTAD, 2023). Thus, technological advancement does not necessarily result in inclusive or sustainable development outcomes.

Considering recent crises, both the potential and risks have become evident coming from such an advancement. During the COVID-19 pandemic, digital tools enabled remote learning, telemedicine, e-commerce, and e-governance, allowing many governments to maintain continuity of services (World Bank, 2022). However, these same measures exposed deep inequalities in internet access and digital literacy (UNESCO, 2021). In several instances, digitalization raised concerns regarding surveillance, data protection, and the long-term implications for civil liberties (United Nations, 2020). These experiences underline a central dilemma for policymakers: how to harness technology for sustainable development while preserving democratic regulations and human rights.

The conflict at hand arises between innovation and inclusion. Emerging technologies tend to evolve faster than the regulatory and institutional frameworks designed to govern them. Without deliberate policy intervention, technological benefits may cater primarily to multinational firms and conglomerates, and people with access to attaining the needed skills, putting marginalized groups and rural areas disadvantaged (UNCTAD, 2021). Democratic development, therefore, requires not only access to technology but also participation in its governance (UNDP, 2021).

The Commission on Science and Technology for Development (CSTD), as the UN's focal point for examining the relationship between technology and development, is uniquely positioned to address these challenges. The Commission provides a platform for dialogue between governments, international organizations, the private sector, and civil society, enabling coordinated approaches to digital transformation. Through policy analysis and capacity-building, the CSTD can help ensure that emerging technologies contribute to sustainable growth, social inclusion, and democratic resilience.

As technological change accelerates, the question before the committee is no longer whether emerging technologies will shape development trajectories, but how they can be governed to serve the public good. Delegates are encouraged to consider strategies that promote equitable access, ethical governance, and international cooperation, ensuring that technological innovation strengthens, rather than undermines, sustainable and democratic development. The answers to these essential questions could shape the next upcoming decades (United Nations, 2020).

4.2 Ethical and Human-Centered Technology Governance

As emerging technologies increasingly shape economic growth, political participation, and public service delivery, the question of who governs technology, and in whose interest, has become one of the defining governance challenges of the 21st century. Artificial intelligence, digital platforms, biometric systems, and algorithmic decision-making are no longer abstract innovations; they directly affect how citizens access social protection, participate in elections, receive education, and interact with the state. Without ethical and human-centered governance frameworks, these technologies risk deepening inequality, enabling surveillance, and undermining democratic institutions rather than strengthening them.

Human-centered technology governance places people, rights, and societal well-being at the core of technological development and deployment. It demands that innovation serve public interest objectives such as inclusion, transparency, accountability, and sustainability. This approach aligns closely with the CSTD's mandate to ensure that science, technology, and innovation contribute to equitable development rather than reinforcing existing power asymmetries between states, corporations, and citizens.

One of the central ethical challenges lies in algorithmic power. Governments increasingly rely on automated systems to allocate welfare benefits, assess creditworthiness, manage migration, or predict criminal behavior. While such systems promise efficiency and cost reduction, they often operate as "black boxes," making decisions that are difficult to explain or contest. Evidence from multiple countries has shown that poorly designed algorithms can reproduce racial, gender, and socio-economic biases present in historical data, leading to discriminatory outcomes that disproportionately affect marginalized communities. When these systems are deployed without transparency or oversight, citizens may lose not only access to services, but also trust in public institutions.

Closely related is the issue of data governance and digital rights. Emerging technologies rely heavily on the collection and processing of vast amounts of personal data, from facial images and fingerprints to location data and online behavior. In democratic contexts, data misuse threatens privacy, freedom of expression, and political participation. In more authoritarian environments, it can enable mass surveillance, social control, and repression. The absence of robust data protection frameworks in many developing countries leaves citizens particularly vulnerable, while cross-border data flows complicate questions of jurisdiction, accountability, and consent.

The concentration of technological power in the hands of a few multinational corporations further complicates governance. Major technology firms often control critical digital infrastructure, proprietary algorithms, and platforms that shape public discourse. While public-private partnerships can accelerate innovation, they also risk creating dependencies that limit state sovereignty and democratic oversight. Governments may lack the technical capacity or regulatory leverage to hold private actors accountable, especially when contracts are opaque, or technologies are protected as trade secrets.

In response to these challenges, the international community has begun to articulate ethical principles for technology governance. UNESCO's Recommendation on the Ethics of Artificial Intelligence (2021) establishes global norms centered on human rights, fairness, transparency, and environmental sustainability. Similarly, the UN Secretary-General's Roadmap for Digital Cooperation calls for embedding human rights into all stages of the digital lifecycle and advancing a Global Digital Compact. However, these frameworks remain largely non-binding and unevenly implemented, particularly in low- and middle-income countries.

Human-centered governance therefore requires moving beyond principles toward institutional mechanisms. This includes independent oversight bodies for algorithmic systems, impact assessments before deploying high-risk technologies, and legal avenues for individuals to challenge automated decisions. Equally important is participatory governance: citizens, civil society, and affected communities must be involved in shaping how technologies are designed and used. Without meaningful participation, technology governance risks becoming technocratic rather than democratic.

The CSTD is uniquely positioned to advance this agenda by fostering dialogue between governments, technologists, and social actors, and by promoting capacity-building for ethical governance in developing countries. It can support the development of adaptable policy toolkits, encourage technology transfer aligned with ethical standards, and help bridge the gap between innovation and democratic accountability.

For delegates, the key question is not whether emerging technologies should be governed, but how governance frameworks can remain flexible enough to encourage innovation while firm enough to protect human dignity, democratic values, and sustainable development. Achieving this balance will be central to ensuring that technological progress strengthens, rather than threatens, democratic societies.

4.3 Utilizing Emerging Technologies for Sustainable Development

Key Challenge: Access and Capacity

Emerging technologies can support sustainable development across multiple sectors, but their impact depends on access to infrastructure, skills, and institutional support. When deployed responsibly, these technologies can enhance agricultural productivity, improve access to healthcare and education, optimize energy systems, strengthen public institutions, and support evidence-based policymaking (UNCTAD, 2021). However, their ability to drive sustainable development is not automatic. Instead, it is deeply shaped by disparities in access, capacity, and governance (UNCTAD, 2023).

4.3.1 Digital Infrastructure

Digital connectivity forms the foundation of modern development. Broadband networks, data centers, and reliable electricity enable participation in the digital economy and access to online public services (World Bank, 2022). Yet large segments of the global population remain offline, particularly in the least developed countries and rural areas. Further neglect of such areas will further accelerate the already growing digital divide (UNCTAD, 2023).

An instance of this would be **Sub-Saharan Africa.** Unreliable electricity and further unstable frameworks inhibited the usage of digital services, restricting their access to education and public services (UNDP, 2021). Unreliable internet access and low rural electrification rates led to millions of students not being able to participate in remote learning, and digital health or e-governance solutions failed to reach the most vulnerable populations (UNESCO, 2021; World Bank, 2022).

4.3.2 Futuristic Technologies

The impact of automation and AI can be felt in every sector, be it manufacturing, agriculture, finance, healthcare, or public administration. Employment and labor roles are changing at an unprecedented pace as AI systems enhance productivity while reducing operational expenses (UNCTAD, 2021). However, these benefits are unevenly distributed, and without deliberate policy intervention, AI risks deepening existing inequalities both within and between countries (UNCTAD, 2023).

For developing economies, the impact of AI on employment presents a dual challenge. On one hand, automation threatens jobs in labor-intensive and routine sectors, such as textile manufacturing, call centers, and basic data processing. On the other hand, many countries lack the advanced digital skill set, educational infrastructure, and innovational ecosystems required to transition workers into higher-value, technology-driven roles (World Bank, 2022). This creates the risk of “premature deindustrialization,” where economies lose employment opportunities without successfully moving up the value chain in the market (UNCTAD, 2021).

Furthermore, AI development is highly concentrated and limited to a handful of corporations and countries. According to UNCTAD, these groups have authority over AI research, patents, and ownership, leading to disproportionate influence over its development and deployment (UNCTAD, 2021). As a result, developing countries often become passive consumers of AI systems designed elsewhere, limiting their ability to adapt technologies to local labor markets, languages, and cultural contexts (UNCTAD, 2023). The CSTD can play a role in promoting international cooperation on skills development, sharing best practices, and ensuring that AI contributes to inclusive and decent work rather than widening global employment disparities (UNCTAD, 2022).

4.3.3 Green and Climate Technologies

Technological innovation is a cornerstone of sustainable development, particularly in the global effort to combat climate change and environmental degradation. Green and climate technologies such as renewable energy systems, sustainable transport, and smart grids show potential to decouple economic growth from carbon emissions while improving resilience to environmental shocks (UNCTAD, 2021).

For developing countries, this means that solar and wind energy can expand electricity access in remote areas, reducing dependence on fossil fuels and enhancing energy efficiency (UNDP, 2021). Smart urban systems can help cities manage waste, transportation, and energy consumption more efficiently as urban populations grow (World Bank, 2022).

Despite these benefits, access to green technologies remains highly unequal. High upfront costs and limited access to finance often prevent developing countries from adopting or producing these technologies at scale (UNCTAD, 2023). This creates a dependency on countries importing such solutions to developing countries and reduces domestic learning opportunities. This, in turn, affects the efficient deployment and maintenance to maximize the benefits of such technologies (UNCTAD, 2021).

International cooperation is therefore essential. CSTD policy processes shall provide platforms to facilitate knowledge-sharing and promote equitable access to climate technologies (UNCTAD, 2022). Encouraging open innovation models and supporting local adaptation of green technologies can also empower developing countries to pursue sustainable development pathways tailored to their specific environmental and socioeconomic contexts.

4.4 Relevant UN Bodies and Stakeholders

The governance of emerging technologies for sustainable and democratic development requires coordination across a diverse ecosystem of international institutions, governments, private actors, and civil society. No single actor can independently manage the social, economic, and ethical implications of rapid technological change. Instead, effective governance depends on clearly defined mandates, complementary roles, and inclusive multistakeholder engagement.

4.4.1 The United Nations System

Several United Nations bodies play central roles in shaping global norms, providing technical assistance, and supporting capacity-building related to emerging technologies and development.

United Nations Conference on Trade and Development (UNCTAD)

As the host of the CSTD secretariat, UNCTAD plays a pivotal role in analyzing how technology and innovation affect development trajectories, particularly in developing and least developed countries. Through its Technology and Innovation Reports and Digital Economy Reports, UNCTAD highlights structural inequalities in technology access,

ownership, and value creation. It also provides policy guidance on how countries can strategically leverage digitalization, artificial intelligence, and green technologies to diversify economies while preserving policy space and democratic governance.

United Nations Development Programme (UNDP)

UNDP focuses on the human development dimension of technological transformation. Through initiatives on digital public infrastructure, e-governance, and inclusive digital economies, UNDP supports governments in using technology to improve service delivery and citizen participation. Its Human Development Reports consistently emphasize that technological progress must be accompanied by institutional trust, social inclusion, and rights-based governance to avoid reinforcing inequality or exclusion.

United Nations Educational, Scientific, and Cultural Organization (UNESCO)

UNESCO plays a key normative role, particularly in education, ethics, and culture. Its Recommendation on the Ethics of Artificial Intelligence (2021) is the first global standard-setting instrument on AI ethics, emphasizing human rights, transparency, and accountability. UNESCO also addresses digital literacy, gender gaps in technology access, and the impact of digitalization on education systems, all of which are essential for democratic participation in the digital age.

International Telecommunication Union (ITU)

The ITU develops technical standards that enable global connectivity and support governments in expanding digital infrastructure. Its work on broadband development, spectrum management, and digital inclusion is critical for ensuring that emerging technologies do not remain concentrated in urban or high-income regions. ITU initiatives such as “AI for Good” also explore how frontier technologies can contribute to sustainable development outcomes.

United Nations Environment Programme (UNEP)

UNEP contributes by linking technological innovation to environmental sustainability. It supports the deployment of green and climate technologies, including renewable energy systems, smart grids, and digital environmental monitoring tools. UNEP’s role is particularly relevant in ensuring that technological growth aligns with climate goals and does not exacerbate ecological degradation.

4.4.2 Other Key Stakeholders

Beyond the UN system, a wide range of actors shape how emerging technologies are developed, deployed, and governed.

National Governments

Governments are responsible for establishing regulatory frameworks, investing in digital infrastructure, and ensuring that technological adoption aligns with national development priorities. However, disparities in institutional capacity often limit the ability of developing countries to regulate complex technologies effectively, increasing reliance on external actors.

Private Sector and Technology Firms

Private companies are major drivers of innovation, investment, and technological diffusion. While their expertise and resources are indispensable, their dominance also raises concerns about market concentration, data ownership, and accountability. Without appropriate regulation, private-sector influence can undermine democratic oversight and public interest objectives.

Academia and Research Institutions

Universities and research centers contribute by advancing knowledge, developing context-specific technologies, and assessing social and ethical impacts. They also play a critical role in training future policymakers, engineers, and researchers, strengthening domestic innovation ecosystems.

Civil Society and Local Communities

Civil society organizations advocate for transparency, human rights, and inclusion in technology governance. Local communities, as end-users of technology, provide essential insights into contextual needs and risks. Their participation is vital to ensuring that emerging technologies serve people rather than marginalize them.

4.4.3 Challenges in Governance

Despite the presence of multiple stakeholders, governance remains fragmented. Regulatory frameworks often lag technological change, coordination between institutions is limited, and power asymmetries favor technologically advanced actors. For the CSTD, the central challenge is to promote coherent, inclusive, and forward-looking governance that balances innovation with democratic accountability and sustainable development.

4.5 Case Studies

Case Study 1: Estonia's Digital Government: Trust through Transparency

Estonia is often cited as a global leader in digital governance, having built one of the world's most comprehensive e-government ecosystems. Through its X-Road digital infrastructure, Estonian citizens can access healthcare records, vote online, pay taxes, and interact with public services securely and efficiently. What distinguishes Estonia's approach is not merely technological sophistication, but its strong emphasis on trust, transparency, and citizen control.

Citizens retain the right to see who has accessed their data and can challenge misuse, creating accountability within public institutions. Strong data protection laws, cybersecurity investments, and digital literacy programs have helped ensure broad public acceptance of digital systems. While Estonia's model benefits from its small population and high institutional capacity, it demonstrates how ethical governance can enable digital innovation without sacrificing democratic principles.

Case Study 2: India's Aadhaar System: Inclusion versus Privacy

India's Aadhaar biometric identification system, the largest of its kind globally, assigns a unique digital identity to over one billion people. The system has enabled millions to access social services, banking, and mobile connectivity, particularly those previously excluded from formal identification systems. Aadhaar illustrates how technology can support inclusive development at scale.

However, the system has also raised significant concerns regarding privacy, surveillance, and exclusion. Reports of data breaches, authentication failures, and mandatory linkage to essential services sparked legal challenges. In response, India's Supreme Court imposed limits on Aadhaar's use and affirmed privacy as a fundamental right, highlighting the need for judicial oversight in large-scale digital systems.

Case Study 3: Algorithmic Welfare Systems in Europe: Efficiency at a Democratic Cost

Several European countries have introduced automated decision-making systems in welfare administration to detect fraud and allocate benefits. In the Netherlands, the SyRI algorithm aimed to predict welfare fraud by analyzing large

datasets. However, investigations revealed discriminatory impacts on low-income and migrant communities. In 2020, a Dutch court ruled the system violated human rights and suspended its use.

This case underscores the risks of deploying high-risk technologies without transparency or accountability. Efficiency-driven automation, when poorly governed, can erode trust in public institutions and harm vulnerable populations.

Case Study 4: AI for Public Services in Rwanda Innovation with Capacity Constraints

Rwanda has positioned itself as a regional technology hub, piloting AI applications in healthcare diagnostics, agriculture, and public administration. Partnerships with international technology firms have enabled rapid deployment of innovative solutions, such as drone-based medical deliveries and AI-supported disease detection.

While these initiatives have improved service delivery, they also expose challenges related to dependency on external providers, data ownership, and long-term sustainability. Limited domestic regulatory capacity raises questions about who controls data and how accountability is ensured.

4.6 Further Reading & Guiding Questions

To support informed debate on the role of emerging technologies in sustainable and democratic development, delegates are encouraged to consult the following resources. These materials provide analytical, policy-oriented, and empirical perspectives on digital transformation, inequality, and governance.

Key Reports and Frameworks :

UNCTAD (2021, 2025) – Technology and Innovation Reports

Technology and Innovation Report series

Analysis of frontier technologies, digital concentration, and policy options for inclusive innovation.

UNCTAD (2023, 2024) – Digital Economy Reports

Information Economy Report publications

Comprehensive assessments of global digital trends, digital divides, and development implications.

UNDP 2021/22 - Human Development Report

Examination of uncertainty, inequality, and the societal impacts of digital transformation.

Guiding Questions for Debate

Ethics and Democratic Governance :

- How can governments ensure that emerging technologies strengthen democratic institutions rather than undermine civil liberties?
- What safeguards are necessary to prevent surveillance, algorithmic bias, and misuse of personal data?
- Should global ethical standards for AI and digital governance be legally binding or remain voluntary?

Access and Inequality :

- How can developing countries overcome barriers related to infrastructure, skills, and financing?

- What role should technology transfer and capacity-building play in reducing the global digital divide?
- How can gender, rural, and socioeconomic inequalities in technology access be addressed?

Economic and Sustainable Development :

- How can emerging technologies support green growth and climate resilience without increasing dependency?
- What policies can ensure that automation and AI create decent work rather than displace vulnerable workers?
- How can innovation ecosystems be strengthened at the local and regional levels?

International Cooperation :

- What role should the CSTD play in coordinating global technology governance?
- How can cooperation between governments, the private sector, and civil society be improved?
- Should emerging technologies be treated as global public goods in certain development contexts?

Closing Reflection

Emerging technologies hold transformative potential, but their outcomes are not predetermined. Whether they deepen inequality or foster inclusive and democratic development depends on governance choices made today. Delegates are encouraged to engage critically with these materials and propose policy solutions that ensure technology serves sustainability, equity, and democratic resilience.

5. Bibliography

5.1. Topic 1

UNCTAD (2021) *Technology and Innovation Report 2021: Catching Technological Waves – Innovation with Equity*. Geneva: United Nations Conference on Trade and Development. https://unctad.org/page/technology-and-innovation-report-2021

UNCTAD (2023) *Digital Economy Report 2023*. Geneva: United Nations Conference on Trade and Development.

https://unctad.org/topic/ecommerce-and-digital-economy/digital-economy-report

UNDP (2021) *Human Development Report 2021/2022: Uncertain Times, Unsettled Lives*. New York: United Nations Development Programme.

https://hdr.undp.org/content/human-development-report-2021-22

United Nations (2020) *Roadmap for Digital Cooperation*. Report of the Secretary-General, A/74/821.

https://www.un.org/en/content/digital-cooperation-roadmap/assets/pdf/Roadmap_for_Digital_Cooperation_EN.pdf

UNESCO (2021) *Global Education Monitoring Report: Technology in Education*. Paris: UNESCO.

https://unesdoc.unesco.org/ark:/48223/pf0000385723

World Bank (2022) *World Development Report 2022: Data for Better Lives*. Washington, DC: World Bank.

https://www.worldbank.org/en/publication/wdr2021

UNCTAD (2024) *Digital Economy Report 2024*. Geneva: United Nations Conference on Trade and Development.

https://unctad.org/publication/digital-economy-report-2024

UNCTAD (2025) *Technology and Innovation Report 2025: Inclusive Artificial Intelligence for Development*. Geneva: United Nations Conference on Trade and Development.

https://unctad.org/publication/technology-and-innovation-report-2025

World Bank (2023) *From Connectivity to Services: Digital Transformation in Africa*. World Bank.

https://www.worldbank.org/en/results/2023/06/27/from-connectivity-to-services-digital-transformation-in-africa

5.2. Topic 2:

World Bank (2023) *Digital Africa: Technological Transformation for Jobs*. World Bank.

https://www.worldbank.org/en/region/afr/publication/digital-africa

UNESCO (2025) *Closing the digital divide for women and girls in Africa through education*. UNESCO.

https://www.unesco.org/en/gender-equality/education/digital-divide

United Nations (2024) *Global Digital Compact*. United Nations.

https://www.un.org/techenvoy/global-digital-compact

World Bank (2025) *Green Technologies: Decarbonizing Development in East Asia and Pacific*. World Bank.

https://www.worldbank.org/en/region/eap/publication/green-technologies

Brookings (2025) *Accelerating digital inclusion in Africa*. Brookings Institution.

https://www.brookings.edu/articles/accelerating-digital-inclusion-in-africa

ResearchGate (2024) *Renewable Energy in Developing Countries: Challenges, Opportunities and Policy Recommendations for Innovative Funding*. ResearchGate.

https://www.researchgate.net/publication/384054591_Renewable_Energy_in_Developing_Countries_Challenges_Opportunities_and_Policy_Recommendations_for_Innovative_Funding

Wikipedia (2025) *Rural electrification*.

https://en.wikipedia.org/wiki/Rural_electrification

Wikipedia (2025) *Global digital divide*.

https://en.wikipedia.org/wiki/Global_digital_divide