WASMUN 2018

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Background Guide for the

Commission on Science and Technology for Development

Contents

Welcome from the Director-General

Dear Delegates,

It is with great pleasure that I welcome you all to Washington State Model United Nations (WASMUN) 2018. My name is Tyler Lincoln, and I am serving as your Director-General for this year's WASMUN conference. Throughout my time at the University of Washington, I have been able to participate in Model United Nations as a delegate, committee staff, and executive staff, each bringing their own sets of challenges and rewards. I have been working with WASMUN for 3 years now, first serving as committee staff, and last year as the Assistant-Director-General for WASMUN 2017. As Director-General for this year's conference, it has been my goal to continue to increase WASMUN's ability to provide a fun, challenging experience from which all can grow and learn.

The theme of this year's WASMUN conference is building a more sustainable future together. With the conference taking place in the Pacific Northwest, and keeping in mind the 2015 Sustainable Development Goals, this year's WASMUN is focusing on diversity and inclusivity. The wide range of committees chosen for WASMUN this year aims to reflect the importance of sustainable development. Additionally, the diversity of committees aims to show the interlinkages between the social, economic and political pillars of sustainable development. Each of these three dimensions is crucial for promoting the development of all. We hope you keep this in mind as you pursue your own unique solutions to the challenges we provide you.

On a final note, each committee dais worked hard in ensuring they provide you with helpful and useful information through writing the background guides. That being said, I wish you the best of luck in preparing for this conference and I look forward to meeting you all in a couple of months! If you have any questions during your preparation, please don't hesitate to send them to dg@wasmun.org.

Best,

Tyler Lincoln

Director-General

WASMUN 2018

Welcome from the CSTD Committee Staff

Dear Delegates,

I have the privilege to welcome you to Washington State Model United Nations (WASMUN) 2018. My name is EJ Velasco and I will be serving you as your Director of the Commission on Science and Technology for Development. I will be joined by Assistant Director, Alex McKennon, and Chair, Arica Schuett. It is our pleasure to work with you for this weekend. The topics that we have chosen for you are straight from the most recent agenda of the CSTD. The first topic regards how science, technology, and innovation have a role in ensuring food security. The second discusses smart cities and infrastructure.

Whether this is your first or fiftieth MUN conference, we hope you engage in serious dialogues with your colleagues over the weekend. I was once in your shoes; I was the delegate of the United Arab Emirates in the United Nations Office on Drugs and Crime at WASMUN 2013. Since then, I've embarked on a long journey through MUN. We hope you enjoy a long journey in Model UN as well. We look forward to seeing each one of you this weekend.

Sincerely,

Arica Shuett, Chair

Alex McKennon, Assistant Director

EJ Velasco, Director

Committee Overview

The Commission on Science and Technology for Development (CSTD) is a subsidiary body of the Economic and Social Council (ECOSOC).[1] Established in 1992, the Commission provides the General Assembly (GA) and ECOSOC with high-level advice on relevant science and technology issues. The CSTD has ample relevance in both developed and developing nations. Though their influence in development is, perhaps most salient in developing communities, research findings supported by the CSTD influence development different types of communities around the world.

The Commission can trace its roots back to the Intergovernmental Committee on Science and Technology for Development (IGCSTD) which was established in 1979. This committee was established to assist the GA in formulating policies and plans for development with regard to science and technology and to deal with other aspects of science such as creation and strengthening of related infrastructure, financing, and building human capacity. Major reforms in recent years include the establishment of annual sessions that are usually held in May every year since 2003.

The Commission acts as a forum for examining science and technology questions and their implications for development; advancing understanding on science and technology policies, particularly in respect of developing countries; and formulating recommendations and guidelines on science and technology matters within the UN system.[2] The commission has 43 Member States elected by the ECOSOC for a term for 4 years. Experts are nominated by their respective governments, and should possess the necessary qualifications and professional or scientific knowledge. Members are elected to ensure equitable geographical distribution by comprising members of:

- Eleven members from African States
- Nine members from Asian-Pacific States
- Eight members from Latin American and Caribbean States
- Five members from Eastern European States
- Ten members from Western European and other States[3]

All terms end 31 December of the year in which they expire. The Commission usually meets for a week in Geneva in May for its annual session where it addresses its priority themes, which are selected during the previous year, and reviews the progress made on the outcomes of WSIS, and elects a bureau for the next session during this regular meeting. The bureau, which consists of a chair and four vice-chairs, assumes responsibilities for the Commission's activities during the inter-sessional period.

The Commission's core mandate is to provide the GA and the ECOSOC with appropriate policy recommendations through research on topics pertaining to science and technology for development and promote

[1] United Nations Conference on Trade and Development, "Mandate and Institutional Background." United Nations, 2017. http://unctad.org/en/Pages/CSTD/CSTD-Mandate.aspx
[2] Ministry of Foreign Affairs and Trade, "United Nations Handbook 2016-17." Government of New Zealand. [Report], 2016.
[3] UNCTAD | Membership of the Commission on Science and Technology for Development, 2017. unctad.org/en/Pages/CSTD/CSTD-Membership.aspx.

understanding of science and technology policies, especially in developing Member States.[4] Part of this mandate includes advising ECOSOC on the implementation of the Summit outcomes by reviewing and assessing progress at international and regional levels in the implementation of recommendations made by the outcome document of WSIS.[5] The Commission also aims to promote dialogue among United Nations (UN) funds, programmes, and specialized agencies with governments, the private sector, and civil society actors to contribute to the attainment of internationally agreed upon objectives, such as the Sustainable Development Goals (SDGs).[6]

Since 2006, the Commission has been mandated by the ECOSOC to serve as the focal point in the system-wide follow-up to the outcomes of the World Summit on the Information Society (WSIS) and advise the Council thereon, including through the elaboration of recommendations to the Council aimed at furthering the implementation of the Summit outcomes. The CSTD believes that informed policy drives progress. By providing evidence-based policy analysis, the CSTD helps countries to improve economic, social and environmental outcomes.[7] Research investigated by the CSTD provides authoritative data and analysis on trade, investment, finance and technology.[8] And it offers solutions to the major challenges facing countries, particularly the poorest and most vulnerable nations. Beyond tailored analysis and policy recommendations, research conducted by the CSTD has also generated global standards that govern responsible sovereign lending and borrowing, investment, entrepreneurship, competition and consumer protection and trade rules.[9]

In its more recent work, the CSTD had concluded its twentieth session in May 2017. Member states continue to pass resolutions regarding the CSTD's status as the "torch-bearer for science, technology, and innovation for development"[10]The twentieth session focused on two priority themes: "New innovation approaches to support the implementation of the Sustainable Development Goals" and "The role of science, technology, and development in ensuring food security by 2030."[11]The former was addressed through a draft resolution that supported the General Assembly resolution 70/125. It outlined the importance of human capacity-building and information technology to attain the 2030 Sustainable Development Goals. The CSTD welcomed the discussion of widespread technology and implementation of such to get closer towards the SDGs. The session "highlighted many links between Science, Technology, and Innovation actions and the Sustainable Development Goals."[12] The latter will be discussed in full later as our first topic. The twentieth session also selected two priority themes for its next session in 2018: "the role of science, technology, and innovation to increase substantially the share of renewable energy by 2030" and "Building digital competencies to benefit from existing and emerging technologies, with special

[4] United Nations Conference on Trade and Development, "Mandate and Institutional Background." United Nations, 2017. http://unctad.org/en/Pages/CSTD/CSTD-Mandate.aspx
[5] Ibid.
[6] Ibid.
[7] United Nations Conference on Trade and Development, "Mandate and Institutional Background." United Nations. [Website].
[8] Bell, Bob, et al. The Role of Science, Technology and Innovation in Ensuring Food Security by 2030: Report: 2017. Edited by Shamika N. Sirimanne, United Nations, 2017,
[9] "ANALYSIS." UNCTAD | Analysis, unctad.org/en/Pages/analysis.aspx.
[10] UNCTAD, "UN highlights critical role of science, technology and innovation in achieving the SDGs", 2017,http://unctad.org/en/pages/newsdetails.aspx?OriginalVersionID=1481&Sitemap_x0020_Taxonomy=UNCTAD%20Home;#1629;#Commission on Science and Technology for Development

[11] CSTD, "Report on the twentieth session (8-12 May 2017)", 2017,http://unctad.org/meetings/en/SessionalDocuments/ecn162017d4_en.pdf
[12] Ibid.

focus on gender and youth dimensions."[13] It is clear that the CSTD has embraced diversity and its role in innovation by making it a priority theme for 2018.

[13] *Ibid.*

I. The Role of Science, Technology, and Innovation in Ensuring Food Security by 2030

Introduction

Food security has been recognized as a threat by the UN, the US and the EU since 2008.[14] Currently, the world's undernourished population comprises of about 795 million people, or every ninth person, with the majority living in developing countries and rural areas.[15] The hurdles which perpetuate food insecurity in these regions are being addressed through the rapid development of new technology every day. It is the mission of the CSTD to bring attention to relevant new technology and knowledge to address food insecurity so that development will contribute to the improvement of lives around the world.

Food security has historically been and remains a major global concern for the international community. The Food and Agricultural Organization defines food security as the attainment for all and at all times, the physical, social and economic means to acquire safe and nutritious food which meets their dietary needs and preferences which allow them to live an active and healthy life. As a whole, the CSTD categorizes food security in four dimensions: **food availability, access, food use/utilization and food stability**. It is the goal of the CSTD to help nations achieve food security by focusing on different components of food security.[16]

The need to address global food security presents different and complex challenges to both urban and rural communities. Although, at this moment, food insecurity presents an ongoing crisis in the lives of many rural and small hold farmers, as urbanization increases and a greater share of the global population becomes more disconnected from their food source the likelihood of new food insecurity issues arising must be anticipated. In addition to demographic changes, climate changes present other elements of uncertainty which must be addressed in the quest to provide global food security.

Historically, inhabitants of rural and lesser developed nations (LDNs) have been the most vulnerable to food supply shocks. Fortunately, global familiarity with many of the leading causes of rural food insecurity has spearheaded the research and development of a diverse array of solutions to many of the issues which have reoccurred historically. This includes the recognition that innovations created by for-profit firms may fail to reach the populations they best serve. As a result, in recent years the CSTD has encouraged the participation of educational institutions and other non-profit stakeholders to advance the development of technologies which address common issues faced by rural small hold farmers.

In contrast to the ongoing obstacles faced by rural farmers, threats to urban food supply are often characterized more acutely. While climate change will affect the food supply of both food importing and exporting nations making problems which may arise within or between nations pose threats to urban food supplies as well. Beyond that food security for developed nations could be affected by threats of political conflicts, as well as social and political rebellions for food, feed and water the global competition for agricultural commodities, agricultural land

[14]Intersessional Panel of the United Nations Commission on Science and Technology for Development (CSTD), 2017. http://unctad.org/meetings/en/Contribution/CSTD_2017_IPanel_T2_foodsecurity_con10_Austria_en.pdf
[15] Bell, Bob, et al, The Role of Science, Technology and Innovation in Ensuring Food Security by 2030: Report: 2017, 2017. http://unctad.org/en/PublicationsLibrary/dtlstict2017d5_en.pdf
[16] Ibid.

and energy, all of which are needed for agricultural production, also presents a potential hazard to the food supply of urban communities and developed nations.

New, existing, and emerging technologies can address the four dimensions of food security. One example, genetic modification, aims to improve soil fertility, and irrigation technologies can increase food availability. Post-harvest and agro-processing technologies can address food accessibility, biofortification can make food more nutritious, and climate-smart solutions anchored in science, technology and innovation (STI) – including the use of precision agriculture and early warning systems – can mitigate food instability. New and emerging technologies, including synthetic biology, artificial intelligence and tissue engineering may have potential implications for the future of crop and livestock agriculture. However, harnessing the potential of such technologies for food security requires investments in research and development, human capital, infrastructure and knowledge flows. Creating an environment for agricultural innovation also benefits from an enabling environment, gender-sensitive approaches to technology development and dissemination, regional and international collaboration, and technology foresight and assessment for agricultural innovations.

Committee-specific Action and International Framework

Sustainable Development Goal 2 aspires to "end hunger, achieve food security and improved and promote sustainable agriculture," with four of the five targets specifically listing milestones to be reached by 2030.[17] Specifically, targets 2.3 and 2.4 outline targets to "double the agricultural productivity […]of small scale farmers" as well as to "ensure food production systems and implement resilient agricultural practices that increase productivity and production." [18] While the wording of SDG 11 does not specifically address the role of science and technology in achieving more efficient food production systems and agricultural productivity, the utilization of science and technology to achieve these ends has been widely addressed by other UN organizations.

Of these, the leading entity within the United Nations Secretariat for matters concerning science and technology is UN Conference on Trade and Development (UNCTAD). In January 2017, discussions and ideas provided during the Inter-sessional Panel of the CSTD in Geneva provided valuable input to a study published in 2017 called "The Role of Science, Technology and Innovation in Ensuring Food Security by 2030."[19] Among other things, the document details challenges, innovations, and policy considerations for attaining food security worldwide.

For many developing countries, achieving the SDGs by 2030 will be practically impossible without effective and widespread application of science, technology and innovation through the efforts of the CSTD. STI is also necessary to measure the SDG indicators and monitor the progress made. It is equally important to ensure that technology and innovative ideas are disseminated in an inclusive way, without widening existing technological gaps or creating further divides. The report of the Secretary-General on the role of science, technology and innovation in ensuring food security by 2030 E/CN.16/2017/3 reiterates the challenges and strategies to achieve the SDGs as defined by the CSTD at their 20th session in May of 2017.

[17] United Nations Department of Economic and Social Affairs, "SDG 2: End Hunger, achieve food security and improved nutrition, and promote sustainable agriculture", 2014, https://sustainabledevelopment.un.org/?page=view&nr=164&type=230
[18] Ibid.
[19] UNCTAD, "The Role of Science, Technology and Innovation in ensuring food security by 2030", 2017, http://unctad.org/en/PublicationsLibrary/dtlstict2017d5_en.pdf

Key Issues

Food and nutrition insecurity is a key driver and consequence of poverty. To better categorize food security issues so as to match and scale solutions, the CSTD has identified four main components to food security. The components are:

Food availability, which the CSTD addresses through the development of science and technology to improve agricultural productivity. This is accomplished through means such as conventional cross-breeding for improved plant varieties and increased crop yields or improving agricultural productivity through transgenic crops. Technology to improve soil management and irrigation are also addressed via technology.[20] One such irrigation technology is the Groasis Waterboxx which is an integrated planting technology which surrounds the base of a plant, building up a water column by collecting dew and rain water under the plant, and avoiding evaporation by distributing such rainwater over long periods of time.[21] The Groasis Ecological Water Saving Technology is extremely efficient with water, allowing someone to plant in areas where water is scarce or expensive.[22] Using Groasis farmers and individual growers can use 1 liter water instead of 10 while planting dry areas.[23]

Other methods include providing farmers data more accessible to institutions and governments to inform their farming methods. The Institute for University Cooperation Onlus helps farmers in developing countries by providing them with irrigation recommendations based on climate, meteorological and soil data through a mobile platform.[24] This information is otherwise difficult for farmers to access. Another means of providing farmers access to environmental information is FutureWater's Flying Sensors which use near-infrared sensors which can detect crop stress up to two weeks before it is visible.[25] In its first year of use households in Mozambique reported a 39% reduction in water usage.[26]

Food Access, which the CSTD addresses through the development technologies for food accessibility. This includes goals to minimize food losses during production, storage, transport and waste of food by retailers and consumers.[27] Because many African smallholder farmers lack access to ready markets, they tend to store their grains in inadequate facilities (e.g. no protection from moisture, excess heat, rodents, and pests) and end up with spoiled grains. Refrigeration needed for meats, fruits, and vegetables is typically lacking.[28] For example, Uganda is one of eight African countries participating in a project to improve rice post-harvest handling, and marketing and development of new rice-based products.3025 The six-year project, which started in 2011, provides improved rice-threshing technologies (ASI and NARO Lightweight Rice threshers) to smallholder rice farmers, particularly women and youth; farmer cooperatives; rice millers; traders and local agromachinery manufacturers.[29]

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[20] Ibid.
[21] Ibid.
[22] Kuwait Oasis - Planting Trees with High Temperatures." Groasis, Let's Beat Hunger & Desertification, 2017. www.groasis.com/en/projects/planting-ghaf-trees-in-the-desert-of-kuwait-with-a-high-survival-rate-and-less-water.
[23] Ibid.
[24] Bell, Bob, et al, The Role of Science, Technology and Innovation in Ensuring Food Security by 2030: Report: 2017, 2017. http://unctad.org/en/PublicationsLibrary/dtlstict2017d5_en.pdf
[25] Ibid.
[26] Ibid.
[27] Ibid.
[28] Ibid.
[29] Ibid.

Food use and utilization, advances by encouraging research and education in the development of science for nutrition. One billion people worldwide suffer from insufficient calories and nutrients, 2 billion people have sufficient calories but insufficient nutrients and 2.5 billion consume excess calories, but many with insufficient nutrients. Thus, only about 3 billion have sufficient but not excessive calories and sufficient nutrients (Ingram, 2016). Research in biofortification which is the breeding of critical micronutrients and vitamins into staple crops aims to increase the nutrient density of crops. While other programs seek to expand the growing regions and increase the tolerance of already nutrient dense crops.[30]

Food stability must improve through new ways to combat acute and chronic food insecurity. Sustainable food systems deliver food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.[31] The effects of climate change will require sustainable and climate-compatible agriculture practices, including diversifying production.[32]

Potential Impacts of Science, Technology, and Innovation

Eradicating poverty with the principle of "leaving no one behind", will be impossible without bringing science, technology and innovation (STI) to the forefront of development policy and practice. The level of ambition of the SDGs requires innovative new approaches to development and using the potential of STI to find and scale up affordable solutions to the needs of the poor.[33] For example, replacing flimsy plastic grain silos with those made with more durable materials prevents rodent infestation and preserves grains longer. Likewise, providing farmers with durable bicycles outfitted with small trailers has allowed farmers in Ghana to sell and purchase goods from distances too far to travel by foot. These simple technologies compounded with Information and communications technologies (ICTs) mentioned below allow rural farmers to access more diverse foods, seeds, water, and even medical care that were until recently out of reach.

Some contemporary technology-based approaches have not included poor and marginalized groups and even contribute to increasing inequalities and environmental degradation. Therefore, the CSTD is looking into forms of innovation that are mission-oriented, socially inclusive, and environmentally benign, to address food security. The goal is not only to encourage more innovation, but most importantly, to encourage the types of innovation that help to eradicate hunger. Doing so requires identifying limitations and shortcomings of current methods being used to address food security.

Big data can be used in the fight against chronic hunger and undernutrition. A big data project, named Nowcasting Food Prices in Indonesia Using Social Media Signals, coordinated by UN Global Pulse, the Indonesian government, and the World Food Programme monitored public tweets mentioning food prices to develop a real-time food index, assisting policy-makers in developing risk-management techniques to keep prices affordable.[34] The International Center for Tropical Agriculture uses big data on weather and crops to better adapt to climate change. Early warning systems—like the Chinese Academy of Sciences' Cloud Based Global Crop

[30] Ibid.
[31] Ibid.
[32] Ibid.
[33] Commission on Science and Technology for Development: Contribution to the High-Level Political Forum on Sustainable Development (HLPF), 2017. https://sustainabledevelopment.un.org/index.php?page=view&type=30022&nr=586&menu=3170
[34] United Nations Global Pulse, Projects, 2018. https://www.unglobalpulse.org/projects/nowcasting-food-prices

Monitoring System—have played critical roles in disseminating country and region-specific information to help farmers maximize productivity.[35]

ICTs are creating new possibilities for pro-poor financial inclusion. Innovations in credit and payment such as mobile payment systems are not only transforming mechanisms of transactions and finance, but also have the potential to reach and meet the needs of millions of people without access to formal financial services. Crowdfunding, peer-to-peer lending and social impact bonds are new ways to access capital, creating alternative sources of finance and contributing to business and community initiatives that might not be able to obtain funding through traditional credit markets.

UNCTAD estimates that achieving the SDGs requires an annual US$ 2.5 trillion funding gap to be filled. Public sector action and Official Development Assistance is indispensable, but on its own will be insufficient to meet demands across all SDG-related sectors. The CSTD is examining areas of investment with a positive impact on development through STI and the achieving of the Goals. The international community should address financing challenges by sensitizing the finance community to the Goals and changing mindsets in the financial sector, with specific emphasis on the development of technological and innovative capabilities.

Case Study

Bulgaria's Institute of Plant Physiology and Genetics

The CSTD recognizes that a hurdle in the accessibility of technology historically has been that new technology development has been dominated the for profit sector. To this end the committee partners with nonprofits such the Bill and Melinda Gates Foundations and educational institutions to engage the development of technology whose accessibility is not reliant on profit. The CSTD has brought to the attention of the global community advances made in agricultural research at Bulgaria's Institute of Plant Physiology and Genetics (IPPG). At this institute scientists implement fundamental and applied research in the field of plant physiology, biochemistry and genetics, with a key significance in working out the current problems of modern society, the most important of which is feeding a growing population under conditions of unfavorable climate changes. The priorities in scientific activities are directed to the study of basic life processes in plants and the functional organization of eukaryotic genome under normal and stress environmental conditions.[36] The mission of IPPG is to contribute to the resolution of global issues such as feeding the population despite adverse climatic changes. Its priorities are:

- The creation of new plants for agriculture, food processing and pharmaceutical industries, health and environmental protections
- Research in to physiological and biochemical bases of regulation so as to safeguard plants against negative effects of the environment and increase their resilience
- Study plant genetics to improve their positive genetic attributes to enhance the viability of these plants to improve and safeguard production.[37]

[35] Ibid.
[36] Institute of Plant Physiology and Genetics BAS RSS, "About Us," 2017. www.bio21.bas.bg/ippg/en/?page_id=2.
[37] Bell, Bob, et al, The Role of Science, Technology and Innovation in Ensuring Food Security by 2030: Report: 2017, 2017. http://unctad.org/en/PublicationsLibrary/dtlstict2017d5_en.pdf

- Because the IPPG studies plants on the molecular level as well as their relationship with environmental air, soil and water.[38] The data from their research can help improve productivity while minimizing adverse effects on the environment. This project is developing new genotype cultivars with improved food and biological properties which improve the plants drought tolerance, resistance to pathogens, and nitrogen efficiency.[39]

Conclusion

The United Nations Food and Agricultural Organization (FAO) identified a food gap of close to 70 per cent between the crop calories available in 2006 and the expected calorie demand in 2050. To close this gap, it would be necessary to increase food production by making genetic improvements, reduce food loss and waste, shift diets and raise productivity by improving or maintaining soil fertility, pastureland productivity and restoring degraded land. What this means is that ensuring food security by 2030 includes creating the frame works for food security for the decades that follow.[40] The CSTD is on the forefront of this quest and in so doing has dispelled the myth that a few simple answers, methods, or technologies will be the lone silver bullet moving forward. Instead, the CSTD recognizes the viability in solutions that are beyond all else accessible, inclusive, and sustainable.

To implement the varied and effective solutions that are anticipated to be necessary requires the inclusion of communities and people who have been previously left at the margin, including through financing and information sharing. The solutions the CSTD seeks require the expedition of information exchange both from technologists to agriculturalists and vice versa which calls for the scaling of current technologies to meet the needs of more people. The scaling of STI requires the development of infrastructure such as roads, water systems, and electrical grids which require coherent government policies. To this end the CSTD will continue to facilitate the exchange of information and best practices between member states to make the achievement of food security possible.

Questions to Consider

- Are GMO's a viable solution to an ever-growing global food crisis?
- How are the science, technology and innovation-related food security projects in your country or region resilient, sustainable, replicable, and/or scalable? Can you give any success stories or examples in this regard from your country or region?
- With access to food saving technologies at the fingertips of many developed nations, how can the CSTD work with national governments to provide such instruments to developing areas and rural farmers?
- How can CSTD help in creating and strengthening networks between academic and research institutions that conduct research on the application of STI in agricultural practices?

[38] Ibid.
[39] Ibid.
[40] Ibid.

II. Smart Cities and Infrastructure

Introduction

In May 2016, the United Nations World Cities Report mentioned that cities have "become central to the transformation of the global economy."[41] With the rise of technology and urbanization, it is only inevitable that these two facts of human life have intertwined in the 21st century. CSTD has made it a priority in exploring the utility of smart cities to advance development and improve the lives of a city's citizens. An internationally agreed upon definition of a smart sustainable city is as follows:

> "An innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects.[42]

In short, smart cities and infrastructure rely on the production and usage of data to meet the challenges of developing a city. There are three main pillars that smart cities rely on: technological, social, and institutional. The technological pillar of smart cities relies on actuating, networking, and data analytics to deliver smart, dynamic solutions to municipal problems. The social aspect regards how a city manages its population, including aspects like education, governance, and human capital. The third pillar is the institutional pillar, involving the structures that cities revolve around such as urban planning, communities, and infrastructure.[43]

The need for smart solutions arises from ever increasing international urbanization. The year 2008 marked a watershed moment in human history as the first time that there were more urban dwellers in the world than rural as reported by the UNCTAD.[44] Estimates project that 60 percent of the global population will be urban dwellers by 2030, "increasingly concentrated in Africa, Asia, and Latin America".[45] Projected growth rates show that countries with lower gross domestic products (GDP's) must address far more rapid urban population growth than higher income countries. These countries have a lot of catching up to do when it comes to development. These trends are followed by an ever-increasing demand for water, food, energy, shelter, and waste management along with constant pressure to meet those demands with high quality solutions. Collecting data on metrics such as the population's water consumption, urban growth rates, and traffic patterns allows city planners and municipal leaders to easily chart and map city solutions.

A smart city's role in a developing country is to expedite development to match the pace of urbanization and to augment municipal frameworks. The necessity to provide adequate urban infrastructure leads to cooperation to use smart infrastructure applications to leapfrog other areas in terms of development and grow its economy faster

[41] Smart Africa, "The Smart Africa: Smart Cities Blueprint", 2017, http://www.mitec.gov.rw/fileadmin/Documents/Strategy/SMART_AFRICA_Sustainable-Cities_A_Blueprint_for_Africa.pdf.pdf
[42] United for Smart Sustainable Cities Initiative, "Terms of Reference", 2016, https://www.itu.int/en/ITU-T/ssc/united/Documents/ToR-U4SSC.pdf
[43] Lea, Rodger, "Smart Cities: An Overview of the Technology Trends Driving Smart Cities", 2017, https://www.ieee.org/publications_standards/publications/periodicals/ieee-smart-cities-trend-paper-2017.pdf
[44] ECOSOC, "Report of the Secretary General", 2016, http://unctad.org/meetings/en/SessionalDocuments/ecn162016d2_en.pdf
[45] Ibid.

than competing areas.[46] Likewise, developing countries' high infrastructure deficits provide cities with opportunities to develop technology alongside their infrastructure.[47] Integrating data and real time, retrospective insights into city planning can improve situational awareness and decision making. This allows cities to better develop concurrently with their actual growth rather than reacting to population booms and traffic congestions after they become a problem.[48]

Smart cities do not only have utility in developing countries. Developed areas, such as the United States and the European Union also can rely on smart cities and infrastructure to address their own needs.[49] Rather than focus on building new infrastructure, a developed area's municipal leaders can turn their attention towards integrating smart technology into existing infrastructure. Much of that smart technology includes data collection. Data collection is an increasingly significant field as it allows architects, city planners, engineers, and other significant city leaders to look at how infrastructure is being used. This data could include data about "income, burglaries, traffic, fires, illnesses, and parking citations"[50] These cities must strive for the most optimal use of their infrastructure. Although they forgo the need to develop as much as other nations, developed countries face the challenge of maintaining their existing infrastructure systems. Municipal leaders often cannot abandon these systems due to high costs and use of space[51]. Implementing technology to non-obsolete infrastructure that were built in the 1980's to 2000's can highlight the incongruences of these systems with today's technology. Integrating such technology can often come at a high price, albeit not higher than abandoning a system altogether.

Smart infrastructure is the foundation of any smart city. These can include elements like smart energy, smart water, smart mobility, and smart buildings. These elements share more in common than just the name smart. They all "are connected and generate data, which may be used intelligently to ensure the optimal use of resources and improve performance"[52]. For example, smart buildings utilize and integrate building management systems to improve building energy efficiency, waste management, and operational effectiveness. These systems could be as simple as building data collection and as complicated as technologies and workflows to adjust operation systems contemporaneously to changing factors. Likewise, smart mobility "is best described as approaches that reduce congestion and foster faster, greener, and cheaper transportation options."[53] Such smart mobility systems include mass transit systems, vehicle sharing, and on-demand transportation. Smart cities can effectively create smart mobility by analyzing mobility patterns in order to help optimize traffic conditions holistically. City leaders can not only rely on infrastructure and technology alone to build better a smarter city. Without proper training and enough labor, the ideas and elements of smart cities become moot. Cities without the necessary human capital will be unsuccessful in achieving the maximum potential of their smart cities.

International Framework

[46] Ibid.
[47] Deloitte, "Africa is ready to leapfrog the competition through smart cities technology", 2015, https://www2.deloitte.com/content/dam/Deloitte/za/Documents/public-sector/ZA_SmartCities_12052014.pdf
[48] Ibid.
[49] Ibid.
[50] Totty, Michael, Wall Street Journal, "The Rise of the Smart City", https://www.wsj.com/articles/the-rise-of-the-smart-city-1492395120
[51] Ibid.
[52] Ibid.
[53] Ibid.

In September 2015, UN Resolution A/RES/70/1 outlined the 17 Sustainable Development Goals (SDGs) as well as 169 targets detailing those goals. Sustainable Development Goal 11, entitled "Sustainable Cities and Communities" seeks to "make cities and human settlements inclusive, safe, resilient, and sustainable"[54] . To make the targets of SDG 11 more attainable, the United Nations Economic Commission for Europe (UNECE) partnered with OiER, EAA, RICS, UN-Habitat and ISOCARP to establish the United Smart Cities program, which lays out objectives to:

- Decrease city vulnerabilities to climate change, environmental degradation, urban migration, and demographic changes,
- Reduce the carbon footprint of cities,
- Heighten the quality of life for city residents,
- Improve cities' environmental quality,
- And establish public-private partnerships (PPPs).[55]

The United Smart Cities Program also addresses capacity-building, technology transfer, implementation strategies, and policy recommendations to governments and other key stakeholders for facilitating the transition to Smart Cities. The program currently consists of 87 projects, 45 companies, and 36 cities.[56]

The push to make SDG 11 a reality continued in May 2016 when the UNECE collaborated with the International Telecommunication Union (ITU), the Ministry of Economy and Finance of Italy, the Chamber of Commerce of Rome, and Tecnoborsa to organize a "Forum on Shaping Smarter and More Sustainable Cities: Striving for Sustainable Development Goals" with the objective of assessing the concepts of smart sustainable cities as well as key barriers at the local level and current initiatives across the globe concerning smart cities[57]. Also launched at the forum was the United for Smart Sustainable Cities (U4SSC) initiative, which not only clarified the exact definition of a smart sustainable city but also has functioned as a global platform for knowledge sharing relating to the feasibility of smart city practices, guidelines to their implementing those practices, and concrete frameworks[58]. Additionally, the U4SSC has developed and continues to promote a set of key performance indicators (KPIs) for assessing the progress of smart sustainable cities. Each indicator contributes to one of three dimensions that together illustrate a holistic view of a city's performance: Economy, Environment, and Society and Culture. In a broader sense, these KPIs describe a criteria to assess the effect size of ICT contributions on making a city smarter and more sustainable[59]. Currently, ITU is working on developing a Global Smart Sustainable City Index within the U4SSC initiative, which is expected to be completed by 2017[60]. However, some private sector entities have already created similar indices, such as Arcadis' (a multinational Design and

[54] United Nations Department of Economic and Social Affairs, "Sustainable Development Goal 11", 2017, https://sustainabledevelopment.un.org/sdg11
[55] United Nations, "United Smart Cities", 2016, https://sustainabledevelopment.un.org/partnership/?p=10009
[56] Ibid.
[57] ITU, "Forum on 'Shaping smarter and more sustainable cities: striving for sustainable development goals", 2016,https://www.itu.int/en/ITU-T/Workshops-and-Seminars/Pages/201605/forum-20160518.aspx
[58] Ibid.
[59] ITU, "KPI's on Smart Sustainable Cities", 2016, https://www.itu.int/en/ITU-T/ssc/Pages/KPIs-on-SSC.aspx
[60] Ibid.

Consultancy firm) 2016 Sustainable Cities Index, which ranks 100 of the world's leading cities according to the "three pillars of sustainability": People, Planet, and Profit.[61]

Committee-specific Action

The CSTD has only recently begun to address the issue of smart cities and infrastructure, naming it one of two priority themes for its 18th session. In 2014, CSTD adopted E/2014/31 which included the recommendation of acknowledging how science, technology, and innovation must be closely linked with national development planning.[62] As a result, In the summer of 2014, ECOSOC passed E/RES/2014/31 that reaffirmed CSTD's goals for its role as a torchbearer for science, technology, and innovation.[63] Likewise, in 2017, ECOSOC adopted E/RES/2017/22 regarding science, technology, and innovation for development. The resolution encourages governments "To promote local innovation capabilities for inclusive and sustainable economic development by bringing together local scientific, vocational and engineering knowledge, mobilizing resources from multiple channels, improving core information and communications technology and supporting smart infrastructure."[64]

Case Study: Dubai

In line with the objectives of the U4SSC initiative, the city of Dubai was the world's first to use ITU's Key Performance Indicators for Smart Sustainable Cities. The ITU KPI pilot project was launched in 2015, and Dubai was the first to join, quickly followed by Singapore and later by other cities including Montevideo, Uruguay; Buenos Aires, Argentina; and Valencia, Spain. The ITU's findings for this pilot project are chronicled in an all-inclusive document entitled "Smart Dubai"[65]. The document, among other things, shares the current status of Dubai's current ICT applications, provides an evaluation of Dubai's progress in meeting its smart city objectives, and summarizes how well the city was able to implement the KPIs. The findings, which are outlined below, will not only be used by the U4SSC board to advocate for public policy encouraging the use of ICT for smart city development but will also feed into an ITU expert group called the ITU-T Study Group 20, which addresses the requirements necessary to standardize Internet of Things (IoT) technology and its applications. Furthermore, the Dubai case study provides an assessment of how relevant the KPIs are to pursuit of the SDGs, particularly SDG 11.

Key Findings

The following list highlights some of the important findings of the Dubai Smart City case study. The findings are grouped into 6 dimensions: Information and Communications Technology, Environmental Sustainability, Productivity, Equity and Social Inclusion, Quality of Life, and Physical Infrastructure.

[61] Ibid.
[62] ECOSOC, "Resolution adopted by the Economic and Social Council on 16 July 2014", 2014, http://www.un.org/ga/search/view_doc.asp?symbol=E/RES/2014/28
[63] CSTD, "Report on the seventeenth session (12-16 May 2014), 2014, http://unctad.org/meetings/en/SessionalDocuments/CSTD2014_17th_Report_en.pdf
[64] ECOSOC, "Resolution adopted by the Economic and Social Council on 6 July 2017", 2017, http://www.un.org/ga/search/view_doc.asp?symbol=E/RES/2017/22"
[65] ITU, "Dubai Reports Results from Implementing ITU's Key Performance Indicators for Smart Sustainable Cities", 2016, http://new.unhabitat.org/news/dubai-reports-results-implementing-itu%E2%80%99s-key-performance-indicators-smart-sustainable-cities

ICT: It is necessary for an aspiring smart city to incorporate ICT into their urban infrastructure prior to commencing other actions aimed at creating a smart city. While expanding the role of ICT in a city, city leaders and stakeholders should take care to appropriately address electromagnetic field (EMF) management, child online protection (COP) policies, and cybersecurity. ITU has prepared guidelines for each of these[66].

Environmental Sustainability: It is recommended that city leaders integrate ICT into their water management systems in order to efficiently collect, treat, and distribute clean water. Furthermore, they should use ICT-based monitoring systems to track energy usage with the goal of expanding renewable energy sources as well as to reduce their city's carbon footprint.[67]

Productivity: To better support business licensing and registration as well as foster a atmosphere of entrepreneurship, Dubai introduced an artificial intelligence-based e-service called SAAD. Leaders and stakeholders of other aspiring smart cities should introduce similar platforms that promote business innovation. In addition, ICTs for reporting on various economic parameters should be implemented.[68]

Equity and Social Inclusion: Based on Dubai's success with the DubaiNow app, which provides citizens with 2000 government services, other cities are encouraged to develop e-platforms that enable them to access public services and information. Other online-based applications such the eComplain System and Police Eye have been implemented with success in Dubai, and as such it is recommended that other cities implement similar transparent online platforms for feedback and crime monitoring.[69]

Quality of Life: Dubai has used The Mohammad Bin Rashid Learning Programme to integrate ICTs into the existing education infrastructure. City leaders are encouraged to integrate similar e-learning systems not only to help familiarize the population with the new technology but also as a means to better reach remote areas. City leaders are also encouraged to implement technology-based medical systems for managing health records and offering services through tele-medicine channels.[70]

Physical Infrastructure: It is important for a smart city to facilitate the transition to hybrid automobiles to help reduce their carbon footprint, and as such city leaders should promote the use of hybrid vehicles amongst the public as well as the public transportation services. Dubai has initiated the transition by adopting the Green Mobility Initiative to promote hybrid vehicles.[71]

In conclusion, the first year of the ITU-Dubai pilot project for testing the practicality of the KPIs as a framework for developing smart cities has yielded much practical advice, but further research is needed and as well as refinement of ITU's KPI guidelines to make them more accessible and feasible for all cities, developed and developing.

Case Study: A Smart Africa

[66] ITU, "References", 2017, https://www.itu.int/en/publications/Documents/tsb/2016-DubaiCase/mobile/index.html#p=59
[67] Ibid.
[68] Ibid.
[69] Ibid.
[70] Ibid.
[71] Ibid.

From a global perspective, the world is becoming increasingly urbanized, which has posed concerns such as growing numbers of slum dwellers, inadequate city services, improper infrastructure, increased air pollution, and unexpected urban sprawl. In 2015, an estimated 4 billion people, then 54 percent of the world population, lived in cities, and this number is expected to increase to 5 billion by 2030.[72] Africa's rate of urbanization has increased from 15 percent in 1960 to 40 percent in 2010 and is projected to reach 60 percent by 2050.[73] African economies have also been growing rapidly, above 5 percent a year for the past 10 years. These levels of growth require efficient and sustainable urban centers that not only provide localities for industry and high value services but also transportation infrastructure to link national, regional, and global markets. Currently, the majority of African citizens reside in rural areas, but this balance is expected to shift as half of the African population is projected to occupy cities by 2030.[74] This inevitable shift in the population has been known for some time. In October 2013, the Rwandan city of Kigali hosted the Transform Africa Summit, which ended in the adoption of the Smart Africa Manifesto adopted by 7 African Heads of State. The Smart Africa Manifesto was soon after endorsed by the African Union (AU) at the 22nd Ordinary Session of the AU Assembly in January 2014. To better implement the Manifesto, a coalition of African countries, development partners and private sector members came together to create the Smart Africa Alliance. One project that precipitated from this new alliance is Smart Cities, led by the government of Rwanda with the goal of forging a Smart Sustainable Cities framework to be referenced and used by other African nations.[75]

At the heart of the Smart Sustainable Cities concept is manipulation of information and communications technology (ICT) to better enable city leaders to make decisions about resource allocation, city services, and other aspects of urban development. The African continent is in a unique position to do this, with large multinational information technology (IT) companies labelling Africa as "the next big market."[76] With some tactful urban development, particularly using Smart City concepts, Africa could easily be catapulted into the developed world by the mid-21st century. Fortunately, Africa is in a promising position to turn existing urban areas into Smart Cities. This propensity for Smart City development owes to a few key characteristics of contemporary Africa:

Most African cities have little legacy drawbacks. This means that, as opposed to well-established Western and Eastern metropolises, African cities are not developed to the point where they must worry about maintaining and upgrading costly legacy infrastructure. For example, countries such as Ethiopia and Libya do not have substantial telecommunication cable installations, and thus they can readily look forward to implementing the latest 5G/LTE networks. Furthermore, they will not have to worry about outdated network servers, allowing businesses to join the forefront of the interconnected global network.[77]

Africa has a youthful population. About 62% of the African population is under 25 years of age. This, in combination with the fact that by 2025 over 20% of Europeans are predicted to be 65 or older, means major multinational businesses have their eyes set on the youthful African population as the next big consumer market.[78]

[72] Ibid.
[73] Ibid.
[74] GSMA, "The Mobile Economy: Africa 2016", 2016, https://www.gsmaintelligence.com/research/?file=3bc21ea879a5b217b64d62fa24c55bdf&download
[75] Ibid.
[76] Ibid.
[77] Ericsson, "Mobile Subscriptions and penetration Q3 2016", 2016, https://www.ericsson.com/en/mobility-report/mobile-subscriptions-and-penetration-q3-2016
[78] Ibid.

Urbanization is increasing in Africa. Soon more than half of the African population will love in cities, providing a wealth of think tank and innovation potential, if the appropriate physical and economic resources are in place. This potential has already been realized with the Nairobi Innovation Hub in Kenya, which created an environment filled with some of the brightest, innovative minds in the country. Smart Cities could catalyze the materialization of other such facilities in cities throughout Africa.[79]

Africa displays a culture of entrepreneurship. Africa is well known for her peoples' "can do" attitude. This optimistic attitude has led some African businesses to thrive, such as the Standard Bank of South Africa, which earned the Innovation in Societal and Community Impact Award in 2013, and the First National Bank, which earned the *Most Innovative Bank of the Year Award* in 2012.[80]

Mobile connectivity is rapidly increasing in Africa. In the past five years, Africa has experienced the fastest telecoms growth worldwide.[81] At the end of 2016, mobile subscription penetration in Africa reached 82%, and about half the African population was subscribed to mobile services, amounting to more than half a billion people. Interconnectedness through the mobile phone industry is an important facilitator of economic growth and a vital contributor to successful Smart Cities.

African governments are positioning ICT as an enabler. Statistics show that African countries with very low internet access correlate with low levels of health, income, and education. A Deloitte study found that an increase in mobile subscription penetration of 10% precipitated a 1.2% increase in the GDP of middle/low income countries.[82] African state leaders such as Trevor Manual, the South African Minister in the Presidency, are taking the evidence to heart and are urging the public sector to take action.

The African Urban Agenda:

The African Urban Agenda is a document endorsed by Habitat III held in Quito, Ecuador in October 2016 that commits to utilizing technology to improve city management, protect public resources, and promote data transparency. It serves as an overarching guide to transform African cities to sustainable and technologically integrated entities. The agenda also stresses the importance of improving the business environment to make it more attractive to investors. Notably, the agenda remarks that building the cities of the future will require "a national ICT policy and e-government strategy."[83]

While many African leaders have their sights set on establishing Smart Cities, the continent is not without its roadblocks. While rapid urbanization is necessary for Smart Cities to become fully actualized, it can also create a challenge if the rate of urban migration outpaces the city's capacity to supply adequate city services to its growing population. Statistics project that the rate of urbanization in Africa will reach 60% by 2050, with the total number of urban residents in Africa to triple in the next 50 years.[84] Better urban management and careful resource

[79] Ibid.
[80] Freire, Lall, Leipziger, "Africa's Urbanization: Challenges and Opportunities", 2014, http://www.dannyleipziger.com/documents/GD_WP7.pdf
[81] Ibid.
[82] Ibid.
[83] UN Habitat, "Africa Urban Agenda Programme", 2015, https://unhabitat.org/urban-initiatives/initiatives-programmes/africa-urban-agenda-programme/
[84] Ibid.

allocation will be of vital importance to preventing African cities from deteriorating under the stresses of rapid development.

Conclusion

With urbanization rapidly rising, it is imperative that cities are prepared to deal with populations higher than ever before. The CSTD has embraced smart cities and their functions to create a better quality of life for a citizens. As technology becomes ever prevalent in today's society, it is only inevitable that technology becomes integrated in all of a city's facets. Creating a smart city is a multifaceted issue. In a developed area, the question is whether a smart city can easily integrate smart features into existing infrastructure. In developing cities, municipal leaders must figure out how to balance constructing new infrastructure and affording new technology. As can be noted in Africa, the lack of legacy systems makes the potential for their development limitless. Africa has both the human capital and the space ready to become home to some of the world's next metropolises. The CSTD has embraced smart cities and the implementation of technology into city life to address increasing urbanization.

Questions to Consider

- To what role can technology and information systems play to address depreciating infrastructure?
- To what extent should technology and data collection be integrated into a city? Should there be no limit on what data to collect?
- How can countries implement smart cities without overstepping its boundaries onto citizen's private lives?
- Which cities are in a position to begin implementing smart city practices? For those cities that are not yet, what changes are needed to help them reach that position?
- How can city leaders and relevant stakeholders be motivated to invest in smart city infrastructure?
- How can city populations be appropriately educated about the use of new ICT and IoT-based technologies, especially in the face of such rapid urban growth?

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In 2017, the UNCTAD released a report regarding “The Role of Science, Technology and Innovation in Ensuring Food Security by 2030”. The report is a comprehensive list of elements of food security and solutions to them. Here delegates can read these and weigh which problems are priorities for the CSTD to address, and which solutions are necessary for the CSTD to call upon. The High Level Political Forum also addressed how the CSTD can contribute to sustainable development. This resource can be used to look at how the CSTD can act within its mandate to achieve sustainable development.

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