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ON SCIENCE AND TECHNOLOGY FOR DEVELOPMENT (CSTD)**

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Contribution by UNIDO

to the CSTD 2020-2021 priority theme on “Using science, technology and innovation to close the gap on Sustainable Development Goal 3 on good health and well-being”

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**PRIORITY THEME 2:** Using science, technology and innovation to close the gap on SDG 3, good health and well-being

**United Nations Commission on Science and Technology for Development (CSTD)**

Dear international organization/UN entity/agency,

The CSTD 23<sup>rd</sup> annual session selected “Using science, technology and innovation to close the gap on SDG 3, good health and well-being” as one of the priority themes for its 24<sup>th</sup> session (2020-21 period).

Science, technology, and innovation (STI) can play an important role in strengthening the capacity of all countries, in particular developing countries for early warning, risk reduction and management of national and global health risks as described in SDG 3D. Data science, biomedical science and engineering and other technologies can broadly transform health and medicine and specifically support countries and regions in their responses to emerging health crises as well as in their preparedness for future threats. Beyond specific technological innovations, STI policy advice, diplomacy, and international cooperation also play a prominent role in current and future infectious disease preparedness and response. The theme will explore experiences about using STI to strengthen health outcomes as well as approaches to regional and global STI cooperation in this field.

The CSTD secretariat is in the process of drafting an issues paper on the theme to be presented at the CSTD inter-sessional panel meeting. In this context, we would like to solicit inputs from international organizations, UN entities and agencies on this theme. We would be grateful if you could kindly answer the following questions based on your organization’s work at the global level.

1. Can you give examples of international projects/policies aimed at using science, technology, and innovation for early warning, risk reduction and management of national risks? What are the main challenges confronted while trying to implement these projects/policies?

UNIDO developed a recovery Programme proposal for Iran. It aims to mitigate the COVID-19 impacts on Industry and Business. The programme leverages from UNIDO’s technology foresight (TF) expertise to facilitate their procedures on designing a thorough process to engage industrial and business stakeholders’ invaluable discussions to prepare the community better. Technology foresight (TF) has increasingly been recognized worldwide as a powerful instrument for establishing standard views on future development strategies among policy-making bodies, bridging the present with the future. Its unique feature stems from broad participation of a large number of stakeholders and experts, namely, the government, science, industry and civil society (UNIDO TECHNOLOGY FORESIGHT MANUAL, Volume 1, Technology Foresight in Action, 2005).

TF methodology is an approach designed to bridge the gap between early warning and early action by inviting experts and policymakers to develop concrete goals, instruments and measures that help them formulate coherent strategies to prevent risks from turning into actual security threats and foster resilience in the country level. Going beyond merely deriving policy options from best- and worst-case scenarios, the goal is to identify policy options that are robust (i.e., effective or at least not harmful across different futures) and adaptable to changes in the future environment (Crisis Response and Disaster Resilience 2030, 2012).

Technological advances in digital technologies—artificial intelligence (AI), machine learning, robotics, additive manufacturing (3D printing), the Internet of Things, distributed ledger technology (blockchain), and quantum computers—and their integration with nanotechnology and cognitive, social and humanitarian sciences (convergent technologies)— have given rise to a new generation of TFs. The sixth generation of Technology foresight (also referred as Foresight 6.0) leverages from the expanded capacities and rising affordability of digital technologies, like Big Data and AI to provide more accurate information; facilitate the overall implementation process; assist the analysis of large amounts of information and enable the participation of a more significant number of stakeholders (Çifci & Yüksel, 2018).

The programme developed details a list of steps for the community to consider when starting a planning process for economic resiliency in the event of a disaster which is in turn, based on the expanded capacities and rising affordability of 4IR digital technologies.

2. Could you share specific examples, projects or initiatives that have used frontier technologies (e.g., AI, drones, blockchain, 3D printing, etc.) or other forms of innovation in general in addressing the Covid-19 pandemic?

Many companies, especially MSMEs, may find that they encounter a very different business environment, in particular, spurred on by significant growth in the medical manufacturing sub-sector, a slowdown of globalized production chains and accelerated digitalization of operations. Given UNIDO's mandate to promote and accelerate ISID, the organization is prioritizing post-crisis recovery and transformation through a variety of actions, such as 4IR readiness assessments and analysis at country-level; 4IR upskilling and training programmes; investment and technology matchmaking forums; promotion of 4IR clusters, networks and export consortia; and assistance for SMEs with accessing global value chains, technology adoption and digitalization. For example, in Colombia, UNIDO has worked with partners in the automotive industry to develop guidelines for restarting production. The Global Market Access Programme (GMAP), supported by the Norwegian Agency for Development Cooperation (NORAD), also addresses compatibility issues that SMEs encounter when trying to access international export markets. Guidance for Micro, Small and Medium Enterprises (MSMEs) is provided in the document titled: "Responding to the COVID-19 Crisis. Pathway to Business Recovery". An online platform called Building Back Business from Crisis (B3C) is enabling MSMEs in India and further afield to recover from the strains of lockdown.

Considering the current COVID-19 situation, the containment measures adopted by many countries have shaken the foundations of the three main pillars of the global economy: demand, supply, and finance. This has a disruptive impact on global supply chains, with the closure of international borders, diminishing of goods or parts transportation and distribution limitations, among others, affecting the availability of emergency medical supplies or equipment, or increasing the food demand. Within this context, UNIDO will explore the use of blockchain for improving the efficiency, transparency, traceability and security of crucial supply chains in the short, medium and long term. For example, through the Global Quality and Standards Programme (GQSP) it will be supported the development of national systems for verified and traceable competences of medical analysis and testing laboratories using blockchain technology, allowing in times of crisis rapid verification of competences and reliability of test capacity. Moreover, the use of blockchain-based smart contracts will be piloted to automate processes, reduce costs and integrate different actors involved at the different levels of sourcing, procurement, manufacturing, distribution, and logistics; to promote more transparent and resilient supply chains.

The global response to the challenges and the adverse social, economic and financial impact of the COVID-19 pandemic require innovative ideas and technologies. The UNIDO's Global Network of Investment and Technology Promotion Offices (ITPO Network) aims to support the development of effective, fast-acting solutions to combat the outbreak and spread of the coronavirus and ideas to help in mitigating the aftermath of the crisis in developing countries. In particular, the ITPO in Italy launched a global call for developing countries on "Innovative Ideas and Technologies vs. COVID-19 and beyond" in the form of a competition for innovators from various fields and backgrounds. Through the 1,100 applications submitted from 108 countries from around the world, the initiative successfully identified innovative solutions and scalable technologies to respond to the crisis and recover better, building more equal, sustainable and resilient economies through ISID. To maximize visibility to the awarded proposals and support the conclusion of international partnerships, UNIDO will provide the winners of the Global Call with advisory and mentorship services. (<https://www.unido.org/news/over-1100-applications-submitted-unido-global-call-innovative-ideas-and-technologies-vs-covid-19-and-beyond>). Also the ITPO Tokyo developed a project titled "Strengthening the capacity of developing countries to mitigate the impacts of the COVID-19 pandemic through appropriate technology transfer from Japan", where some companies have been selected already for the STePP. Their technologies are described here:

[http://www.unido.or.jp/en/activities/technology\\_transfer/technology\\_db/human-health-technologies/](http://www.unido.or.jp/en/activities/technology_transfer/technology_db/human-health-technologies/)

In another action, thanks to a partnership between UNIDO's ITPO in Shanghai, and the Beijing-based White Rhino Auto company, unmanned vehicles were set to work at Wuhan's Guanggu Field Hospital. Unmanned vehicles or carts that can carry food or other items are nothing new, not in China at any rate. The JD.com e-commerce company began road-testing the country's first domestically developed self-driving delivery vehicle in September 2016, and a number of other companies quickly joined in a race to seize the market. However with the outbreak of the coronavirus in Wuhan in Hubei province in

December 2019, a new role for the unmanned delivery vehicle soon emerged. Two White Rhino vehicles were brought to Wuhan from Beijing by the company CEO and two engineers who set them up to transport medical supplies, deliver meals for doctors and patients, and complete other emergency tasks in the hospital. The use of the unmanned vehicles not only helped avoid cross-infection but also reduced the workload of the hard-pressed medical staff. (<https://www.unido.org/stories/stopping-spread-covid-19-disinfecting-public-spaces-china>)

3. Can you provide examples of policies/projects/initiatives aimed at strengthening health innovation systems at the global level? For example, how does your organization support the building of innovative capabilities through investments in R&D and human capital? What projects are in place to stimulate healthcare innovation and effectively address safety, ethical and other concerns?

UNIDO's ongoing project titled "Fostering Slovenian – Cuban innovation cluster for biopharma, medical and nanotechnologies sectors 2020 – 2021" is aiming to promote innovation and collaboration in the field of the biopharmaceutical, medi-tech and nano-tech sectors, contributing to improving the economic growth and the quality of life. The project is motivated by the new generation of innovation clusters or innovation hubs that are arising which are changing their definition into spatial concentrations of innovative activity in which actors can benefit from mutually reinforcing competencies without the need to be physically close. The new technologies and business models stemming from the 4IR are enabling more open innovation collaboration and networking among different stakeholders.

The project contributes to strengthening cooperation between companies and institutions from Cuba and Slovenia in the areas of trade, innovation and investment; and in the promotion of new products, technologies and processes' development in the selected sectors, with high impact on the human health and the quality of life. The specific objective is to foster Slovenian – Cuban innovation cluster development in biopharma, medical and nanotechnologies sectors during the period 2020 – 2021. Likewise, the project aims to establish strategic alliances between Cuban and Slovenian partners for developing commercially viable and bankable business proposals in the identified priority sectors.

UNIDO is playing an essential role in the development of clusters that are used as mean to promote the development of competitive industries and to facilitate innovation and economic development, knowledge sharing and increase of competitiveness for market access and investment promotion. UNIDO helps with establishing and providing support to business networks, building public-private partnerships and promoting dialogue among service offers and policymakers. UNIDO also technically assists financial and non-financial service providers (e.g., business development service (BDS) providers, vocational schools, etc.) to make their services more responsive to the demands from within the cluster.

4. Could you share case studies of international cooperation that have strengthened health capacities, particularly in developing countries? Can you provide success stories involving global cooperation in academic research networks, STI diplomacy, or initiatives to make healthcare innovations accessible for all?

Since 2006 UNIDO has engaged in strengthening the local production of essential medicines in developing and least developed countries. The primary development objective of this work has been to increase access to high-quality essential medicines and vaccines through, for example, helping to address the scourge of substandard and falsified medicines. The issue of local pharmaceutical production, particularly in Africa, has attracted significant interest during the COVID19 crisis due to the potential to address the security of supply challenges given the reliance on imports from distant geographies.

Enhancing local production of essential medicines to improve access to high-quality products requires a multifaceted approach enabling improved quality and commercial viability of existing manufacturers and new entrants to the market. It requires initiatives covering access to investment, access to technology, capacity building for industry stakeholders, market transparency and opportunities for international standard products. UNIDO has been active at the global, regional and national level supporting the design and implementation of strategic initiatives to help drive transformation on this long-term agenda.

The following are some examples of the initiatives that UNIDO has taken in this space.

<b>Type of initiative</b>	<b>Specific intervention</b>	<b>Comments</b>
Strategy development and implementation to support the transformation of the pharmaceutical industry	National strategies for the sector in Ghana, Kenya, Zimbabwe, Vietnam, Myanmar, Panama.	Strategies developed through the consultative and diagnostic process. Implementation supported through, e.g. convening national working groups.
	Support to the AU for developing and implementing a Business Plan for the accelerated implementation of the Pharmaceutical Manufacturing Plan for Africa	UNIDO part of a range of partners supporting the agenda including WHO, UNAIDS, UNCTAD, UNICEF, AUDA.
Roadmap approach for a stepwise increase in compliance with international manufacturing standards – Good Manufacturing Practices (GMP) Roadmap	National GMP roadmaps for Kenya and Zimbabwe, as well as for all ECOWAS member states in line with a joint reference framework for the West African region; support to roadmap implementation in Ethiopia.	UNIDO has developed a methodology to assess the current status of manufacturers and devise a stepwise approach for their upgrading. The methodology also includes training in GMP and development of Corrections and Corrective Action Plans.
Human Capacity development for the pharmaceutical industry	Support for various training formats in Industrial Pharmacy at the Kilimanjaro School of Pharmacy / St. Luke Foundation in Tanzania.	150 pharmaceutical professionals trained in subjects including drug formulation development, GMP, clinical trial design
	Training of trainers in increasing operational efficiency through, e.g. applying lean six sigma approaches	Increasing operational efficiency can enable manufacturers to maintain/enhance competitiveness whilst investing in quality.
Industry associations to lobby for industry and provide support to members	Foundation and support to Federation of African Pharmaceutical Manufacturers Associations (FAPMA) and Southern African Generic Medicines Association (SAGMA)	As well as support to founding and running of BMOs UNIDO worked with Global Fund and FAPMA to advance progress towards the GF sourcing more products from African Manufacturers.
Investment and Technology transfer	Guidance document on investment, incentives and technology, pilot interventions in investment promotion and technology transfer.	In conjunction with the Investment and Technology Promotion Office (ITPO) in Bonn, UNIDO conducted a partnership forum to promote collaboration between international and African pharmaceutical manufacturers.
Pharmaceutical Market Information to provide requisite intelligence for evidence-based decision-making by manufacturers, policymakers and investors	Design and deployment of a Pharmaceutical Market Information System in EAC member states.	UNIDO has developed a system that allows generating quantitative data on the types of imported (re-)exported and locally produced medicines circulating in a national market.
Development of capacities for manufacturing and commercializing vaccines in LMICs	Several publications including Vaccine Manufacturing Plan for Africa, White Papers on Establishing Capabilities for Manufacturing and Commercializing Vaccines	As well as policy briefs UNIDO has provided direct support to Biovac in South Africa and has worked closely with, e.g. Institute Pasteur in Senegal. UNIDO has also been active in global deliberations on pandemic preparedness pre-COVID19 particularly concerning influenza.

5. Could you suggest some contact persons responsible for projects/policies, related technologies and international collaboration in this context as well as any experts dealing with projects in this area? We might contact them directly for further inputs or invite some of them as speakers for the CSTD inter-sessional panel and annual session.

Alastair West, Business Plan Coordinator at the Quality Infrastructure & Smart Prod.Div. Email: [A.West@unido.org](mailto:A.West@unido.org)

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Mr. Weixi Gong, Chief of Investment and Technology Promotion email: [W.Gong@unido.org](mailto:W.Gong@unido.org)/[W.Gong@unido.org](mailto:W.Gong@unido.org)

6. Do you have any documentation, references, or reports on the specific examples on the priority theme in your organization?

- A Regional GMP Roadmap Framework for The Pharmaceutical Manufacturing Industry in Ecowas
- Boosting Pharmaceutical Production [https://www.unido.org/sites/default/files/files/2019-01/Boosting\\_Pharmaceutical\\_Production.pdf](https://www.unido.org/sites/default/files/files/2019-01/Boosting_Pharmaceutical_Production.pdf)
- Kenya Pharmaceutical Sector Development Strategy
- Pharmaceutical Industry in Sub-Saharan Africa a Guide for Promoting Pharmaceutical Production in Africa [https://www.unido.org/sites/default/files/files/2019-10/PHARMACEUTICAL\\_INDUSTRY\\_IN\\_SUB-SAHARAN\\_AFRICA\\_Guide\\_Book.pdf](https://www.unido.org/sites/default/files/files/2019-10/PHARMACEUTICAL_INDUSTRY_IN_SUB-SAHARAN_AFRICA_Guide_Book.pdf)
- Pharmaceutical Manufacturing Plan for Africa. Business Plan
- Sector Development Strategy for Pharmaceutical Manufacturing in Zimbabwe 2017-2022
- Vaccine Manufacturing and Procurement in Africa (VMPA).
- White Paper – Commercializing Vaccines: A Methodology to Identify Potential Market Opportunities and Conduct Outline Assessments.
- White Paper – Establishing Manufacturing Capabilities for Human Vaccines [https://www.unido.org/sites/default/files/files/2018-12/Commercialising\\_Vaccines\\_Identifying\\_Market\\_Opportunities.pdf](https://www.unido.org/sites/default/files/files/2018-12/Commercialising_Vaccines_Identifying_Market_Opportunities.pdf)
- White Paper on UNIDO's GMP Roadmap Concept. Design of A Stepwise Approach for The Pharmaceutical Industry in Developing Countries to Comply with Who GMP.
- [Covid-19 Implications and Responses-Digital Transformation and Industrial Recovery](https://www.unido.org/sites/default/files/files/2020-05/Guide%20for%20MSMEs%20in%20wake%20of%20COVID-19_EN%20FINAL%200.pdf)
- Guidance for Micro, Small and Medium Enterprises Business Recovery in the wake of the COVID-19 pandemic ([https://www.unido.org/sites/default/files/files/2020-05/Guide%20for%20MSMEs%20in%20wake%20of%20COVID-19\\_EN%20FINAL%200.pdf](https://www.unido.org/sites/default/files/files/2020-05/Guide%20for%20MSMEs%20in%20wake%20of%20COVID-19_EN%20FINAL%200.pdf))
- QUALITY & STANDARDS AND THEIR ROLE IN RESPONDING TO COVID-19 <https://www.unido.org/sites/default/files/files/2020-04/Quality%20and%20Standards%20and%20their%20Role%20in%20Responding%20to%20COVID-19.pdf>

In addition to answers to your questionnaires, please consider:

1. Mr. Rikiya Abe, who is one of the pioneers in this field in Japan, as an expert to include in your pool of international experts. His work includes, among others, utilization of digital technology in energy systems.

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2. Link to an article with examples of how UNIDO supported enterprises response to the COVID-19 outbreak <https://www.unido.org/stories/cleantech-innovators-take-covid-19>
3. In the area of Health, a story from UNIDO's ITPO Shanghai: <https://www.unido.org/stories/china-robot-delivery-vehicles-deployed-help-covid-19-emergency>