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Contribution by UNIDO

to the CSTD 2021-2022 priority theme on "Industry 4.0 for inclusive development"

PRIORITY THEME 1: Industry 4.0 for inclusive development

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

To Whom it May Concern,

As you are aware, the CSTD 24th annual session selected "Industry 4.0 for inclusive development" as one of the priority themes for its 25th session (2021-22 period).

This priority theme is directly relevant to SDG 9 on industry, innovation and infrastructure. As highlighted by the Technology and Innovation Report 2021, we live at the beginning of a new technological revolution around Industry 4.0 technologies such as AI, robotics, Internet of Things, and blockchain. The way to be prepared to benefit from Industry 4.0 is by promoting the use, adoption, adaptation, and development of technologies associated with this new technological wave. This priority theme will focus on the challenges and prospects for developing countries to pursuit an industrialization path considering the emergence of Industry 4.0. This may include the possibility of bypassing intermediate stages of technology that other countries have historically passed in their development process, often referred to as "leapfrogging". The priority theme will cover the impact of this new technological revolution on the traditional channels for technological learning and innovation in developing countries, including FDI and participation in Global Value Chains. It will examine the opportunities for "leapfrogging". It will also consider the role of public policies in enabling vulnerable groups and communities to benefit from Industry 4.0, including through better and more equitably accessible jobs.

Questions to be addressed include: How can developing countries take advantage of the window of opportunity presented by the Industry 4.0 technologies for technological upgrading and catch up? What can countries do to ensure that Industry 4.0 does not increase inequality? What is the role of international cooperation in facilitating this process?

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 on 17-19 November 2021. In this context, we would like to solicit inputs from international organizations, UN entities and agencies, and regional commissions on this theme. We would be grateful if you could kindly answer the following questions based on your organization's work at the global, regional, and/or national levels.

1. Could you share national strategies, policies, laws, programmes and initiatives concerning Industry 4.0 concerning your member countries?

UNIDO as the leading UN agency with the mandate to foster inclusive and sustainable industrial development, the organization aims to enable a smooth transformation towards Industry 4.0 for countries at different levels of economic development. With over 170 Member States, UNIDO is composed of both developed as well as developing countries that are promoting a variety of national strategies, programmes and initiatives in relation to Industry 4.0. Complementing national strategies from developed member countries such as Germany's *Industrie 4.0*, or France *Alliance du Futur* as well as developing countries including Kenya's *Vision 2030*, and India's *Digital India*, UNIDO is actively engaged in supporting policy development, programmes, and initiatives in beneficiary countries in relation to Industry 4.0 to ensure inclusive and sustainable industrial development.

These programmes by UNIDO include but are not limited to building awareness among policy makers and industry associations on the issues of new infrastructure, standards and policies that need to be developed or mainstreamed to correspond to the new technologies, including establishing multi-stakeholder knowledge sharing platforms to mainstream Industry 4.0 opportunities and challenges for pursuing ISID in developing countries.

The directorate of environment is supporting countries in adopting and scaling up industry 4.0 initiatives. Notable Industry 4.0 projects or pipeline projects are highlighted below:

- Strengthening capacity for operation and maintenance with Internet of Things technologies for Olkaria geothermal power station complex in Kenya currently implemented by Climate Technology & Innovations Division

LAC REGION

Brazil
- Following a wide range of studies carried out by the Brazilian National Federation of Industries (CNI), the government of Brazil set up the Brazilian Chamber of Industry 4.0 (Chamber I4.0) in 2019.
- The Chamber I4.0 has been led by the Ministry of Science, Technology and Innovation (MCTI), the Ministry of Economy (ME), the Brazilian Agency for Industrial Development (ABDI), the CNI, Financier of Studies and Projects (Finep), the National Council for Scientific and Technological Development (CNPQ), the National Bank for Economic and Social Development (BNDES), the Brazilian Micro and Small Support Service Companies (SEBRAE) and the Brazilian Company for Research and Industrial Innovation (EMPRAPII). Several representatives from the public, private and academic sectors have also taken part in the Chamber I4.0.
- The Brazilian Chamber of Industry 4.0 has set an action plan to introduce the use of concepts and practices related to industry 4.0 to companies, aiming at increasing their competitiveness and productivity and contributing to the insertion of Brazil in global value chains and, consequently, improving its position in global indexes of competitiveness.
- In order to do so, several working groups have been set up, with the following goals:
  - Increase the competitiveness and productivity of Brazilian companies through Industry 4.0;
  - Improve Brazil's insertion in global value chains;
  - Introduce the use of Industry 4.0 technologies in small and medium enterprises;
  - Ensure instruments so that solutions for technology-based companies, startups and integrators can be directly offered and made available to companies;
  - Ensure stability and volume of resources at an adequate cost to implement initiatives for Industry 4.0;
  - Identify and develop Industry 4.0 solutions suitable for companies in the Brazilian productive park, and;
  - Avoid overlapping individual efforts by public and private institutions to address needs and Industry 4.0 demands in Brazil.
- The Chamber has been following the path provided by other governmental plans, including the CT&I Plan for Advanced Manufacturing in Brazil – ProFuturo (MCTIC, 2017) and the National Internet of Things (IoT) Plan (MCTIC and BNDES, 2017).

Colombia
- The country includes the Industry 4.0 as one of the main challenges of the Industrial Policy "Política Industrial en marcha" to promote the adoption and use of modern technologies upon the addressing of social and economic conditions, and the contribution to higher levels of productivity and competitiveness of the productive units nationwide.
- Within this policy, the Government is delivering programmes and action plans related to the adoption of new technologies, such as the launch of The Center for 4IR, aiming to ease the adoption of AI, Big Data, IoT, Blockchain, and Smart Cities, among others, and the initiative "Banco de Retos", with the purpose to promote the matchmaking between productive processes and local service providers.
- In addition, the Taxes Law 1955/2019 includes incentives for the investment in science, technology and innovation (CTI) and there are credit lines for innovation included in the strategy to use royalties by the Science, Technology and Innovation Fund

Ecuador
- A Digital Agenda containing elements related to Industry 4.0 was launched in April 2021. The new Government of Ecuador took office in May 2021, and new authorities from the Ministry of Production have indicated interest on promoting Industry 4.0 in the country.

Nicaragua
- Nicaragua has a "Nicaraguan Council of Science and Technology" (CONICYT)[1]. Through this Council, the country incentivises innovation, research and robotics.
- Technical education is one of the priorities in the country. The National Technological Institute (INATEC) is the public training center for technical education.[2]

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[1] See htttp://www.conicyt.gob.ni/ for more information.
[2] See https://www.tecnacional.edu.ni/ for more information.

INATEC opened recently an "Innovation and Technology National Center" to promote innovation and the development of digital technologies and offers technical study programmes related to electricity, electronics and computing.
- Innovation is also promoted through the National Council of Universities (CNU) in cooperation with other government institutions (including CONICIT and INATEC).

Uruguay
- The "Centre of Industry Automation and Mechatronics (CAIME)" (http://www.caime.uy/institucional) was fully self-financed by the Government of Uruguay and designed/implemented by UNIDO in collaboration with the Ministry of Industry, Energy and Mining of Uruguay. The Centre offers training in automation technologies in order to help local industries with technical knowledge and best practices, process control and quality management in the field of automation.

UNIDO programmes:
- Since May 2008, UNIDO has been partnering with Hewlett Packard to empower mainly young aspiring entrepreneurs and students with entrepreneurship and IT tools in several countries. At the core of the partnership lies Hewlett Packard's Learning Initiative for Entrepreneurs (HP LIFE) which is an online platform free of charge that offers 32 courses in seven languages for entrepreneurs and small business owners. Entrepreneurs learn innovative business and IT tools to solve the daily business challenges they face. In Tunisia, for example, this partnership has so far created more than 3,000 full-time equivalent jobs, trained more than 4,500 women with IT and business skills and helped launch almost 200 women-led start-ups.[3]
- As part of UNIDO's Programme for Country Partnership Morocco, UNIDO will be implementing a project to foster the consolidation of a digital economy ecosystem by promoting e-commerce. The project aims to specifically address the barriers faced by women entrepreneurs, particular those in rural areas, in accessing and making use of online business-to-business platforms and digital marketplaces.

- Also, UNIDO supports small and medium enterprises in 4IR technological learning, smart manufacturing and innovation, including in Azerbaijan and Belarus.

For gender equality policies in the technology industry in China, Japan and the Republic of Korea, see Chapter III of UNESCAP (2020) The Future is Equal: Gender Equality in the Technology Industry.

2. What are the challenges that governments have faced or may face for promoting Industry 4.0, to contribute to national development priorities and accelerate the progress towards the SDGs?

Several developing countries have actively undertaken digitization of industry, and started at least a partial adoption of Industry 4.0 technologies. However governments are facing various challenges related to macro-, meso-, and micro level conditions relating to infrastructure, support institutions, appropriately skilled labour, as well as a general preparedness of key industries.

As such, a first challenge faced by governments with regards to preparedness of key industries is the imperative that they cultivate an understanding of the future, and remain informed about the potential implications, opportunities as well as risks ahead.

Secondly, there is the challenge to ensure that the adequate infrastructure, including that pertaining to energy and ICT, is in place in order to support the adoption and implementation of Industry 4.0, enabling country to reap the benefits that are brought by the technological change.

Furthermore, it is crucial for governments to maintain a social cohesion in an era that has the potential for major disruption. These aspects would relate to managing instability in the labour market and significant changes in income and wealth distribution that are further impacted through Industry 4.0. Other challenges that governments may face for promoting Industry 4.0 to accelerate the progress towards SDGs relate to a widening technology and knowledge gap, its implications on skills, rising

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[3] Further reading: https://www.unido.org/news/unido-and-partners-create-more-6000-jobs-young-people-tunisia

inequalities, and gender equality which will need to be managed to increase a societal acceptance for change.

The challenges and potential challenges that governments could face are closely linked with:

- The lack of infrastructure and capacity/knowledge
- Creation in disruption of labour markets by industry 4.0 (eg. AI, Robotics and Automation increases productivity, however might cause job losses especially in developing economies markets where cost of labour is cheap)

Brazil
- The major challenges identified by the Federation of industries of Brazil are the following:
  - Application of Industry 4.0 in production chains and supplier development;
  - Limited mechanisms to induce the adoption of new technologies;
  - Limited technological development;
  - Limited expansion and improvement of broadband infrastructure;
  - Regulatory aspects;
  - Limited training of relevant stakeholders and
  - Lack of institutional partnerships.

Colombia
- The Industry 4.0 trends need both horizontal and vertical integration of value chains functions and players. This can be achieved with a satisfactory level of homogeneity in quality, technology and productivity within the productive ecosystem, and the alignment of strategic goals of a representative number of enterprises and institutions.
- Furthermore, this reality is bringing new aspects of social and economic needs, such as the conversion/update of labour skills or the accelerated technological obsolescence of the productive processes and assets.
- Finally, this new industrial revolution is an opportunity for gender mainstreaming and fixing historical gaps, such as the limited access of women to new technologies, the low participation in global value chains, and the restricted assignments to leadership and research roles.

Ecuador
- Ecuador is experiencing an economic crisis aggravated by the COVID-19 pandemic. Until the economic crisis and the health and social sectors' priorities are addressed, it will be difficult to advance in other relevant topics such as Industry 4.0.

3. What should governments, the private sector, labour unions and other stakeholders do so that developing countries can benefit from these technologies?

The best way to benefit from these technologies is when technical change spread across the productive system, in other words, when they are incorporated into the productive process of the domestic firms. It is not enough to use the new technologies, it is necessary to understand them, replicate and diffuse them across the local firms. So, I would say that probably the best bet would be to facilitate this process.

The most obvious way to do this is promoting human capital formation, meaning that governments in developing countries need highly skilled people that is able to understand these technologies and spread them on their local economies.

Certainly human capital formation is just one of many other initiatives that can contribute in the path of adopting and benefiting from these technologies. Other initiatives may more related to facilitate the arrival of firms with these technologies (development of infrastructure and export zones, tax incentives or grating some monopoly power under certain conditions), while other may be more related to spread the adoption of these new technologies by domestic firms, as for example creating technology-transfer agreements with the foreign companies that bring these new technologies.

There are certain factors that have some positive impact on the overall process of technology transfer as the development of a favourable business environment and local conditions such as:

- Political stability, the enforcement of rule of law or development of the capital market
- The related infrastructure must be strengthened to encourage reforms
- Awareness raising is required for labour unions and other stakeholders

- Governments should incentivize technological investment and empower industry 4.0 SMEs
- Establishment of a permissive Innovation Ecosystem
- Stakeholders should be prepared to embrace sustainability and upgrade human capital
- Optimize regulations and Policies by involving cross-ministerial collaborations

There are a number of steps that governments, the private sector and other stakeholders in developing countries can do to benefit from the opportunities that Industry 4.0 brings with it. Primarily the principal challenges that hinder the dispersion of Industry 4.0 need to be managed. These include for example building awareness, promoting digital transformation and providing access to education systems and necessary infrastructures to set up resilient ecosystems. Other actions that can be taken are to support related programmes such as upskilling and retooling programmes that address gaps such as digital skills and gender divide in the workforce. Besides providing a framework to support individuals, SME's can equally be supported through enhancing their digital resilience and competitiveness. On a policy level, innovation management standards can assist developing countries to transition / leapfrog into Industry 4.0.

Through supporting such tailored programmes that assist upskilling, support digital resilience, develop guidance, policies and strategies, developing countries can benefit from the rapid progress of digital and convergent technologies associated to the Industry 4.0.

For example, UNIDO assisted in establishing a multi-stakeholder knowledge sharing platform to create awareness on Industry 4.0 opportunities and challenges for pursuing ISID in developing countries. Furthermore, this platform allows for sharing available tools and methods for innovation management; designing training curricula for new workforce skills requirements; exploring methods and best practices to support SMEs digital transformation and bridging the gender digital divide, as well as building awareness among policy makers and industry associations on the issues of new infrastructure, standards and policies that need to be developed or mainstreamed to correspond to the new technologies.

Brazil
- Support the insertion of countries in global value chains;
- Increase investments in Industry 4.0
- Formulate policies and programmes for the adoption of 4.0 technologies by small and medium industries;
- Ensure the stability and volume of resources at an adequate cost to implement initiatives
- Increase capacities to identify and develop appropriate Industry 4.0 solutions
- Avoid overlapping of individual efforts of public and private institutions to address the needs and demands of Industry 4.0.

Colombia
- The productive ecosystem shall set a roadmap that may start recognizing the specific capacities currently available, and the technologies to be adopted to bring relevant results in order to build and strengthen trust in long-term changes through a rational path. The criteria to prioritize the efforts shall always point to general benefit. Therefore, the implementation of good practices of policy making and regulation is essential.

Ecuador
- Governments should realize that Industry 4.0 poses an opportunity to "build back better". For example, in Ecuador Industry 4.0 should be seen as an opportunity to help reactivate the industrial sector with new technologies and with more sustainable production practices. UNIDO his making efforts by transmitting this idea to Government authorities and counterparts.

Uruguay
- Middle-income countries need to move towards advanced manufacturing and industry 4.0 to leapfrog ahead in the fields of technology development and innovation. This implies to invest heavily in education if they are to keep up with current trends.

4. What actions can the international community, including the CSTD, take to help countries take advantage of Industry 4.0 for inclusive and sustainable development?

In the area of technology transfer, there is nothing like one size fit all. And therefore, technical assistant that provides tailor-made aid in the specify fields that developing countries are lagging behind is crucial for taking advantage of the new technologies and moving forward to a more inclusive and sustainable development.

To enable developing countries to respond to the challenges of Industry 4.0 and take advantage of the opportunities, the international community has to take collective actions and pursue new innovative partnership approaches for delivering and strengthening its portfolio of services to address market failures related to the uptake of new technologies and business models.

Convening is a crucial element of international cooperation, in order to gain the widest possible range of expertise, exchange and agreement on sustainable industrial development actions. UNIDO is working on the forefront helping developing countries and economies to absorb frontier technologies and to overcome potential challenges associated with industry 4.0. In its longstanding experience, the organization recommends that the international community take pragmatic actions, and implement activities and tailored solutions based on local needs and absorption capacities of countries. This approach may sound straightforward, however it's unfortunately not always the case in practice. International Organizations are urged to leverage building on solutions developed within the country whenever possible => through innovation hubs for example.

Partnerships are equally critical to maintain manufacturing operations as much as possible worldwide. UNIDO thus coordinates closely with partners in the private sector, government and academia to this end such as acting as co-chair of the Global Manufacturing and Industrialisation Summit (GMIS) (in cooperation with the Ministry of Energy and Industry of the United Arab Emirates) to convene advanced technology actors worldwide in pursuit of an inclusive and sustainable Fourth Industrial Revolution.

Brazil
- Create pilot initiatives of the application of Industry 4.0 in priority sectors;
- Develop technological research programmes and services;
- Identify markets or market segments with greater demand for joint technological development;
- Create joint specific technology development programmes applied to the national context, such as demonstrative technological platforms or pilot initiatives;
- Foster public policy towards more feasible technological areas, along with leading technological firms;
- Create joint programmes that facilitate technological and commercial exchanges, especially with leading countries in these technologies.
- Design training programs with leading technology firms.

Colombia
- The international community may support the national infrastructures that allow the development and implementation of the 4IR technologies in the productive processes, such as infrastructure, in order to take advantage of global networks that could have multiplier effects in the decisions of regulators and other actors.
- Furthermore, the international community may encourage the adoption of technologies that directly contribute to the achievement of SDG.

Ecuador
- Join forces with UNIDO, other UN Agencies, International Cooperation Agencies, Multilateral Banks (IFIS) and Governments to promote Industry 4.0 as a mechanism that can help reactivate the industry and the economy, with a view to introduce more sustainable production practices, increase FDI, foster participation in Global Value Chains, generate employment and reduce poverty.

Uruguay
- Governments are eager to learn about the benefits of Industry 4.0 technologies and how they can be absorbed by firms to bridge the productivity gap. Hence, they are seeking to learn about international best practices, to build a global network and to receive advisory services. Global partnerships to promote this agenda would be welcome, as resources of international cooperation (donors) are scarce in terms of Industry 4.0 agenda promotion.
- The organization of Global Forums for raising sectorial main megatrends is also relevant, I this regard UNIDO Regional Office in Uruguay has recently participated in the following:

- o Advanced Manufacturing Summit of Chile 2020
- o UN Global Compact´s Leaders' Summit 2020: "Industry 4.0 and the Circular Economy: Megatrends for a Sustainable and Inclusive Future"

Combined response to Q 2 – 4 from a gender perspective:

Uncertainty remains about which industries and which types of jobs will most pronouncedly feel the impact of new frontier technologies and innovations. Emerging trends are however pointing into the direction that those working in low-skill and routine manufacturing jobs are expected to bear the brunt of this technological upheaval.

Due to restricted access to education and training, structural barriers and social norms, these types of low-skilled and routine manufacturing jobs are predominately held by women. As more advanced robots and machines are developed and more widely introduced, there is concern they will, on average, replace more jobs held by women than by men, especially in the textile and apparel, sectors where they represent up to 75% of total employment.[4]

The future of inclusive industry will thus depend largely on how 4IR addresses current gender inequalities. Accelerating technological trends could further deepen existing inequalities unless policy responses and investments are appropriately targeted.To reap the full benefits of future industrial practices, targeted gender-responsive actions, policies and investments are essential. Industrial policies and development programmes should

- **Address the gender digital divide** by specifically targeting women, especially rural women, in digital policies.
- **Support women's participation in the engineering and information and communications technology labour force**, including through measures to enhance women's recruitment, retention, promotion, re-entry and career advancement in technical and managerial positions in 4IR companies, including:
  - o Creating an enabling work environment for women and men that includes policies for non-discrimination, a zero tolerance for harassment, including sexual harassment, comprehensive maternal and paternal leave provisions and flexible work arrangements;
  - o Increasing women's representation at the senior and executive level and company boards by setting diversity goals: For company boards, a target of no less than 30-40 per cent representation of one gender; and
  - o Aiming at approximate gender equality (40-60%) among participants of technical and executive trainings.
- **Promoting investment in women-owned or women-led technology start-ups**, and/or start-ups registered in developing countries.
  Activities to advance women-owned or women-led technology start-ups that can *mutatis mutandis* be applied to start-ups registered in developing countries include:
  - o **Targeted tax exemptions**. The government and national financial institutions in India have been providing a range of state subsidies and collateral-free loans earmarked or with a specific quota for women entrepreneurs.[5]
  - o **Gender-responsive** public **procurement measures** such as quotas for women SMEs (e.g. India and Kenya have introduced respective quotas for women-owned businesses. The President of South Africa announced in August 2020 that the government would set aside 40% of all public procurement for women-owned enterprises); this should be equally replicated by private sector procurement (see here for further details).

5. Could you suggest some contact persons responsible for projects/policies and international collaboration in this context as well as any experts (from academia, private sector, civil society or government) dealing with projects in this area? We might contact them directly for further

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[4] ILO. (2014) Wages and Working Hours in the Textiles, Clothing, Leather and Footwear Industries. Geneva: ILO.
[5] For a non-exhaustive list of measures strengthening women-owned MSMEs, see, e.g. Singh, Jayati. (2019) MSME Funding: Nine schemes which will give wings to women entrepreneurs. The Times of India. 20 June 2019.

inputs or invite some of them as speakers for the CSTD inter-sessional panel and annual session.

UNIDO
- Cecilia Ugaz Estrada, Director, Gender Equality and Empowerment of Women Office, UNIDO (c.ugazestrada@unido.org)
- Mr. Marco Kamiya - Division Chief - Innovation and Digitalization Division UNIDO
- Mr. Alejandro Rivera – Advisor – Department of Digitalization, Trade and Innovation, UNIDO
- Prof. Sirin Tekinay, Dean of Engineering, American University of Sharjah

Brazil
- Professor Ricardo Rabelo from UFSC University (ricardo.rabelo@ufsc.br)
- Mr. Bruno Jorge (abdi@abdi.com.br/bruno.jorge@abdi.com.br) from the Brazilian Agency for Industrial Development (ABDI)

Colombia
- Jaime Monguí. UNIDO Colombia. National Technical Coordinator. Automotive value chain development project. j.mongui@unido.org
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- Colombian Government:
    - o Entity: Center for the Fourth Industrial Revolution Colombia
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      Documentation:
      https://www.acimedellin.org/what-is-the-center-for-the-fourth-industrial-revolution/?lang=en
      https://xfiles.unido.org/index.php/s/PWwfctM8isyjws4
      https://interestingengineering.com/medellin-becomes-a-fourth-industrial-revolution-networks-affiliate-center
      https://markets.businessinsider.com/news/stocks/medell%C3%ADn-latin-america-s-hottest-tech-spot-will-host-a-center-for-the-fourth-industrial-revolution-1028031880
    - o Entity: DNP (National planning department)
      Contacts: Juan Pablo García, Subdirector of Science, Technology and Innovation, National Department of Planning (juangarcia@dnp.gov.co)
      www.dnp.gov.co
      Documentation:
      https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/3975.pdf
      CONPES - NATIONAL POLICY FOR DIGITAL TRANSFORMATION AND INTELLIGENCE ARTIFICIAL (Spanish)
      https://www.dnp.gov.co/Paginas/CONPES-de-transformacion-digital-promovera-la-competitividad-del-pa%C3%ADs-y-la-eficiencia-del-sector-publico.aspx (Spanish)
      https://www.dnp.gov.co/Paginas/La-transformacion-digital-como-generador-transversal-de-valor-economico-y-social-la-vision-del-PND.aspx (Spanish)
    - o Entity: Innpulsa Colombia
      Contact: Rosana Velasco Chaves (rosana.velasco@innpulsacolombia.com)
      Documentation:
      https://minciencias.gov.co/sites/default/files/colombia_y_la_nueva_revolucion_.pdf (Spanish)
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    - o Entity: Solenium

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Nicaragua
- To receive official inputs/ answers, the Ministry of Foreign Affairs may be contacted through enlace@cancilleria.gob.ni. Once contact is established, a teleconference with CONICYT's Executive Secretary, Ms. Maria Eunises Rivas Robleto, may be organized
- It is suggested to keep the UNCT informed of the process. This may be done through Ms. Dulce Mayorga, UN Programme Oficer (dulce.mayorga@one.un.org).

Uruguay
- Carola Saavedra (csaavedra@ciu.com.uy) – Chief of the Technology Center of the Uruguayan Chamber of Industries (CIU)
  The CIU provided inputs and technical analysis for UNIDO IDR 2019, focusing on country experiences towards Industry 4.0 and presenting several case studies at a national level.

6. Do you have any documentation, references, technological assessments, future studies or reports on the priority theme?

Brazil
- CT&I Plan for Advanced Manufacturing in Brazil – ProFuturo (MCTIC), 2017. Available at: https://www.mctic.gov.br/mctic/export/sites/institucional/tecnologia/tecnologias_convergentes/arquivos/Cartilha-Plan-de-CTI_WEB.pdf);
- National Internet of Things (IoT) Plan; MCTIC and BNDES, 2017. Available at: https://www.bndes.gov.br/wps/portal/site/home/conhecimento/pesquisaedados/estudos/estudo-internet-das-coisas-iot/estudo-internet-das-coisas-um-plano-de-acao-para-o-brasil
- Brazilian Agenda for Industry 4.0; (ABDI and MDIC, 2018. Available at: http://www.industria40.gov.br/);
- Industry 2027; (MEI, 2018. Available at http://www.portaldaindustria.com.br/cni/canais/industria-2027/); and
- Opportunities for Industry 4.0: Demand and Supply Aspects in Brazil (CNI), 2018. Available at:
- https://www.portaldaindustria.com.br/publicacoes/2018/2/oportunidades-para-industria-40-aspectos-dademanda-e-oferta-no-brasil/).
- https://www.gov.br/economia/pt-br/centrais-de-conteudo/publicacoes/arquivos/camara_i40__plano_de_acaoversao_finalrevisada.pdf

Colombia
- Center for the 4IR: https://c4ir.co/focos-estrategicos/
- Wisemen Mission report on 4IR: https://minciencias.gov.co/sites/default/files/colombia_y_la_nueva_revolucion_.pdf
- Innovation and 4IR in Industrial Policy: https://www.mincit.gov.co/ministerio/politica/politicas-sectoriales/industria/grandes-retos-de-la-politica/innovacion-e-industrias-4-0
- National Policy for the Digital Transformation and Artificial Intelligence: https://colaboracion.dnp.gov.co/CDT/Conpes/Econ%C3%B3micos/3975.pdf
- Banco de Retos: https://www.mintic.gov.co/portal/inicio/Sala-de-Prensa/Noticias/152199:Se-inicio-la-implementacion-de-las-soluciones-a-los-retos-4-0-planteados-por-las-empresas-colombianas
- National Policy for the digital transformation and artificial intelligence: https://www.mintic.gov.co/portal/inicio/Sala-de-Prensa/Noticias/152199:Se-inicio-la-

implementacion-de-las-soluciones-a-los-retos-4-0-planteados-por-las-empresas-colombianas
- Strategy for the Digital Transformation and Innovation: https://colaboracion.dnp.gov.co/CDT/Prensa/Andicom-Gloria%20Alonso.pdf
- Initiative to promote the Centers for Enterprise Digital Transformation https://www.innpulsacolombia.com/sites/default/files/documentos-recursos-pdf/Analitica_II%20%281%29.pdf

Uruguay
- Speeding Up the Circular Economy Transition in Latin America Through the Internet of Things. https://circulareconomy.earth/publications/ce-in-latin-america-internet-of-things
- The circular economy in Latin America and the Caribbean Opportunities for building resilience. https://www.chathamhouse.org/sites/default/files/2020-09-17-circular-economy-lac-Schr%C3%B6der-et-al.pdf
- Industrialization in Latin America: exile and return. https://www.unido.org/stories/industrialization-latin-america-exile-and-return

UNIDO Publications in relation to Industry 4.0;

- Advancing Conformity Assessment for the New Digital Age
- UNIDO and GMIS: Promoting Strategic Approaches for the Fourth Industrial Revolution in Mexico
- Enhancing the Quality of Industrial Policies (EQuIP) – Tool 12 (Industry 4.0 and Productivity)
- Boosting Innovation
- Opportunities and challenges of the new industrial revolution
- Industry 4.0 Opportunities behind the challenges (background paper)
- Preparing for the 4th industrial revolution
- Preparing accreditation for the new digital age
- Covid-19 – Digital Transformation and Industrial Recovery
- Industrial Development Report 2020 and related background papers
- What can policymakers learn from Germany's Industrie 4.0 development strategy?
- UNIDO: Inclusive and Sustainable Industrial Development: The Gender Dimension. 2019.
- Cecilia Ugaz Estrada, Müge Dolun, Carmen Schuber and Nicolas Schmidt (May 2020): Industries post-COVID-19: A gender-responsive approach to global economic recovery. UNIDO Industrial Analytics Platform.
- Sorgner Alina: The Impact of New Digital Technologies on Gender Equality in Developing Countries. UNIDO Department of Policy, Research and Statistics Working Paper 20/2019.
- Sorgner Alina: Gender and industrialization. Developments and trends in the context of developing countries. UNIDO Department of Policy, Research and Statistics Working Paper 1/2021.
- Braunstein E. (2021), "Gender and the future of industrialization in a post pandemic world", UNIDO 2022 background paper. Forthcoming, a draft can be shared if of interest, when available.
- "Intelligent Industry and narrowing the gender gap": article by Cecilia Ugaz Estrada, Director, Gender Equality and Empwerment of Women Office Issue 3 of the Capgemini Research Institute's "Conversations of Tomorrow". Forthcoming in October 2021

More information can be found under: https://www.unido.org/unido-industry-40 or on the UNIDO Knowledge Hub: Front UNIDO HUB | UNIDO Knowledge Hub

'Industrial Analytics Platform' to access multiple UNIDO reports and articles on Industry 4.0

Please send your responses and any further inputs on the theme to the CSTD secretariat (stdev@unctad.org) by 6 September 2021. We look forward to receiving your valuable inputs.

Sincere regards,

CSTD secretariat