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Advisory Group on Advanced Technologies**Report of the Advisory Group on Advanced Technologies in Trade and Logistics at its Second Session****Submitted by the secretariat***Summary*

The United Nations Economic Commission for Europe (UNECE) Advisory Group on Advanced Technologies in Trade and Logistics (AGAT) held its second annual meeting on 25 November 2020. The secretariat prepared a conference report detailing presentations and discussions, as well as activities undertaken by the Group since the last annual meeting in January 2020.

The second meeting of the AGAT showcased examples of new technologies that can assist in the transition to a more circular economy by creating (internet of things), storing and providing (blockchain), and analysing (artificial intelligence, machine learning) data of products and processes. The discussions highlighted that new technologies can: promote safe, secure, reliable and interoperable data exchange; promote transparency and traceability of value chains; support innovation; and enable the reduction and reinsertion of waste into production to extend its life, promoting the circular economy.

This Report provides also a brief summary of the major activities conducted by the Group, namely: the publication of a report on the impact of the COVID-19 outbreak on international trade and logistics, and virtual conferences on the role of advanced technologies in overcoming COVID-19 disruptions in international trade.

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I. Introduction and attendance

1. The United Nations Economic Commission for Europe (UNECE) Advisory Group on Advanced Technologies in Trade and Logistics (AGAT) held its second session, together with an online conference entitled “Technologies supporting circular economy in achieving United Nations SDGs,” on 25 November 2020.
2. This virtual event gathered more than 100 delegates and UN/CEFACT experts from around the world to discuss the way advanced technologies can help promote an economy that would shift from linear to circular.
3. Experts from the following member States were present: Algeria, Belarus, Belgium, Brazil, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, India, Israel, Italy, Mongolia, the Netherlands, Norway, the Russian Federation, Senegal, Slovenia, South Korea, Spain, Sweden, Switzerland, Turkey, the United Kingdom of Great Britain and Northern Ireland, and the United States of America.
4. Experts from the United Nations Conference on Trade and Development (UNCTAD), The United Nations Development Programme (UNDP), the United Nations Economic Commission for Europe (UNECE) and other international organizations also participated in the session.
5. The Agenda of the meeting¹ was presented by the Chair of the AGAT and approved as proposed.

II. Update on Advisory Group activities

6. The Chair of the AGAT updated participants on the principal activities of the Advisory Group since the last annual meeting. Among others, the Advisory Group has immediately focused on the response to COVID-19. Concrete steps taken include:
 - At the beginning of the COVID-19 pandemic, the Advisory Group prepared the “Report on the impact of the COVID-19 outbreak on international trade and logistics and the ways advanced technologies can help overcome such disruptions”²;
 - As a follow-up to publication of this report, the Advisory Group organized a virtual conference on the “Role of advanced technologies in overcoming COVID-19 disruptions in international trade”³;
 - Subsequently, the secretariat prepared the “Report of the online conference on the role of advanced technologies in overcoming COVID-19 disruptions in international trade”⁴.
7. Further, the Advisory Group continues to work on activities outside the scope of COVID-19. Topics of high importance include circular economy, sustainability, and the challenge to provide adequate means for life — food, energy, water, transportation, basic healthcare, education — while at the same time decreasing our environmental footprint.
8. The Advisory Group established a website to host the outcomes and materials related to the Group’s work at <https://www.unece.org/trade/uncefact/AGAT>.
9. The Advisory Group’s future areas of work will continue to focus on technologies that support the United Nations Sustainable Development Goals (SDGs), and ultimately a sustainable future for expected nine billion people.

¹https://www.unece.org/fileadmin/DAM/cefact/AdvancedTechnologyAdvisoryGroup/2020_2ndSession/ECE_AGAT_2020_INF7_Agenda.pdf

²https://unece.org/fileadmin/DAM/cefact/cf_plenary/2020_Nov_Plenary/ECE_TRADE_C_CEFAC_T_2020_05E.pdf

³ <https://unece.org/trade/uncefact/online-advancetech-covid-19-disruptions>

⁴https://unece.org/fileadmin/DAM/cefact/AdvancedTechnologyAdvisoryGroup/2020_2ndSession/ECE_AGAT_2020_INF6-Report-OnlineConf.pdf

III. Technologies supporting circular economy in achieving the United Nations Sustainable Development Goals

10. The conference and discussion were divided into five sessions to assess how advanced technologies can promote a transition to a more circular economy in the following areas:

- trade and logistics;
- traceability of value chains;
- sustainable procurement;
- waste management; and
- standards and regulatory frameworks.

11. Speakers emphasized that advanced technologies can increase the life expectancy of products and promote their re-use in global value chains. For example, distributed ledger technology (DLT) such as blockchain, stores and provides trustworthy data about the products. The internet of things (IoT) monitors and gathers physical parameters and environmental details about the products through artificial intelligence (AI). These technologies contribute to increased longevity and reuse of products by analysing and supplying resultant data to further processing (capacity and demand predictions, information extraction and transformation for electronic communication, business process optimisation, and others). Advanced technologies can also facilitate new solutions that promote a greener and more circular economy; these new ideas can be shared worldwide in support of the SDGs.

12. Advanced technologies provide a variety of tools to promote safer, greener, and more efficient trade. They can help make trade contactless, paperless, innovative, trustworthy, and more efficient and help avoid issues arising from lack of transparency, lack of personnel and lack of information exchange.

IV. Details of the discussion

13. As noted by the Chair of AGAT, the Advisory Group is charged with monitoring, studying and analysing the latest development and use cases of advanced technology in the international trade context. Ultimately, the group encourages the use of advanced technologies as the foundation for both sustainable solutions and the implementation of the Agenda for Sustainable Development (2030 Agenda).

14. The Chief of the Trade Facilitation Section of the UNECE emphasized that transitioning to a circular economy is of utmost importance in achieving the SDGs. Advanced technology can help achieve such a transition. Technology can help to prevent or productively reuse waste, facilitating circular economy. For instance, IoT equipment can be used to measure the temperature of medical goods to ensure they remain within the acceptable parameters, reducing waste. Blockchain technology, by storing and providing trustworthy data about the products and processes, is used to promote more sustainable, transparent, and trustworthy value chains. These examples of using new technologies for circular economy can help achieve SDG 8, 9 and 17. AGAT is at the forefront in promoting the use of these new technologies.

15. The circular economy is not only an important component in achieving the SDGs, but crucial for resource preservation. If we keep moving along the track of a linear economy, the resources that we need for trade and for our daily lives will soon run out. Products will continue to decline in quality as they are used up over the time, while producing more and more waste. If this waste is not returned to the system, it may have harmful effects to both the environment and the economy. Products, materials, and resources need to remain in the economic system longer. This can be achieved by manufacturing fewer, higher quality products with a longer life span and by reusing materials and creating bio-loops. Because of the urgency of resource preservation, there is a shared responsibility among stakeholders to communicate knowledge and know-how to promote a more circular economy. Technology

provides a key tool with functionality of sharing measurable data and links between stakeholders; by using technology to share information, we avoid working in silos.

16. During the Conference, five sessions showcased examples of new technologies that can promote a more sustainable and circular economy. In doing so, new technologies also create much needed employment opportunities related to circular economy. For example, employment opportunities may arise in sectors such as resource management, product repair, material recycling, or renewable energy production. Particular attention was given to how new technology can create more communication and transparency between actors who share knowledge and know-how to promote a more circular economy.

A. Session 1: Trade and logistics

17. Session 1 began by acknowledging the aim of circular economy is to use resources sustainably. This entails responsible consumption and production. Advanced technology can contribute to responsible consumption and production through the creation of data. Data needs to be created, stored and made available while movement and states of products changes, so once they reach the end of their lifecycle, each product's component can have the potential to be reused and reinserted into circular system and a new input.

18. The session on trade and logistics provided an account of experiences from the private sector. As logistics represent 48 per cent of the global economy, this part of the economy is an important aspect to consider in the transition to a more circular economy. As presented by private sector participants, circular economy is divided between the following 4 pillars in a circular supply chain:

- Using renewable resources;
- Repairing and reusing assets to extend product life;
- Creating an information sharing platform to increase the rate of product use by sharing access to information about these products; and
- Promoting use of product as a service, rather than possession of product as chattel.

19. To achieve circular value chains, these four aspects need to be in place. Sharing of know-how and information is crucial. This can be done through products such as e-customs platforms, where platforms can be created to develop and promote data sharing between traders and other stakeholders involved in customs-related procedures. In this case, blockchain technology can be used to store the data online in an accessible format. Blockchain technology enables interoperable exchange, and easy access to trustworthy information that can be used by the four pillars of circular supply chains mentioned above. This online access also enables traders and other stakeholders to save time and money by accessing automatically on demand data needed for custom-related procedures.

20. Transitioning to a more circular economy is also part of [at the core of] the European Green Deal — a comprehensive environmental plan to make EU's economy more sustainable, and provides an action plan to boost the efficient use of resources by moving to clean, circular economy. By promoting the reuse or recycling of materials that are now discarded, reuse of raw materials, waste prevention eco-design and eco-innovation, according to Circular Economy Package⁵, can bring net savings for EU businesses of up to 600 billion euro for EU businesses, 8 per cent of their annual turnover⁶, most importantly to small and medium-sized enterprises (SMEs). It also reduces European Union carbon emissions and optimizes waste management. The circular economy is also a good opportunity for public-private partnerships through collaboration promoted by 750-billion-euro EU next generation recovery resilient plan.⁷

⁵ https://ec.europa.eu/environment/green-growth/index_en.htm

⁶ https://ec.europa.eu/commission/sites/beta-political/files/circular-economy-factsheet-general_en.pdf

⁷ https://ec.europa.eu/info/strategy/recovery-plan-europe_en

21. The circular economy can also bring business benefits, including benefits for international business. Among others, the following business benefits were mentioned during the conference:

- Economic growth from virgin resource inputs;
- New profit opportunities;
- Reduced costs due to lower virgin material requirements and stronger relationship with customers; and
- Keeping products in use, extending their lifespan and decreasing negative environmental externalities.

22. Digitalization and advanced technologies can help promote a circular economy. For example, with the uses of new technologies by 2050 the EU aims to cut emissions from heavy industry by 56 per cent, and global emissions from steel, cement, plastic and aluminium by 45 per cent⁸.

B. Session 2: Traceability of value chains

23. The second session discussed that data reliability from carriers who comply with standards, such as the international standards developed by UN/CEFACT, is the key aspect for traceability of value chains. In traceability related procedures, there is a need for increased accurate data creation, security, and reliability. Data reliability can be ensured using advanced supply chain data management and can be accessed using quick response (QR) codes or DNA markers, which provide rapid access to trustworthy data. The idea is to integrate the data carrier into the product from the earliest point of production. The advantage of this type of data is that, once created, it is hard to be manipulated or modified. Moreover, the data carrier for the product will remain in place for the entire lifecycle of the product, promoting a more transparent and sustainable/circular economy.

24. Traceability of value chains also focuses on the transparency and accountability of global value chains. International value chains need to shift the order of their priorities from “profit-planet-person” to “person-planet-profit” thinking. For example, only a small amount of trade revenue goes to stakeholders in Africa, but by promoting the circular economy, looking for opportunities, and providing the training to local communities, the world can help to better redistribute the profits (for example by utilizing space on the house walls, the owner can build vertical farming garden as sustainable solution for food security, but also raise the revenue for these stakeholders by 50 per cent⁹). Circular economy can also support a greener trade and less pollution in all regions of the world, which has suffered from of the negative impacts of the linear economy. The circular economy produces less non-reusable waste and promotes the handling of waste in a productive and healthy way. Artificial intelligence, though automatic translation of various written and spoken language, can be used to share information between stakeholders speaking different dialects within a same region or between regions. Promoting the use of this advanced technology, by building capacity and offering educational support to raise awareness and revenue, can extend the life of products and encourage innovative ways of handling waste. This could create a whole new type of economy called the “spiral economy” (a system where bi-products of one industry can become platforms that can spawn other endlessly unfolding opportunities, allowing other systems to grow). This is an economy that is circular, but as mentioned above, also allows for increased revenue and innovative ways of handling waste.

C. Session 3: Sustainable procurement

25. The use of a common language instrument of data and information exchange is important for sustainable procurement, which in turn, is an important lever for a more circular economy. This can be achieved through the use of standards such as Core Component Library

⁸ https://ec.europa.eu/clima/sites/clima/files/toward_climate_neutral_europe_en.pdf

⁹ <https://www.thesolargarden.org/the-green-wall-kenya-vertical-bottle-farm/>

(UN/CCL)¹⁰, between stakeholders in global value chains, and on raising awareness among major actors in international trade. In today's world, SMEs and other actors care about the environment and the need for circular economy, however, they use different requirements and define their needs in different ways. This creates a lack of communication and leads to losses in time and money. This also means a lack of trustworthy information. Governments and international organizations need to promote more collaboration through incentives which will support procurement that concentrates not only on economic factors but also on sustainability.

26. The third session on sustainable procurement focused on the need for stakeholders to share information between themselves and with international organizations. In order to facilitate sustainable procurement, stakeholders need traceable information to ensure that their sought-after input has indeed been sourced sustainably. The information, of relevance in the procurement process, could cover how an activity has been performed and how goods have moved from one point to the other. This sharing of information needs to be incentivized by governments and international organizations who can provide better interest rates for loans, incentives to invest, tax reductions, and simplification of procedures. Transparency about sustainable production and transportation processes can help place products in a higher-value market segment and promote circular economy.

27. A presentation from a private sector representative described the idea of reducing the environmental impact of wind turbine blades that begins in manufacturing and procurement phases. The concept was proposed to the European Commission as an R&D project focused on developing a holistic approach for procuring, recycling and re-manufacturing of fibreglass-reinforced composites and multi-layer materials. The approach uses artificial intelligence and deep learning methods to automatically categorize state of equipment, from an asset-integrity point of view, using visual inspection pictures. This solution allows wind turbine operators to identify and correct blade integrity threats in a timely manner, extending the wind blade operating life. The market of wind blades is facing a sustainability issue. Composite wind blades disposal has been one of the blind spots of environmental footprint in these sustainable-energy wind power industries. Most Western European countries have started to re-blade old (as in older than 15 years) wind turbines or decommission them to install new ones and need to reduce wind blade waste as 14,000 blades could be decommissioned by 2023. This is equivalent to 40-60 thousand tons of composite material. Therefore, through these new technology tools, the private sector can promote circular economy in the wind blade turbine sector.

D. Session 4: Waste management

28. There is a need for better tracking and data consolidation in waste management. Tracking process, using technology such as blockchain, can create a register that enables a secure and immutable recording of inputs and outputs, allowing a stakeholder with oversight to guarantee source materials based on confirmed input and output volume. Through creation of digital identity, we can then track commodities up to end user and enables the subsequent trading on the secondary market. In addition, to close the loop, we can also track supplier (including steps such as extraction, refinery, transport and production) and product entire history, by storing in near real-time immutable records on blockchain that can be reconsolidated through the entire supply chain by allowed parties.

29. The fourth session on waste management elaborated that the traditional methods of producing textiles creates a lot of harmful waste for the environment. The environment is suffering from polyester pollution. A lot of waste is created at every step of the value chain. There is a growing demand from customers and producers to have visibility and awareness about this issue. There is a need for solutions to ensure that waste can be reused to create new goods and that customers and producers behave in a sustainable way. To raise awareness with producers and consumers and reduce waste, three steps need to be taken. The first is to collect textiles through existing recycling infrastructures. The second is to establish a waste-to-fibre specification. The third is to establish a waste-to-yarn specification. This can be done

¹⁰ <https://unece.org/trade/uncefact/uncccl>

using new and advanced technologies, to shred and separate different fibre types such as mixed synthetic fibre containing polyester and natural fibre (cotton, hemp, bamboo). Technology can also be used to consolidate fragmented data from different stages of textile lifecycle — from raw material production, wearing, cutting, garment production to waste collection. Often, missing data breaks the continuing chain of information about the product, making sustainable waste management more difficult. For example, when waste fibre is made back to yarn and to fabric, each stage of this lifecycle needs to have benchmark data. When this fabric is delivered to manufacturing company, the different sources of fibres are mixed together. Data detailing the chain of information about the product is currently missing in the industry. Blockchain technology enables a transparent supply chain tracking that supports tackling supply chain issues, human rights abuses, violations of international law, impacts on local communities, and impacts on local and regional ecosystems.

30. A representative from the venture capitalist industry explained the need to promote responsibility and accountability among consumers and producers. This can be done through tokenized waste management, which entails the creation of digital identity for products from the very first point in the value chain, that can be demanded by regulators or incentivised by industry sector. Once a digital identity is created, that product can be tracked at any time and at any step in the value chain. This existence of digital identity supports responsibility and accountability and raises awareness with both consumers and producers.

E. Session 5: Standards and regulatory frameworks

31. Developing standards is important in enabling greater efficiency through interoperability and traceability. The transition to a circular economy is the most challenging, yet most important, transition that the World is facing today. Digital technologies are a critical enabler for attaining the 2030 agenda. Digitalization can indeed create circular economy and proper legislation and national strategies can promote this transformation.

32. The fifth session on standards and regulatory frameworks featured a presentation on the UN/CEFACT project called “Enhancing Transparency and Traceability for Sustainable Value Chains in the Garment and Footwear Sector”. The garment sector is a key priority to look at when promoting circular economy. With an annual revenue of three trillion euros, it is one of the largest industries in the global value chain. Only 30 per cent of companies in this sector track and trace their value chain; this proportion is insufficient considering the relative human and environmental impact this sector has. Although proper legislation is being developed, there is a need for more action and coordination. As such, a multi-stakeholder project team has been created to develop policy recommendations and guidelines. This project aims to promote norms and standards that can act as enablers to foster sustainable supply chains in garment and footwear sector, in its initial launch phase. The project team is developing standards for electronic information exchange, together with inputs interface for a standardized dataset for information exchange among partners, business requirements specifications with key aspects in mind (traceability, transparency, sustainability, due diligence, circularity) to ensure that all actors in the global value chain speak the same language and understand each other from data and information exchange perspectives. The UNECE is also developing a cotton blockchain pilot project, involving 22 worldwide experts. The UNECE also identified user stories from cotton actors to compile quality information and tips to improve the cotton blockchain pilot.

33. A representative from the legal sector presented an overview of the regulatory status of the circular economy within the European Union. The European Union is focusing on circularity through the European Union Circular Economy Action Plan, which mainly focuses on SDG 12. Through legislation such as the directive 2008/98/CE on waste, the European Union is attempting to promote waste as a resource. The idea is to address sustainable waste management. New technologies such as AI, can digitally enable supply chain and facilitate interaction within industrial clusters. Automated systems can improve decisions innovation and the speed of recycling of waste. Some types of waste not only pose threats to the environment, but also create threats to human safety (chemicals). New technologies are needed to reduce, recycle, and diminish the threats from waste. To this end, the European Union and the Organisation for Economic Co-operation and Development

(OECD) are promoting digital strategy through guidelines such as European Data Strategy¹¹ and White Paper on Artificial Intelligence.¹² Their objective is to support international data exchanges and thus enable better international cooperation with inclusive growth, sustainable development and well-being, human-centred values and fairness, transparency and explainability, robustness, security, safety and accountability in mind. Some examples of national digital and circular economy policy include the German Environmental Digital Agenda and Natural Digital Sustainable Action Plan¹³, the Finland Digital Framework¹⁴, the Dutch Circular Economy Strategy¹⁵, the Italian National Strategy for the Technological innovation and Digitisation of Italy 2025¹⁶ and Industry 4.0 Action Plan¹⁷.

34. The closing keynote focused on the benefits and challenges arising from big data sets. In the age of circular economy and data exchange policy attention needs to focus on the data itself — to have regulations focused on its nature and its limits. There is also a need to focus on what to do with the data and their quality, during their capture, cleaning and processing phases. Decision-makers in government and international organizations need to know what data is, what to do with it, and how data can help promote circular economy (raising awareness).

V. Conclusions

35. Circular economy entails the gradual decoupling of economic activity from the consumption of finite resources and the designing of waste out of the system through three main principles: design out waste and pollution, keep products and materials in use and regenerate natural systems. Transitioning to a circular economy can help open opportunities for international trade that is sustainable and works towards the 2030 Agenda.

36. The second meeting of the Advisory Group on Advanced Technologies in Trade and Logistics showcased examples of new technologies that can and do help to promote a more circular and sustainable economy.

37. Technology can assist in the transition to a more circular economy by creating (IoT), storing and providing (blockchain), and analysing (AI) data of products and processes. The discussions highlighted that new technologies can: promote safe, secure, reliable and interoperable data exchange; promote transparency and traceability of value chains; support innovation; and enable the reduction and reinsertion of waste into production to extend its life, promoting the circular economy. Through advanced technologies, and with the support of national strategies and policies, international trade and logistics can become more circular — capturing and creating data, sharing information between stakeholders, redefining economic growth and focusing on positive societal benefits.

38. The meeting concluded with statements by the Chair of AGAT and by the UNECE secretariat. The Chair of AGAT stressed the importance of using new technologies and urgently moving toward circular economy in pursuit of the 2030 Agenda. Further, he stressed the need to examine how new technologies can help facilitate the transition for developing countries, including countries with economies in transition, as well as least developed countries to a more circular economy. In the closing remarks, the Chair of AGAT commended the valuable work that has been done by AGAT throughout 2020. AGAT has been at the forefront of monitoring how new technologies can support trade and logistics and has also addressed the COVID-19 pandemic by publishing a report in June 2020 on the impact of the COVID-19 outbreak on international trade and logistics and the ways advanced technologies can help overcome such disruptions. AGAT will continue its work to monitor

¹¹ <https://ec.europa.eu/digital-single-market/en/european-strategy-data>

¹² <https://ec.europa.eu/digital-single-market/en/artificial-intelligence>

¹³ <https://www.bmw.de/Redaktion/EN/Artikel/Digital-World/digital-agenda.html>

¹⁴ <https://www.businessfinland.fi/496a6f/globalassets/julkaisut/digital-finland-framework.pdf>

¹⁵ <https://www.government.nl/topics/circular-economy>

¹⁶ Italian National Strategy for the Technological innovation and Digitisation of Italy 2025 and Industry 4.0 Action Plan

¹⁷ https://www.mise.gov.it/images/stories/documenti/INDUSTRIA-40-NATIONAL%20PLAN_EN-def.pdf

the latest enabling technology developments and trends relevant for trade and logistics; study the potential impact of these technologies on standards, business models and operations; and identify implementation challenges and best practices learned by overcoming these challenges.
