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Report of the Conference on "Latest Technology Trends Impacting eBusiness Internet Trading and Trade Facilitation - Anticipating the Fourth Industrial Revolution"

Summary

This report reflects the discussions of the Conference on "Latest Technology Trends Impacting eBusiness Internet Trading and Trade Facilitation - Anticipating the Fourth Industrial Revolution". This event was held on 3 April 2019. The event's focus was to introduce and explain concepts relating to emerging technologies and to discuss the potential implications, impacts, and benefits these technologies may have for electronic trade and trade facilitation.

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I. Introduction

1. United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) and its Secretariat held the Conference "Latest Technology Trends Impacting eBusiness Internet Trading and Trade Facilitation - Anticipating the Fourth Industrial Revolution" on 3 April 2019 at the Palais des Nations, Geneva, Switzerland, in conjunction with the UN/CEFACT Forum and the United Nations Conference on Trade and Development (UNCTAD) eCommerce Week. The goal of the conference was to introduce and explain concepts relating to emerging technologies and to discuss the potential implications, impacts, and benefits these technologies may have for electronic trade and trade facilitation.

II. New Technology Trends in Data Sourcing

2. There is currently an extensive range of autonomous devices. The technology continues to advance, and the level of automation increases with some types of navigation methods not needing to rely on remote control or Global Positioning Systems (GPS). Challenges exist in how to regulate these new technological devices.

3. The drone market is estimated to be around 130B$ and the use of drones is present in different sectors, including infrastructure, agriculture, transport, security and rescue operations. Currently, commercial drones can be controlled remotely or have other types of navigations systems. The use of remotely controlled drones in inspection and exploration of inaccessible spaces enables companies to reduce downtime, inspection costs and risks to workers. GPS-based navigation drones have been used to conduct aerial surveys and are 80% faster than ground methods. Likewise, in the transport industry, drones represent a shorter delivery time of health supplies between hospitals. GPS may not be available for different reasons but technology enables drones to continue to be operational by using different communication methods such as Ultra-Wideband Localization (UWB), which is a type of short-range radio communication.

4. Even without any external sensors, like GPS or UWB, drones can use Light Detection and Ranging (LIDAR) based localization, which uses sensors to determine where the drone is located relative to objects in its environment. Additionally, drones can use vision-based localization, where visual data is utilized to localize the drone's position and orientation in a specific environment. However, there are some perception challenges in vision-based drones such as limited luminosity and motion blur at high speeds. Those obstacles are being overcome by using machine learning and artificial intelligence. The robot programs itself to imitate examples provided and continues to self-improve with more data and experience.

5. The United Nations Economic Commission for Europe (UNECE) and many other stakeholders in the sector are distinguishing levels of automation, including the starting point where humans have no assistance in driving. The early stages consist of a driver being assisted. In 2017 the production of vehicles with automation up to Level 2 was approved. Level 3 requirements are currently under development. Levels 4 and 5, which involve fully automated and autonomous vehicles, are only available for testing and piloting operations. Automated vehicles are not necessarily connected vehicles, but automated vehicle manufacturers are expected to take advantage of connectivity for non-driving related tasks (entertainment, services) and for assisting to create smoother rides thanks to information provided by the connectivity.

6. In 2014, the International Transport Forum published a booklet stating that the automation strategy could follow either an evolutionary or revolutionary approach. They proposed a two-by-two matrix divided into automated/manual operation and owned/shared assets. Today most automated vehicles are privately owned, but in the future the solutions

will also be present in collective vehicles. Some argue that challenges will increase when authorities approve the higher levels of automated vehicles. Other observe that while technical progress is spectacular, it is not at the point of offering safe automated driving. In freight transport, automation is also advancing rapidly.

7. UNECE activities on Intelligent Transport Systems were presented at the conference. Since 2014 the World Forum for Harmonization of Vehicle Regulations (WP.29) has been working on the development of technical regulations regarding the safety assessment of automated and connected vehicles. WP.29, which has been working on the harmonization of technical vehicle regulations for more than 70 years, is regulating various matters such as emissions of pollutants, safety, noise, and automated/autonomous vehicles. UNECE works on the main challenges related to road transport: environment issues, road safety, urban transport, along with others.

8. Automated and connected vehicles are expected to contribute to the solutions needed to address transport issues. Technical progress triggers new behaviours and poses new challenges regarding automation. Even though autonomous vehicles are not a mass-market product yet, regulatory work is pre-empting the technology. By taking a proactive stand, the regulator is integrating these technologies into the existing transport system without compromising on the safety and achievements so far (e.g. interoperability, trade, and environmental performance). Regulatory activities in vehicle automation include technical provisions relevant to Advanced Driver Assistance Systems (ADAS) as well as other relevant safety features such as Advanced Emergency Braking (AEB) and Emergency Steering Functions, among other safety measures. There are also regulatory actions being taken on connectivity, such as international negotiations on cyber security, data protection, and the environmental performance of vehicles.

9. Autonomous vehicles include not only cars and freight transport, but also self-driving boats. Artificial intelligence (AI) is being used to create low-cost, automated boats (equipped with commercial cameras and machine-learning applications) by using commodity hardware and tools. Instead of using the LIDAR sensor system, the self-driving vehicle is produced using minimal hardware available in the mainstream market; this is shifting the focus to an algorithmic approach. The advantages are lower cost, and the AI systems learn how to function in a generic environment which enables the technology to be used in different types of vehicles. Based on the success of self-driving boats, technology is now being developed to realize autonomous shipping. This technology has resulted in automation systems that can extract and connect nautical data, which is being further used to develop products that include collision detection, auto stowage, and semi-autonomous ships.

III. New Technology Trends in Data Communication

10. Data communication is crucial for trade and e-business. As a growing concern of stakeholders and policymakers, technology in data communication offers opportunities by linking economies into global value chains and enhancing productivity and competitiveness. New technologies improve communication performance, but standards also play a key role in increasing efficiency by saving time and costs and by creating an inclusive global trade environment.

11. The shift from a traditional message exchange to a web of linked data resources, with interoperability between one or more systems, is made possible by changing the designing approach of developers of Application Programming Interfaces (APIs) from an inside-out model (reflecting internal semantics) to an outside-in model (based on standard semantics).

The use case presented showed how Single Window[1] is an improvement over paper-based lodgements to multiple regulatory authorities. Traders use highly integrated systems to deal with multiple stakeholders, which entails many Single Submission Portals serving different communities.

12. Looking at expanding the reach of data communication, nanosatellites, weighing only 4kg, promise to lower barriers to utilizing extra-terrestrial communication channels from space. The nanosatellites are becoming a more affordable communication means enabling secure connection to Internet of Things (IoT) devices in places where traditional terrestrial networks are non-existent or unreliable. The use of nanosatellites reduces logistics costs by enabling global monitoring and tracking of assets securely, and at a much lower cost than heavy legacy infrastructures.

13. Along the same lines, 5G (the fifth-generation wireless technology for digital cellular networks), as the newest evolutionary step, offers more than the previous networks (3G and 4G). As the future digital communication infrastructure, 5G is a physical network divided into virtual networks to support various customers. It covers a variety of applications and services, including machine-type/IoT, autonomous cars, factory automation, drone control, public safety, and many others. Compared to 4G, 5G may use millimetre wavelengths, much shorter that of 4G, improving performance and bringing new services such as superfast data rates, virtual reality, 3D live video, and free TV (both live-stream and interactive) on smartphones and tablets. One important use case is in IoT: 5G characteristics meet the needs of IoT devices—like the use of 1 million IoT devices per km². In the end, 5G will be the communication infrastructure for the 4th Industrial Revolution and a growth engine for economies and trade. 5G will enable new technologies and applications and increase economic competitiveness.

IV. New Technology Trends in Data Computation

14. Today, data is everywhere and machine-generated data (from sensors, IoT devices, cameras, and others) exponentially increases our ability to generate more data. The emergence of technologies like machine learning, deep learning and artificial intelligence, create the need for advancements computation capacity, and the attention is now on Graphics Processing Units (GPUs) capacity. The demand for more powerful GPUs is mainly driven by the rise of deep learning—advanced machine-learning techniques that can be performed on hardware, accessible to mainstream customers, which is present in many industries such as medicine (cancer cell detection, diabetic grading); media and entertainment (real-time translation); security (face recognition, video surveillance, cybersecurity); autonomous machines; and others. GPUs make possible the parallel computation of millions of matrices, which is necessary to create correlations and find patterns in real situations.

15. The amount of data to manage for IoT devices and autonomous vehicles is also a challenge. With so many devices connected to the internet, communication among them becomes extremely costly. The volume of data to be stored in cloud servers is huge, and is continuously increasing, together with requirements for computation power. One of the solutions is edge computing architecture, which means that instead of a centralized architecture that controls everything (devices, network traffic, storage), it runs computations in a decentralized fashion; the control and computation is distributed to bring computation

[1] "A Single Window is defined as a facility providing trade facilitation that allows parties involved in trade and transport to lodge standardized information and documents with a single entry point to fulfil all import, export, and transit-related regulatory requirements. Individual data elements should only be submitted once electronically." ECE/TRADE/C/CEFACT/2020/07, 2020 revision of Recommendation N°33.

closer to the location of the end device. Edge means that the object is closer to the edge of the network end-point devices rather than to the cloud data centres. This process is less costly, minimizes delays in data processing and maintains real-time response by delegating part of the task to the point where data is generated, lowering requirements for data connectivity and network bandwidth.

16. Another revolution to address future computing needs is the emergence of quantum computation. Quantum computing promises to significantly speed up some specific, computationally-expensive tasks like integer factorization, which is the foundation of many cryptographic protocols. Quantum computing involves a paradigm shift, where the principle of a binary digit (or bit) is transformed into a quantum bit (qubit). The qubit stores information in a superposition of all the possible states of traditional bits and utilizes other quantum mechanics principles, such as quantum entanglement, to achieve higher processing capacity. There are many challenges before quantum computing realizes its full potential, but its use, combined with AI and deep learning, could create new possibilities for data analysis and process optimization. Challenges that quantum computing may pose for current cryptography should be considered when designing and updating cryptographic algorithms, and a quantum-resistant approach should be taken into consideration.