Executive Summary

I. Introduction: disruptive… or (just) emerging technologies?

There has been a significant uptake of disruptive technologies, in particular blockchain, the Internet of Things, artificial intelligence and machine learning, since the Study Report was first published in 2019, including in the Customs domain. However, there are still opportunities for broader implementation, which is why the WCO, the WTO and other stakeholders are looking into these and other technologies, with an eye towards identifying the key benefits for supporting international trade and economies more broadly, as well as identifying ways in which they can assist Customs administrations in fulfilling their objectives, such as ensuring trade facilitation, safety, security, and fair revenue collection. Numerous initiatives, including webinars, online conferences, policy documents and capacity building work, have been carried out by both organizations in the past three years with the aim of supporting their Memberships in these endeavours.

II. Holistic use of technologies for Smart Customs of the future

2021 has highlighted the critical role that Customs play in enabling global trade. To make global supply chains of the future more efficient, Smart Customs have to minimize Customs clearance time and costs, while intelligently managing inbound and outbound goods and vehicles. Disruptive technologies need to be used in combination. Furthermore, numerous elements such as cyber security, data collaboration, identifiers and others need to be considered when implementing innovative solutions.

III. The technologies

1. Blockchain technology

Blockchain's potential to facilitate Customs processes is multifaceted, from Customs clearance to inter-agency cooperation, certification, identity management, compliance management, revenue collection and post-clearance audit. Through this technology, the same copy of a ledger is instantly available to all parties at different nodes in the most updated, trusted, secure and immutable manner, obviating the need to maintain separate ledgers by each party as per the current practice.

Considering the potential of blockchain, the WCO and the WTO have been exploring the use of this technology in the Customs domain for the last few years. According to the results received through the WCO's 2021 Annual Consolidated Survey (ACS), blockchain and distributed ledger technology (DLT) is still in an experimental phase for Customs, with around a third of Customs authorities who responded to the survey testing it through proofs of concept (22 Members) and pilot projects (15 Members) using mainly private (permissioned) blockchains, while only two Customs administrations have reported a full deployment of this technology. 26 Customs authorities have plans for this technology in the next three years, while another 45 have indicated that they have no plans in place for it as yet.

2. Internet of Things

Statista estimates that, by 2025, the Internet of Things (IoT) will be made up of over 30 billion devices worldwide (more than four devices per person). Customs can work towards strengthening cooperation with certain stakeholders (shippers, carriers, forwarders etc.) that have employed IoT applications, with a view to promptly obtaining any information that corresponds to certain risk factors. Thus, Customs administrations would be able to focus on using analytical tools to identify high-risk and low-risk shipments and supply chains based on information collected through IoT technology.

The fact that everything that is connected to the Internet or interacting with it can be geo-located is now an important new parameter which may also provide new opportunities to Customs. Half of the respondents to the above survey indicated that they used IoT in Customs business processes, and 9 per cent planned to deploy them. However, as many as 40 per cent had no plans to use

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the technology, for now. Of the 72 respondents deploying IoT, the majority indicated that this was in relation to X-ray or computed tomography (CT) scanning, and significant numbers used QR code and barcode readers, automated licence plate readers and cameras, as well as electronic seals (e-seals).

3. Big data, data analytics, artificial intelligence and machine learning

Use of big data, data analytics, artificial intelligence (AI) and machine learning (ML) in Customs and border management presents a tremendous opportunity in the cross-border movement of people and on the commercial side. As huge volumes of data are generated by people and goods moving across borders, this group of technologies provides the ability to make sense of this huge and ever-increasing amount of data. These technologies can be used to ingest this data, and to detect and predict patterns more accurately than humans can. Visual search and facial recognition technology, and behavioural and predictive analytics that are already being used in other sectors, can also be further tailored for use in Customs and border management.

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According to the WCO's ACS, almost 45% of Customs authorities use either data analytics, or AI/ML, or both. There are numerous case studies that are focused on risk management and targeting, improving tariff classification and revenue collection, fighting fraud including undervaluation, advance analytics for Authorized Economic Operators (AEO), and many more.

4. Biometrics

Governments and organizations all around the world are choosing biometric technology to combat identity fraud and security breaches, secure confidential data, reduce costs and improve overall user experience. Biometrics is a rapidly growing field in the information technology sector, with fingerprint recognition expected to remain the most dominant form of biometric technology.

Customs administrations are uniquely situated to demonstrate useful methods of interagency coordination, which biometrics requires. Customs administrations also have a long history of coordination and interagency work, as they enforce laws and regulations for partner government agencies. They are often co-located with immigration agencies, and can work to promote the adoption and facilitation of such efforts.

Customs agencies, other government partners and private actors should monitor this field closely to identify additional uses, potentially for the following purposes: verifying identities and controlling the access of Customs operators; identifying the different actors in the supply chain such as Customs brokers, freight-forwarders, logistics operators and others; etc.

5. Drones

Drones are already an integral part of the international trade supply chain, pushing regulators to become more comfortable with the technology, and thereby developing a legal framework that determines the conditions in which they will operate. Studies indicate that the integration of drones in the trade environment can support economic growth. However, integrating them successfully and safely requires all players in the market to be prepared and engaged in the process to ensure that the supply chain can fully realize the benefits. In the trade environment, modes of physical delivery of goods are being continually re-defined.

Drones are already being used by some Customs administrations for surveillance and monitoring purposes. Some are increasingly using drones to monitor port areas and coastal regions. This involves surveillance not only to combat drug smuggling but also to provide aerial assistance. A remote-controlled drone with a high-definition camera for underwater surveillance has already been used to go as deep as 50 metres to perform a detailed scan of a boat.

Customs need to monitor, analyse and comprehend emerging developments in the use of drones, and related regulatory developments, and come up with an appropriate policy response, together with potential adjustments of Customs procedures and requirements where needed.

6. Virtual, augmented and mixed reality

As regards Customs, augmented and mixed reality can be used to project visual assistance in the physical world, e.g. when carrying out a physical inspection.

Another potential use is the visualization of big data sets. When using mixed reality, data can be projected in the physical world as digital artefacts that can be manipulated as real objects.

The use of virtual reality solutions for Customs training purposes has been successfully employed by governments and the WCO to improve inspectors' efficiency in identifying prohibited items. Virtual training programmes offer inspectors the chance to hone their skills and knowledge of their duties and responsibilities in a low-risk virtual environment, while following a progression system.

7. 3D printing

According to some reports around 1.4 million 3D printers were shipped globally in 2018, with an estimated 8 million units to be shipped in 2027. There are predictions that 3D printing could potentially have a major impact on the work of Customs in the future.

Some feel that Customs should be involved in monitoring the virtual supply chain, and the question has been raised as to how this could this be achieved, including whether existing legal instruments are sufficient to cover such responsibilities. In general, the cooperation of Customs with tax authorities and other relevant agencies (possibly as a new dimension of coordinated border management) is regarded as important in this field.

The implications of 3D printing for origin, valuation, IPR, and security, and for VAT in particular, have been stressed in the WCO. It has even been posited that there may be a need to redefine the term "goods" in the future.

Challenges remain in assessing the overall impact of 3D printers, as stressed by the 2021 OECD trade policy report. In response, the new heading 84.85 for additive manufacturing (3D printers) was created as part of the 2022 edition of the WCO Harmonized System (HS 2022) and entered into force internationally on 1 January 2022, which will enable better national monitoring of 3D printers and their impact on trade.

IV. Strategy behind technology

There is a need to harness the latest technologies as traveller and trade growth, including e-commerce, has significantly outpaced the typical public service evolution, challenging our conventional operations, programme policies and legislation.

Technologies such as blockchain, biometrics and artificial intelligence are more than business enablers, they set expectations for our clients and change how we work. It is essential, however, to focus technological changes on those key to an organization's mandate, as otherwise there is a risk of overcommitting.

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Options for the implementation of emerging technologies must be evaluated based on the services required and the needs of the Organization. The high rate of failure in large, multi-year IT-enabled projects has resulted in organizations moving away from large IT system development and instead selecting technologies that can easily migrate to new hardware in the future. Key to the new methodologies used is the principle of failing fast, and recovering quickly.

V. Recommendations

The WCO and the WTO have extensively explored the topic of disruptive technologies, sharing experiences and discussing the different projects and lessons learnt. A number of possible recommendations have been considered for policymakers. They include recommendations on how Customs and the private sector can cooperate in making best use of disruptive technologies for the purpose of facilitating and securing trade.

VI. Conclusion

There is a general understanding of the need to keep abreast of the developments in this field and continuously seek to understand the challenges and opportunities that the latest technologies can bring to Customs and border management.

Information on numerous pilot projects and proofs of concept (PoCs) shared by the Customs administrations and other stakeholders show the interest in expanding the use of these technologies, as well as the confidence in the benefits they will bring to Customs in achieving its objectives and supporting cross-border trade.

The Study Report will continue to be updated with the latest insights and information on pilots.

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