Disruptive trade technologies will usher in the 'internet of rules'

Businesses, especially micro, small and medium-sized enterprises (MSMEs), face many challenges in understanding and complying with international commercial rules and regulations. Research also indicates low utilisation of eligible tariff preferences, or favourable tax rules, by traders. In other words, many businesses do not always effectively benefit from their negotiated market advantages. Unfortunately, the current "version history" (or stage in the functional evolution) of trade policy creates costs for governments, firms and consumers and constrains achievement of the benefits associated with free trade.

Although small enterprises do not readily participate in international trade, digital technology is rapidly changing market dynamics and the value of electronic commerce continues to grow on a global scale, increasing from $16 trillion in 2013 to $25 trillion in 2015. These evolving market conditions have put a strain on public agencies (e.g. customs authorities) that lack the capacity to efficiently apply their rules amid a "tsunami" of incoming parcels of international origin.

Founded in 2016, the Xalgorithms Alliance has developed free, libre and open source components for an "internet of rules" to enable, among a variety of use cases, the automation of key functions in support of trade facilitation and cross-border e-commerce. An internet of rules, a networked repository of computer executable versions of rules, can lower the costs associated with interactions across commercial systems. As a visiting fellow with the World Trade Institute (WTI) and as contributor to the Xalgo4Trade Project, my research focuses on how digital technologies can foster market transparency, automate compliance and reduce barriers to the participation of small firms in international trade.

The WTO Trade Facilitation Agreement: multilateralism 2.0

At present, trade policies, the rules that govern commercial interactions across borders, are largely codified in natural languages (i.e., human language, as opposed to computer code) via trade agreements, national laws, standards and ad hoc policy documentation/forms. This step of codification could be described as "1.0" in the version history of trade policy. Inherently, differences in natural languages create a pervasive barrier, both in terms of literacy and technicality, when considering the functionality of trade policy 1.0 for business.

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Meanwhile, the rules of trade have continued to grow in both complexity and coverage. This is due to almost universal World Trade Organization (WTO) membership, the so-called "spaghetti bowl" of other agreements and the emergence of "second" or "new" generation rules between countries that address matters not typically thought of as trade-specific. The resultant web of policies has spawned ever more complicated documentation and compliance requirements. This has become a mounting issue given the emergence of global value chains.

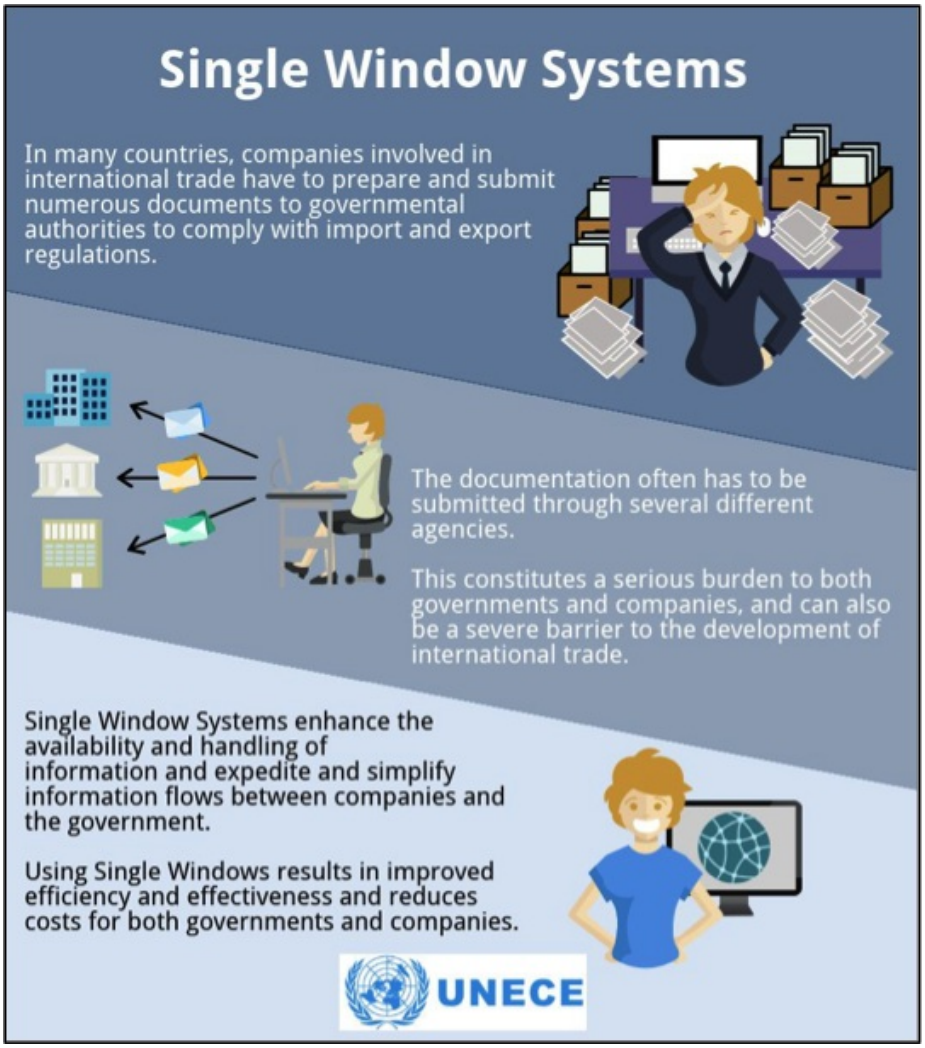
However, the media and format of rules, as well as their distribution model, are now subject to technological change. The WTO agenda has moved closer toward achieving what could be considered "trade policy 2.0" – via computer-assisted forms of a policy delivery – with the entry into force of the Trade Facilitation Agreement (TFA) in February 2017. A "global" agreement on trade facilitation, the simplification, modernisation and harmonisation of export/import processes, TFA implementation includes non-binding obligations for member nation adoption of "single window systems". It could be considered the first agreement on digitally enabled trade. Full implementation may reduce trade costs by 14.3 per cent (on average) and increase global trade by as much as $1 trillion per year. The realisation of the TFA is pushing the version history of trade policy closer to 2.0 at the global level.

Making trade facilitation more inclusive

Recently, there have been calls from national finance officials, especially members of the G20, to make international trade more inclusive for not only small business, but also also in support of the governments faced with new policy obligations. The World Economic Forum's Global Future Council on International Trade and Investment has even released a "strategic brief for trade ministers on creating an inclusive trade agenda". In particular, simultaneous policy change and technological implementation are a major concern for the governments of least-developed countries, where firms incur trade costs shown to be equivalent to a 219 per cent tariff.

Technologies (e.g. data standards, private e-commerce platforms/marketplaces , government single-window systems; Application Programming Interfaces (APIs); digital identities, blockchains and smart contracts) are rapidly altering the nature of interactions amongst economic actors: governments, firms and consumers. Yet, it may take more than a decade to realise the estimated benefits of implementing the TFA, and national governments are faced with decisions on how to modernise the design and delivery of trade policy.

Figure 1. Single window systems for international trade



Single windows are pushing trade policy toward version "2.0". (Source: UNECE)

Towards trade policy 3.0

New and disruptive technologies are signalling "trade policy 3.0" in the form of more functional versions of rules: algorithmic law and/or automation-friendly legislation. These executable, networked, forms of legislation have the potential to make the rules of trade more useful for all economic actors.

The distinctive character of trade policy 3.0 is that countries will be able to publish both natural language and digitally executable language versions of laws and regulations. It is possible that trade agreements will be "born digital". Private rules (e.g. between banks) can also be published securely online to work in concert with digitally expressed regulations.

One of the main objectives of a multilateral framework like the TFA is to "cut red tape". But, why just cut red tape when we can, virtually, throw out the tape? The automation of rules and legislation has the potential to reduce administrative burden and enhance the inclusiveness of cross-border commerce.

Table 1. The "version history" of trade policy

Trade Policy 1.0	Trade Policy 2.0	Trade Policy 3.0
Natural language codification of rules (i.e. trade agreements). Paper-based delivery (e.g. trade agreements and de facto policy / compliance documentation).	Natural language codification of rules and partial-digital forms (e.g. computer assisted: web-based portals / forms, electronic document formats, etc.). Disparate single window and private systems (e.g. e-commerce platforms / marketplaces, logistics providers, banking). Quasi-paperless on a global scale.	Both natural language codification and computer executable expressions of rules (i.e. algorithms) published online. A ubiquitous "Internet of Rules" that can power the global network of single windows and private systems. Paperless and interoperable on a global scale.

Source: Craig Atkinson 2018

Realising the benefits of trade digitisation: an "internet of rules"

Xalgorithms Alliance has implemented beta specifications and components that will assist the move toward enhanced integrity of markets via digital standards-based rules automation. According to Xalgorithms, "an "internet of rules" (IoR) is created when computational algorithms can be readily transmitted from any independent source repositories within which they are maintained, to any applications that would use them."

More simply, an internet of rules is like a domain name server (DNS) for fetching, delivering and applying rules. Rule owners (government and private actors) will be able to "publish" these according to a standard specification, and embedded or stand alone software can act as a "browser" to fetch relevant rules (e.g. tax policies), make calculations and issue payments in real-time.

A new level of automation – fetching, delivering and applying computer-executable rules – reduces the capabilities, administration and costs associated with trade. Together with standards, an internet of digital versions of rules to enable transactions may create interoperability across trade facilitation systems and power the growing "network of networks": rules will be accessible to, and function with, any computer system (e.g. government single windows and private logistics, supply chain and banking systems).

Figure 2. A single window network of both public and private actors

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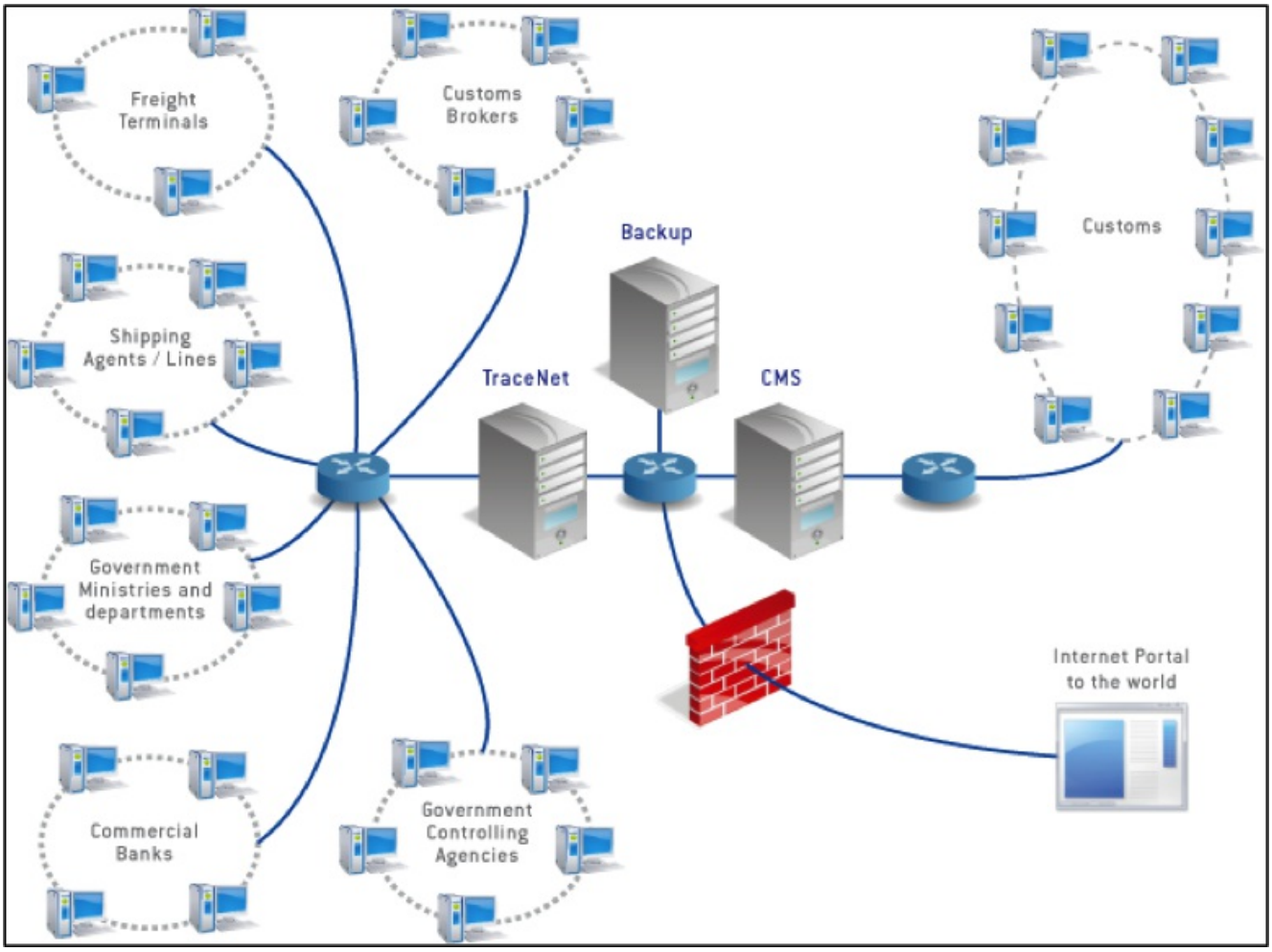

Source: UNECE

Instead of moving data around, rules are accessible via a "data fabric". By ensuring the return is coming from the data fabric, or the outcome of applying the rules to the data, compliance with local data protection rules can be assured. According to Xalgorithms, "In the realm of commerce, payment, and electronic forms, each IoR-connected solution can obtain and present to the transacting parties (who retain the prerogative to 'apply') all the computational rules that should be invoked with each transaction. This may involve rules such as those for taxes, tariffs, loyalty systems or indices, as well as contract-specific algorithms that the parties have created for themselves."

An IoR is enabled by underlying standards for e-commerce (UBL), payments (ISO 20022), open systems' interoperability (the "4-corner" model in PEPPOL terminology), and "algorithmic contracting". For trade, interoperability with UN standards, namely UN/ EDIFACT, is of key importance. Using middleware available on GitHub, the IoR is truly interoperable with the most important UN standard/format for trade facilitation. Such an internet of rules has significant implications for commercial law, especially when combined with emergent distributed ledger and blockchain technologies.

Figure 3. The simplified functions of an "internet of rules".

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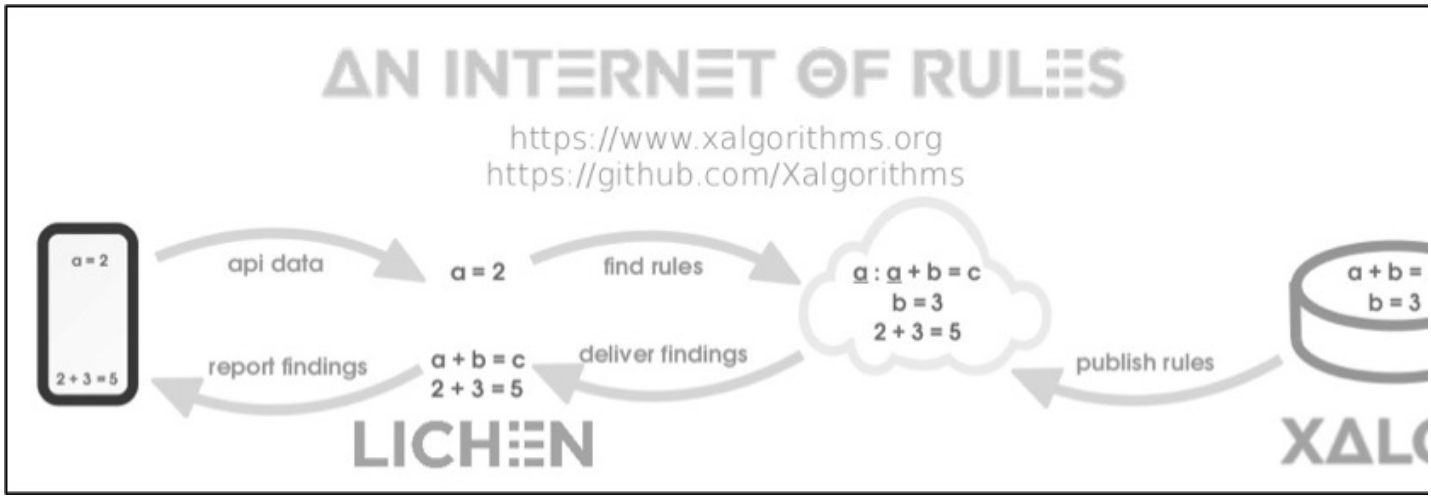

Source: Xalgorithms 2018

A note on blockchain and the version history of trade policy

Amongst existing and emerging technologies, blockchain may represent a key technology for the future of trade. Although an IoR does not require distributed ledger technology (such as blockchain) to effectively automate compliance and support trade management, it is possible that certain functions may be made more efficient and secure.

While blockchain has been touted as a part of "trade policy 4.0", it is not possible to skip a step in a version history without creating a significant, parallel, evolution in the functionality of policy itself. It could also be the case that trade digitisation needs to come before blockchain: the technology is not a panacea for the reality that the present, analog, form of rules inherently creates transaction costs.

Blockchain may be better classified as a part of trade policy 3.0, along with other supporting technologies. There are also the data mapping problems to solve, the appropriateness of blockchain for decentralised storage requirements and energy consumption-related issues. Blockchain and DLT also face regulatory challenges of their own and, according to the Oxford Internet Institute, it is not clear that distributed ledger technologies may be the particular transformative means to achieve an inclusive global economy.

Other key technology initiatives for trade

Aside from Xaglo4Trade and the development of an internet of rules, there are several other key initiatives focused on technology for trade. In the blockchain space, the Linux Foundation and its Hyperledger project have generated several components for the development of solutions for international supply chain management, smart contracts and identification.

At an individual level, The Sovrin Foundation has advanced the area of digital identification to enable decentralised trust. At an institutional level, the Global Legal Entity Identifier Foundation (GLEIF) has been mandated by the G20's heads of state to realise a global "Legal Entity Identifier" system as a broad public good to support financial transactions of the private and public sector. Such forms of identification as well as new options for "virtual residency" could play a key role in the future of cross-border e-commerce.

Global shipping company Maersk and IBM are collaborating to digitise supply chain processes via a joint venture to develop a solution for secure information sharing across logistics providers (e.g. shippers, freight forwarders, ocean carriers, customs authorities, and ports). At the WTO Public Forum 2017, ICC Brasil launched the Intelligent Tech + Trade Initiative (ITTI) with several partners to evaluate the role of blockchain and artificial intelligence in support of international transaction automation and improving free trade negotiations. The ITTI has since continued to grow with the recent signing of a memorandum of understanding between ICC Brasil and the United Nations Conference on Trade and Development (UNCTAD) at eCommerce Week 2018.

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Aside from blockchain, standards and open data initiatives are helping to drive innovation in support of trade. The Organization for the Advancement of Structured Information Standards (OASIS) and the United Nations Centre for Trade Facilitation and Electronic Business (UN/CEFACT) are leading the development of electronic business standards in both the private and public spheres. The WTO's nascent Open Trade Data Initiative is making highly valuable information assets more readily available and functional. Such standards and open data inputs are essential in supporting the advancement of the version history of trade policy.

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Notes:

- *Additional reference: An Internet of Rules and the Future of Commerce, by J. Potvin, dissertation in partial fulfilment of a doctorate in administration (project management), Université du Québec (forthcoming, 2018).*
- *The post gives the views of its author, not the position of LSE Business Review or the London School of Economics.*
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