

The Republic of Ireland & Northern Ireland: Technology Enablement for a Frictionless Smart Border

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The sensitive issue of an invisible border between the Republic of Ireland and Northern Ireland continues to be a stumbling block in negotiations between the EU and the United Kingdom. Commentary on the proposed 'smart border' has ranged from the hysterical¹, to the thoughtful². But just what is the problem? Once the UK leaves the EU single market and the customs union they will be classified as a 'third country'³, it is then for the UK and EU to negotiate a free trade agreement.

From the EU perspective, if the UK exits under WTO⁴ rules it is assumed that goods imported into Ireland must to be stopped at the border and checked for EU standards compliance, and due process is followed for point of origin and tariffs. It is also assumed that citizens must show their passports upon entry into Ireland. For numerous reasons, this creates many potential issues and is seen as a return to 'the bad old days' by many north and south of the border.

Therefore, the UK government is seeking to find an arrangement that can avoid third country status with the EU, while also meeting the different mandates of Brexit, such as seeking free trade deals elsewhere. One such proposal to the EU is to implement a soft border in the island of Ireland. The concept of a 'soft' EU border is contentious instigating much political posturing. Katie Daughen, head of Brexit policy at the British Irish Chamber of Commerce has been much quoted stating "It is a fallacy that the UK can trade independently with non-EU nations while maintaining an open border on the island of Ireland"⁵.

The reality is that the UK will be leaving the EU bloc and therefore a mutually beneficial agreement is highly desirable when compared with a 'no-deal' WTO rules exit. This position is somewhat endorsed in Ireland through Simon Coveney, Republic of Ireland minister for foreign affairs and trade, who stated "There needs to be quite a unique political solution agreed between Ireland, the UK and the EU that can allow the free movement of goods and services and people"⁶.

The prospect of a no-deal exit is worrisome on both sides, particularly in the Republic of Ireland. Where the UK have stated many times⁷ there will be no border controls on their side, the EU has not.

Essentially, the EU has approached Brexit from a political standpoint thus far. The political engagement with the UK has not⁸ been in partnership on the best way forward for all parties involved, it has postured that the UK will receive 'Third Country' status unless they meet the criteria of the single market and customs union. The UK Government cannot accept these terms and meet the mandate of Brexit. Unresolved, this situation will lead to a scenario where Ireland will be forced

¹ <https://www.irishtimes.com/business/technology/post-brexit-tech-border-deemed-complete-nonsense-by-it-experts-1.3188475>

² <https://eandt.theiet.org/content/articles/2018/04/ultra-hi-tech-invisible-irish-border-perfectly-doable-ex-customs-chief-says/>

³ https://en.wikipedia.org/wiki/Third-country_economic_relationships_with_the_European_Union

⁴ <https://www.wto.org/>

⁵ <https://www.wired.co.uk/article/irish-border-brexit-tech>

⁶ <https://www.chathamhouse.org/expert/comment/facing-brexit-ireland-northern-ireland-and-eu>

⁷ <https://www.gov.uk/government/publications/northern-ireland-and-ireland-a-position-paper>

⁸ <https://blogs.spectator.co.uk/2017/03/papers-say-jean-claude-junckers-deluded-brexit-punishment-talk/>

by the EU to impose a hard border with Northern Ireland and impose all border controls required including passport checks, goods inspections and the necessary import controls and tariffs.

On one level, this scenario serves to highlight the EU's monolithic approach to trade facilitation. A 2011 report commissioned by the Department for Business, Innovation & Skills and the Department for International Development stated "the problem remains that many regulations affecting UK traders— around 93% of the overall burden - emanate from Europe, and it has proved very difficult to reform trade regulation at the EU level" and that "efforts to reform Intrastat and simplify the EU tariff have faltered due to failure to agree among Member States". Nevertheless, while reform is obviously needed, the EU's primary concern in any future trade deal will maintain the integrity of their internal market as it stands.

From the EU's perspective, being 'outside' requires controls to ensure sub-standard goods from, or via, third countries are prohibited from entering the EU through any 'back-doors'. It should be stated, that even though the EU is preparing to treat the UK as a third country, contrary to media opinion it is not preparing to flood the EU with non-conforming goods such as the much quoted 'bleached chicken', or indeed inferior quality goods. By profiling the UK as a pariah in this way and as a potential 'snake oil salesman' ready to flood EU markets with inferior goods and services, only serves to reinforce the appearance of EU leaders' belligerence. The EU should recognise that the protectionist bubble of the single market as it stands is not a 'Jewel in the Crown'. Even with multitudes of regulations, the EU and the European Committee for Standardization (CEN) have presided over the horse meat scandal⁹, the proliferation of fake goods¹⁰ and the diesel scandal¹¹.

This position, which has played out over the last two years, where the UK proposes and the EU refuses, has only served to emphasise the protectionist nature of the bloc. The EU's derisory attitude toward the UK and their unwillingness to negotiate their trade policies with such a unique partner has led commentators such as the Institute for Economic Affairs to state¹² "the economic scale of the (Brexit) prize shows the opportunity to unleash prosperity when we liberate ourselves from a system with such serious distortions".

How the UK meets EU regulations (and directives) is in question and the EU seems uninterested in facilitating a situation where the UK can achieve harmonisation, while simultaneously actively seeking free-trade agreements with other global partners. It would appear the EU's all or nothing approach will force UK businesses into a persona non grata position despite years of meeting regulations, and for the UK Government to legislate explicitly to meet EU requirements.

It seems the immovable object has no consideration for the irresistible force.

Different options to facilitate post-Brexit trade have been proposed by the UK Government¹³ and UK think-tanks¹⁴, each approaching the EU's position with varying degrees of compromise and

⁹ <https://www.cambridge.org/core/journals/cambridge-law-journal/article/runners-and-riders-the-horsemeat-scandal-eu-law-and-multilevel-enforcement/8CBF4541AF1CBCDFB0DD4B64DE05B8E4>

¹⁰ <https://www.ft.com/content/73405e12-f24c-11e6-95ee-f14e55513608>

¹¹ <https://blogs.spectator.co.uk/2018/02/the-truth-about-the-great-diesel-scandal-has-finally-been-said/>

¹² <https://iea.org.uk/iea-report-plan-a-creating-prosperous-post-brexit-uk>

¹³

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/723460/CHEQUERS_STATEMENT_-_FINAL.PDF

¹⁴ <http://2mbg6f6b1kl380gtk22pbxgw-wpengine.netdna-ssl.com/wp-content/uploads/2018/09/The-Border-between-Northern-Ireland-and-the-Republic-of-Ireland-3.pdf>

politeness. However, to date the EU has insisted ‘rules are rules’. The simple fact is that if exporting to a different country¹⁵ or trading bloc, your goods must meet their required standards.

This is where the UK is unique when compared to the EU’s other trading partners, as the UK has diligently implemented all EC directives into British law over a long period, and it is this ‘starting point of equivalence’ that should be taken into account when considering any new deal.

Is the UK a Third Country?

The starting point of equivalence is emphasised in the UK government’s Northern Ireland and Ireland position paper. With the stated aim of “address(ing) the unique circumstances of Northern Ireland and Ireland in light of the UK’s withdrawal from, and new partnership with, the European Union”, the paper proposes that a hard border is not required if the UK and EU can agree a combination of regulatory alignment (or mutual recognition), with comprehensive enforcement and dispute resolution,¹⁶ and implementing technology-solutions at the border.

Without considering the UK’s starting point of equivalence and willingness for ongoing regulatory alignment in trade, the EU is forcing Europe into an unnecessary regulatory divergence.

Much of Katie Daughen’s critique is directed toward the highly experienced Lars Karlsson, former director of the World Customs Organisation and the author of an EU-commissioned paper¹⁷ on Brexit and the Irish border. Karlsson has stated that a smart border “perfectly possible and doable”, he describes that with “a simplified and fully electronic customs declaration system and new voluntary ‘trusted trader’ system.. it would be possible to avoid having to maintain a manned border with people physically checking goods if leading UK and Ireland politicians were to come to an agreement about this. Any necessary checks could be moved away from the border and new joint arrangements around data could enable cross-jurisdictional cooperation”¹⁸. Daughen disagrees, “It is difficult to think of any technology that would be able to deliver on the frictionless movement of trade along the Irish border that both jurisdictions currently enjoy”.

Perhaps Ms. Daughen has a point – it is difficult to think of a technological solution to this problem, but this should not stop us thinking.

The Problem Stated

Karlsson has openly admitted that no such border configuration currently exists, and that the Irish government has expressed doubts over his proposals. It is also true that the common examples given such as the Sweden-Norway and US-Canada borders have some, but not all the technologies proposed.

With this in mind, what are the potential technologies that can facilitate this new frictionless ‘smart border’? Where are their current use-cases? And how can they be backed up by regulatory equivalence? To address these issues, any proposed solutions must meet the following criteria¹⁹;

- Revenue Collection

¹⁵ <https://www.gov.uk/guidance/exporting-to-the-usa>

¹⁶ <https://www.gov.uk/government/publications/enforcement-and-dispute-resolution-a-future-partnership-paper>

¹⁷ [http://www.europarl.europa.eu/RegData/etudes/STUD/2017/596828/IPOL_STU\(2017\)596828_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2017/596828/IPOL_STU(2017)596828_EN.pdf)

¹⁸ <https://eandt.theiet.org/content/articles/2018/04/ultra-hi-tech-invisible-irish-border-perfectly-doable-ex-customs-chief-says/>

¹⁹

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/32470/1-1102x-trade-facilitation-uk-issues.pdf

- Collection of Customs duties, excise duties and other indirect taxes; payments of duties and fees; management of bonds and other financial securities
- Safety and Security
 - Security and anti-smuggling controls; dangerous goods; vehicles checks; immigration and visa formalities; export licenses
- Environmental and Health
 - Phytosanitary, veterinary and hygiene control; health and safety checks; CITES controls; ships waste
- Consumer Protection
 - Product testing; labelling; conformity checks with marketing standards
- Trade Policy
 - Administration of quota restrictions; agricultural refunds

Perhaps simpler, the Swedish National Board of trade expresses the costs faced by companies as;

- Financial
 - Fees and taxes
- Material
 - Installing and running an IT system
- Administrative
 - Costs of establishing, storing and transmitting information
- Nuisance
 - Waiting time and uncertainty

Movement of Goods

When crossing borders, a small percentage of goods are selected for documentary control or physical control by customs. Typically, this is risk-based with no country able to inspect 100% of goods, to minimise unnecessary checks and prevent disruption to supply chains. Risk assessments help customs authorities to target inspections, identifying goods or traders that present most risk while allowing legitimate trade to pass as freely as possible. As a result of this approach, documentary checks are carried out on less than 3% of imports²⁰.

²⁰ https://www.politico.eu/wp-content/uploads/2017/09/IfG_Brexit_customs.pdf

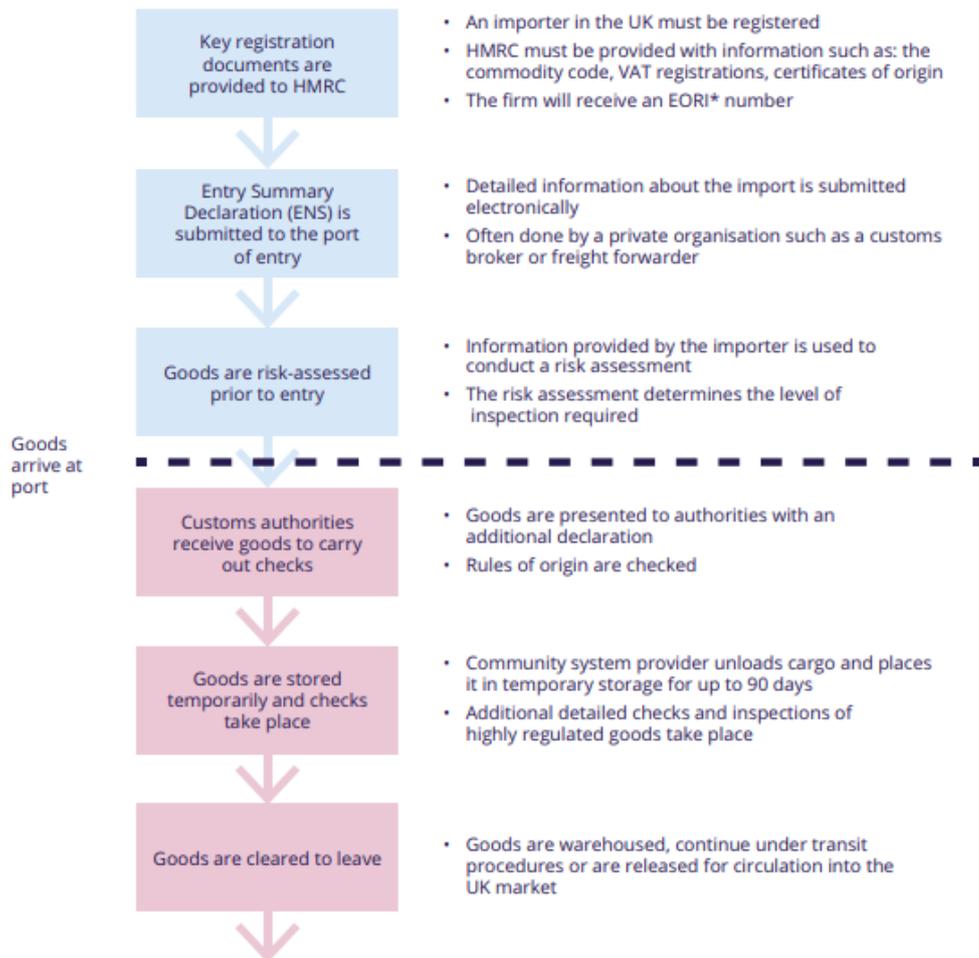


Figure: Current UK process for non-EU 'third country' imports

Without a mutually beneficial agreement British companies will find themselves in a position where UK manufactured goods, and any non-EU imported goods that are then due to be exported into EU countries, will be subject to EU customs duties tariffs and border inspections. As it stands today, for non-EU imports duties are paid in the UK and the goods can then move into other EU countries without further duties.

Business Identification & Document Preparation

To maintain registered traders the UK Government has asked for mutual recognition of Authorised Economic Operators (AEOs)²¹, enabling faster clearance of AEO goods at the border²². However, AEOs will tend to be larger companies, and to facilitate the large number of small businesses the border between Northern Ireland and Ireland, the UK would want to implement a 'trusted traders' scheme on either side of the border to meet EU requirements²³.

²¹ https://ec.europa.eu/taxation_customs/general-information-customs/customs-security/authorised-economic-operator-aeo_en

²² <https://www.gov.uk/government/publications/northern-ireland-and-ireland-a-position-paper>

²³ To support this, Karlsson's Smart Border 2.0 paper proposes a further Trusted Commercial Travellers programme to accommodate vehicle drivers

From the principal of a starting point of equivalence, mutual recognition of AEOs should be a simple piece of legislation with adherence to ongoing regulatory alignment. However the creation of a trusted traders scheme does represent a new burden on smaller businesses who have not registered as AEOs and whose primary business is intra-Ireland.

How does Northern Ireland to Ireland trade work right now? HMRC offers the following guidance for UK businesses dispatching goods to the EU²⁴;

- Check if you need a licence or to follow special rules to export restricted goods from the UK.
- Your courier or freight forwarder will ask you to complete a proforma invoice. Charge VAT if you'd do the same for customers in the UK.
- Attach the proforma invoice (and licence, if you need one) to your consignment.
- If you move goods anywhere within the EU worth over £250,000 in the last calendar year, make an Intrastat declaration.

While VAT reclaim becomes a non-issue post-Brexit, it does highlight the parameters under which a 'trusted traders' scheme can work with minimal effort with continued access to Intrastat²⁵ and VAT Information Exchange System (VIES)²⁶. In this scenario, most British businesses engaging in intra-EU trade will already be registered under these systems.

Currently companies must register for Intrastat if, in the last calendar year they moved more than £250,000 worth of goods to other EU countries, or they received more than £1.5 million worth of goods from other EU countries. If UK companies were to continue with the Intrastat scheme, a burden they currently carry, they would continue to submit monthly data including;

- VAT number
- Company details
- Agent VAT number (if applicable)
- Commodity code
- Value
- Country
- Period

Accepting of course that the VAT declaration itself is not relevant, continuation with the Intrastat scheme will allow UK companies to meet EU requirements by;

- Already being registered (and being considered a trusted trader)
- Provide monthly (retrospective) shipping data

The provision of this data would give the EU and its customs authorities the appropriate data required for any intelligence-led border controls it feels necessary, and a basis for reciprocity if abuse of the system occurs. What this does not do however is facilitate free movement for micro-businesses, such as sole traders – which is covered in the movement of people section.

²⁴ <https://www.gov.uk/starting-to-export/within-eu>

²⁵ The Intrastat system is a statistical data collection system on intra-community trade in goods where data on trade between EU Member States are collected directly from companies.

²⁶ VIES is an electronic mean of validating VAT-identification numbers of economic operators registered in the European Union for cross border transactions on goods or services.

While Intrastat currently provides the EU with all its intra-EU trade statistics, if it is insisted that the Intrastat data is not significant enough, for what the EU will then consider imports, use of a different system will be required.

A potential option would be to update the Intrastat system, to lower the value of goods threshold (if appropriate) and support expanded data sets including manifests, tariffs, vehicle registrations and if necessary, move to real-time. This would represent a development request to the EU to facilitate trade for UK companies under a 'special status', but it would also be a net-positive benefit to other countries such as Norway and Turkey. As it stands, the Intrastat systems is currently under consultation to decide its future therefore this option is not entirely unfeasible given an appropriate time-period for development.

Given an EU refusal to update their systems to facilitate trade, the UK already has an efficient digital system for customs. The CHIEF²⁷²⁸ (Customs Handling of Import and Export Freight) system processes declarations for goods entering and leaving the UK or EU through ports and airports. CHIEF supports both Human Computer Interface and electronic data interchange (EDI) interfaces, with dedicated high-speed communications links to service providers and customs offices throughout the UK.

It is well known that CHIEF is being replaced by the new Customs Declaration Service (CDS), CHIEF is 25 years old and can't be easily adapted to new requirements. The decision to replace CHIEF with CDS was made before the EU referendum to meet the requirements of the World Customs Organisation Kyoto Convention and once live, will be well prepared to meet any future customs arrangements. Many businesses will have already invested in technology²⁹³⁰ or services solutions that provide direct integration into the Intrastat or CHIEF systems and are in the process of transitioning to CDS.

Data Standards:

CEN has proliferated numerous data standards across the single market. This burden is reliably met by companies such as MuleSoft and OpenText, who have numerous integration offerings to support the challenge, and many ERP providers have built-in functionality or third-party plug-ins. The increased use of secure, tokenised application programming interfaces (APIs) also facilitates data standards challenges.

Regulation Technology:

The regulation technology market, or RegTech³¹, has grown significantly due to increasing levels of regulation and more challenging regulatory expectations that have significant operational impacts on firms.

²⁷ <https://www.gov.uk/guidance/chief-trader-import-and-export-processing-system>

²⁸ HMRC is scheduled to replace CHIEF with a new Customs Declaration Service (CDS)

²⁹ <https://www.gov.uk/government/publications/chief-customs-freight-simplified-procedures-cfsp-contact-list/customs-freight-simplified-procedures-traders-software-providers>

³⁰ <https://www.opentext.co.uk/what-we-do/partners-and-alliances/partner-solutions-catalog/partner-solutions-catalog-detail?id=a10D000000lkG6IAI>

³¹

https://www2.deloitte.com/content/dam/Deloitte/ie/Documents/FinancialServices/IE_2016_FS_RegTech_is_the_new_FinTech.pdf

This market is inclusive of biometrics, tax regulation, statutory reporting, information & cybersecurity and digital identity³². Given the scenario new solutions are required to meet regulatory alignment, it would be prudent for the UK Government to ‘reverse-pitch’ its requirements so that this market could meet the demand.

An example of RegTech supporting the Northern Ireland and Ireland border would be the digital identification of businesses and trade facilitation using Mastercard’s Track³³ system.

Point of Origin Calculation:

Given a willingness on the EU’s part to engage in a free-trade agreement with the UK, the diligence to prove point of origin is required. This is a commonplace activity for countries already engaged in free-trade and there are 400 ratified free trade agreements (FTAs) around the world. To Enable free-trade in a global economy, manufacturers that source materials and components from diverse countries are required to determine the country of origin for customs purposes, including, but not limited to tariffs/duties, sanctions and quotas.

If you consider an automotive manufacturer sourcing parts and materials globally, and then assembling in the UK, this can become a complex beast. This is exactly why point of origin calculation software³⁴³⁵³⁶ already exists to automate these processes. They provide the necessary tools to operate in a free-trade environment and calculate all duties due, easing the burden on international businesses.

Blockchain and Business Networks (e-Commerce):

A recent Accenture thought piece³⁷ proposes the use of Blockchain for the electronic facilitation of cross-border trade documents and digital identification. Without getting into a low-level discussion on the technology (which I am happy to do), Blockchain provides the authenticity and integrity of transactions for Bitcoin (and other digital currencies). It provides ‘trust in a trust-less environment’ through an open ledger and proof of work consensus.

When applied to B2B networks the argument for Blockchain falls down quickly. As the open ledger is publicly shared, with all participants having a copy, this goes against the understanding of data protection for businesses, banks and indeed, government. Even though the data is encrypted, the idea of a public ledger does not sit well. Additionally, for Bitcoin’s blockchain the price per transaction increases steadily as the proof of work is required to process ever difficult mathematical problems through brute force.

This has led to ‘private blockchains’ being pitched for B2B scenarios, where only trusted parties take part and the consensus is reached by other means reducing the data risk and transaction costs. However, this scenario sounds suspiciously like the kind of authenticity and integrity already offered by the many hundreds of business networks³⁸³⁹ with existing network effects currently available in the market.

³² <https://complyadvantage.com/blog/what-is-regtech/>

³³ <https://smallbiztrends.com/2018/09/mastercard-track-small-business.html>

³⁴ <https://www.integrationpoint.com/en/countryoforigin-details.html>

³⁵ <https://www.shippingsolutions.com/blog/importing-basics-country-of-origin>

³⁶ <https://www.mic-cust.com/software-solutions/origin-calculation/>

³⁷ <https://www.accenture.com/gb-en/insights/public-service/blockchain-trust-mapping-new-trade-routes>

³⁸ <https://www.digitalcommerce360.com/2017/11/21/online-business-networks-broaden-reach/>

³⁹ <https://edi-solution.logisticstechoutlook.com/vendors/top-edi-solution-providers-2016.html>

While Blockchain is an interesting technology its immaturity leaves it placed firmly behind other e-commerce business networks.

Physical Movement of Goods & Border 2.0 Technologies

Karlsson's Smart Border 2.0 paper proposes a number of technologies to monitor traffic across the major land trade routes of Ireland. There are more than 200 crossing points along the 500-kilometre border and it is estimated there are more than 86,000 HGVs and 100,000 light commercial vehicles cross the border North to South each month. However, only a small number of these crossing points are suitable for heavy traffic, the busiest crossing for Northern Ireland registered HGVs and light commercial vehicles being the Newry-Dundalk (M1-A1) corridor, which represents 50% of all crossings. The notion that large numbers of HGVs and light commercial vehicles will 'go off the beaten track' to avoid customs procedures is negated by both the environment they must traverse in secret and the cost/benefit analysis of breaking the law vs reward, not to mention the trust that Irish and Northern Irish businesses have built with each other. The following technologies are proposed for supporting the movement of goods in Karlsson's Smart Border 2.0 paper;

A fully electronic environment: requiring the electronic submission and receipt of documents and payments. This creates a more secure environment by reducing the amount of paper as well as the faster processing of goods and passengers at a border.

The CHIEF and Intrastat systems already exist, otherwise RegTech will need to be applied. Existing business networks and software providers already provide these services, any further regulation from the EU side will drive new market requirements.

Automatic Number Plate Recognition (ANPR): ANPR allows the reading of number plates and the use of this information to link to customs pre-arrival information or a declaration for a truck arriving at a border, which can allow faster or even no processing at a border. It can also facilitate the movement of passenger vehicles through risk assessment if it is possible to access data on vehicles in other government databases.

ANPR is widely used and considered highly reliable. The UK Police⁴⁰ and Security Services use it on a daily basis to detect, deter and disrupt criminality. In conjunction with a fully electronic environment, ANPR can support the movement of goods by associating vehicles to documentation. Emphasis should be made on the monitoring of goods traffic only, and not the monitoring of citizens.

Smartphone apps: Information for goods and passengers can be exchanged through smartphone apps. This can include the provision of minimum information from drivers approaching a border and the receipt of information (e.g. a barcode) by drivers to facilitate passing the border.

Barcode scanning: To facilitate the movement of goods across a border, the provision of a barcode by customs or other border agencies can allow documentation to be scanned and released quickly on arrival.

The concept of smartphone apps combined with barcode/QR codes to support the movement of goods is feasible but not available today as a dedicated customs solution. In a scenario where documentation is electronically held, the authenticity and integrity of the document must be proven either through digital signatures or the immutability of the app itself. This scenario would only be applied to the 3% of traffic identified for inspection. This scenario would likely have to support paper-based scanning for laggards, or potentially force a single digital option. Uber is a prime example of

⁴⁰ <https://www.police.uk/information-and-advice/automatic-number-plate-recognition/>

commercial application of a phone app applying relevant technologies to monitor, assess and manage vehicle transactions in real-time.

RFID technologies: The use of RFID associated with goods and/or enhanced drivers licenses or other forms of identification means that scanning can take place within a limited area, reducing the need for people to leave vehicles.

Under the Canadian RFID border scheme⁴¹ travellers enter inspection lanes with their RFID-enabled travel documents. The RFID reader reads the RFID tag number as their vehicle approaches the booth. Information is retrieved from secure databases, assessed for risk and then displayed on the border services officer's screen. While this is seen as an efficiency for the US-Canada border, it will only serve to add frustration on the Ireland and Northern Ireland border as it requires people to slow down.

More appropriate would be the widely used and reliable RFID-based Toll-Collection⁴² system used in the United States. In the whole these systems maintain traffic flow while extracting a toll for each vehicle, but they can 'bottleneck' during extreme rush hour situations or public holidays. With a coordinated solution, HGVs and light vehicles can carry the RFID transponders to identify themselves, which in turn will relate back to supporting documentation.

Internet of Things & Artificial Intelligence:

Moving beyond Karlsson's proposals, there are working examples of how technology is making supply chains smart. The internet of things (IoT) and big data analytics have already brought predictive maintenance, re-order, and supply practices to modern businesses. Embedded sensors on cars, ships, planes, trains, plant machinery, or buildings are already able to provide data that's either analysed in situ at the edge⁴³ or sent up to be crunched in the cloud⁴⁴ in order to derive insight into that device's behaviour and the wearing and tearing effects on its components⁴⁵.

While IoT devices are currently being used reliably (your phone is one) in many scenarios, they are typically aimed at enhancing consumer experience. The application of IoT for tracking, traceability, and provenance across supply chains is starting to happen now. In an extension of the RFID proposal, think of every supply chain item down to every boxed item, tracked in real-time with all appropriate documentation.

The application of artificial intelligence through predictive analytics and machine learning across supply chains is generally the domain of early adopter businesses with significant resources. However, as AI becomes more commoditised, there are more solutions available. Machine learning is typically aimed at process optimisation, supporting predictive analytics that suggest future possible outcomes based on previous and current data sets.

⁴¹ <https://www.rtinsights.com/case-study-using-rfid-at-the-border/>

⁴² <https://www.rfidjournal.com/blogs/experts/entry?10743>

⁴³ Gartner's definition of edge computing: "Gartner defines edge computing as solutions that facilitate data processing at or near the source of data generation. For example, in the context of the Internet of Things (IoT), the sources of data generation are usually things with sensors or embedded devices.

⁴⁴ In the simplest terms, cloud computing means storing and accessing data and programs over the Internet instead of your computer's hard drive.

⁴⁵ https://www.opentext.com/file_source/OpenText/en_US/PDF/the-supply-chain-gets-smarter-whitepaper.pdf

While the use of IoT and artificial intelligence in the application of a smart border is appealing due to the maturity of the systems, there is no coherent solution customised for trade facilitation available at this time and therefore must be considered supporting technologies.

Robotic Process Automation (RPA):

Well known and established within the IT industry, RPA is rapidly becoming a solution of choice for businesses and increasingly, government agencies. While RPA does not constitute a quantum leap in innovation its return on investment is well proven. Simply, RPA allows the creation of scripted 'robots' that will automate existing processes.

The robot acts as a human agent and can interact with other software in the same way a human does. An RPA robot does not make complex decisions without some detailed configuration, but it can quickly and effectively copy repetitive actions allowing for faster and more accurate completion of tasks. RPA is proving particularly effective in financial process automation, and should companies find themselves in a situation where they are effectively having to interact with other systems to fulfil their customs requirements, RPA is well suited to automating these tasks so that they are completed quickly and accurately.

Given hazy estimates⁴⁶ of the cost to British businesses for converting their current 200 million intra-EU transactions into customs declarations, the application of RegTech and RPA will ease the administrative costs significantly.

Drones:

Some commentators have proposed the use of drone technology for the patrolling of minor roads across the border. While drone technology has advanced considerably, their applied use in a synchronised patrolling formation across a large area has not been attempted. Their use would bring into question the subject of reliability, cost of maintenance, air traffic control and primarily the invasion of privacy and liberty for citizens living on the border.

Drones do have applied agricultural uses in the measurement of crop health.

Inspections

Starting from a position of equivalence, with assured ongoing equivalence and trusted electronic documentation and vehicle tracking systems, the need for inspections is greatly reduced – arguably if at all. But even if this is reduced to 0.5% of traffic, approximately 450 HGVs will have to be inspected monthly. This paper highlights a number of potential existing solutions that can provide electronic documentation for imports into Ireland, if inspections are then required customs officials will need effective tools to expedite the inspection process.

Karlsson proposes the use of non-intrusive inspection⁴⁷ technologies, where controls on goods or vehicles are required, the use of scanners and other non-intrusive technologies for inspections prior to any requirement to open or stop a vehicle. A working example would be Linear Accelerator technology⁴⁸ for X-ray container security screening, where alternating energies allow enhanced material discrimination and the potential for automatic identification of contraband materials.

⁴⁶ <https://www.bbc.co.uk/news/business-44238226>

⁴⁷ <http://tfig.unece.org/contents/NII-technology.htm>

⁴⁸ <https://www.vareximaging.com/products/security-industrial/linear-accelerators/linatron-mi>

The United States Customs and Border Protection service has employed the Vehicle and Cargo Inspection Systems (VACIS), which uses gamma rays to produce an image of the contents of a container for review by inspectors, which can be deployed in a mobile or stationary capacity⁴⁹.

Intrusive inspections make up a very small amount inspections, but they do exist and most are typically based on intelligence. Canine teams can be used, but there are a number of optical and near infra-red (NIR⁵⁰) spectroscopy technologies that can achieve similar results.

These are hand-held devices that can 'see' at micro resolutions (0.5 microns) and can be applied to identify substances and bacteria in close to real-time, where previously laboratory was involved. Examples include devices to identify pharmaceuticals⁵¹, unknown chemicals, explosives, and other hazardous materials⁵², asbestos⁵³(new)⁵⁴, bacteria & pathogens (new)⁵⁵, raw materials⁵⁶ and metal alloys⁵⁷

As these are all hand-held devices and can provide close to real-time analysis, they offer customs officials increased flexibility when dealing with a number of contraband items and the capability to apply random spot checks where appropriate.

Sanitary and Phytosanitary Measures (SPS)

Agrifood represents a significant challenge⁵⁸ in the implementation of a soft border and requires a combined mutual regulatory alignment and mutual recognition, and compromise on both sides, to move these measures away from the border. A challenge arises due to a lesser number of technological solutions being available to expedite processes. This is a significant issue needing resolution as the import and export of food and live animals between the two countries represents a significant percentage of overall trade, the numbers being approx. €1bn each way⁵⁹.

The UK Government proposes that the UK and the EU should prioritise addressing how to avoid a hard border in relation to checks on particular types of goods, such as Sanitary and Phytosanitary (SPS) measures for agri-food⁶⁰. However, the EU stipulates a range of controls and checks for third country agri-food products in situations where the EU does not have a sufficiently deep trade relationship with the relevant country.

The UK is starting from a position of equivalence, already having deep trade relationship with the EU.

⁴⁹ <https://fas.org/sgp/crs/RL32399.pdf>

⁵⁰ <https://www.thermofisher.com/uk/en/home/industrial/spectroscopy-elemental-isotope-analysis/spectroscopy-elemental-isotope-analysis-learning-center/molecular-spectroscopy-information/nir-technology.html>

⁵¹ <https://www.thermofisher.com/order/catalog/product/MICROPHAZIRRX>

⁵² <https://www.thermofisher.com/order/catalog/product/TRUDEFENDERFTCHEM?SID=srch-srp-TRUDEFENDERFTCHEM>

⁵³ <https://www.thermofisher.com/order/catalog/product/MICROPHAZIRAS>

⁵⁴ <http://www.asbestoprobe.com/>

⁵⁵ <https://www.ezlabsystems.com/>

⁵⁶ <https://www.thermofisher.com/order/catalog/product/TSRMTRUTOOLS?SID=srch-srp-TSRMTRUTOOLS>

⁵⁷ <https://www.thermofisher.com/order/catalog/product/XL2?SID=srch-srp-XL2>

⁵⁸ <http://apha.defra.gov.uk/documents/bip/manual/bip-manual.pdf>

⁵⁹ UK Government, HMRC Regional trade statistics, 2017

⁶⁰ <https://www.gov.uk/government/publications/northern-ireland-and-ireland-a-position-paper>

An example of the EU already compromising in this area is Switzerland, where a common veterinary area with no border controls is established at the EU-Swiss border, as well as a regulatory equivalence agreement for some non-trade aspects of animal health regulation.

To facilitate an ongoing trusted relationship with the EU in regard to agrifood, regulatory equivalence on agrifood measures will have to be applied and proven to be applied, to achieve the same outcome and high standards. Reciprocity in the case of disputes will also have to be agreed.

Regulatory divergence with the UK would be of particular concern to the EU post-Brexit, and agrifood exporters to the EU will need to assistance in proving they meet the multitude of EU regulations⁶¹. What is required is either full regulatory compliance on agrifood, or individual farms being able to declare compliance.

The challenge for the UK would not be the regulatory alignment itself, but the proof of alignment. An example would be EU legislation banning the use of certain neonicotinoids and a potential ban for glyphosate⁶², how could farmers prove they have not used these chemicals?

In the UK, there are around 150,000 farm visits each year by Defra group bodies or local authorities. 58% of all farm visits are to do with animal, plant or bee health. Of these, the majority are bovine TB tests that must be carried out for disease surveillance and control, indeed nearly 45% of all inspections are for bovine TB surveillance or control⁶³.

The decision for the UK government is if providing regulatory alignment on agrifood with the EU has any advantages/equivalence when exporting to other countries, or whether alignment places an unreasonable burden on UK agrifood exporters. However, in 2017 the EU imported €138bn agrifoods – so extra-EU trade is entirely possible.

Providing the UK and the EU could reach a sufficiently deep agreement, this approach could ensure that there would be no requirement for any SPS or related checks for agri-food products at the border between Northern Ireland and Ireland.

There are a number of phytosanitary technology solutions that could prove adherence to regulations. Combined with an immutable digital delivery system between traders and customs, they could potentially provide electronic documentary evidence that negates the need for border checks;

Food and feed safety:

Feed and ingredient analysers⁶⁴ are rugged and easy-to-use instruments for animal feed and feed ingredient quality testing. They can be used onsite for rapidly analysing multiple components simultaneously without consumables, chemicals, or disposable costs.

Mobile Near-Infrared Spectrometers:

⁶¹ <http://apha.defra.gov.uk/documents/bip/compendium/POAO-150918.pdf>

⁶² <http://foodresearch.org.uk/wp-content/uploads/2017/01/FRC-Blog-Final-Michael-Cardwell-and-Fiona-Smith.pdf>

⁶³

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/724785/farm-inspection-review-interim-report.pdf

⁶⁴

https://tools.thermofisher.com/content/sfs/brochures/FL52069_E%200511M_Feed_Hsng_CalibratePackage.pdf

There are a number of prototype⁶⁵ and research⁶⁶ applied NIR products that can identify bacteria and pathogens, bringing laboratory expertise into the field in close to real-time. There are also established mobile NIR multi-function devices that can be used in the field to provide evidential documentation for the existence of numerous agrifood use-cases⁶⁷; fungus detection, food quality inspection, bacteria, soil monitoring, textile fabrics and plant health monitoring.

Bovine Tuberculosis:

The stand-alone Bovine Tuberculosis (bTB) test is a blood-based assay of cell-mediated immunity. Animals infected with *Mycobacterium bovis* can be identified by measurement of the cytokine interferon gamma. The test is widely used as a standalone test or as an ancillary test to the tuberculin skin test and is approved by the OIE as a solution for all bTB testing situations⁶⁸.

Live Animals – Trade & Imports:

The current intra-EU and extra-EU regulations for the intra/extra movement of animals are similar in many ways, requiring all live animals to travel with a health certificate signed by an official veterinarian guaranteeing that the conditions for import/transit into the EU have been met. For extra-EU imports the difference is that animals and the accompanying certificates must be verified and checked by EU official veterinarians at a designated Border Inspection Post (BIP). Further checks on the animals may also be carried out at the final destination⁶⁹.

Given the UK's starting position of equivalence these procedures can happen as a matter of course and current EU certified veterinarians can be recognised. To maintain an on-going frictionless border, proof of adherence to EU rules⁷⁰ on health certification and transportation is required (as it currently is for extra-EU exporters).

The choice for the EU is if the UK can provide enough documentary evidence through veterinary inspections and spot-checks to negate the need for physical documentation checks at the Irish and Northern Irish border. As it stands, the EU has published several papers^{71,72} warning of the requirements of a hard border.

Plant Health:

Due to several listed pests, certain commodities are not allowed to be imported into the EU unless certain well-established conditions are complied with the country of origin. Also, some specified plants or plant products must be accompanied by a plant health certificate.

Supporting evidence can be provided by the application of drones flying over crop fields measuring the RGB and NIR spectral ranges. This technique is widely-used by farmers to measure the Normalized Difference Vegetation Index (NDVI) and Visible Atmospherically Resistant Index (VARI) to

⁶⁵ <https://www.ezlabsystems.com/>

⁶⁶ <https://www.i-sense.org.uk/research/flagship-3-sensing-systems-detect-and-identify-bacteria>

⁶⁷ <https://nirvascan.alliedscientificpro.com/#products>

⁶⁸ https://tools.thermofisher.com/content/sfs/brochures/animalhealth_flyer_bovigam_tb_CO121138.pdf

⁶⁹ https://ec.europa.eu/food/animals/live_animals_en

⁷⁰ <http://apha.defra.gov.uk/documents/bip/compendium/POAO-150918.pdf>

⁷¹ https://ec.europa.eu/info/sites/info/files/file_import/movements_of_live_animals_en.pdf

⁷² https://ec.europa.eu/food/sites/food/files/animals/docs/brexit-notice_animal-transport.pdf

approximate plant health and vigour⁷³⁷⁴. These NIR devices can also be applied at ground-level⁷⁵ and can detect applied to detect plant drought, disease, nutrient stress and pathogens.

People

To avoid any confusion regarding the free movement of people across the border, the UK Government has stated that controls on the Irish border are regarded as impractical and undesirable and express a desire to continue the Common Travel Area (CTA) arrangement⁷⁶ keeping Irish nationals with a special status in UK law.

Essentially, the ball is in the Republic's court in reciprocating this arrangement. The Republic of Ireland is outside the Schengen Area⁷⁷ and would be within its right to maintain unobstructed travel between North and South. However, the Republic's decision can be greatly eased if a soft border for the movement of goods can be arranged.

One reason why unobstructed travel between North and South must be maintained is the number of sole traders and micro-businesses in and around the border who regularly cross over to work or supply their goods. As part of any mutually beneficial arrangement, financial thresholds would be required for those exporting goods over a certain value to qualify for this status, this monitoring is already in place through HMRCs VAT calculations. Larger companies would still have the duty to report and prove compliance as this paper has suggested.

It should also go without saying, the unfettered travel for citizens should remain in place.

If a mutually beneficial arrangement can be made, with a frictionless smart border, the use of technology to monitor citizen movements should be negated. To apply any technological solution to monitor the movement of citizens and these smaller businesses would be bureaucratic and affect individual rights and freedoms.

The application of technologies such as ePassports, SmartGates and enhanced drivers licenses are inappropriate for intra-Ireland travel. Due to Irish geography, international travel is controlled; Northern Irish citizens with a British passport will be able to easily enter Ireland and can easily fly from Dublin, but subject to the limitations of a British passport within the EU. Republic of Ireland citizens can easily enter Northern Ireland and fly from Belfast, but subject to the limitations of an EU passport within the United Kingdom. The same principle applies to ports.

Some may consider this a 'wild west' scenario where smugglers transport contraband across the border, and swathes of immigrants march north or south depending on their preferred destination. Long convoys of trucks and vans traverse stealthily through the b and c roads laden to the brim. Any concerted efforts to use minor roads for illegal smuggling in sufficient quantities, or mass movement of migrants, would easily be spotted by the local populace and police – and probably already is.

There is already a fiscal border between the North and South, and given the Euro's unerring tendency to always pin itself below Pound Sterling, the idea of cheap booze and cigarette runs is not

⁷³ <https://botlink.com/blog/rgb-versus-nir-which-sensor-is-better-for-measuring-crop-health>

⁷⁴ <https://blog.dronedeploy.com/identifying-crop-variability-whats-the-difference-between-ndvi-false-ndvi-and-vari-plant-health-98c380381a33>

⁷⁵ <https://surfaceoptics.com/applications/precision-agriculture-hyperspectral-sensors/>

⁷⁶ <https://researchbriefings.parliament.uk/ResearchBriefing/Summary/CBP-7661>

⁷⁷ https://ec.europa.eu/home-affairs/what-we-do/policies/borders-and-visas/schengen_en

only probable, but logical. It only rarely happens today as the cost/benefit of the journey mostly negates the savings, but this may change.

So what is the worst that can happen? Take a leaf out of the ever-long struggle between the high-tax US state of Massachusetts and the 'live free or die' zero sales tax state of New Hampshire⁷⁸. The consensus is the competition around tax rates will never stop across land borders, but the worst that happens in the US? Citizens buy their 4th July alcohol and fireworks at the cheapest place.

Citizen Technologies⁷⁹:

ePassports: The use of ePassports with biometric capabilities can facilitate the faster movement of persons across borders. The international standard for ePassports is governed by the International Civil Aviation Organization.

SmartGates: The use of smart gates or fast-scanning or machine reading technologies to facilitate the fast movement of persons through the border and to support risk management.

Enhanced Drivers Licenses: Drivers licenses or personal identification cards with biometric or other identifying data. This facilitates fast identification of people at the border through quick scanning and can be used instead of a passport.

Conclusion: It is clear for a frictionless smart border to become apparent, significant effort and cooperation is required from all parties.

Considering the assumed desire for EU companies to retain access to the UK market, the political desire to create a soft border between Ireland and Northern Ireland, the UK's unique position of regulatory equivalence with the EU and the availability of technology solutions to underpin the required bureaucracy, then a frictionless smart border is achievable.

This paper recognises that the technologies suggested individually do not represent a coherent customs system, but given an applied strategy they can help meet the necessary EU legislation.

Given the willingness for the UK to support free movement through the Northern Ireland and Ireland border, the UK's current starting position of equivalence & intention of ongoing regulatory equivalence for trade, plus the availability of supporting technologies to enable this, the possibility of a mutually beneficial border arrangement is highly probable.

However, if the EU insists on placing the UK as a third country and dismissing its current position of equivalence, this places an administrative burden on the Irish government where a hard border for goods must be imposed. This, in time will in all probability lead to the UK imposing reciprocal tariffs on imported goods from the EU to balance the flow of trade, which in turn will necessitate goods inspections on the Northern Ireland side of the border.

Can we agree a soft border?

What is required is an agreement on the types of technology that can assist in the origination, documentation, transportation and inspection of goods. This agreement could easily be reached by Friday, 29 March 2019. Then a two-year implementation period is required to co-ordinate the implementation of these technologies into a coherent solution, with mutually agreed milestones. Followed by a further three-year review period to measure effectiveness and compliance.

⁷⁸ http://www.lowellsun.com/todaysheadlines/cj_11825022

⁷⁹ [http://www.europarl.europa.eu/RegData/etudes/STUD/2017/596828/IPOL_STU\(2017\)596828_EN.pdf](http://www.europarl.europa.eu/RegData/etudes/STUD/2017/596828/IPOL_STU(2017)596828_EN.pdf)

Does the UK deserve a unique deal?

Treating the UK as a third country will of course place a burden on the United Kingdom as it will be forced to treat the EU bloc as a third country also, but primarily it will expose the EU's protectionist bureaucracy on a global stage. While many are happy to predict a doomsday scenario for the UK⁸⁰, the no deal scenario will not only affect all EU member's economies, it will wake up European nation leaders, business people and citizens to question if the EU bureaucracy is representing their members interests, or their own.

⁸⁰ <https://publications.parliament.uk/pa/cm201719/cmselect/cmhaff/540/540.pdf>