# DIGITAL FUTURES The Future UK Border

Presented in partnership by



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## Capgemini & Early Metrics present DIGITAL FUTURES

Capgemini and Early Metrics are proud to present *Digital Futures*: a series of events and reports showcasing **the cutting-edge technology transforming the way we live and work**.

A global leader in digital transformation, **Capgemini** is at the forefront of innovation - applying deep expertise and imagination to solve business challenges across industries.

**Early Metrics** provides corporate innovators with the tools to understand and leverage the startup ecosystem.

Together, they are exploring **the potential of emerging technologies to effect genuine change**.



By 2050, UK trade will be worth £4 trillion; 450 million people will cross the UK border each year.

Borders across the globe are transforming at an electric pace to keep up with an **ever-changing backdrop of opportunities and expectations**; among these, the exponential increase of people and goods crossing the border; associated security threats; and the need for frictionless and hygienic end-to-end solutions.

We envisage a data driven and unified border of the future: digitally seamless, intuitive and safeguarded against disruption. Border systems will be proactive, not reactive, and fully capable of predicting and planning for the unexpected whether it be the next pandemic, new Customs legislation or an organised crime syndicate operating on the dark web.

We envisage the border of the future as seamless, intuitive and safeguarded against disruption.

At the border of the future, a system that knows you're arriving supplies you with all the requisite documents in advance. A passport control gate identifies you in motion - no need to stop - and can alert a staff member if you're running a temperature. Goods carrying vehicles pass through checkpoints and the number plate is scanned and logged in a matter of seconds. Simultaneously, the freight on board is scanned for counterfeit or dangerous material. Once across the border, the Internet of Things will track shipments to their destination and the full journey will be irrevocably logged in a blockchain ledger for total transparency.

Meanwhile, passengers disembarking at their destination will have instant access to international payment systems - no fees, no delays. International trade and travel will be transformed.

With the right combination of coordinated focus, accelerated investment, extensive industry collaboration and the application of emerging technologies, the UK can develop a word-leading border by 2025.







## At the border











<b>ECOSYSTEM MATURITY</b>	
<b>BEFORE THE BORDER</b>	The market for solutions designed for use before the border is relatively young. Adoption of predictive services catering to supply chains and regulatory or customs compliance has been limited, and <b>traditional bodies are only just</b> <b>starting to explore these options.</b>
AT THE BORDER	The market for solutions deployed at the border is at a similarly early stage, although recent evidence suggests <b>the market is becoming much more responsive</b> to new technologies in the wake of the Covid-19 crisis.
AFTER THE BORDER	Solutions for tracking journeys of goods and people after the border are widespread. The majority of startups are at an advanced stage, bringing <b>tested and stabilised solutions to a mature market</b> primed for adoption.

## Understanding the startup ecosystem

## OPPORTUNITIES

The majority of solutions in the startup
 ecosystem are software focused and asset
 light, meaning easy scalability and few
 variable costs

**Covid-19** has triggered an increase in awareness of the **need for people and asset tracking**, meaning investment is up and the market is growing

(+)

Likewise, **EU Exit priorities are fasttracking innovation** and highlighting the need for upgraded and unified systems CHALLENGES

Governments can be slow to adopt innovative border management solutions; many end up playing catch up to regulate already widespread technologies

Front end transformation is only effective if implemented in parallel with workforce education, upskilling and recruitment; new technology widens the employee skill gap

The regulatory landscape can be complex for data-driven solutions; **compliance is key to scalability** 

Implementation of new tech can't be isolated; it's important to consider end to end service design, requiring greater collaboration between Government and industry



## **Before the border: Overview**

To clear goods quickly and effectively, we need traders to be ready with the necessary data."



Tony Smith CBE Ex-Director General UK Border Force Now that the UK has exited the EU, 400m customs declarations will be processed per year - yet just prior to the introduction of new legislation, 30-40% of businesses reported feeling underprepared.

There's a big risk that upheavals to existing systems will result in bottlenecks and lengthy delays, throwing the UK border system into chaos for an extended period of time. Technology has a role to play here, both through assistive technologies for Border staff and automated systems to manage traffic and crowds.

It's also crucial to act early to shift customs activity away from the border, employing **data-driven solutions** to predict and manage flow. The creation of a **unified interface**, incorporating mobility and customs data across industries, will enable border agencies to access real-time alerts, trigger automated actions and, where necessary, make informed interventions - thereby enabling immediate risking and analysis of people and goods.

At the front end, traders will benefit from frictionless and intuitive services. Consumers have come to expect the highest standards of user experience from the private sector, and therefore need to see this usability reflected by public bodies. Moreover, they will have access to a one-stop shop platform where they can access information and address queries.

Digitising customs clearance is the most logical way to ensure that goods carrying vehicles spend the least time possible at the border itself, having submitted all the necessary documentation in advance. The creation of **Trusted Trader and Passenger Corridors** will also allow speedy processing of known entities.

## Before the border: Ecosystem insights



#### **CASE STUDY**

Sweden is a leading example globally of effective trade innovation, and e-government in particular.

Their trade facilitation processes have all been created in close collaboration with the national business community; this ongoing public-private dialogue has allowed Swedish government to design systems which work for the user as well as the administrator. Their 'Stairway' system, implemented in 2002, allowed goods traded by known compliant companies (Authorised Economic Operators) to move quickly through the supply chain; importers make declarations in 2 simple steps at point of entry and after goods have crossed the border - and can defer payment of duties and fees. These proven principles, tested with over 50 pilot companies, informed the EU rules for AEOs.

A key feature of the Stairway system is that all declarations can be submitted electronically; Sweden's Single Trade Window (tullverket) was first introduced in 1989. It allows businesses and citizens to make declarations and apply for licences electronically, either via the Swedish Customs Internet or through their own business system. The platform brings together Customs with the Board of Agriculture, the National Board of Trade, National Inspectorate of Strategic Products & the police.

Swedish government reports that the quality of information submitted improved. The system was more efficient, freed up time and resources and provided better service to users. Tax revenues increased marginally - but proper customs information collection was already very high prior to the programme, at 99.5%.

Use of the system is voluntary; nevertheless, 94% of all customs declarations each year are now submitted on the platform.

## At the border: Overview

At the border, several priority areas have emerged: **efficiency**, **security and**, **now**, **hygiene**.

ePassport gates have been available to British and EU nationals since 2008, but technology has advanced considerably in the years since and identification solutions could be utilised to greater effect.

The International Air Transport Association predicts that **the number of air travellers globally will double by 2037** - from 4.2bn in 2018 to 8.2bn. To keep people moving fluidly through potentially high-congestion areas, **contactless identification solutions** (like biometric passports, already in use in 120 countries) can be employed to quickly and reliably authorise the passage of large volumes of people.

Two secondary but beneficial outcomes: effective flow management positively impacts traveller experience, and the prevention of overcrowding is likely to remain important, if not crucial, in adapting travel to a post-pandemic world.

As well as global travel, global commerce is on the rise, and so too consumer expectations. In 2021, it's already fairly commonplace to pay for and receive next-day delivery; **the number of cross-border 'fast-parcels' is expected to grow by 60%** by 2025.

Quick processing of goods and goods carrying vehicles will be essential to manage these increasing volumes without compromising security - which calls for greater levels of automation. The border is a combination of people, process and technology
 and all these elements must be balanced."



Steve Armitage Head of Technology Design and Innovation Heathrow Airport

For example, machine learning algorithms can be trained to detect dangerous situations according to video, radar or sensor surveillance of parcels and vehicles.

Admittedly, the application of emerging technologies to security poses some problems. **Regulation is complex and user trust is low** due to data privacy concerns - 40-60% of UK citizens don't trust public bodies with their personal data.

This is why **blockchain technology is a transformational tool**: it provides 'zeroknowledge proof', allowing the assessment of sensitive information without disclosing confidential data.

## At the border: Ecosystem Insights



#### CASE STUDY

In Abu Dhabi, strategic border checkpoints have been equipped with a full suite of automated technologies designed to help customs officials protect borders and collect revenues.

An under vehicle inspection system takes high-resolution 4K digital camera images of a vehicle undercarriage. The undercarriage can be viewed as a whole with 12X zoom capabilities, and a snapshot of the whole vehicle is also provided, creating a consolidated image of the scanned car or lorry. Large-scale X-ray imaging, capable of detecting explosives, weapons, drugs and stowaways, is also deployed (the radiation level is low enough that travellers may stay in their vehicles).

A licence plate reader uses optical character recognition technology to provide customs officials with the number plate and country and state of origin of any given vehicle.

A vehicle inspection software system consolidates results and assesses risk; the programme can check vehicles against a record of suspect vehicles and send automated alarm notifications to off-site officials. The database is fully searchable.

### After the border

As goods and people travel on to their final destinations, emerging technology can allow governments and trade bodies to see these journeys end-to-end. Complex supply chains, containing many touchpoints and stakeholders, are often opaque - but more and more **companies and consumers are now demanding greater transparency**, in order to trace product origins and track the fulfilment of orders. The application of blockchain technology is becoming increasingly practical. It means the sustainable credentials of a product can be ratified, transactions and liability tracked - and all relevant information immutably and securely stored.

And it's not just logistics that can be transformed by effective data management and analysis; it also has the potential to facilitate much more **efficient integration of downstream processes** for people. Immigration status could be used to determine NHS eligibility, or conduct automated 'right to rent' or 'right to buy' checks. As with the UK financial services sector - which has seen an explosion in personalised services enabled by data sharing - we could see an exciting byproduct in the form of third party organisations offering innovative solutions powered by user data.

A key enabler of global trade will be improved international payment services. In this area, fintech tends to have the advantage over incumbent banks - they can offer multicurrency accounts with low commission and good exchange rates, granting users greater flexibility. Startup UX also tends to be better adapted to customer needs than products from traditional banks. Another growing trend is the use of cryptocurrency; governments around the world will need to review and adapt financial regulation to accommodate **increased adoption of alternative currencies**.

Again, the increase in data collection and sharing along supply chains and across borders is likely to present security challenges - **by 2025**, **it's projected that 50% of Dark Web sites will illicit illegal trade or identity fraud**. This in turn has spawned a generation of cyber security and fraud detection companies developing algorithms to assess threats, detect fraud and ensure compliance.

The key to supply chain transparency is provenance and proof."



Veera Johnson Co-founder Circulor

## After the border: Ecosystem Insights



#### **CASE STUDY**

The Port of Rotterdam and the City of Rotterdam have created BlockLab, a research and technology agency tasked with developing blockchain solutions to improve efficiency of supply chain management and port logistics.

An average of 27 parties are involved in transporting sea containers; data is exchanged between them around 200 times on any given route. Each of the organisations along the supply chain probably have their own systems and associated costs, requiring significant resources and financing. Document processing and administration represents on average 1/5 of the cost of physical transport.

A pilot project from BlockLab (in partnership with ABN Amro & Samsung SDS), DELIVER, is a blockchain powered supply chain management platform; it tracks orders, shipments and finance in real time, improves data sharing, reduces risk and enhances interoperability.

In 2019, two containers from South Korea arrived in Tilburg via the Port of Rotterdam. It was an entirely paperless shipment, financed and tracked door-todoor using DELIVER. All parties had full visibility all the way along the journey, and every piece of proof was stored automatically in the DELIVER blockchain.

Following this successful proof of concept, BlockLab continues to explore how blockchain can change Rotterdam's maritime processes.

## After the border: Startups to watch

#### **CIRCULOR**

Circulor provides Traceability-as-a-Service to verify responsible sourcing, to underpin effective recycling and to improve efficiency. At every step, raw material suppliers and manufacturers can input data into Circulor's web and mobile platform, recording it onto an immutable blockchain ledger. This allows global companies in the automotive, consumer electronics and many other industries to check provenance and chain of custody. The startup has so far secured strong partnerships with several large companies including Volvo, Oracle and ATI Boeing.



- Founded: 2017
- O Location: London (UK)
- Employees: +10 Early Metrics rating: Top 5% in 2018
  - ) Funding: Series A in 2020 (sum undisclosed)
  - Maturity: Early Stage Post revenue



#### **USE CASE**

Apple uses the rare metal tantalum to build its smartphones. The tech giant suffered public backlash after it was reported that its main supplier was using child labour in Rwanda. Apple's head of procurement met Circulor through a human rights association and asked to implement their solution. Apple demanded of its raw tantalum supplier to use Circulor, and for its employees to register their identity with a photo and fingerprint. Now, when the precious metal is extracted the miner registers the weight of the bag and tags himself using the Circulor app. Apple can verify the provenance of the material, with the process repeated at each transfer of custody along the supply chain and across borders.

## The Future UK Border Expert panel highlights

In the first of a series of webinars, Daniel Searle, Director of Borders, Tax & Trade at Capgemini, sat down (virtually) with **five expert panellists to discuss the future of the UK border**. From the EU Exit to Covid-19 to fostering innovation in the public sector, there was a lot to cover.

On the question of the UK's exit from the European Union and how to adapt, Tony Smith (CBE) - Ex-Director General of the UK Border Force and chairman of the IBMATA - identified three priority areas: trade flows, people and health. From his point of view, the role of customs now is huge compared to when the UK was still in the Customs Union - and the new regulatory framework is proving difficult for traders. In order to get traffic flowing again, traders need to be ready with the necessary data to enable quick and efficient goods clearance. Tony also pointed out the numerous moving parts, many of them new, that are proving complicated to harmonise - technologies like GVMS, huge volumes of customs declarations, a points-based immigration system, irregular migration and, of course, the implications of Covid-19 on travel.

The issue of interoperability across all trade systems and functions is one that Lesley Batchelor OBE, CEO of Export Boot Camps, also pointed out. In particular, she highlighted the confusion among traders resulting from multiple new requirements, lack of information and disjointed messaging - with a damaging effect to trust levels. Priscilla Li, Head of Applied Innovation Exchange at Capgemini UK, echoed this with her finding that there had been **over 360 policy narrative changes in health, transport and travel over the last year**, 70% of which had implications for the movement of people and goods - an untenable pace of change, she argues.

Lesley asserts that the top priorities now must be consolidation of processes and systems and coordination of government messaging, in order to remedy the lack of confidence which is currently overwhelming industry. She hopes that by achieving this synchronicity we can move towards a fully integrated digitised system, enabled by smart ledger technology with the ability to streamline the entire trade process. From her point of view, the combination of new systems and confusion over access to zero rated duties (through the Trade & Cooperation Agreement) is threatening trust around ease of trade. Intolerance of new systems - currently suffering with teething problems and data input errors - seems to be growing, and is also exacerbating frustration with messaging from government, industry and media. Lesley feels that "the UK has learnt the hard way that international trade isn't easy unless you know how to do it".

As Head of Technology Design and Innovation at Heathrow Airport, Steve Armitage has likewise seen firsthand the need for coherent and effective systems. He stresses that recent events have underlined **the need for flexibility and counsels designing systems with the worst case scenario in mind**, to ensure uninterrupted flow in all eventualities. Like Steve, Priscilla cautions that it is irresponsible to hold too many assumptions at this time, as new systems must be tested against all externalities.

A common theme throughout the session was the vision for a **data-driven border**, enabling electronic upstream checks away from the border and supply chain visibility. As every panellist pointed out, manual data entry is imperfect - but obtaining vast volumes of reliable data poses its own challenges. As Lesley notes, **smart ledgers will only work with**  a safe data lake, invulnerable to cyber crime and held by a trusted party, from which to draw information. Establishing this will require extensive collaboration between government and industry.

This is consistent with the second big theme of the afternoon - the need for cohesion between both public and private sectors and within internal government departments. Tony asserts that **continuity**, **communication and strong relationships are all imperative to good governance**. He feels that at the moment there is good work going on in isolated pockets but there is no unified framework under which they can all be united.

In Tony's work with border agencies globally, he notes that many countries are drafting strategies for future pandemic controls and urges that this is an important addition - calling to mind Steve's earlier assertion that system design is most successful when it plans for the worst case. In his role at Heathrow, Steve has found himself now contending with very new issues - requiring implementation of new technology and policies to maintain a safe environment. To the question of health passports and increased use of biometrics, which has been posited as a solution for travel during and after the pandemic, he believes that people are more willing to trade data in return for service - in this case, guaranteed safe and contactless travel. He also stressed the need to move to risk-based systems rather than blanket bans or guarantines; as he sees it, these kinds of systems are already used for security in airports and could be equally effective where health is concerned.

The implementation of new technology to power this data-driven border was a muchdiscussed topic - so what's needed to cultivate effective innovation? For Tony, it's important to resist the inclination to be too insular, learn from other countries and take advantage of game-changing technologies. Priscilla, with her vast experience in innovation, thinks that more time is needed on discovery; identifying the questions that need to be answered and accepting that these may change; including more stakeholders at the very beginning of the process; moving away from rigid structures and allowing flexibility and experimentation; and, crucially, ensuring that new initiatives are scalable.

Veera Johnson, Co-Founder of the startup Circulor, detailed how her business is one of many providing **innovative services to improve global supply chains.** Circulor's tech platform enables clients to track, monitor and analyse the provenance of raw materials and goods for example in the automotive industry, raw minerals are tracked from the mine through chemical refinement and finally end up as batteries in electric vehicles, passing through complex supply chains and across borders in the process. The chain of custody is logged in a private permission ledger and the carbon emission footprint monitored. You can read more about Circulor on p. 20.

Our thanks to all the panellists who participated and provided invaluable insight into what the UK border of the future could look like. In the words of Tony Smith, "let's hope we're all up for the challenge!".



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#### EARLY METRICS

Early Metrics specialises in startup ratings and emerging technology research. As an independent agency, it has developed a scientific methodology to identify emerging tech players and assess their growth potential. It therefore provides the right tools for decision-makers from funds and corporates to discover, qualify and engage with startups. To date, Early Metrics has rated over 3000 startups in Europe and worldwide.

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The organisers would like to give special thanks to to all the startups and speakers who have made this webinar series possible.









