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Freight Data Sharing Case Studies

CATAPULT
Connected Places

Executive Summary

Background

The Department for Transport (DfT) is currently developing its Future of Freight strategy, which is a long-term plan to address the challenges and opportunities facing the freight sector in the coming years, including decarbonisation, changing consumer behaviour, adoption of new technology, new trading relationships, and maintaining the balance between capacity and resilience.

DfT commissioned the Connected Places Catapult to conduct a logistics end to end data research project, to define an approach for accessing freight data. Access to such data will provide better understanding of (1) freight flows across the transport system; (2) inefficiencies and bottlenecks of freight movements; and (3) the value of the freight moving through the network. This will enable the development of evidence-based freight investment decisions and policies that align with industry priorities and improve the way freight infrastructure investments are being assessed using DfT appraisal tools.

This document provides an overview of the challenges facing the freight industry which can be addressed through data-enabled interventions, and presents best practice data sharing case studies that highlight the potential opportunities associated with the generation and sharing of data; the barriers to data sharing and how they can be overcome, and the challenges that can be addressed through solutions built on shared data. This document is the first deliverable of the logistics end to end data research project and will be used to inform the subsequent work packages of Freight journey mapping and Freight data use cases.

Challenges and data-enabled opportunities

The freight sector operates successfully as part of a complex and diverse value chain and is critical to the success and growth of UK plc. The sector has risen to the unprecedented challenges of COVID-19 and the significant changes in consumer behaviour and highlighted its role as one of the pillars of the UK economy. The sector has achieved its current successes through an organic process of evolution, but the scale of the change needed to meet the coming challenges means a more strategic and data-enabled approach is required. Such challenges include lack of targeted investment, limited capacity, skills and employment, and the need to reduce the sector's environmental impact.

There are broad operational and planning challenges facing the freight transport sector which can be positively impacted by multi-sourced data and information. These challenges and data-enabled opportunities are grouped into five categories explored in table overleaf. While not an exhaustive list of challenges facing the freight sector, they make up the key areas in which data can significantly help to overcome them.

	Challenges	Opportunities
Freight service planning	• Demand for freight transport is highly dependent on consumers' behaviours and trends • The impact of potential long-term disruptive technologies such as 3D printing is not well understood • Short term shocks to consumer demand are not well catered for which compromises network resilience	• Understanding consumer behaviour changes can help in quantifying and predicting the impact on the demand and infrastructure requirements of the relevant parts of the freight system and results in more targeted and effective investment • Capturing consumer behaviour data - for example from retailers - will lead to better evidence-based strategic and tactical transport plans
Road congestion	• Freight is not the root cause of congestion but can be a contributor especially around logistic hubs e.g. ports • The cost of congestion to freight transport can be very high especially when delays lead to halted production, missed 'Just in Time' deliveries, and fines • Road freight transport is a contributing factor to the environmental impact of congestion	• Capturing the spatial and temporal movement of freight will help identify the contribution of freight transport to congestion at the macro and micro levels. This will in turn help to identify targeted operational and infrastructure interventions • Capturing the economic value of the freight moving through the network at the micro and macro levels will help to identify targeted investments and policy interventions that can minimise the economic impact of congestion on the freight sector
Poor intermodal links	• Transitioning freight to rail and water transport could reduce greenhouse gas emissions but road transport is currently more convenient and efficient • Rail and water don't deliver end-to-end service and therefore must interface with road transport	• A good understanding of the freight movements in the UK at the macro and micro levels will help develop evidence-based investment decisions to improve intermodal links. This includes information about freight movements across different modes, types of goods and its value and economic impact
Inefficient loading	• The increasing demand for fast deliveries and the imbalance between export and import and supply and demand in different geographies leads to inefficiencies in the freight sector. These include empty running, limited utilisation and missed consolidation opportunities • Backhauling (finding and moving return loads to minimise empty running) has been found to have limited potential in reducing congestion	• Freight sharing between operators has more potential in reducing economic and environmental costs, however data sharing across the freight operators is a key enabler
Freight environmental impact	• There is a limited understanding of where to focus decarbonisation efforts for the greatest impact with the relative cost/ benefit analysis of interventions such as alternative fuels, operation optimisation and modal shift largely unknown	• Understanding the freight routes, vehicle types and movements and load data can help to achieve better planning of the refuelling network infrastructure, introduce air quality improvement measure and implement efficiency improvements and targeted demand management measures

Data sharing barriers

Despite the benefits of data sharing, there are many barriers to it. Identifying and understanding these barriers is crucial to overcoming them in the freight industry. The barriers can be grouped into five categories[1]:

1. **Legal and Institutional** - legal barriers relate to the existence of laws that restrict or perceive to restrict data sharing (e.g. GDPR) while institutional barriers refer to the interaction and coordination barriers between various organisations, public or private, in data collection and sharing
2. **Process, Standards, and Technical** - barriers linked to the lack of consistency and comparability among different data sources, data quality, and the underlying processes and standards applied to the generation of the data across different organisations and regions
3. **Stakeholder and Culture** - cultural barriers to data sharing include risk aversion[2], and general reluctance to sharing which can be due to the legacy of high-profile data breaches. The complexity of stakeholder interactions and relationships and the number of stakeholders involved can also create barriers to data sharing
4. **Resource** - the capital and revenue costs associated with the digitalisation of processes, generation of data, and the facilitation of data sharing can be a barrier especially for public bodies and low margin organisations including freight and logistics companies
5. **Commercial** - there are competitive advantages to some data components held by the private sector which prevent them from sharing data.

Case studies

This document highlights examples of data sharing case studies, within the freight sector and beyond, that overcome the relevant barriers and address some of the challenges specific to the freight sector. The nine chosen case studies are presented in the table overleaf with an explanation of the company and a summary of the applicable benefits to the freight sector.

1 It is important to highlight that these barriers apply to many sectors and not specific to the freight sector
2 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/895505/_Kantar_research_publication.pdf

Case study	Brief description
ZenCargo	ZenCargo is a startup that offers customers a software platform through which they can securely share and view real-time supply chain data with other stakeholders in their supply chain. Self-described as a “digital freight forwarder”, Zencargo provides users visibility of where their Stock Keeping Units (SKUs) are located within their supply chain, allowing for more accurate demand forecasting and disruptiuon mitigation. **This case study highlights the role of shared freight data to fuel innovative solutions that can significantly enhance the day-to-day logistics operations.**
PortXchange	PortXchange is a centralised platform for sharing real-time port call data. It seeks to improve sustainability and efficiency of operations through optimisation of port calls and use of predictive analytics. **This case study highlights the operational efficiency and environmental benefits of data sharing across collaborative and competitive stakeholders in the freight shipping and maritime industries.**
Hamburg Vessel Coordination Centre (HVCC)	HVCC coordinates data collaboration between relevant stakeholders at the port of Hamburg. They use the consolidated data sources to optimise both the vessels’ movements to and from the port and the utilisation of terminal infrastructure. **This case study highlights the potential for data sharing to optimise infrastructure assets and fuel consumption in the shipping industry to benefit many stakeholders.**
Google Waze	A free GPS navigation software app for drivers which collects and aggregates crowdsourced data from its users. The data is used to create solutions for improving the road network by reducing disruptions for drivers and authorities. Waze also offer a two-way data sharing partnership with city authorities. **This case study demonstrates the value of using crowdsourcing data to tackle system-wide transport problems.**
London Data Store	A free and open data-sharing portal set up by the Greater London Authority (GLA) to enable the public to access data relating to the UK’s capital. **This case study highlights the value of making public sector data easily accessible to citizens and private companies so that products and solutions can be developed to help solve city-wide challenges.**
ElectraLink Energy Market Data Hub (EMDH)	The ElectraLink EMDH platform provides a range of solutions and services to the energy sector including the Data Transfer Service (DTS) which is critical to the competitive energy market enabling utility service providers to exchange information about their customers. **This case study shows how competitive private sector organisations mutually benefit from the sharing of their data through an impartial and trusted partner.**
The Clinical Effectiveness Group (CEG)	CEG has been supporting primary medical care in a challenging inner-city environment in east London. Through the sharing of performance data between peers, CEG demonstrated the potential of data sharing to drive performance improvements across General Practices (GPs). **This case study demonstrates the benefits of data sharing among competitive stakeholders to facilitate benchmarking and drive performance improvements.**
Open Banking Ltd	The UK enactment of the EU law which enforces the largest banks and building societies to share customer data with authorised third parties. These third parties, such as FinTech companies, can use the data to create products and services for customers. The law was designed to foster innovation and increase competition in the financial sector. **This case study sets out the merits of enforcing data sharing across a competitive industry to foster innovation.**
Insurance Claims Underwriting Exchange	The CUE is a central database which seeks to prevent insurance fraud by providing insurers with access to all motor, home and personal injury/industrial illness incidents which have been logged and reported in the past six years. **This case study highlights the benefits of data sharing between competing private sector organisations to address a common industry challenge – identifying and addressing insurance fraud claims in this case.**

Concluding remarks

The key enablers for successful data sharing practices and outcomes, based on the lessons learned from the presented case studies in this document, are:

- Strong and trusted **leadership** that can pull different stakeholders around a shared vision and common challenges
- Reputable, impartial, and trusted **facilitator/intermediary** that could take the role of the data sharing platform operator
- Clearly defined, and ideally quantified, **benefits** for data providers. These could be in the form of direct financial gains or the ability to address a recognised operational challenge
- Multi-party data **agreements** and codes that considers the variant needs of all stakeholders
- **Governance**, user representation, and change management processes
- Defined and agreed **standards and processes** for data generation, sharing, and consumption
- Continual development and **investment** on the data sharing facilities to adapt to technological, economical, and user needs changes.

Contents

1 Background

The effectiveness and resilience of the freight transport network is essential to the UK livelihood.

The importance of the freight logistics system to the nation has been significantly highlighted during the COVID-19 pandemic. This has led to initiatives for improving the operational and planning aspects of the freight network to enhance efficiencies, improve resilience, streamline operations and address integration and interface challenges across the different freight transport modes.

The freight transport network has an important role to play as part of the UK effort to decarbonise transport and achieve the government net zero targets[3]. Many initiatives are looking at the use of alternative fuels such as Hydrogen and Biofuels and the electrifications of the rail network and road freight fleet[4]. Complementary to such efforts, other activities that can support the decarbonisation targets include improving the efficiency of freight transport through innovative packaging methods, consolidations, congestion reduction initiatives, and demand management activities as examples. Such activities span across the operational and strategic planning aspects of freight transport.

The Department for Transport (DfT) is currently developing its Future of Freight strategy which is a cross modal initiative with the vision of realising an efficient, resilient, and green freight transport network that is fit for purpose. Delivering this vision requires informed and evidence-based investment and policy decisions. Such decisions are required at the operational, tactical, and strategic levels and across the whole logistics value chain including public and private sector stakeholders. These informed and evidence-based decisions need to be fuelled by multi-sourced data of suitable quality from the accuracy, completeness, and timeliness perspectives.

To help inform the Future of Freight strategy, DfT commissioned Frazer-Nash Consulting to conduct a freight data discovery project, providing high-level insight into the current UK freight data landscape and the potential future needs for a UK national freight data hub service to enable the development of data-driven governmental policies. The study identified clear and immediate benefits for the public sector, but the concept needs refining to further demonstrate the benefits for the private freight sector. Furthermore, the study recommended a strategic approach to deliver a national freight data hub service, that aligns with the future freight strategy and focuses on sharing publicly available freight data, whilst working with the private freight industry to obtain more targeted freight data for resolving specific problems.

Building on the recommendations from the Frazer-Nash study, DfT commissioned the Connected Places Catapult to conduct a logistics end to end data research project, to define an approach for accessing freight data. Access to such data will provide better understanding of (1) freight flows across the transport system; (2) inefficiencies and bottlenecks of freight movements; and (3) the value of the freight moving through the network. This will enable the development of evidence-based freight investment decisions and policies that align with industry priorities and improve the way freight infrastructure investments are being assessed using DfT appraisal tools.

The project will:

1. Produce transferrable best practice case studies for data sharing across public and private sectors
2. Conduct a detailed mapping of an end-to-end freight journey for agreed economic sectors or commodities
3. Develop freight data use cases that can address validated industry challenges
4. Provide a strategic-level assessment around freight value indicators and development of a digital twin.

This document is the output of stage 1, above. It provides an overview of the challenges facing the freight industry which can be addressed through data-enabled interventions, and presents best practice data sharing case studies that highlight the potential opportunities associated with the generation and sharing of data; the barriers to data sharing and how they can be overcome, and the challenges that can be addressed through solutions built on shared data. The document is structured as follows:

- **Section 2** reviews the freight challenges and associated data opportunities
- **Section 3** reviews the barriers to the generation, sharing and use of data
- **Section 4** presents the motivation for the case studies and the selection approach
- **Section 5** presents the best practice case studies
- **Section 6** provides concluding remarks.

3 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf
4 Connected Place Catapult: Transition to Zero-Emission Transport – A Pathway for Long-Haul Heavy Goods Vehicles – https://cp.catapult.org.uk/news/transition-to-zero-emission-transport-a-pathway-for-long-haul-heavy-goods-vehicles/

2 Challenges and data-enabled opportunities

The freight sector operates successfully as part of a complex and diverse value chain and is critical to the success and growth of UK plc. The sector has risen to the unprecedented challenges of COVID-19 and the significant changes in consumer behaviour and highlighted its role as one of the pillars of the UK economy.

The sector has achieved its current successes through an organic process of evolution, but the scale of the change needed to meet the coming challenges means a more strategic and data-enabled approach is required. Such challenges include lack of targeted investment, limited capacity, skills and employment, and the need to reduce the sector's environmental impact.

This section presents the broad operational and planning challenges facing the freight transport sector where multi-sourced data and information can have a positive impact. These challenges and data-enabled opportunities are discussed in the following groups:

1. Freight service planning
2. Road congestion
3. Poor intermodal links
4. Inefficient loading
5. Freight transport environmental impact

2.1 Freight service planning

Challenges

The demand for freight transport is highly dependent on consumers' behaviours and trends[5] and how suppliers respond to such demand. Such behaviours are driven by social, economic, and environmental factors[6]. The growth of ecommerce in the UK as an example has increased the demand for last mile deliveries which are leading to many challenges especially in urban areas. Such consumption behaviour changes, were well predicted, however, extrapolating that prediction to understand their impact on the freight demand, and taking suitable actions was more challenging. The impact of other potential long-term technology changes such as the use of 3D printing on the freight transport network is still not fully understood. Short-term shocks to consumer demand and their transport impact are also not well catered for and hence, compromising the network resilience.

Data-enabled opportunities

Having a good understanding of consumer behaviour changes, whether short-term, long-term, or seasonal can help in the understanding of the impact on the demand and infrastructure requirements of the relevant parts of the freight system. This will support targeted infrastructure planning and investments that lead to resilient and sustainable freight services from the commercial, economic, social and environmental perspectives.

Capturing consumer behaviour data, from retailers as an example, and developing models that link such trends to transport network demands predictions, will lead to better evidence-based strategic and tactical transport plans.

2.2 Road congestion

Challenges

Road congestion is a major problem in the UK with significant economic, social and environmental impact. Freight traffic is not the root cause of congestion; van[7] (light commercial vehicles) and lorries (Heavy Goods Vehicles) traffic in Great Britain was estimated at 55.5 and 17.4 billion vehicle miles (bvm) respectively in 2019. This is compared to car traffic which was estimated at 278.2 bvm[8]. Nonetheless, freight traffic can be a significant contributor to road congestion in some areas such as around logistics hubs (e.g. ports) and at certain times[9].

The cost of congestion to freight transport can be very high especially when delays lead to halted production, missed 'Just in Time' deliveries, and fines[10]. Annual congestion cost to road freight has been estimated to be £3-6 billion a year[11, 12]. Ways to overcome these challenges can lead to inefficient operations and undesired behaviours. Furthermore, the environmental impact of congestion from freight traffic at the vehicle level is considerably higher than other road transport vehicles, which presents both air quality and decarbonisation challenges.

Data-enabled opportunities

Having a good understanding of the spatial and temporal movement of freight will help identify the contribution of freight transport to congestion at the macro and micro levels. This will in turn help identify targeted operational and infrastructure interventions to minimise the impact of road freight on congestion. Examples of such interventions include traffic junctions, signals design, location planning of freight distribution centres and major road and rail infrastructure projects.

A better understanding of the economic value of the freight moving through the network at the micro and macro levels will help in identifying targeted investments and policy interventions that can minimise the economic impact of congestion on the freight sector. The freight economic value covers the monetary value of goods, their time sensitivity, and the economic impact of delays on the end-to-end freight value chain.

5 National Infrastructure Commission | Better Delivery: the challenge for freight
6 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/780868/future_of_mobility_final.pdf
7 Some of the van traffic is associated with the service industry and not all is linked to freight traffic
8 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/916749/road-traffic-estimates-in-great-britain-2019.pdf
9 National Infrastructure Commission | Better Delivery: the challenge for freight
10 National Infrastructure Commission | Better Delivery: the challenge for freight
11 National Infrastructure Commission | Better Delivery: the challenge for freight
12 Vivid Economics - The Value of freight - https://www.vivideconomics.com/wp-content/uploads/2019/10/Future-of-Freight_The-Value-of-Freight_Vivid-Economics.pdf

2.3 Poor intermodal links

Challenges

Rail and water freight transport have a strong potential to reduce the environmental impact of the sector and support the delivery of the government net zero carbon targets. The DfT Transport Decarbonisation Plan[13] highlights the need for the shift to sustainable transport modes for passenger and freight. The EU Green Deal recognises the potential role of rail freight in reducing emissions[14]. Coastal shipping is another alternative mode to road freight that has also strong positive environmental impact[15, 16]. However, road freight is currently considered as the most convenient and efficient transport mode; and is the dominant freight mode in the UK - 79% of domestic goods were moved by road in 2018[17]. While there are strong needs for major infrastructure investments in the alternative modes, improving the interface between these modes and road transport is critical to the success of any modal shift initiative. In 2018, only 2% of road freight journeys in the UK were part of an inter-modal journey[18].

Data-enabled opportunities

Major rail projects in the UK such as HS2 and the East-West rail link will free up capacity on the network and pave the way for more rail freight services. The ability to shift freight to more sustainable transport modes will depend on factors relating to the goods route, nature, volume, value, and time sensitivity. A good understanding of the freight movements in the UK at the macro and micro levels will help develop evidence-based investment decisions to improve intermodal links. This includes information about freight movements across different modes, types of goods and its value and economic impact.

2.4 Inefficient loading

Challenges

The increasing demand for fast deliveries and the imbalance between export and import and supply and demand in different geographies leads to inefficiencies in the freight sector[19]. This is in the form of empty running with 30% of HGVs ran empty in 2017[20], limited utilisation of full vehicle capacity, and missed consolidation opportunities. Some empty running is necessary for efficient operations and the concept of backhauling[21] is thought to have limited impact on reducing congestion[22]. However, the relevant data is not currently available to understand how efficiently the freight service is running.

Data-enabled opportunities

The concept of freight sharing has potential to address the inefficient loading challenge and reduce unnecessary freight trips. Freight sharing refers to “freight services provision performed by actors working together at the same level in the supply chain, often facilitated by an intermediary digital platform player, that provides added value for all participating entities”[23]. Data sharing between freight operators and customers is a key enabler of freight sharing. But there are commercial imperatives which are often seen as a barrier to data sharing.

13 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf
14 https://www.era.europa.eu/sites/default/files/events-news/docs/fostering_railway_sector_through_european_green_deal_en.pdf
15 Modal shift from road haulage to short sea shipping: a systematic literature review and research directions TRANSPORT REVIEWS https://doi.org/10.1080/01441647.2020.1714789
16 F. Medda, and L. Trujillo. Short-sea shipping: an analysis of its determinants. Maritime Policy & Management · MARIT. POL. MGMT., MAY 2010, VOL. 37, NO. 3, 285–303
17 DfT (2019) Road Traffic Statistics, TRA0101 (online). Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/801185/tra0101.ods
18 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/815839/domestic-road-freight-statistics-2018.pdf
19 National Infrastructure Commission | Better Delivery: the challenge for freight
20 Department for Transport (2018), Percentage empty running and loading factor by type and weight of vehicle: annual 2000-2017 (Table RFS0125)
21 Backhauling refers to finding and moving return loads to minimise empty running
22 McKinnon, A., and Ge, Y., (2006), The potential for reducing empty running by trucks: a retrospective analysis, International Journal of Physical Distribution and Logistics Management, Vol. 36 Issue: 5
23 Mason, R. and I. Harris (2019) A review of freight and the sharing economy. Future of Mobility: Evidence Review. Foresight, Government Office for Science. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/777699/fom_freight_sharing_economy.pdf

2.5 Freight transport environmental impact

Challenges

There are significant decarbonisation efforts underway in the UK with the aim of reaching the Net Zero Carbon targets set by the Government. This includes efforts to decarbonise the transport sector given that it is now the largest contributor to UK domestic GHG emissions, contributing 28% of UK domestic emissions in 2018[24]. Furthermore, transport has other environmental impacts related to air quality and noise. The DfT Transport Decarbonisation Plan[25] sets a vision where all road vehicles will be zero emission and goods will be delivered through an integrated and sustainable delivery system.

A key challenge to deliver these ambitious plans is access to the data that enables informed and evidence-based investment decisions for interventions that deliver the set targets in an economical, timely and efficient manner.

Data-enabled opportunities

Understanding the freight routes, vehicle types and movements, and load data at the macro and micro levels can help in:

(1) better planning of the alternative fuels infrastructure (whether it is for Hydrogen, Biofuel, Electricity, or other fuel types);

(2) introducing targeted Air Quality improvement measures (e.g. for urban logistics); and

(3) identifying areas for efficiency improvements and targeted demand management measures and policies.

24 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf
25 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/932122/decarbonising-transport-setting-the-challenge.pdf

3

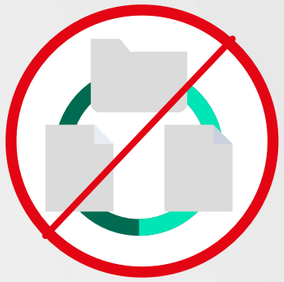
Data sharing barriers

Data-enabled services and solutions have the potential to address many of the freight sector challenges and support the delivery of a more efficient, economic, green, and resilient freight transport network

The link between data and innovation and the disruptive power of data-enabled solutions are widely recognised[26]. The complexity of the freight and logistics sector and the diversity of the stakeholders in the industry highlight the need for multi-sourced data and data sharing practices to deliver on the benefits of digitalisation. Such benefits include streamlined operations, customer oriented services, generation of new businesses and improved tactical and strategic planning.

Despite the benefits of data sharing, there are many barriers to it which can be grouped into[27]:

- Legal and Institutional
- Process, Standards, and Technical
- Stakeholder and culture
- Resource
- Commercial



26 New Technologies Case Study: Data Sharing in Infrastructure (nic.org.uk)
27 It is important to highlight that these barriers apply to many sectors and not specific to the freight sector
28 https://www.legislation.gov.uk/ukpga/2018/12/contents/enacted
29 New Technologies Case Study: Data Sharing in Infrastructure (nic.org.uk)
30 https://www.gov.uk/government/publications/cdei-publishes-its-first-report-on-public-sector-data-sharing/addressing-trust-in-public-sector-data-use
31 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/777699/fom_freight_sharing_economy.pdf
32 T. Moschovou, E.I. Vlahogianni and A. Rentziou (2019) Challenges for data sharing in freight transport, Advances in Transportation Studies: an international Journal, Section B, V. 48, pp: 14 1-1 52
33 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/895505/_Kantar_research_publication.pdf

Legal and institutional

Legal barriers link to the complexity of laws such as the General Data Protection Regulation (GDPR) and its UK implementation version (The Data Protection Act 2018[28]), and the associated breach consequences which can act as barriers to data sharing, whether being real or perceived[29]. Misunderstandings relating to GDPR and what it permits may have created further aversion to data sharing[30]. Furthermore, fear of breaching competition/anti-trust legislation can also be a barrier to data sharing especially across organisations within the same sector[31].

Institutional barriers refer to the interaction and coordination barriers between various organisations, public or private, in data collection and sharing[32]. While an initiative such as the Digital Economy Act (DEA) in the UK was introduced to help better facilitate data sharing across government, the use of its powers has been lower than expected[33].

Process, standards, and technical

A key barrier to the sharing of data is linked to the lack of consistency and comparability among different data sources, data quality, and the underlying processes and standards applied to the generation of the data across different organisations and regions[34]. This includes data security processes and requirements[35]. Variability of data systems used, and different levels of technical capabilities and IT maturity levels also act as a barrier to the integration of multi-sourced data and the derivation of intelligence from such data[36]. This can prevent data sharing or increase the cost and time to finalise data sharing agreements[37].

Stakeholder and culture

Cultural barriers to data sharing include risk aversion[38] and general reluctance to sharing which can be due to the legacy of high-profile data breaches[39]. The number of stakeholders in the case of the freight and logistics sector and the relationship complexity among them is another barrier to data sharing. The vast differences of organisations sizes, objectives, technical maturity levels, internal cultures, willingness to change despite day job demands, and understanding of the data sharing benefits are key barriers to data sharing in the freight sector.

Resource

The digitalisation of processes, generation of data, and the facilitation of data sharing has associated capital and revenue costs. This can be a barrier especially for public bodies with limited funding resources and private sector organisations with low margins (e.g. freight and logistics) and/or where the return on investment is not clearly visible.

Commercial

There are clear competitive advantages to some data components held by the private sector which prevents them from sharing. There are also a range of datasets that can be shared without comprising commercial aspects and a great example is the sharing of safety data[40]. However, most datasets fall into the grey area between these and despite the collective benefits of sharing some of these datasets, the perceived loss of competitive advantage is a barrier to sharing in most of these cases.

34 T. Moschovou, E.I. Vlahogianni and A. Rentziou (2019) Challenges for data sharing in freight transport, Advances in Transportation Studies: an international Journal, Section B, V. 48, pp: 14 1-1 52
35 https://www.gov.uk/government/publications/cdei-publishes-its-first-report-on-public-sector-data-sharing/addressing-trust-in-public-sector-data-use
36 https://nic.org.uk/app/uploads//Data-sharing-in-infrastructure.pdf
37 https://www.gov.uk/government/publications/cdei-publishes-its-first-report-on-public-sector-data-sharing/addressing-trust-in-public-sector-data-use
38 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/895505/_Kantar_research_publication.pdf
39 https://www.gov.uk/government/publications/cdei-publishes-its-first-report-on-public-sector-data-sharing/addressing-trust-in-public-sector-data-use
40 The Open Data Institute - The value of sharing data for benchmarking and insights: A case study in the shipping industry. https://docs.google.com/document/d/1bLr7gCjJuqQAnOF7p--PEX0r_V4-QM95E18OKBHVpZc/edit#heading=h.68piuvp57jk4

4

Case studies

Motivation and approach

There are many examples of projects and initiatives that led to successful sharing of data across different organisations overcoming the relevant barriers and delivering economic, social and environmental benefits. The Open Data Institute (ODI) has published case studies highlighting the benefits of open and shared data[41]. The Royal Academy of Engineering, as another example, published data sharing case studies in transport and other sectors[42].

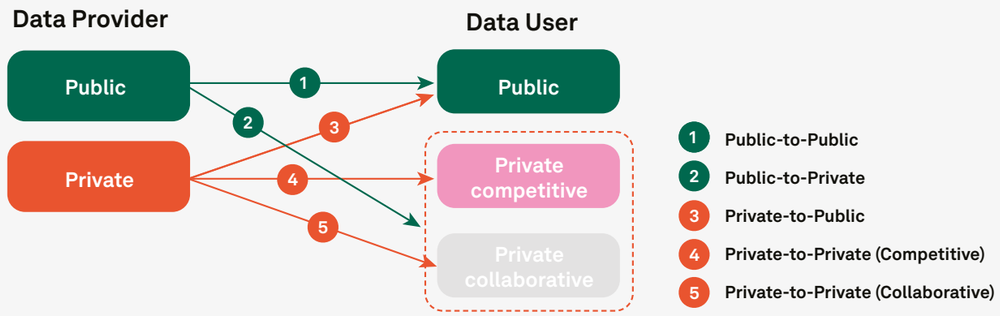
This document highlights examples of data sharing case studies that overcome the relevant barriers within the freight sector and beyond and where applicable, addressed some of the challenges facing the freight sector. The applied approach to identify and develop the relevant case studies was based on (1) conducting a literature review to capture a long list of data sharing case studies from different sectors and geographies; and then (2) developing a subset of diversified case studies, from publicly available information.

41 Case studies – The ODI
42 Royal Academy of Engineering - Towards trusted data sharing: guidance and case studies - http://reports.raeng.org.uk/datasharing/case-studies/

The case studies selection process was based on the following three principles:

(1) Operational benefits to data sharing - The Frazer-Nash freight data discovery study for the DfT highlighted how, despite acknowledging the value of data sharing from the wider strategic perspective, the freight industry does not fully see the value of data sharing from the operational aspect. Therefore more focus was given to the operational benefits of data sharing to the freight sector and highlighting such benefits from other sectors

(2) Sharing between public and private and within private organisations - There are common technical, legal, and cultural barriers to data sharing across public and private sector organisations. However, there are barriers that are more specific to public or private sector organisations such as resource and commercial barriers. Data sharing initiatives can be grouped into five categories from the data provider and user perspective as seen below:



More focus was given to case studies where the private sector is the data provider (categories 3-to-5) as:

- Private sector freight data provide rich information with the potential to improve operational and planning activities and address the challenges facing the sector
- There are many case studies demonstrating the value of sharing public sector data. An example is the UK Centre for Data Ethics and Innovation (CDEI) report[43] which provided good analysis of five case studies of categories 1 and 2

(3) Lessons from other sectors - Capturing lessons from other sectors in the UK and abroad where different stakeholders overcome some or all of the barriers to data sharing and realised benefits is one of the key objectives of this document

The application of these three principles to the initial long list of case studies led to the identification of the developed case studies summarised in the Table 1 below and detailed in Section 5.

43 https://www.gov.uk/government/publications/cdei-publishes-its-first-report-on-public-sector-data-sharing/addressing-trust-in-public-sector-data-use

Table 1 - Developed data sharing case studies

Case study	Brief description
ZenCargo	ZenCargo is a startup that offers customers a software platform through which they can securely share and view real-time supply chain data with other stakeholders in their supply chain. Self-described as a "digital freight forwarder", Zencargo provides users visibility of where their Stock Keeping Units (SKUs) are located within their supply chain, allowing for more accurate demand forecasting and disruptiuon mitigation. **This case study highlights the role of shared freight data to fuel innovative solutions that can significantly enhance the day-to-day logistics operations.**
PortXchange	PortXchange is a centralised platform for sharing real-time port call data. It seeks to improve sustainability and efficiency of operations through optimisation of port calls and use of predictive analytics. **This case study highlights the operational efficiency and environmental benefits of data sharing across collaborative and competitive stakeholders in the freight shipping and maritime industries.**
Hamburg Vessel Coordination Centre (HVCC)	HVCC coordinates data collaboration between relevant stakeholders at the port of Hamburg. They use the consolidated data sources to optimise both the vessels' movements to and from the port and the utilisation of terminal infrastructure. **This case study highlights the potential for data sharing to optimise infrastructure assets and fuel consumption in the shipping industry to benefit many stakeholders.**
Google Waze	A free GPS navigation software app for drivers which collects and aggregates crowdsourced data from its users. The data is used to create solutions for improving the road network by reducing disruptions for drivers and authorities. Waze also offer a two-way data sharing partnership with city authorities. **This case study demonstrates the value of using crowdsourcing data to tackle system-wide transport problems.**
London Data Store	A free and open data-sharing portal set up by the Greater London Authority (GLA) to enable the public to access data relating to the UK's capital. **This case study highlights the value of making public sector data easily accessible to citizens and private companies so that products and solutions can be developed to help solve city-wide challenges.**
ElectraLink Energy Market Data Hub (EMDH)	The ElectraLink EMDH platform provides a range of solutions and services to the energy sector including the Data Transfer Service (DTS) which is critical to the competitive energy market enabling utility service providers to exchange information about their customers. **This case study shows how competitive private sector organisations mutually benefit from the sharing of their data through an impartial and trusted partner.**
The Clinical Effectiveness Group (CEG)	CEG has been supporting primary medical care in a challenging inner-city environment in east London. Through the sharing of performance data between peers, CEG demonstrated the potential of data sharing to drive performance improvements across General Practices (GPs). **This case study demonstrates the benefits of data sharing among competitive stakeholders to facilitate benchmarking and drive performance improvements.**
Open Banking Ltd	The UK enactment of the EU law which enforces the largest banks and building societies to share customer data with authorised third parties. These third parties, such as FinTech companies, can use the data to create products and services for customers. The law was designed to foster innovation and increase competition in the financial sector. **This case study sets out the merits of enforcing data sharing across a competitive industry to foster innovation.**
Insurance Claims Underwriting Exchange	The CUE is a central database which seeks to prevent insurance fraud by providing insurers with access to all motor, home and personal injury/industrial illness incidents which have been logged and reported in the past six years. **This case study highlights the benefits of data sharing between competing private sector organisations to address a common industry challenge – identifying and addressing insurance fraud claims in this case.**

Table 2 below outlines the structure of the case studies and the description of each section.

Table 2 - Description of case studies' structure and description of the contents of each section

Case study section	Content description
Context	An overview of the case study covering its background, objectives, and targeted industry
Relevant challenges	The challenges being addressed by data sharing. These will depend on the targeted industry and could include some of the freight challenges discussed in Section 2
Stakeholders	A description of the stakeholders and, where applicable, their data sharing relationship in the case study context – Public-to-Private or Private-to-Public; one-to-one, one-to-many, or many-to-many
Data	The types of data being generated and shared in the case study
Applications and solutions	The type of services, applications, solutions and/or insights being generated from the shared data
Benefits	The realised, or potential, benefits from the developed services. Such benefits could be accrued by multiple stakeholders
Barriers	Barriers that were faced, and potentially overcome, in realising the case study
Lessons learned	General lessons learned through the development of the case study. These could link to the addressed challenges, faced barriers, and relevant recommendations

5 Case studies

5.1 Zencargo

Context

This case study highlights the role of shared freight data to fuel innovative solutions that can significantly enhance the day-to-day logistics operations.

Despite vast numbers of goods being transported internationally every year, many traditional freight forwarders - organisations that receive and ship goods on behalf of other companies - are still dependent on poorly optimised manual processes, reliant on paper, spreadsheets, email, and bespoke Enterprise Resource Planning (ERP) tools. These out-dated ways of working contribute to significant existing barriers to greater data sharing within freight transport, including insufficient documentation for recording data, the lack of common data formats for different categories of trips, and an unwillingness of freight forwarders to share due to confidentiality restrictions or commercial sensitivity considerations[44].

In response to these traditional ways of working, many startups, such as Xeneta, Freightos and Flexport, are attempting to digitally disrupt the industry with software-as-a-service (SaaS) solutions reliant on data sharing between supply chain stakeholders. One such startup, Zencargo, offers customers a secure enterprise software platform that uses real-time data collection and sharing to give members along a supply chain greater clarity on where goods are at any given time, their expected arrival time at different locations and the commercial rates of moving them.

44 https://www.researchgate.net/publication/334250327_Challenges_for_data_sharing_in_freight_transport

Relevant challenges

Zencargo seeks to address several challenges endemic to the current freight forwarding industry, including:

- **Poor intermodal links**
  - Poor intermodal communication between supply chain operators
  - Poor visibility of the location of goods, and a subsequent inability to recognise and react to supply chain exceptions
- **Freight service planning**
  - Inaccuracy of freight service planning and the resulting inefficiencies in inventory management
- **Freight transport environmental impact**
  - The growing need to decarbonise international supply chains

These challenges are addressed in this case study through improving the visibility of goods movements and associated transactions in a timely manner.

Stakeholders

- Private to private (mainly collaborative stakeholders)

The data sharing facilitated by Zencargo is exclusively private-to-private, but involves one-to-one, one-to-many and many-to-many sharing depending on the supply chain being serviced.

Typical stakeholders involved in the data sharing underpinning Zencargo's offering include:

- goods manufacturers;
- owners of transportation assets (e.g. shipping lines and air lines);
- freight forwarders; and
- e-commerce retailers.

Data

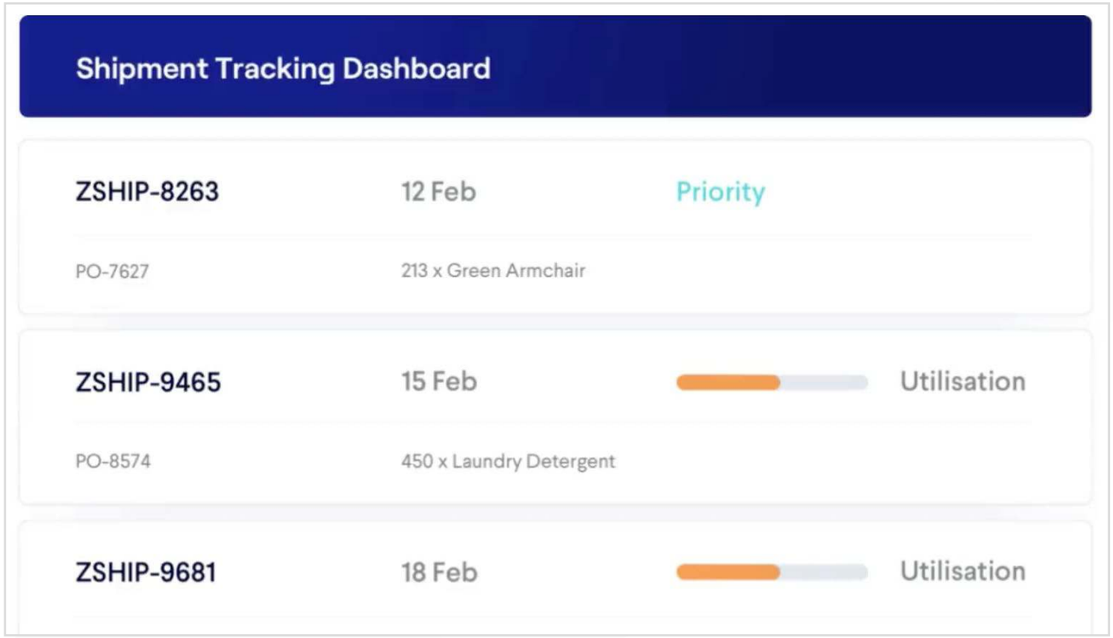
The exact forms of data shared by parties using the Zencargo platform, and whether it is shared in near real-time or with varying levels of time lag, will depend on the supply chain being serviced. Though unlikely an exhaustive list, the platform supports the sharing of:

- Incoterms (the rules used in international and domestic contracts to illustrate responsibilities between buyers and sellers with regards to costs, risks and responsibilities for cargo insurance and regulatory compliance)
- Vessel booking schedules and rates
- Goods paperwork (e.g., export and import hazard certificates at customs)
- Freight method rates and lead times (e.g., air versus rail versus ocean). In the case of maritime freight, this could also include Full Container Load (FCL) or Less Than Container Load (LCL) designation
- Fixed costs per shipping method (e.g., customs charges and documentation fees)
- Shipment and/or vessel location
- Details of key points of contact for supply chain organisations
- Supplier or customer inventory levels
- Live or historical purchase orders

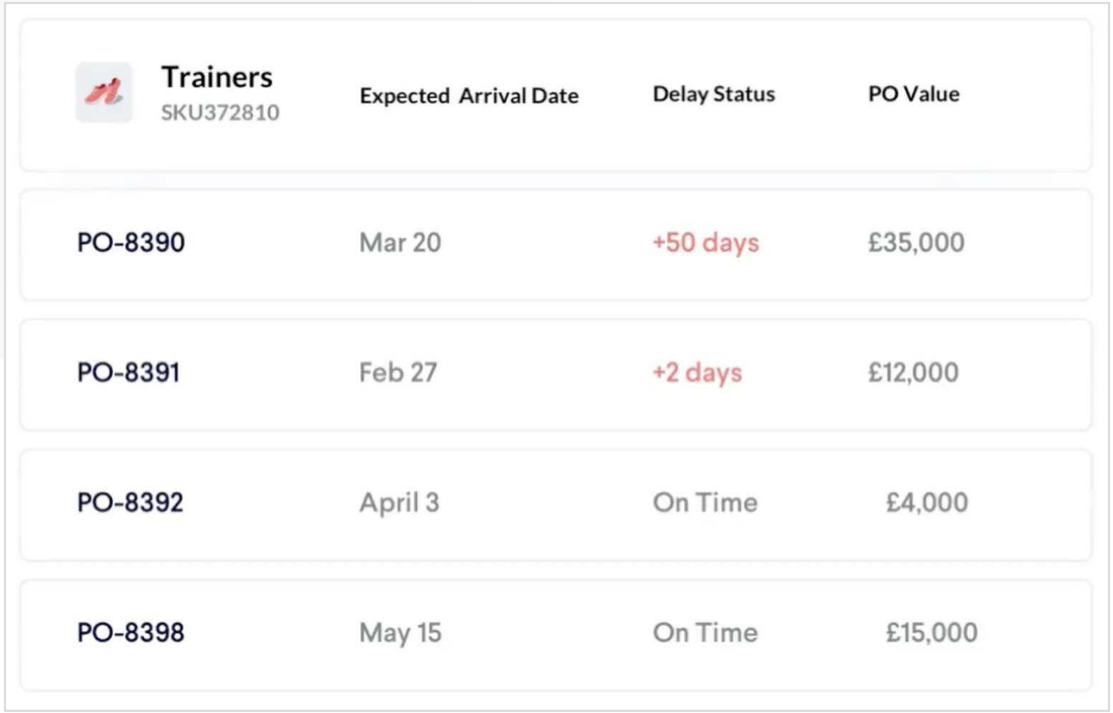
Applications and Solutions

Zencargo's primary offering is the Zencargo Platform - an enterprise Software-as-a-Service (SaaS) tool consisting of a central shipment booking dashboard, individual document management pages (for purchase orders, billing, quotes etc.) and an Analytics capability for the early detection of 'Exceptions' such as forecasted shipment delays or order issues. The platform also provides a live chat functionality for validated organisations.

Zencargo also offers bespoke functionality depending on the customer's requirements, such as emissions tracking, and the ability to integrate bespoke demand planning software, ERP system data and warehouse management systems.



The Zencargo platform's dashboard view



A view demonstrating Zencargo's exception recognition outputs

Benefits (realised or potential)

- Better visibility and forecasting accuracy of goods movements, offered by Zencargo's platform, results in the potential for a significantly more agile and lean supply chain, reducing the fixed costs of holding excessive inventory to address time-sensitive demand and mitigate supply chain disruptions, and maximising the margin made by a vendor for the sale of a given product
- More effective detection of supply chain exceptions, such as significant shipment delays or order issues, can dramatically reduce the likelihood of supply chain disruption resulting in a poor end customer experience
- Greater responsiveness offered by the Zencargo's live chat functionality ensures rapid action can be taken in the event of disruption
- Greater understanding of transportation methods used offers the real prospect of meaningfully and provably decarbonising one's supply chain

Barriers

The overarching barriers that hinder the wider sharing of data underpinning Zencargo's offering are:

1. Process, standards, and technical:

Data Accuracy - A general lack of industry data standards can cause significant variation in the consistency and latency of data provided by different goods manufacturers and freight organisations, resulting in inaccuracies of predicted lead times or rates for customers. Zencargo claims to use proprietary machine learning to detect trends in these inaccuracies so as to correct for their effect but this needs closer interrogation, and further developments (potentially an industry wide approach to data).

Cybersecurity - As in any other domain embracing data sharing, ensuring, and providing proof of secure data protection is a constant concern for early adopting organisations.

2. Stakeholders and culture

Historically, the shipping industry is not seen as a rapid adoptor of digital innovation. Subsequently, there is an existing cultural and organisational barrier to the adoption of new ways of working and the implementation of new technology solutions. Additionally, the adoption of data sharing principles needs to be made across multiple organisations along a supply chain. This requires good alignment from a cultural perspective on "what good looks like" - a consistent understanding between senior decision makers at multiple organisations regarding best practice data sharing.

Lessons learned

Zencargo's growing success demonstrates that there are clear organic, market incentives to encourage private-private collaborative data sharing for the benefit of a much larger supply chain system. That said, there are significant barriers to wider adoption of data sharing practices including the potentially resource-intensive technological adoption for participating organisations, and the shifting of mindsets away from a bias towards commercially driven risk aversity.

5.2

PortXchange

Port Xchange

Context

This case study highlights the operational efficiency and environmental benefits of data sharing across collaborative and competitive stakeholders in the freight shipping and maritime industries.

The case study considers PortXchange, a Port Community System designed by the Port of Rotterdam, which focuses on port call optimisation. A port call is a joint process in which many different parties work together to get vessels into the port, operate them and get them out of the port, safely and efficiently. Port Community Systems are defined by the European Port Community System Association as "neutral and open electronic platforms enabling intelligent and secure information exchange between public and private stakeholders in order to improve the competitive position of the seaport communities. A Port Community System optimises, manages and automates logistics-efficient processes through a single submission of data, connecting transport and logistics chains."[45]

PortXchange started as Pronto in Rotterdam. After successful trials it was launched in 2019 as an independent organisation with Maersk and Shell as their launching customers[46]. Since then it has been implemented in the ports of Felixstowe, Moerdijk, Algeciras and Houston and supports over 100,000 port calls[47]. In Rotterdam all deep-sea container terminals are now connected to PortXchange and 75% of the deep-sea shipping companies in Rotterdam use the platform.[48]

45 https://tfig.unece.org/contents/port-community-systems.htm
46 https://port-xchange.com/about-portxchange/
47 https://port-xchange.com/about-portxchange/
48 https://www.portofrotterdam.com/en/news-and-press-releases/pronto-is-changing-to-portxchange

Relevant challenges

The PortXchange platform is seeking to address the following challenges:

- **Poor intermodal links** in the form of Port call inefficiency at deep-sea ports which are preventing Just in Time (JiT) shipping[49], and impacting many stakeholders including freight forwarders, logistics service providers, and shipping lines
- **Freight transport environmental impact** in terms of the significant CO_2 and NO_x emissions in the shipping industry with both a global and local community impact

Stakeholders

- Private to private (mainly collaborative stakeholders)
- Private to public authorities

The key stakeholder for PortXchange is the Port of Rotterdam who developed the initial system (Pronto) and are the drivers behind PortXchange. Additional stakeholders include:

- Shell
- Maersk
- Ocean Network Express
- Inchcape
- Port of Felixstowe
- Port of Moerdijk
- Port of Algeciras and
- Port of Houston

All stakeholders involved in PortXchange sign up to the Port Call Efficiency Metric. This is a central KPI which measures the performance of each individual Port call with data shared across public and private organisations with the aim of continually improving performance.

Data

The PortXchange platform uses public data, data retrieved directly from participating companies and forecasts from AI applications to generate accurate information about a port call. Data is collected from all operational parties involved in a Port call and then standardised to create a single view of the truth. Users are then able to view data via tools developed by PortXchange or download their own data via an Application Programming Interfaces (API).

Applications and Solutions

PortXchange is a centralised platform for sharing real-time data about a Port call to align shipping lines, carriers, agents, terminals and port authorities[50]. In addition to the central platform, PortXchange has a number of additional features which can be procured by users to optimise their operations. For example, PortXchange analysts use the data to create real time dashboards which users can view to understand progress and monitoring of events.

Furthermore, a key feature of PortXchange is the application of predictive analytics which are applied to forecast potential port call issues which if addressed would reduce CO_2 and NO_x emissions.

Benefits (realised or potential)

PortXchange is a platform which provides a range of benefits to different stakeholders within the shipping journey. These are categorised and detailed below.

The benefits to shipping companies:

- Quicker port call turnaround times
- Increased predictability and opportunities to refine future operations
- Reduction in bunker and charter costs
- Reduction in CO_2 and NO_x emissions during each port call

49 https://www.inmarsat.com/en/solutions-services/maritime/certified-application-providers/fleet-data/portxchange.html
50 https://www.inmarsat.com/en/solutions-services/maritime/certified-application-providers/fleet-data/portxchange.html

The benefits to terminals:

- Better terminal capacity utilisation by improving turnaround times and reducing waiting times

The benefits to agencies:

- Increased time for services to clients thanks to clear and streamlined communication, and fewer telephone calls requesting updates

The benefits to logistical and maritime service providers:

- Improved service due to quicker and clearer understanding of the current operational situation
- Increased predictability and opportunities to implement pre-emptive strategies

The benefits to the port authority:

- Increased predictability and cargo volume through the port
- Reduction in CO_2 and NO_x emissions[51]

The wider benefits:

- Contribution to six of the UN's Sustainable Development Goals

Barriers

The key barriers preventing wider implementation of PortXchange at ports are:

1. Process, standards, and technical:

- **Data standardisation** - to carry out port calls at maximum efficiency globally, all parties should speak the same language. PortXchange has adopted the port information data standards that are defined by the International Taskforce Port Call Optimisation, which is made up of key stakeholders and experts within the shipping industry[52]. However, industry wide data standards remain an issue within the maritime industry.
- **Limited automation** - information doesn't always flow seamlessly between all parties. For example, delays at terminals that aren't reported in time can result in higher fuel consumption and CO_2 emissions. Additionally, one delay can have a resultant impact on multiple fronts. The limited amount of automation reduces predictability and ability to respond to changing circumstances

2. Stakeholders and culture - the maritime industry is competitive, particularly around data sharing, standardisation, and collaboration. A collective change in mindset is required to encourage an open and engaged community.[53]

Lessons learned

Despite the clear benefits of data sharing in this case study, until data and formats are standardised it is likely that there will continue to be pockets of good practice without widespread adoption amongst the shipping industry. Uptake and drive are required from a significant number of port authorities to gain further traction in the industry.

51 https://www.portofrotterdam.com/sites/default/files/portxchange-factsheet-port-of-rotterdam.pdf?token=DjYlaXEc
52 https://portcalloptimization.org/
53 https://port-xchange.com/blog/how-to-facilitate-just-in-time-arrivals-barriers-and-solutions/

5.3 Hamburg Vessel Coordination Centre

Context

This case study highlights the potential for data sharing to optimise infrastructure assets and fuel consumption in the shipping industry to benefit many stakeholders.

The Port of Hamburg is the second largest seaport in Europe by volume, located in the north of Germany. The Hamburg Vessel Coordination Centre (HVCC)[54], registered since 2015, offers coordination and collaboration between relevant stakeholders at the port. HVCC have commissioned a neutral platform which acts as a single point-of-contact for planning and communications. This allows for optimised coordination of port calls and port rotation.

Relevant challenges

The PortXchange platform is seeking to address the relevant challenges

- **Freight service planning:** The real-time updates of ship movements and supply of loading bays at the ports leads to accurate service planning and supply and demand matching. This optimises the existing infrastructure
- **Freight transport environmental impact:** The reduction of emissions is achieved by HVCC by communicating with vessels the minimum speed requirement to reach the port at the optimal time. Lower speeds produce fewer emissions per nautical mile and thus an overall reduction in emissions can be achieved

Stakeholders

- Private to private (collaborative and competitive stakeholders)
- Private to public

The partnership at HVCC includes the terminals, shipping companies, service providers, authorities, and pilots. The partners are integrated through access to the HVCC platform and the project is co-financed by the German Federal Ministry of Transport and Digital Infrastructure. A stakeholder map of organisations that feed into and benefit from the HVCC platform as shown in Figure 1.

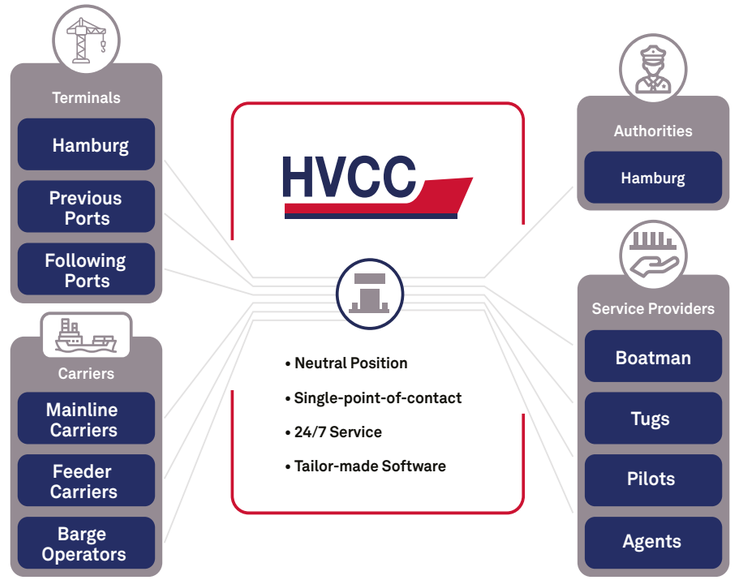


Figure 1 Hamburg Vessel Coordination Centre Stakeholder map

Data

HVCC entered a cooperative relationship with the Rotterdam Port Authority in 2018 which was at the time a world first for such a partnership and the first example of an operational interface based on the Sea Traffic Management (STM) Standard. Both ports agreed to exchange relevant data through a digital interface to improve the efficiency of ships and terminals through steering and resource planning optimisation respectively. The data exchange led to improvements in the operational processes and increased the desirability of both ports. Data between HVCC and Rotterdam Port Authority is directly exchanged through their IT systems.

The system enables the sharing of mutually beneficial datasets such as:

- Terminal and public authority to exchange planning and berth registrations centrally via the HVCC platform
- Relevant status information about the ships is shared with the previous and following ports. Tugs and line handlers can register their responsibility for a ship
- Real-time environmental data such as wind and water levels in the Elbe area are pooled and made available

Applications and Solutions

HVCC uses tailor-made software to manage the coordination of its partners' mega-ships, feeder ships and inland waterway ships. This software updates ship movements in real-time in Northern Europe and coordinates them dynamically with respect to the traffic conditions on the river Elbe and within the port. HVCC is provided with an exclusive overview of all movements within an extensive period of time and a wide geographical area around the port of Hamburg. HVCC is responsible for data aggregation and data interpretation and uses this to orchestrate vessel coordination.

This view of ship movements helps to optimise working and planning processes and enable resources to be used as efficiently as possible. The software includes customised interfaces, dashboard solutions and reporting functions as part of the Software as a Service (SaaS) model.

Benefits (realised or potential)

There are many benefits resulting from the optimisation of port operations and movements through effective data sharing.

Benefits to shipping companies:

- Optimised arrival and rotation planning of vessels results in a significant reduction in the ships' energy consumption and hence a reduction in emissions. For example, sailing at 14 knots instead of 18 knots over 220 nautical miles (distance from the port of Hamburg to the Port of Rotterdam) results in a 66 tonne reduction of CO2 emissions and 22 tonne bunker saving

Benefits to the terminals:

- Faster dissemination of information for more informed decision making. Without central management of data, communication takes place via emails which makes it more time consuming: the information regarding delays at a terminal in the departure port is often first given to the shipping company or its local agents and is then transferred to the central planner of the shipping company, who then informs all upcoming arrival ports. By disseminating the data captured by HVCC and the Port of Rotterdam to shipping companies, courses and speeds can be adjusted to react to real time conditions and avoid unnecessary fuel consumption through measures such as reducing speed of a ship in the case of delays at the arrival port. These measures result in cost savings to the shipping company and environmental benefits to the system
- Maximised use of existing infrastructure within the port's geographic conditions which boosts productivity and avoids unnecessary additional infrastructure costs
- The increased time and cost saving efficiencies are shared with customers and partners which strengthens the terminal's competitiveness
- Optimised resource planning of all stakeholders providing one source of truth

Benefits to all stakeholders:

- The platform and dashboard content can be adapted to meet individual stakeholder requirements meaning less internal effort is involved in the preparation of overviews for the actors within the port
- Optimised resource planning of all stakeholders providing one source of truth

Barriers

1. **Commercial:** Competing ports and competing stakeholders. This barrier was addressed in this case study through dialogue and effective communication of the benefits of effective data aggregation and sharing for all the stakeholders
2. **Stakeholder and culture:** The stakeholder complexity barrier was simplified in this case study by providing one single truth across all partners. HVCC offers a central communication hub where the data is aggregated, interpreted, and used to optimise vessel coordination reducing the need for multiple communication channels and the scope for misinterpreting information

Lessons learned

- Planning and implementing collaboration projects take time and requires trust between all partners
- The process of setting up HVCC has led more stakeholders to recognise the added value of processes and data exchange to external companies and organisations
- While implementing suitable software is a key enabler for data sharing, the main prerequisite for collaboration is the renunciation of the enforcement of individual interests
- The aviation sector was identified by HVCC as an example to learn from with developed data exchange and collaboration which benefits all partners[55]

55 https://static1.squarespace.com/static/57a8878837c58153c1897c2c/t/5c75333aec212d1a6c3c9cf8/1551185129171/2GeraldHirt_Hamburg19.pdf

5.4 Google Waze

Context

This case study demonstrates the value of using crowdsourcing data to tackle system-wide transport problems.

Waze is a free to use navigation software app for drivers which collects and aggregates crowdsourced data from its users[56]. Waze is a subsidiary of Google and was designed for drivers to be able to connect to one another and work together to improve each other's driving experience such as by being alerted to and avoid congested areas[57].

Waze collects user data from drivers to monitor and relay traffic information for its maps. Drivers download the mobile app and report information on the road network such as crashes or traffic jams. Waze then uses the crowdsourced information to deliver solutions to the communities it serves including back to those feeding the information. One such solution is the Waze for Cities Data program which is a two-way data exchange between public sector decision makers and Google Waze. It is free for the public sector. Waze works with approximately 3,000 partners around the globe to reduce traffic, inform infrastructure decisions, and help make communities safer.

56 https://support.google.com/waze/answer/6078702?hl=en
57 https://en.wikipedia.org/wiki/Waze

Relevant challenges

- **Road congestion:** Waze aims to reduce the impacts of road congestion by alerting drivers to disruptions on the road network and rerouting around these areas so as not to add to the problem. By sharing the crowdsourced data with city authorities, data can be used to demonstrate areas of the network which could benefit from short and long-term interventions to increase traffic flow or mitigate the risk of collisions

Stakeholders

- Private to public and public to private
- Crowdsourced to private

The key stakeholders in this case study are:

- **Waze:** Platform provider
- **Waze users:** Drivers who download and use the Waze app to report disruptions to the road network
- **City partners**: Public sector decision makers who also provide data such as planned roadworks and can benefit from the solutions created using the crowdsourced information
- **Other external stakeholders:** Such as event organisers to be aware of likely increased traffic around certain events and private companies such as traffic management platforms to integrate even more information into the Waze platform[58]

Data

Feeds of data come from three main sources[59]:

1. **Reported by community of mobile users:** information including traffic jams, crashes, hazards, construction, potholes, roadkill, stopped vehicles, objects on road, and missing signs
2. **Anonymised user GPS signals:** aggregated user data on location and speed data associated with decelerations to below average speed for a particular segment for the time of day/day of week
3. **Shared by the public sector:** Waze asks that Waze for Cities Data partners share data about road closures (both planned and actual in real-time), traffic incidents such as due to collisions and major traffic events including sports matches and weather disruptions

Waze for Cities data is available via feeds or Google Cloud. The Cloud integration provides Waze for Cities partners access to data warehouse and data visualisation tools which make the datasets more accessible to non-technical audiences. This integration allows partners to securely and privately store and analyse their own data sets and compare with Waze for Cities data as needed to identify relationships and trends.

Benefits

Benefits to Waze users:

- **More accurate journey times:** The Waze map aggregates all the crowdsourced information in addition to other sources, providing drivers with an ever-evolving product and better predictions of journey times. Where appropriate, drivers will be rerouted to the fastest journey leading to time savings

- **Two-way driver communication:** Partners can use Waze to inform drivers of major traffic events and drivers communicate back real-time road insights through the app. The Waze for Cities Data program provides drivers with information about major traffic events directly from the government entities that are managing streets and highways

Benefits to partners:

- **Situational awareness**: Partners receive real-time incident information faster than other reporting methods and accurately pinpoint where incidents occur, creating faster response and clearing times, potentially saving lives
- **Infrastructure planning:** Insights into locations with frequent congestion or hazards yields smarter urban planning
- **Streamlining data inputs**: Waze has designed data standards for closure and incident reporting which can be used by partners to reduce data fragmentation and promote transport and government data aggregation

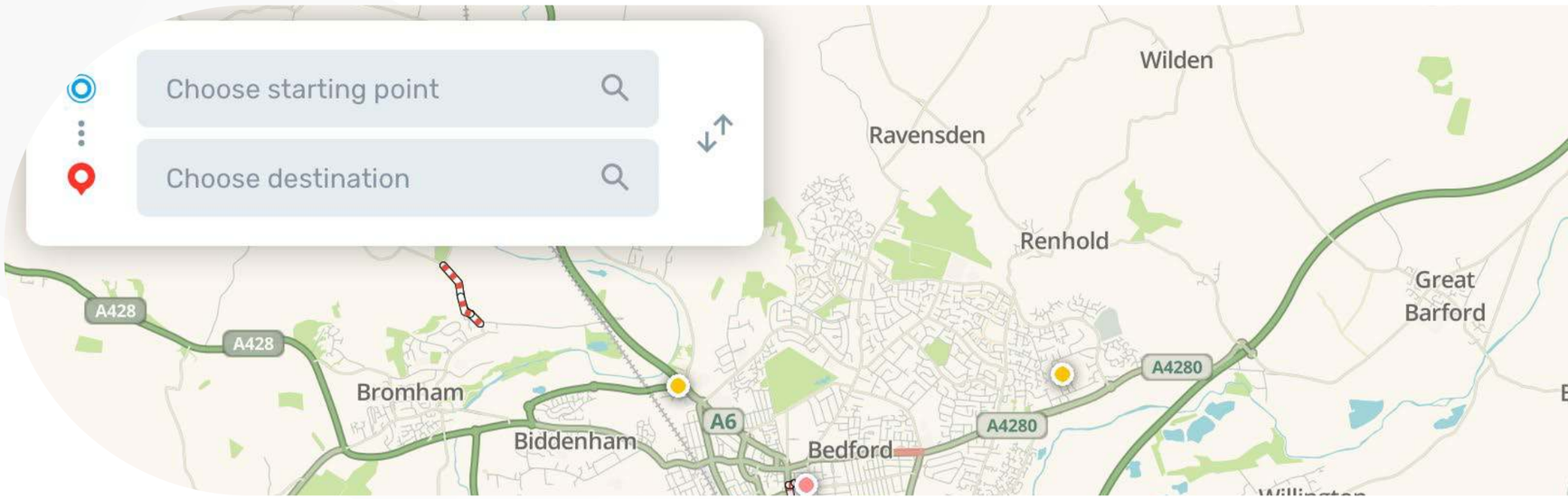
Barriers

1. Stakeholders and culture:

Data ownership - Companies are protective over their data and can be nervous that ownership of the data and therefore its value will be lost through any sharing initiatives. In the Waze for Cities partnership, partners remain in control of their data which helps to overcome this reluctance to data sharing

Lessons learned

Waze demonstrates the value of continuing to develop new solutions and services from aggregated data sets, and making the end users an integral and active part of the system. This case study also shows that by opening up data to new stakeholders such as public authorities, a greater impact on solving system-wide problems can be achieved.



58 https://venturebeat.com/2019/10/01/waze-integrates-city-data-sharing-program-with-google-cloud/
59 https://drive.google.com/file/d/1nj7URicsQIWNnuB9RUJ6TOsRRT04hVlr/view?resourcekey=0-GN7qN1NU184TQYLeSCyRYA

5.5 London Datastore

LONDON DATASTORE

Context

This case study highlights the value of making public sector data easily accessible to citizens and private companies so that products and solutions can be developed to help solve city-wide challenges.

The London Datastore is a free and open data-sharing portal set up by the Greater London Authority (GLA) to enable the public to access data relating to the UK's capital. The site provides over 700 datasets to help citizens, business owners, researchers and developers understand the city and develop solutions to London's problems[60].

When it was set up in 2010, that datastore was one of the first of its kind developed by a major city, making freely available huge amounts of data about the capital. Since then the released data has been used to tackle some of London's most important challenges, such as easing road congestion and improving air quality, as well as providing a wealth of accessible information about how the city functions[61].

Relevant challenges

The London Datastore has many sources of data including from Transport for London (TfL). The opening of this data has led to applications which tackle a variety of city challenges such as:

- **Road congestion:** directly through the provision of information about traffic and road closures; and indirectly by improving real time information about public transport which encourages its use
- **Poor intermodal links:** by providing most of the underlying data for multi-modal journey planning apps such as CityMapper
- **Transport environmental impact:** through identifying poor air quality hot spots to inform planning activities, improving accessibility to public transport information, and reducing congestion through information sharing

60 https://data.london.gov.uk/about/
61 https://smartlondon.medium.com/10-years-of-the-london-datastore-thinking-on-city-data-for-the-next-decade-b634ae62dc3c

Stakeholders

- Public to private
- Public to public

118 publishers of data are collated and accessible through the London DataStore. Publishers include:

- TfL,
- National Health Service (NHS),
- London Fire Brigade,
- Office for National Statistics (ONS),
- Greater London Authority (GLA), and
- UK Power networks.

The datasets are available to anyone from citizens to business owners, researchers and developers to foreign investors and other public services.

Data

The London Datastore opens up raw data to be publicly available. The benefits come from getting outside sources to use the data to develop tools to analyse and visualise the data in a more meaningful way and disseminate through apps and websites.

Over 6000 datasets are split into 19 topics including ***environment, demographics, transport, sport, education, crime and community safety,*** and ***housing.***

In 2018 the Datastore gained the capability to share 'secure' data (restricted and/or licensed data including permission, privacy, publication and distribution; as well as data that is presently held privately).

The Datastore has adapted to include new sources of data such as the increased adoption of sensors. The Datastore is now starting to be able to share live feeds of data as opposed to the usual spreadsheets. An example of this has been the EU-funded Sharing Cities project where the GLA and Greenwich council are working together to trial new technologies such as smart lampposts and energy management systems in council housing. These data feeds are then shared privately between the different organisations working on the project.

Applications and Solutions

Within the London Datastore is access to all of TfL data which is used by thousands of app developers. TfL actively encourages software developers to use the open data to present customer travel information in innovative ways. One such application is journey planning and mobility as a service app, CityMapper.

Some of the other applications built using information freely available from the London Datastore include:

- **A range of air quality mapping** using data from a network of sensors showing Londoners pollution levels in their local areas, as well as prioritising new electric bus routes
- **Minimising disruption from roadworks:** The organisations that manage the city's energy, transport and water infrastructure use the Infrastructure Mapping Application to share data with each other, allowing them to better target investment and minimise disruptions by co-ordinating streetworks
- Non-transport examples include ***London Rents Map,*** a tool to help Londoners find an affordable home, ***Schools Atlas***, a tool for school place planning for parents and the ***Cultural Infrastructure Map***, which helps people enjoy and preserve music venues, studios and community halls in their neighbourhoods

Benefits (realised or potential)

Benefits to the public sector

- Data release can reduce fraud and curb unnecessary spending in the public sector by increasing transparency on spending
- A lot of time is spent by the public sector responding to requests for information from the public and journalists. Operating on the assumption of openness reduces the time needed to deal with these requests and frees up resources where they are most needed[62]
- Data sharing of public information can create a new industry which involves selling analysed data back to the public sector, this is something which has been proven in the USA. This removes the need for the public sector to have highly specialised and expensive technical staff, and encourages the development of new specialised, and taxable, services

Benefits to travellers

- Releasing transport data, especially live feeds, improves travel experiences and increases public transport passenger numbers (or encourages them to adopt more sustainable travel practices). But the benefits may be even more far-reaching than the obvious. Knowing how long till the next bus means you can pop into the shops while you wait. Or choose to walk if it means getting to your destination quicker. Or wait for the next, less crowded bus - particularly useful for people with reduced mobility

Benefits to the economy

- Different types of data will stimulate different parts of the economy. For example, releasing accessibility data removes barriers to work, leisure and tourism for disabled people
- Releasing data into the public domain can enable foreign investors to gauge the extent they want to expand their operations or otherwise invest in the UK. In the short term it may feel counter-intuitive to open up data which does not paint a good picture of the economy. In the longer-term international investors are more likely to be attracted to make investments in a country that releases its data, enabling them to accurately assess all the potential risks and benefits of investment. Global transport app, CityMapper cites London's open data as an enabler for its development

"When TfL made its data available, there was an opportunity to design and develop a comprehensive transport app, starting in the world's most historic and iconic public transport city"[63].

Barriers

1. **Resource:** By opening up data to the public and to private organisations, less public resource is required to analyse the data, however public resources are still required to maintain the data feeds and clean it so that it is suitable for sharing through the API
2. **Institutional:** London Datastore was one of the first of its kind and had to overcome mistrust of data sharing. To overcome the mistrust from businesses, the Datastore policy is to 'only withhold data where to release it would infringe privacy legislation or a contractual obligation e.g. commercial confidentiality'

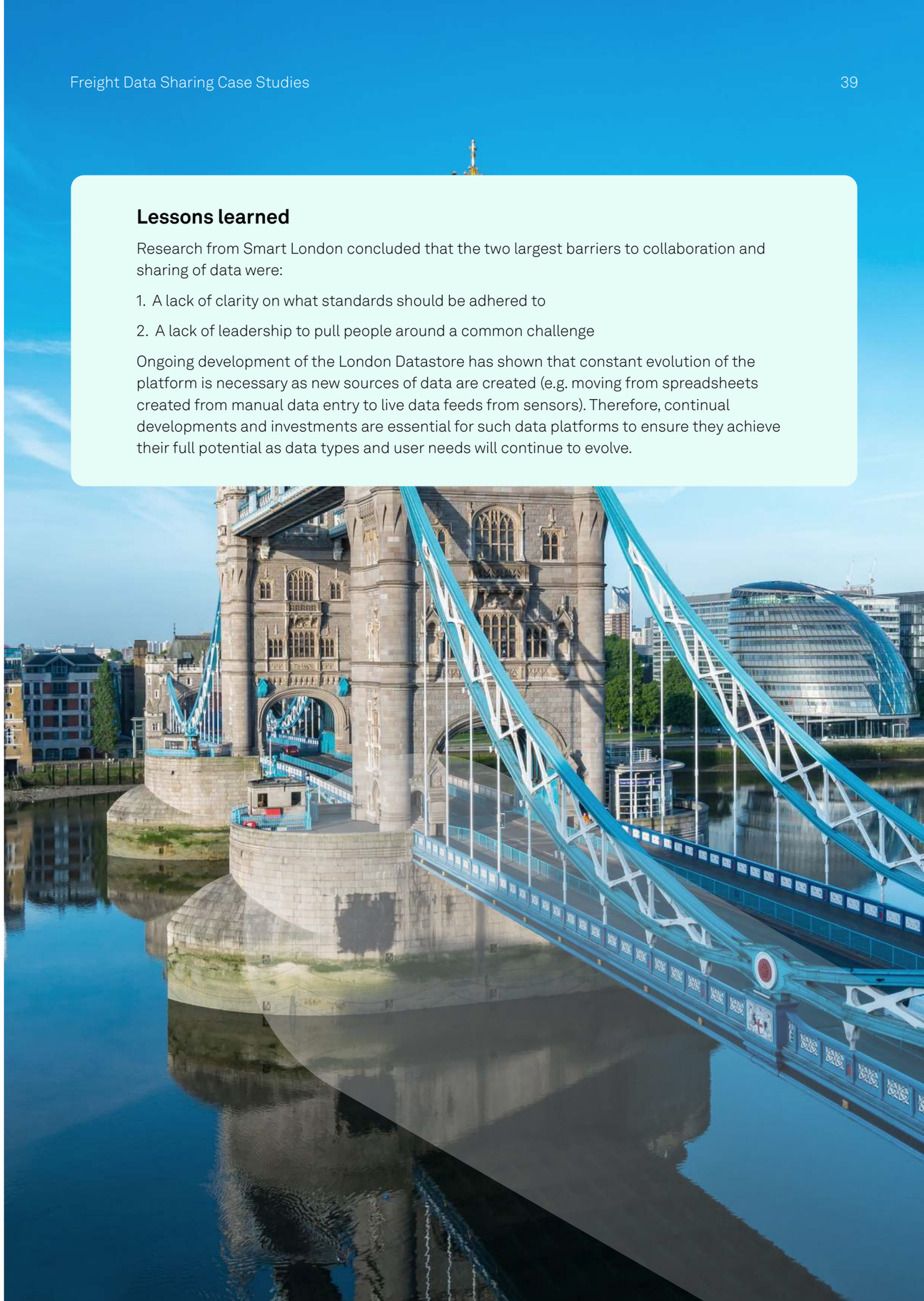
62 https://data.london.gov.uk/blog/economic-benefits-data-release/
63 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/722576/bus-open-data-case-for-change.pdf

Lessons learned

Research from Smart London concluded that the two largest barriers to collaboration and sharing of data were:

1. A lack of clarity on what standards should be adhered to
2. A lack of leadership to pull people around a common challenge

Ongoing development of the London Datastore has shown that constant evolution of the platform is necessary as new sources of data are created (e.g. moving from spreadsheets created from manual data entry to live data feeds from sensors). Therefore, continual developments and investments are essential for such data platforms to ensure they achieve their full potential as data types and user needs will continue to evolve.



5.6 ElectraLink Energy Market Data Hub

ElectraLink

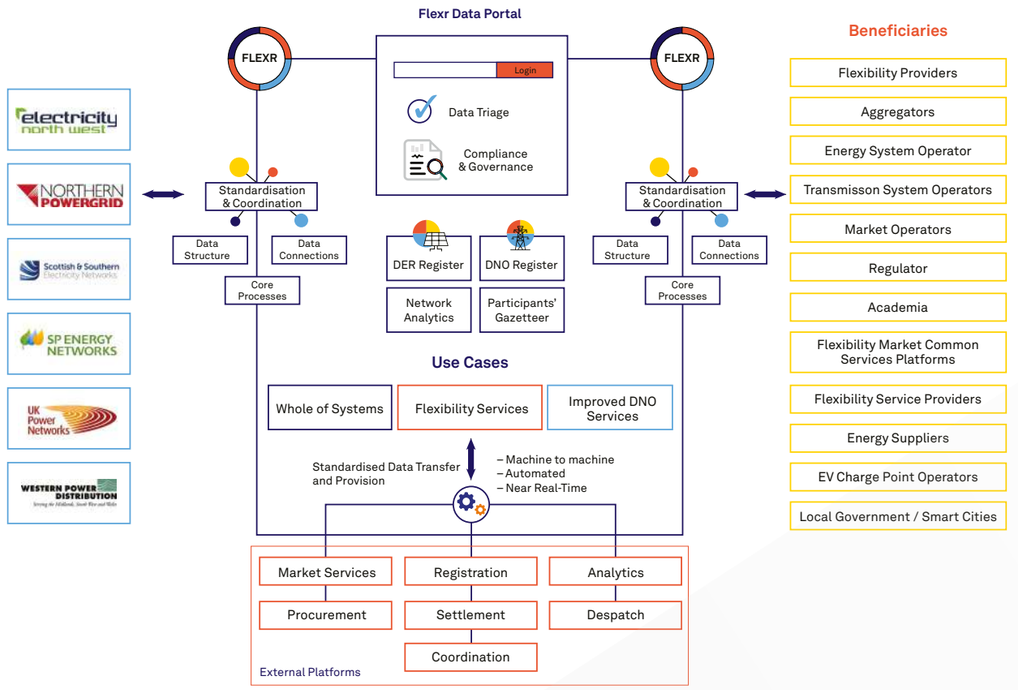
Context

This case study shows how competitive private sector organisations mutually benefit from the sharing of their data through an impartial and trusted partner.

ElectraLink is a regulated central body that facilitates vibrant competition in the energy marketplace through an underlying data hub. It was created in 1998 by the UK's electricity Distribution Network Operators (DNOs) to provide an independent, secure, and low-cost service to transfer data between the participants in the deregulated UK electricity market[64]. ElectraLink provides the Energy Market Data Hub (EMDH)[65] which is a platform that brings together all ElectraLink products, services, and solutions; and offer the opportunity for innovators to develop their own products and services for the benefit of the utilities industry. An example of new services being developed by ElectraLink is the Flexr[66] which is a DNO data provision and standardisation service that will connect to the data held by all six DNOs and their Distributed Energy Resources (DER) customers.

The company operates the regulated Data Transfer Service (DTS) that is critical to the competitive energy market. DTS is one of the most established products of ElectraLink which is a single, centralised data system that enables utility service providers to work together to exchange information about their customers. This information interchange facilitates a wide range of business-critical processes including change of supplier, metering and how energy is paid for by suppliers (settlement). DTS is provided on a cost recovery basis with standard costs for all users of the service.[67]

64 https://www.electralink.co.uk/about-us/
65 https://www.electralink.co.uk/emdh-solutions/
66 https://www.electralink.co.uk/flexr/
67 https://www.electralink.co.uk/dts-governance-and-pricing/



Relevant challenges

The main challenges in this case study relate to:

- The ability of energy customers to switch suppliers and transfer accounts in a streamlined process without service disruptions
- The ability of a highly competitive market to operate in a level-playing field between very large and very small energy providers
- The understanding of energy demand and ability to predict short-term changes
- The need to manage the supply and demand of electricity at the macro and micro levels with the advent of Electric Vehicles (EV) and household solar panel installations

These challenges are relevant to the **freight service planning** challenge especially around the ability to estimate and predict supply and demand and the adaptation to short and long-term disruptions.

Stakeholders

- Private to private (mainly competitive stakeholders)
- Private to public

The ElectraLink DTS is connected to over 270 gas and electricity market participants and innovators. Furthermore, the systems and solutions offered by Electralink, such as the recently developed Flexr solution, bring together a wide range of stakeholders including:

- Energy providers
- Energy System Operators
- Transmission System Operators
- Market Operators
- Regulator
- EV Charge Point Operators
- Local Authorities/Smart Cities
- Academia

Data

The existing and emerging tools from ElectraLink bring a wide range of datasets into a centralised system and these include:

- Network planning data such as maximum load and load forecasting data
- Network asset data which include data about substations, overhead lines, and cables
- Network operational data including network outages, capacity constraints, and status
- Real-time data about the network including capacity and power flows
- DER data which includes flexibility resource forecasting and dispatch and control status data

Applications and Solutions

A wide range of developed tools and solutions were underpinned by the data available to ElectraLink. These services include:

- **Data Transfer Service**[68]: Enabling UK utility providers exchange information about their customers to streamline the supplier switching process
- **CSSConnect**[69]**:** A Central Switching Service (CSS) adaptor solution developed by ElectraLink to deliver faster switching for energy market consumers
- **DUoS E-billing**[70]**:** An efficient alternative to transferring and validating paper or PDF bills between DNOs and Suppliers for Distribution Use of System charges. The service was developed with HM Revenue and Customs to ensure they are recognised as invoices and can be referenced in external financial audits
- **SmetTrack**[71]**:** A household level smart meter tracking service with full visibility of all electricity meter exchanges across the different Smart Metering Equipment Technical Specifications (SMETS) across Great Britain
- **SwitchTrack**[72]**:** A service that provides essential insights into customer electricity and gas switching behaviour by meter class, geographic area, and supplier category
- **UMarketPulse**[73]**:** A tool that accurately tracks an operator performance within industry processes, enabling performance improvement and benchmarking against competitors

Benefits (realised or potential)

Benefits to energy suppliers and new market entrants

- The DTS enables all parties, whether long-standing or new to the industry, to enjoy the same service levels and functionally rich toolset, to support their businesses. This minimises the barriers to entry for new and small energy service providers

Benefits to energy network operators and innovators

- The emerging services and innovative data solutions being developed by ElectraLink have the potential to improve the demand prediction through emerging smart meter datasets; and provide data-enabled insights into the impact of electric vehicles and solar panel installations on the energy supply-demand market as an example

Benefits to the energy customers

- DTS provides an improved customer experience and a simplified process for switching energy suppliers through a central source of switching data

68 https://www.electralink.co.uk/dts/
69 https://www.electralink.co.uk/cssconnect/
70 https://www.electralink.co.uk/duos-e-billing/
71 https://www.electralink.co.uk/smettrack/
72 https://www.electralink.co.uk/switchtrack/
73 https://www.electralink.co.uk/umarketpulse/

Barriers

1. **Resource:** The required funding to open the energy data and facilitate sharing among stakeholders was a barrier addressed through the setting of a not-for-profit entity (ElectraLink) and a cost recovery subscription model
2. **Stakeholders and culture:** The reluctance to share data, especially in a competitive environment such as the energy sector, was addressed in this case study by having a neutral and trusted organisation acting as an intermediary between the different stakeholders sharing and consuming data

Lessons learned

The utility market is increasingly competitive and constantly evolving, requiring significant interaction between industry parties, regulators, policy makers and increasingly consumers[74]. The success of Electralink can be attributed to factors such as:

- The need for a trusted partner, ElectraLink, was crucial for the success of the DTS which enabled data sharing in a competitive market environment
- A reputation for impartiality which ElectraLink successfully established building on the fact that it was an organisation set up by the industry to provide that neutral role
- Having multiparty agreements, such as the Data Transfer Services Agreement, and codes were needed for the success of ElectraLink
- The developed governance, the User Group representation from the wider industry, and the defined Change Management processes

74 https://www.electralink.co.uk/code-management/

5.7

The Clinical Effectiveness Group – Sharing to improve

Context

This case study demonstrates the benefits of data sharing among competitive stakeholders to facilitate benchmarking and drive performance improvements.

The case study, led by the Clinical Effectiveness Group (CEG), highlighted the benefits of sharing data between General Practice (GPs) peers to improve performance through benchmarking. CEG has been supporting primary care in a challenging inner-city environment in east London covering the three clinical commissioning groups (CCGs) of Newham, Tower Hamlets, and City and Hackney. Combined, these have a population of 800,000 people who are served by 150 GPs. Most of these are independent practices, while a minority are part of larger GP provider organisations.

One of the key enablers for improving health care quality is to understand areas of strengths and weaknesses to offer targeted support. The approach taken by the Clinical Effectiveness Group (CEG)[75] is to benchmark GP practices in its geographical area against a set of agreed performance indicators. This is to produce comparative information on agreed metrics, using learning from the best-performing practices to improve care in less well-performing surgeries.

Targeted challenges

The main challenge addressed in this case study is improving primary health care in some of the most deprived areas in London. The targeted area is served by many small independent GPs with the minority being part of a bigger organisation. This results in different processes and approaches to care provision and limit the sharing of data, knowledge, and best practice.

While these are not directly linked to the identified freight challenges (Section 2), there are similarities to the freight sector and lessons to be learnt in terms of (1) introducing operational and behaviour across a large number of small organisations; and (2) improving performance across different aspects such as environmental impact and customer service.

Stakeholders

- Private to private (mainly competitive stakeholders)
- Private to public

The key stakeholder groups are:

- GP practices which represent private sector organisations working in competitive and collaborative environments
- The CEG which run the data sharing and performance benchmarking initiative
- Funding providers including the CCGs, local authorities, and research grants providers

Data

GP performance data was collected using a Clinical data entry template designed by the CEG's practice facilitators and embedded within an electronic health care records system. This is to increase adherence and standardise clinical coding. GP-level data on 12 performance indicators were collected into a central location managed by the CEG.

Applications and Solutions

CEG followed a systematic approach in converting the shared data into meaningful information, then knowledge and action, to drive improvement. Analysts created interactive dashboards showing comparative performance, which is benchmarked locally, regionally, and nationally. The gathered intelligence through the data was used to facilitate/inform:

- **Prioritisation** to agree improvement areas to target based on gathered evidence and the ability to make measurable change
- **Guidelines** developed as evidence-based and which are locally trusted
- **Clinical decision prompts** to support the use of the templates and increase guideline adherence by reminding clinicians of best practice

Benefits (realised or potential)

The CEG activities within the three CCGs in the period 2009-2016 resulted in significant performance improvements across indicators in comparison with London and England as a whole. Such indicators include the percentage of patients with diabetes and chronic heart disease achieving target blood pressure (Figures A and B below)[76].

75 CEG is a clinician-led service providing tools for GP practices, such as clinical templates, in-practice facilitation and health informatics across three clinical commissioning groups (CCGs): Newham, Tower Hamlets, and City and Hackney

76 Briefing: Sharing to improve: four case studies of data sharing in general practice - Rebecca Fisher, Ruth Thorlby, Will Warburton, May 2018

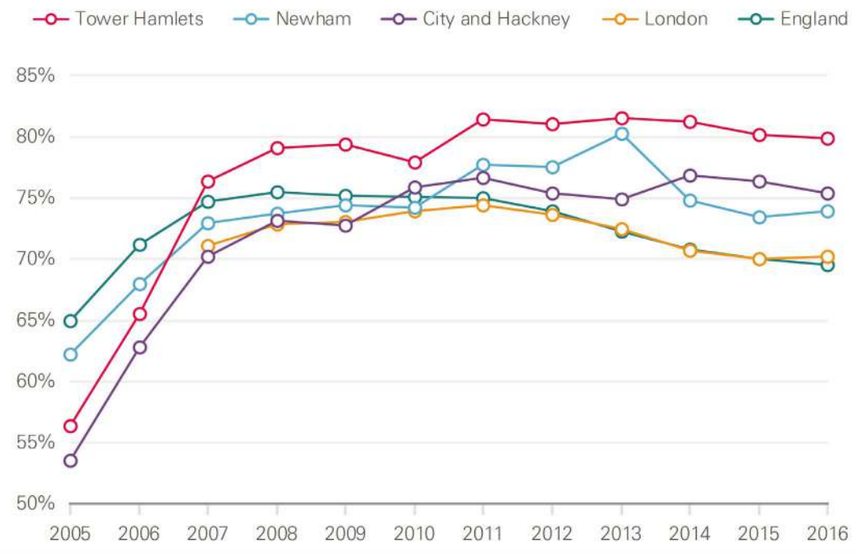


Figure 2: Percentage of diabetic patients achieving target blood pressures (as per NICE guidelines) in Tower Hamlets, City and Hackney, and Newham CCGs, 2005-16[77]

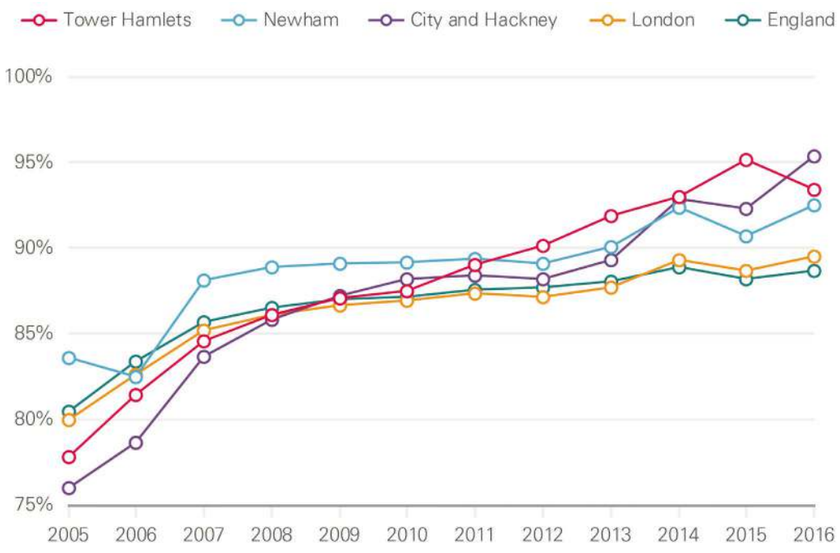


Figure 3: Percentage of patients with chronic heart disease achieving target blood pressures (as per NICE guidelines) in Tower Hamlets, City and Hackney, and Newham CCGs, 2005-16[78]

77 Briefing: Sharing to improve: four case studies of data sharing in general practice - Rebecca Fisher, Ruth Thorlby, Will Warburton, May 2018
78 Briefing: Sharing to improve: four case studies of data sharing in general practice - Rebecca Fisher, Ruth Thorlby, Will Warburton, May 2018

It is important to highlight that high performance was achieved in areas with significantly high deprivation levels. CEG activities that resulted in this performance improvements were underpinned by the data sharing which derived evidence-based decision making.

Barriers

1. **Legal and institutional:** Data sharing practices and agreements between GP practices vary between different types of arrangements . GP providers who run multiple practices do not require data sharing agreements to make pseudonymised data available between practices. In this case study, where the majority of GPs are small independent practices, data sharing agreements would be required along with the need to building trust, buy-in and goodwill to get these agreed
2. **Process, standards, and technical:** The variation in data practices and maturity level across different stakeholders can present a challenge for data-enabled approaches to improvement and for ensuring the stakeholders can benefit equally from such approaches. While the consistent data collection approach developed in this case study has helped in addressing this challenge, other approaches may need to be developed for other data sharing case studies depending on the nature of the data and its collection and dissemination method
3. **Stakeholders and culture:** The reluctance to share data, especially in a competitive environment, was addressed in this case study by having a neutral and trusted organisation acting as an intermediary between the different stakeholders sharing and consuming data. Furthermore, the communication of the clear and direct financial benefits to the stakeholders has helped overcome the reluctance

Lessons learned

The success of this case study in terms of getting different stakeholders to share performance-related data can be attributed to:

- the credibility of the clinical leaders in charge of the initiative
- the relationships developed through the collaborative process
- the role of facilitators in the implementation process
- the clear benefits to the participants; in this case it was the financial incentives aligned to both improvement and collaboration. Practices receive additional income if their network's combined average performance exceeds locally set targets.

5.8 Open Banking Ltd

OPEN BANKING

Context

This case study sets out the merits of enforcing data sharing across a competitive industry to foster innovation.

Revised Payment Services Directive (PSD2) was created by the European Union to foster integrated, safer, and open banking. In the UK, the enactment of the directive is known as Open Banking. Officially the deadline for compliance to Open Banking was September 2019, although in practice some companies took slightly longer.

Open Banking specifies a standard format for the process of sharing customer data in the UK for easier sharing and comparison. The aim was to increase competition and innovation in financial products[79].

Enablers for the enactment for Open Banking included new customer behaviours and requirements within younger demographics and digital technology being a catalyst for radical innovations in the banking industry.

Relevant challenges

The need for change from an industry which typically did not share data, came about after a study by the Competition and Markets Authority (CMA) which found the Current Account market had complex pricing, low customer switching rates, difficulties in comparing products and high charges on overdrafts. The outcome being that people were paying more for lower quality services than they need to[80]. This was a challenge that Open Banking sought to overcome.

In addition, Open Banking aimed to overcome[81]:

- Poor trust in banks
- Poor innovation from the largest banks leaving customers left with outdated products, services, and features. Challenger banks such as Tide, Monzo, and Starling with greater digitalisation have benefited from Open Banking

79 https://www.barclays.co.uk/business-banking/business-insight/open-banking/
80 https://www.openbanking.org.uk/wp-content/uploads/Open-Banking-A-Consumer-Perspective.pdf
81 https://gocardless.com/guides/posts/open-banking/

These challenges present some similarities to the freight sector and potential lessons to be learnt from the banking sector in terms of (1) enabling innovation and positive disruption in a traditional industry through data sharing; and (2) introducing change in an industry with a organisations of significantly different sizes and capabilities.

Stakeholders

- Private to private competitive and collaborative

The key stakeholders in this case study are:

- Open Banking Limited
- UK banks and building societies
- FinTech organisations
- Competition and Markets Authority (CMA)
- Financial Conduct Authority (FCA)
- The Information Commissioner's Office

Open Banking means that large banks have to share data with third party providers and each other. That caused the UK's nine biggest banks to release their data in a secure, standardised form, so that it can be shared more easily between authorised organisations online. Authorised organisations are those which are approved by the Financial Conduct Authority (FCA) including FinTech companies for personal money management and product/service comparison tools.

The system was set up by the Open Banking Implementation Entity (OBIE) or trading name, Open Banking Limited, a non-profit organisation created specifically for the task and enforcement is the responsibility of the Competition and Markets Authority. OBIE is funded by the UK's nine largest banks and building societies. These nine banks were chosen due to their large combined market share of over 90% of the UK's consumer and small business bank accounts and were required to create open source Open Banking APIs to a deadline[82].

Protection for consumers will be done by the banks (for payments) or the Information Commissioner's Office (for data).

Data

Open Banking data sharing is facilitated by two main API's:

1. **Open Data API** - this allows banks to publish unrestricted information about their services such as details of the account types they offer and any special deals
2. **Read/Write API** - which has three distinct components:[83]
   a. **Account Servicing Payment Service Provider** - a Third Party Provider with access to this area can request customers to share their account details, balances, and transaction history
   b. **Payment Initiation Service Provider** - a Third Party Provider with access to this area can set up payments in accordance with customer consents
   c. **Card Based Payment Instrument Issuer** - a Third Party Provider with access to this area could provide advanced credit card services, for example, issue single-use virtual credit cards for online shopping and charge these back to the same bank account

Applications and Solutions

Open Banking Implementation Entity (OBIE) launched the Open Banking App Store to help individuals and companies find the right open banking-enabled financial products for them. The app store currently lists 96 apps and services that are live to market. Examples of apps include:

- **ANNA Money** is a business account and tax application for small businesses and freelancers
- **Banked** is a platform on which users can create real-time payment requests and share them with friends, and family members of clients
- **Cake** is an application which aggregates all the users existing bank accounts and transactions. The platform offers automatic cashbacks on some purchases, analysis on spending behaviour to aid with budgeting and transparency over all transactions

82 https://www.freeagent.com/glossary/cma9/
83 https://www.contextis.com/en/blog/open-banking-the-challenges

Benefits (realised or potential)

The main motivations for introducing open banking were to increase competition and innovation in financial products. While only the nine largest banks in the UK are required to conform to Open Banking standards, many more financial institutions have opted in to Open Banking, demonstrating the business benefits of data sharing. The smaller banks opt in to Open Banking to increase the appeal of their services to existing and prospective customers and the open APIs allow for better customer engagement[84].

Benefits to banks and innovators

- Traditional banks have had to improve their services to customers as competition becomes stronger and better guidance is available for tailored choices. They have also set up new products and services, adjacent to their core offerings to diversify their business models
- Open Banking has created opportunities for new players to the market
- 300 FinTech companies and innovative providers are part of the open banking ecosystem
- API call volume (number of requests for information through the API link) has increased from 66.8 million in 2018 to nearly six billion in 2020
- 320,000 open banking payments were made in 2018, this has subsequently risen to over 4 million in 2020

Benefits to bank customers

- Customers benefit from more choice and better service offerings across the board
- Access to new tools such as digital comparison tools enable more people to make an easy and educated assessment of complex product pricing to get the best product personalised to their needs[85]
- More than 2.5 million UK consumers and businesses now use open banking-enabled products to manage their finances, access credit and make payments
- Every month, hundreds of thousands of UK consumers and businesses become new active open banking users

Barriers

1. **Process, standards, and technical**
   Data protection: Only start-ups that have been approved by the Financial Services Authority (FSA) will be allowed to use the system. However, just like online banking, increased movement of data does offer opportunities for scammers, who might try and trick people into sending over their data
2. **Commercial:** business models which appear to be 'free' to the consumer can increase the onward sale of transactional data. This is a way for companies to monetise what they do without requesting a fee upfront and often customers are unaware of what they have consented to in the terms and conditions. This problem can be intensified further by business models which pay the consumer for unlimited access to data - a model which has been seen in the US[86]
3. **Stakeholders and culture:** The reluctance to share data, especially in a competitive environment with personal and sensitive data, was addressed initially in this case study through legislation. Subsequently, the demonstrated benefits of sharing data have encouraged other organisations to follow

Lessons learned

Open Banking was an enforced change on the largest banks, rather than a natural market behaviour. This approach is time consuming, costly and can attract resistance from the organisations most affected if they believe they are losing competitive advantage. However, enforcement was required to see any major shifts in collaboration in the banking sector rather than relying on large companies opting into a data sharing scheme voluntarily.

84 https://www.mulesoft.com/resources/api/open-banking-apis-benefits
85 https://www.openbanking.org.uk/wp-content/uploads/Open-Banking-A-Consumer-Perspective.pdf
86 https://www.openbanking.org.uk/wp-content/uploads/Open-Banking-A-Consumer-Perspective.pdf

5.9 Insurance Claims Underwriting Exchange

Context

This case study highlights the benefits of data sharing between competing private sector organisations to address a common industry challenge – identifying and addressing insurance fraud claims in this case.

It is believed that there are more than 500,000 fraudulent insurance claims made every year (approx. one per minute), with insurance fraud adding an extra £50 to the cost of every annual premium[87].

The Claims and Underwriting Exchange (CUE) was established in 1994 to help fight insurance fraud, by enabling insurers to access details of incidents. This makes it harder to successfully commit claims fraud or misrepresent claims history which ultimately, helps to keep down the cost of insurance for honest policyholders[88].

The CUE is now a shared database of incidents in relation to individual's household, motor and personal injury/industrial illness which have been reported to insurance companies. The CUE is managed by the Motor Insurance Bureau (MIB), a not-for-profit organisation funded by insurance companies as required by the Road Traffic Act 1988[89].

87 https://www.moneysupermarket.com/car-insurance/cue-database/
88 https://www.mib.org.uk/managing-insurance-data/mib-managed-services/cue-miaftr/
89 https://www.legislation.gov.uk/ukpga/1988/52/part/VI/crossheading/compulsory-insurance-or-security-against-thirdparty-risks/enacted

Relevant challenges

Whilst the literature suggests there is a good uptake of CUE subscription across the insurance industry, we have inferred that there are two challenges that prevent further uptake and subscription to the national database:

1. There is no legal requirement for insurers to use the CUE platform, which may prevent uptake with smaller insurance companies where costs may outweigh the benefits
2. Not all insurers subscribe to the platform and therefore it does not provide a complete view of all incidents which have taken place in the past six years

Stakeholders

- Private to private
- Private to public

The key stakeholders within this case study are:

- **The MIB** - they are the platform owner and data controller
- **Insurers** - they use the platform to access policyholder information (past, present, potential) and provide data to the platform
- **Policyholders (past and present)** - the data subjects in the CUE database

Data

The CUE is a national database for insurers to access individual's incident history and contains approximately 34 million records[90], dating back to the past six years.

The CUE provides two-way exchange of data with insurers who subscribe to the service. Insurers provide data in structured format to the CUE and receive data back upon request. Individuals can request access to their data through completion of a subject access request form.

The MIB is the data controller for the CUE and is responsible for governing data standards, data quality, and enforcement of quality control. They provide risk and compliance support to insurance companies and ensure that the CUE is compliant with all legal requirements.

Applications and Solutions

As the CUE is a database which can be interrogated, it is anticipated that insurers will create scripts to auto-interrogate the database at various points in the insurance journey, such as when preparing a quote or reviewing a claim. This function is likely to be built into insurers existing applications and platforms.

The data is not publicly available, and its use will be limited by data protection legislation. Therefore, it is likely that any supporting applications or solutions will be limited to small features within insurers' wider management platforms.

Benefits (realised or potential)

The benefits of the CUE can be considered from two lenses, that of the insurer and that of the policyholder.[91]

Benefits to insurers:

- CUE can help insurers verify an individual's household, motor, or personal injury claims history
- Shared access to an individual's claim history can help prevent potential fraud by identifying non-disclosure, such as concurrent claim activity with other insurers
- Improve financial performance through more accurate pricing, reduced claims costs, and fraud prevention

90 https://www.moneysupermarket.com/car-insurance/cue-database/
91 https://www.experian.co.uk/business/consumer-information/insurance/claims-underwriting-exchange/

Benefits to policyholders:

- Improved customer service and reduced call time due to reduction in the number of questions requiring answers
- Reduction in premiums for honest policyholders as the overall cost of fraud is reduced

Barriers

There are three key barriers that the CUE faces:

1. **Legal** - ensuring that the CUE meets the relevant data protection and InfoSec legislation such as GDPR
2. **Process, standards, and technical** - the cost of data preparation, enforcement and quality control to ensure consistency across insurers
3. **Commercial** - overcoming issues which may relate to Intellectual Property Rights (IPR) and competitive advantage[92]

Lessons learned

We have found that the following aspects are essential to delivering a national database which is supported by the majority of the industry:

- A central and impartial authority acting as conduit to data exchange builds trust in the platform and fosters buy-in
- Addressing a major challenge, such as insurance fraud, which impacts all potential users is key to bringing partners on board

92 https://www.willistowerswatson.com/en-GB/Insights/2021/02/data-sharing-models-in-the-insurance-industry

6 Concluding remarks

Informed and evidence-based investment and policy decisions are required to deliver operational efficiencies in the freight transport network, enhance capacity, improve resilience, and reduce its negative environmental impact.

These decisions need to be fuelled by timely, accurate, and multi-sourced data from public and private sector organisations. Such data will provide a good understanding of the freight movements through the transport network and key bottlenecks, the real impact of freight transport on the environment at the micro and macro levels, and most importantly an understanding of the value of the freight moving through the network and the economic impact of delays and inefficiencies on the end-to-end logistics value chain.

Access to multi-sourced data is hindered by generic data sharing barriers which include legal and institutional, technical, cultural, resource-related, and commercial. Despite acknowledging the value of data sharing, the freight industry does not fully see the value of data sharing from the operational aspect[93].

Data sharing case studies in this document highlighted the role data sharing can play in improving performance (The Clinical Effectiveness Group case study), streamlining operations (PortXchange and Google Waze case studies), improving customer experience (Open Banking case study), and inform pricing strategies (Claims Underwriting Exchange case study). The role of data sharing in the freight sector from the operational perspective is already evident in the emerging freight data platforms such as ZenCargo and port community systems.

The key enablers for successful data sharing practices and outcomes, based on the lessons learnt from the presented case studies in this document, are:

- Strong and trusted **leadership** that can pull different stakeholders around a shared vision and common challenges
- Reputable, impartial, and trusted **facilitator/intermediary** that could take the role of the data sharing platform operator
- Clearly defined, and ideally quantified, **benefits** for data providers. These could be in the form of direct financial gains or the ability to address a recognised operational challenge
- Multi-party data **agreements** and codes that considers the variant needs of all stakeholders
- **Governance**, user representation, and change management processes
- Defined and agreed **standards and processes** for data generation, sharing, and consumption
- Continual development and **investment** on the data sharing facilities to adapt to technological, economical, and user needs changes

Further work is needed to highlight and quantify the operational benefits of data sharing to the freight industry, in addition to the already acknowledged future planning benefits.

93 Frazer Nash Consulting – UK Freight data hub discovery study for the Department for Transport

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