MADE SMARTER INNOVATION | DIGITAL SUPPLY CHAIN HUB

Improving vehicle utilisation and reducing carbon emissions within logistics through collaboration and deep tech solutions

Logistics Living Lab (L3) Final Project Report

A Made Smarter Innovation | Digital Supply Chain Hub Flagship

“The Logistics Living Lab project has demonstrated the transformative potential of digital innovation and collaboration in the logistics sector. By addressing inefficiencies and enabling more sustainable practices, the project offers a scalable model that can deliver economic and environmental benefits for the UK’s logistics industry.

The solutions built through this unique industry collaboration deliver a triple benefit to the UK logistics sector by empowering the organisations that make up our complex supply chains, to become more efficient, reducing costs to improve their bottom line”

Tim Lawrence, Director - Digital Supply Chain Hub, Digital Catapult

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Executive Summary

This report provides a comprehensive overview of the Logistics Living Lab (L3) project. As a flagship initiative of the Made Smarter Innovation | Digital Supply Chain Hub, the Logistics Living Lab was designed to address inefficiencies, reduce carbon emissions and empty miles, and foster stronger collaboration among various stakeholders in the logistics industry.

The Logistics Living Lab project had three main phases: Discover, Develop, and Demonstrate.

- During the **Discover** phase, the Digital Catapult team undertook comprehensive research to identify the key barriers and enablers to collaboration within the logistics sector.
- The **Develop** phase saw the creation of digital solutions to address collaboration challenges, including the SEQUENCE shared distributed digital infrastructure, which enables secure data sharing between logistics stakeholders and the Fuuse algorithm, which optimises route planning and truck utilisation by matching vehicle transport capacity with shipment needs across multiple organisations.
- In the **Demonstrate** phase, the project case study with AF Blakemore & Son Ltd resulted in a 9% improvement in pallet utilisation efficiency, a 37% reduction in transport costs, and a notable decrease in carbon emissions.

These outcomes indicate the potential for adoption of the L3 collaboration model by the logistics sector, with other organisations (such as customer businesses) also benefiting from the solution's innovations in capacity optimisation and environmental sustainability.

The L3 model also has the potential to address other logistical challenges, such as urban congestion, geographical optimisation, and the integration of alternative transport modes like rail and maritime shipping.

Finally, by integrating additional advanced technologies, such as intelligent systems and transactional payment platforms, capability could be enhanced to further streamline operations and drive even greater efficiency within the logistics ecosystem.

Introduction

Introduction

The logistics industry faces multiple challenges

The UK logistics industry plays a pivotal role in driving domestic economic and employment growth, contributing £163 billion to the national economy. It also serves as a crucial link between the UK and the global market. In 2022, the UK engaged in over £1 trillion in trade, comprising £414 billion in exports and £644 billion in imports.

The sector is under increasing pressure to enhance productivity and efficiency while delivering carbon neutrality. It faces considerable challenges, including rising fuel, labour costs, time pressures, new legislative requirements and the environmental impact of road freight.

To optimise costs and minimise empty running, logistics companies are already using a range of technologies and business models. These include scheduling software such as Paragon, digital freight platforms such as Digihaul and Transporean, and transport services such as Pallet Networks, which shares capacity between multiple users on a daily basis.

Significant investments are being made into upgrading vehicle fleets and adopting alternative fuels to decrease reliance on fossil fuels and reduce emissions. According to the government's 2035 delivery plan, organisations have pledged to convert over 700,000 vehicles to zero emissions by 2030. Zero-emission vehicles (ZEVs) are much more energy-efficient than petrol or diesel vehicles, with an all-electric fleet potentially using up to 75% less energy than a comparable petrol or diesel fleet.

However, statistics from the Department for Transport (DfT) show that 30% of total UK vehicle kilometres for truck journeys are run with empty loads and a significant proportion are run with partial loads, wasting capacity and generating unnecessary CO2 emissions. More needs to be done to solve this wastage and its impact on the environment.

The need for a collaborative approach to optimisation

Realising the optimisation benefits of a more collaborative approach has been the subject of investigation over many years. Advanced digital technologies are now creating an environment where collaboration is achievable on a day-by-day basis.

Currently, process optimisation is usually being achieved within an individual organisation's supply chain, rather collaboratively among organisations across the sector. While the sector has shown ingenuity and the desire to achieve continuous improvement overall, there is a limit to what a single organisation can do in isolation, and inherently, many logistics providers operate in silos, with limited resource sharing.

To benefit from cross-industry collaboration, logistics organisations must be empowered to access shared data in real-time. This means making systems interoperable, identifying synergies, reducing the fear of losing control of data, enabling shared commercial gains, and reducing the complexity of decision-making – all of which require collective industry-wide efforts if collaboration is to be achieved at scale and the potential financial and environmental benefits realised.

To address these challenges, the Logistics Living Lab (L3) project was designed to explore the viability of developing and deploying a technology solution that enables organisations to benefit from operational collaboration and optimisation that would reduce wasted capacity, cut the number of vehicles running empty, and eliminate associated carbon emissions.

The Logistics Living Lab (L3) Project

The Logistics Living Lab (L3) project

The Logistics Living Lab (L3) is a UK Research and Innovation (UKRI) backed project, publicly funded with co-investment from industry partners. As a flagship research and development project within the Digital Supply Chain Hub, the Logistics Living Lab is led by Digital Catapult, working in collaboration with AF Blakemore & Son, Incept Consulting, Fuuse, Microsoft UK, Pairpoint, and Parity Technologies.

The overall L3 project goal is to improve the efficiency and sustainability of UK logistics through enhanced collaboration and innovation, with the aim of optimising capacity use, enhancing truck and route utilisation, and minimising empty miles. It also showcases the potential of a shared digital infrastructure to tackle logistical challenges and address real-world supply chain issues.

With thanks to

With thanks to

L3 project overview

As a flagship initiative of the Made Smarter Innovation | Digital Supply Chain Hub, L3 was designed to address inefficiencies, reduce carbon emissions and empty miles, and foster stronger collaboration among stakeholders in the logistics industry.

The L3 project focused on the UK operations of a leading national retailer and a number of consumer goods manufacturers, and was split into three phases: **Discover**, **Develop**, and **Demonstrate**.

- During **Discovery**, the Digital Catapult team adopted a user-centric approach to identify the core challenges faced by logistics companies.
- During the **Development** phase, agile methodologies were used to explore and develop an interoperable solution that would tackle the challenges identified. Working with multiple partners, the project team facilitated order matching, asset tracking and route planning. Activities included developing the digital infrastructure and matchmaking engine; developing and evolving governance models; creating real-world demonstration scenarios and evaluating the impact on congestion and emissions.
- The **Demonstrate** phase involved AF Blakemore & Son testing the L3 solution in a real-world environment, with the results analysed and disseminated.

This structured approach demonstrated the potential of a digital data-sharing infrastructure that directly addresses key issues within the UK's logistics sector

Targeted benefits

The L3 project enabled logistics stakeholders to collaborate equitably, securely, and in a scalable way, in order to enhance efficiency, reduce environmental impact, and foster innovative business practices.

The project directly addressed critical challenges that the industry faces by focusing on achieving four targeted benefits that contribute to the optimisation and sustainability of logistics operations:

- **Reduced empty running** through optimised route planning and increased vehicle utilisation
- **Decreased CO_2 emissions** through improved route planning, increased truck utilisation, and a reduction in the number of empty trips
- **Enhanced B2B connectivity and coordination** through leveraging shared distributed infrastructure to enable better coordination among prospective collaborative partners (including suppliers, logistics providers and retailers), leading to more efficient supply chain management, reduced lead times, and enhanced service levels
- **Enabling new, adaptive business model**s by paving the way for more interconnected and responsive logistics systems

The L3 solution

The solution developed enables consumer goods manufacturers, retailers, and logistics operators to collaborate in real-time, addressing barriers and leveraging the recognised enablers.

Key elements developed through the three phases of this project include:

1. **Provision of a data-sharing infrastructure**

   The project aimed to develop and demonstrate how a distributed digital infrastructure can be leveraged as a seamless and secure data-sharing mechanism. This equips organisations to share the minimal relevant data necessary to facilitate value-driven collaboration with potential partners

2. **Enabling the integration of value-generating applications**

   For the targeted use case focused on optimising efficiency, an algorithm was developed to analyse vehicle and order data across a logistics network and recommend optimal utilisation of available vehicle capacity while preserving data privacy.

3. **Providing a collaboration and governance model**

   The collaboration governance model enables and unlocks alternative adaptive business models by ensuring data sovereignty and control remain with each individual business owner, while promoting equitable sharing of value among collaborative partners.

L3 roles and responsibilities by project partner

Organisations	Role	Responsibilities
Digital Catapult (Lead Partner)	Technical design authority of solution, and developer of the shared distributed digital infrastructure	• Develop and deploy the distributed infrastructure to facilitate collaborative data sharing • Support the technical case study, enabling order and capacity data sharing
AF Blakemore & Son	Industrial operational logistics, domain knowledge and data provider	• Provide historic order and capacity data for comparative real-world analysis and quantification of benefits
Incept	Order optimisation technology provider, data provision and analysis and transport app developer	• Develop eNVM and eNVO solutions for order optimisation (complementary to the L3 project) • Gather key data for conducting comparison analysis of output results • Develop a demonstration visual front end for users to upload capacity and /or order data
Fuuse	Algorithmic transport optimisation and matchmaking technology provider	• Provide intelligent truck fill and routing to accessible data sets via the distributed infrastructure, and identify compliant matches • Help define the data format/ standard required for matching • Ensure integration with the distributed infrastructure API
Pairpoint	Trusted economy of things platform technology provider	• Explore enhancing L3 solution with supporting use cases incorporating dynamic behaviour • Real-time monitoring and reporting of position and conditions at truck, pallet or case level, enabling automation of supply chain networks
Microsoft	Azure cloud platform resource provider	• Provide the cloud environment for hosting SEQUENCE infrastructure
Parity Technologies	Consultant for DLT-specific infrastructure development	• Provide substrate-specific DLT technical implementation expertise

Phase 1: Discover

Phase 1: Discover

Recognising that logistics organisations struggle to collaborate for a number of reasons, the Digital Catapult team set about identifying the key challenges and enablers involved. Using comprehensive root cause analysis and critical path mapping, supported by interviews and literature reviews, the team identified three types of barrier that hinder collaboration in the logistics industry:

- Technical barriers
- Behavioural and organisational barriers
- Market barriers

The research also help to identify three enablers that facilitate collaboration:

- Communication and trust
- Technology and interoperability
- Organisational synergy and leadership

Barriers to collaboration

Technical

Cybersecurity concerns often make companies hesitant to participate in collaborative platforms, as the confidentiality and sensitivity of shared data becomes a critical issue.

Organisations operating in silos without a unified approach at board or operational level can result in fragmented systems that hinder efficient data sharing and collaboration across the supply chain, making it challenging to streamline operations and effectively adopt new solutions.

The burden of legacy systems can limit interoperability, and overhauling existing systems or implementing new solutions often involves considerable effort.

The lack of a shared language significantly hampers communication and collaboration among stakeholders. Without unified terminologies and standards, translating data into standardised formats becomes challenging, leading to incompatibility. Reliance on manual data maintenance exacerbates these issues, creating inefficiencies and increasing the risk of errors and delays.

There is a lack of ability to experiment, due to limited opportunities for trialling and piloting solutions to prove their value in an operational setting.

Behavioural and organisational

Organisational territoriality has discouraged companies from participating in supply chain collaboration. Many logistics operators are protective of their client base, and key customers are often wary of competitive concerns. This protective stance can create silos within and across organisations that prevent a holistic view and hinder integration of systems.

Resistance to change is another common issue cited by industry professionals, with many organisations reluctant to adopt new technologies or practices. This stems from uncertainty associated with technology investments, and a hesitancy to commit without any guarantee of benefits and return on investment. A lack of familiarity with sharing data and adopting standardised practices also compounds issues in achieving the data quality and availability necessary for efficient day-to-day operations and decision-making at management level.

Service imperatives are also crucial, due to the competitive nature of the industry. Retailers and customers value the achievement of service levels more highly than cheaper costs, so logistics organisations will often sacrifice potential gains in operational efficiency in order to guarantee customer satisfaction. The pressure on services is exacerbated by the desire to reduce lead times.

Market barriers

The UK logistics market is highly competitive, with tight margins that often lead businesses to protect their information and operate in isolation. This competitive environment is compounded by a strong focus on cost leadership, which discourages companies from working together.

Incentive misalignment also poses a considerable challenge. Power and control imbalances between retailers and suppliers can lead to poor negotiations, opportunistic behaviours, and restrictive commercial agreements that discourage collaboration on data standards. This often results in unmet promises of cost savings and strained relationships between parties.

There is a shortage of skilled operational workers in some key areas, such as transport.

Collaboration enablers

Communication and trust

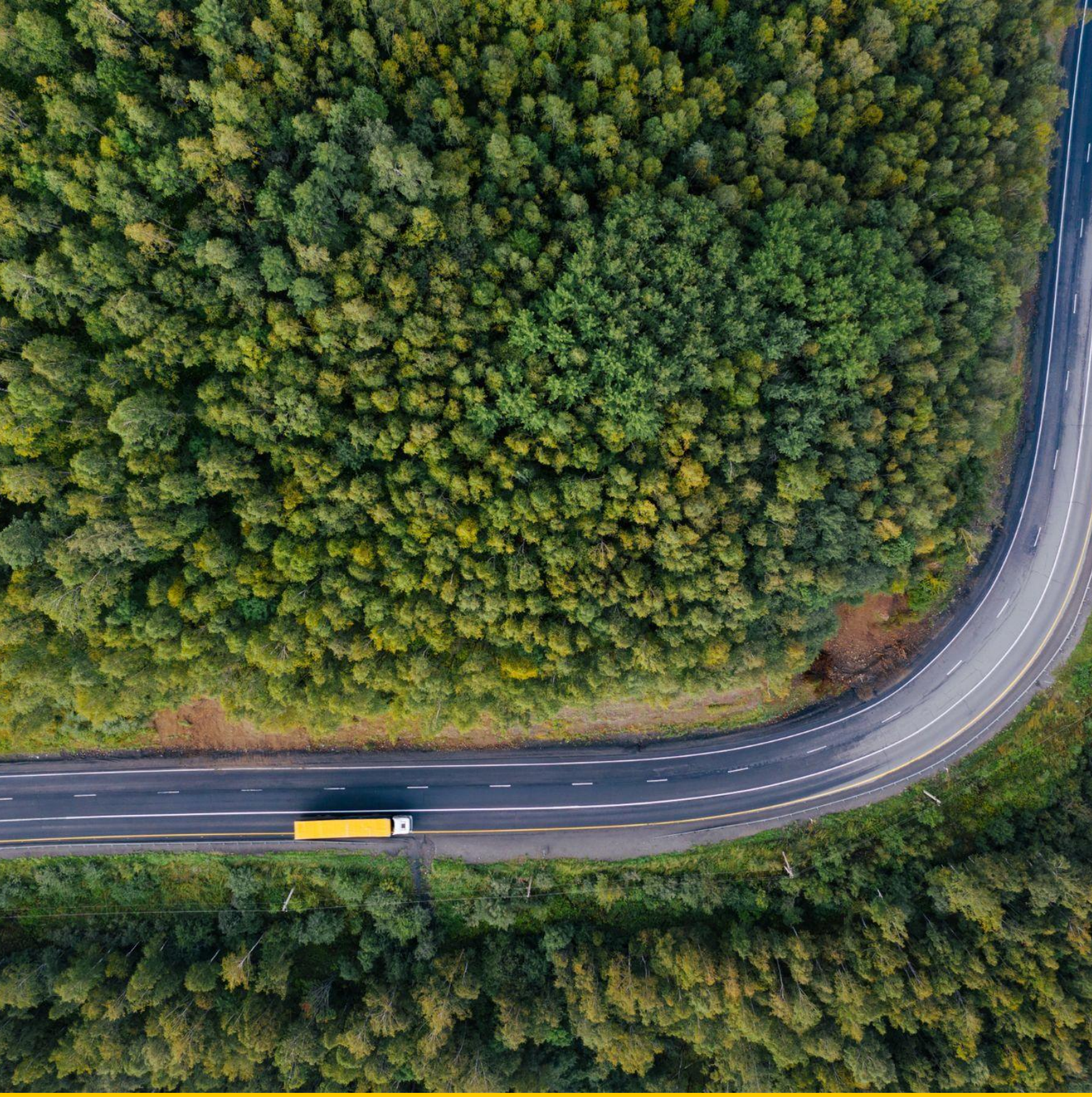
Effective communication and trust between stakeholders is fundamental to successful collaboration. Building trust addresses concerns over data security, control, and potential competitive disadvantages, which can otherwise exacerbate data silos and inefficiencies. Establishing shared goals and benefits, such as reducing costs, increasing efficiency, improving environmental impact, or enhancing customer satisfaction, can play a significant role in aligning interests and fostering collaboration.

Technology and interoperability

Technological advancements and interoperability enable the seamless sharing of information between companies, which is crucial for collaboration. Interoperability and standardised processes ensure that different systems and technologies can work together efficiently, reducing errors and enhancing overall efficiencies. Enabling companies to collaborate, experiment and validate solutions in operational settings can minimise the risk of losses, which is vital for encouraging innovation and the adoption of new technologies.

Organisational synergy and leadership

A collaborative culture, in which all logistics partners are dedicated to working together and openly sharing information, is essential for success. Within each organisation, leadership is needed to provide a clear vision and to demonstrate the commitment to addressing challenges. Mutuality is also essential, with everyone jointly bearing the cost of investment and the risks of new initiatives – as well as the rewards – ensuring that all parties are equally committed to the collaboration's success.



Phase 2: Develop

Phase 2: Develop

The Digital Catapult team applied the learnings from the Discover phase to design and develop a solution that would streamline operations and improve collaboration. This solution incorporates a shared distributed digital infrastructure that enables real-time data sharing between logistics actors, and a matching engine algorithm that correlates available space (capacity) with the requirements for goods to be shipped (orders).

Operational model

The L3 solution assumes a flow of events that relate to real world actions, and results in an anonymised match between a capacity data provider and an order data provider, as shown in Figure 1.

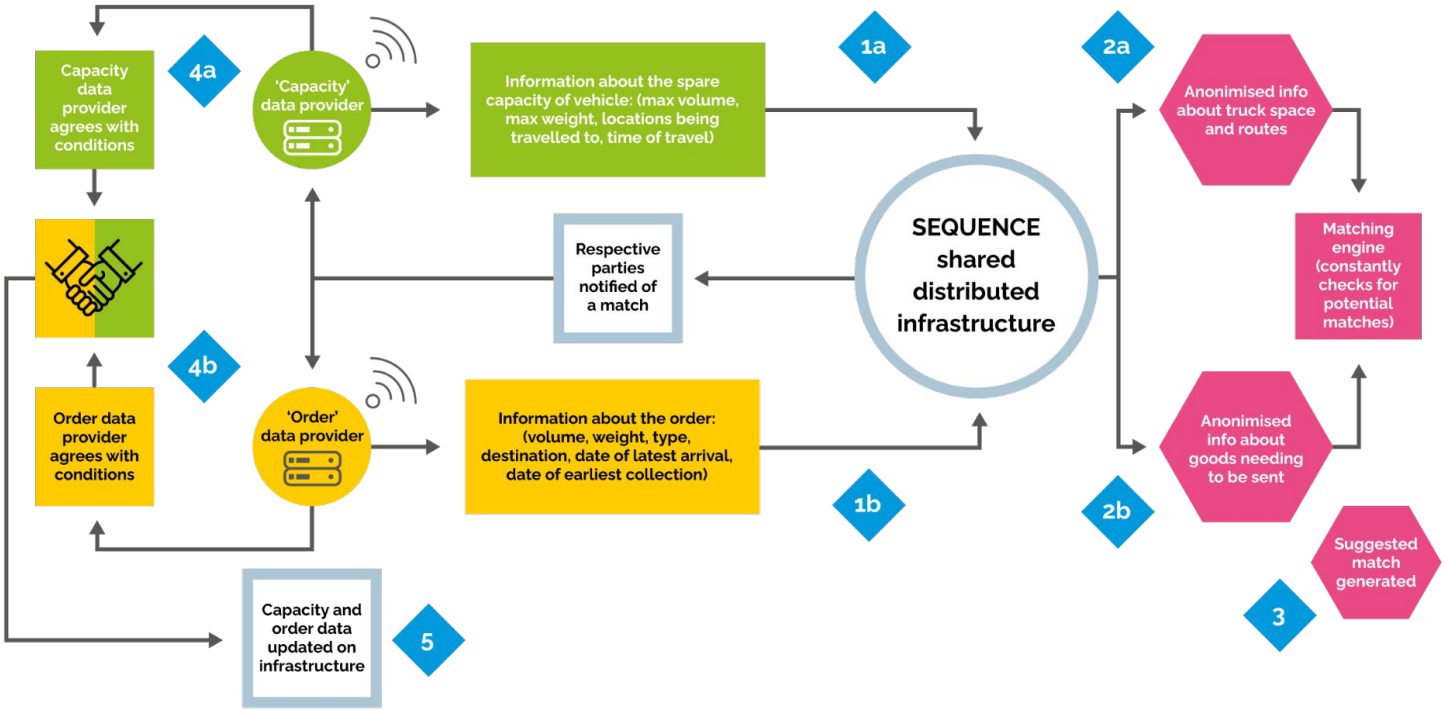
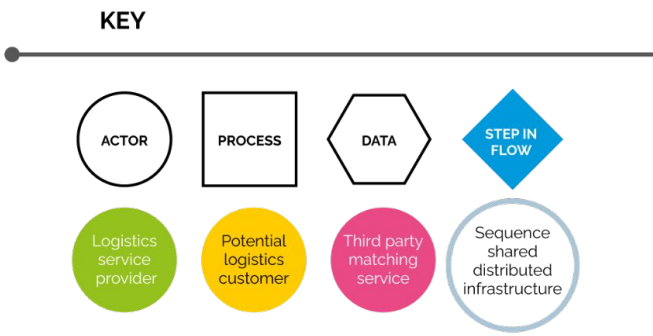


Figure 1: L3 solution operational model

1. *The **capacity data provider** supplies data about the spare capacity they can make available within their fleet. This data would include the maximum volume and weight that can be carried, the approximate locations where capacity will be available, and expected times of travel.*
2. *The **order data provider** supplies data about their shipments, such as volume, weight, type of goods, destination, and critical dates and times.*
3. *The **shared distributed digital infrastructure** (SEQUENCE) enables seamless and secure data sharing with third-party applications and/or other organisations.*
4. *The **integrated third-party matchmaking algorithm** enables the anonymised matching of capacity and order data.*



The Logistics Living Lab solution is scalable and efficient, streamlining operations and reducing costs. It enables participants from the logistics sector to work together effectively and benefit from increased efficiency, while achieving improved environmental outcomes.

Data flow

The flow begins with the capacity data provider and the order data provider each submitting their respective availability and requirement data to the distributed infrastructure, ready for matching. This data includes the required parameters and conditions for identifying an acceptable match, with all relevant resources and requirements clearly defined.

The matchmaking algorithm has permission to access the data submitted. It analyses it, and sends back suitable matches to the relevant data providers. All data is anonymised and is matched only by the parameters defined, and matches can be accepted or rejected by either party. If the match is accepted by both parties, the original submissions are removed from the data pool; if it is rejected by either party, the submissions are returned to the pool for re-matching.

SEQUENCE shared distributed digital infrastructure

Developed by Digital Catapult, the SEQUENCE shared distributed digital infrastructure enables secure, privacy-preserving data sharing among multiple parties. This allows logistics businesses to share critical data, such as vehicle capacity and order schedules, without compromising data control, privacy or security. It creates a virtual pool of common data for matching, with access permissioned by each data owner. Instead of replacing existing systems, it is interoperable – working with them to make data shareable.

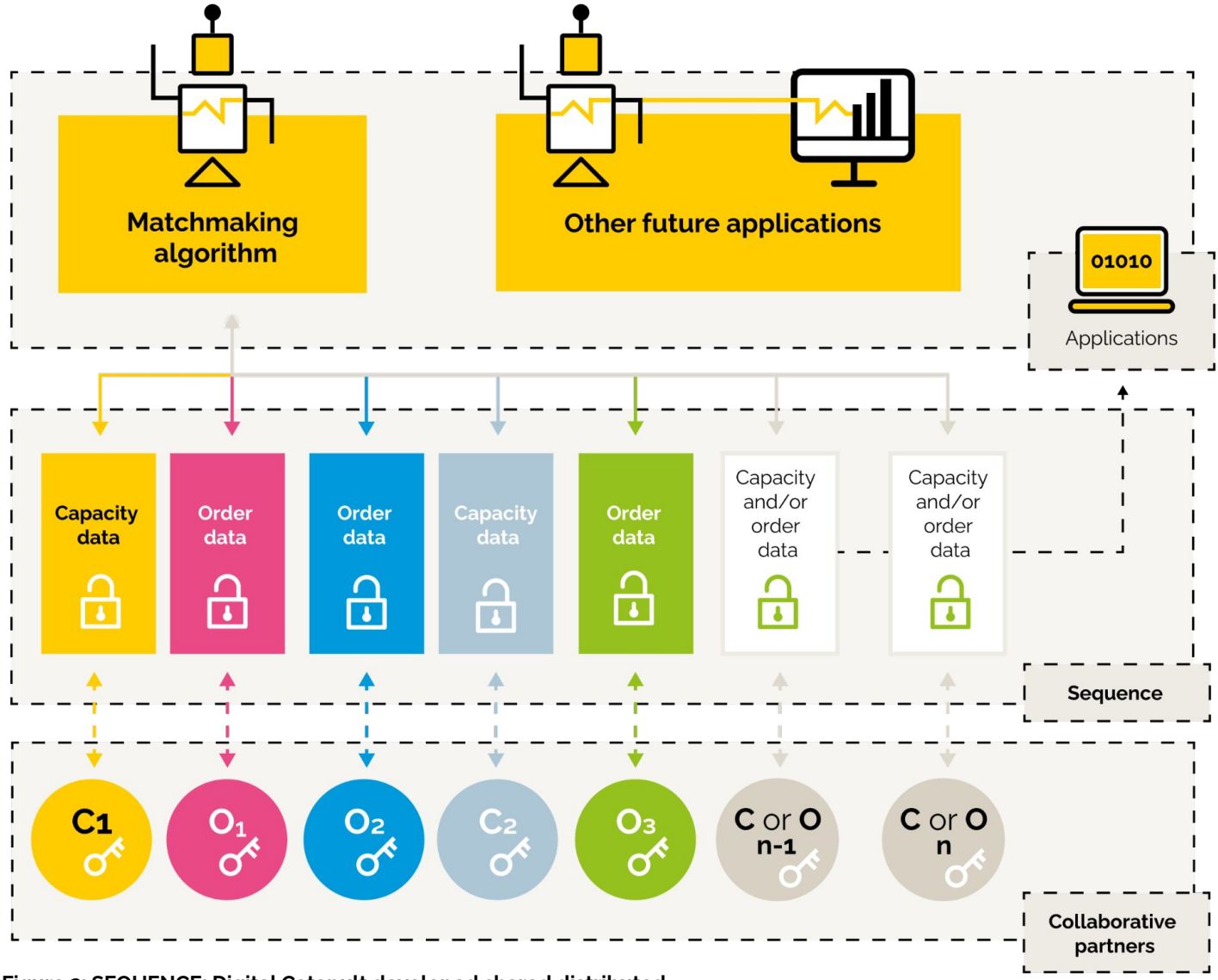


Figure 2: SEQUENCE: Digital Catapult developed shared distributed digital infrastructure

SEQUENCE incorporates distributed ledger technology (DLT) that records all data access and actions, providing accurate audit trails that ensure accountability and foster trusted data sharing among participants. The shared data repository is not owned by any single entity, and each party maintains control over their own data while allowing permissioned third-party algorithms or applications to find a suitable match.

Front-end visualisation

As part of the Develop phase, Incept Consulting developed a transport application to provide a demonstration visual front end, allowing users to upload their necessary capacity and/or order data to the SEQUENCE shared infrastructure. This was then used for the case study in the Demonstrate phase.

Matchmaking algorithm

The integrated matchmaking engine was developed by Fuuse. It operates continuously, analysing the data it has permission to see and identifying potential matches between available transport capacity and orders requiring shipment. The engine considers various parameters, such as the compatibility of volume, weight, and destination, to suggest optimal matches. This automation helps to find synergies quickly, and can also identify matches that might not be apparent during manual processing.

When the matching engine identifies a potential capacity/order match, it alerts the logistics provider and the customer via SEQUENCE. To ensure transparency, it gives details of the match so that both parties can review the proposed collaboration before proceeding. If both agree to go ahead, they can finalise an agreement, with the customer accepting the logistics provider's confirmed terms and conditions. SEQUENCE then updates the shared infrastructure to ensure that the data always remains current.

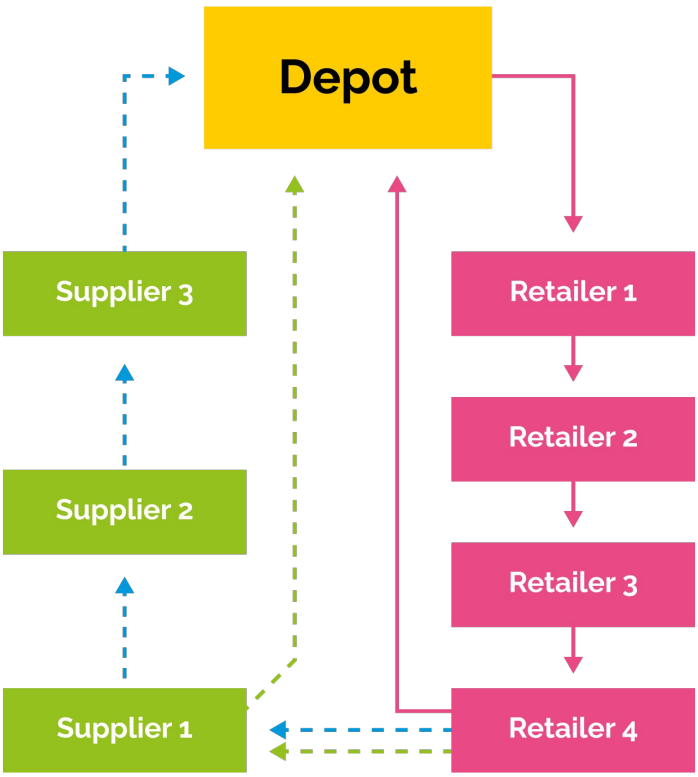


Figure 3 : FUUSE smart routing during the Demonstrate phase

Figure 3 shows how the algorithm was used in the L3 project's industrial case study. It shows a truck's pre-planned route in orange, starting at a depot and delivering goods to retail stores. Once deliveries are complete, the empty truck typically returns to the depot.

The matchmaking algorithm optimised this route by identifying manufacturer/supplier orders also destined for the truck depot, and incorporated them into the return journey. Instead of returning empty (the orange route), the truck can now pick up an order or orders on the way back, maximising efficiency and reducing empty miles (the green and blue routes). This makes productive use of the truck's return trip, improving overall logistics efficiency and reducing associated carbon emissions.

Collaboration models

Collaboration models are the participation mechanisms enabled by the L3 solution's capabilities, and define how multiple logistics parties can collaborate effectively toward a common objective. There are three distinct models that each provide a unique perspective on control, ownership, and value distribution.

Orchestrator model

In this approach, a well-established large retailer, such as AF Blakemore, takes on the role of orchestrator. This organisation would host the SEQUENCE infrastructure, ensuring fair access for all participants and distributing the value generated across the network equitably. Optimisers are invited to participate if they can demonstrate the value they bring to the network's participants.

Cooperative model

A cooperative or crowdsourced organisation would manage SEQUENCE infrastructure to ensure neutrality, transparency, and equitable value distribution. In this model, optimisers are selected according to the priorities and collective goals of the cooperative's members.

Marketplace model

Similar to platforms like app stores, e-commerce marketplaces or auction sites, the marketplace model allows participants and optimisers to engage openly with the L3 infrastructure. Participants can establish their own working methods and data standards for sharing information, creating an open and flexible environment for collaboration.

By providing an agnostic, flexible technology stack and technical expertise it is possible to support all three of these models. As a neutral and independent organisation, Digital Catapult is able to develop and maintain the SEQUENCE infrastructure, and ensure that the collaboration framework operates effectively, allowing participants to focus on their respective roles and responsibilities.

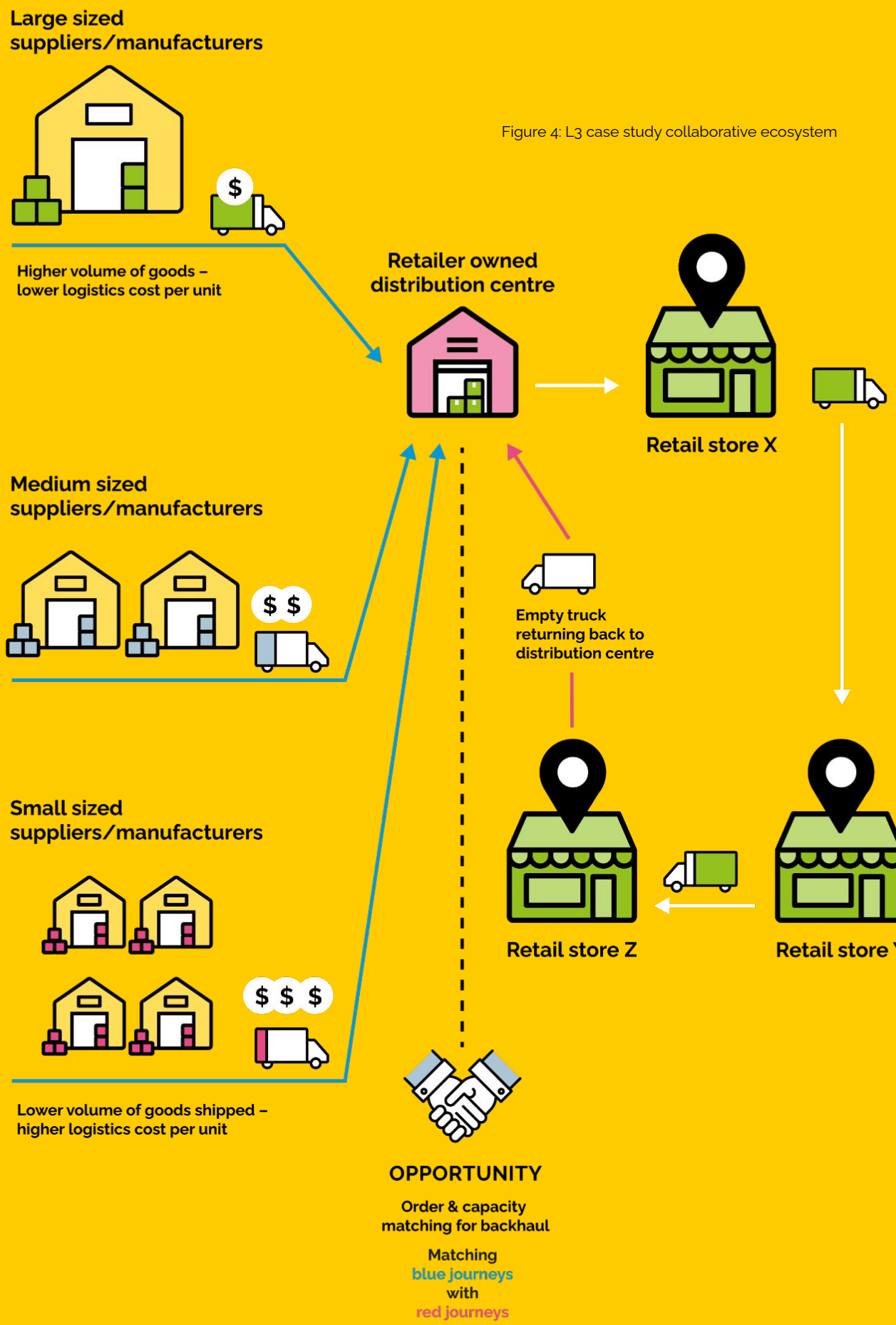


Figure 4: L3 case study collaborative ecosystem

Business model

Although the L3 solution is adaptable and flexible, making it suitable for numerous real world use cases, the L3 project used a specific case study to validate and demonstrate its value. This was centred on supporting manufacturers by leveraging the empty space within the retailer's logistics fleet during the onward journey.

Suppliers or manufacturers delivering to their customers' distribution centres face high logistics costs, which can account for up to 30% of their operating expenses. Retailer delivery vehicles leave the distribution centre loaded to full capacity, delivering orders to stores, and then running back to the distribution centre empty, wasting capacity on that return journey.

The business opportunity here lies in matching outgoing deliveries from manufacturers or suppliers to the empty return journeys of the retailer's fleet. This model supports smaller manufacturers and suppliers by helping them lower their transport costs, allowing them to compete more effectively while operating synergistically with their customers. Concurrently, this creates the opportunity for logistics firms to offer their services, making use of available capacity on empty return journeys. Retailers can optimise fleet utilisation while providing a more cost-effective logistics solution to the manufacturers who are directly supplying them.

Governance model

A shared infrastructure approach requires an effective governance model to underpin the system's operational use, while ensuring accountability, transparency, and effective decision-making on an equitable basis throughout. The L3 approach to governance was to define an agnostic framework that could be used to support and enable different configurations and contexts.

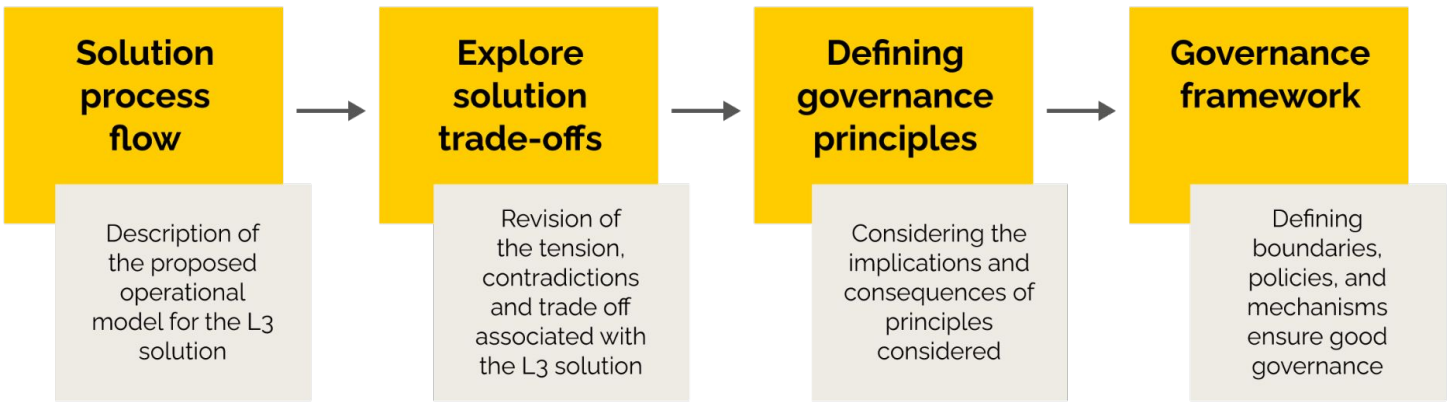
There are four sequential steps to creating a governance framework to support the decision-making processes required in an operational context.

Step 1 is to define the solution process flow, outlining the operational model and how participants interact within the system.

Step 2 is to explore trade-offs and tensions to identify potential challenges or contradictions, enabling a revision of priorities and transparent conflict resolution within the context of how the system and corresponding actors would operate and behave.

Step 3 is to develop the governance principles, taking into account the implications and consequences of the rules established. These principles would serve as the driver of core outcomes for the collaborative ecosystem through objectives that have been collectively agreed. These may include achieving cost reductions, increasing small player participation, ensuring sustainability, and maximising equitable value distribution across participants.

Step 4 is formalisation of the governance framework by setting boundaries, policies, and mechanisms that ensure good governance within a bounded scope, and which can be iterated and evolved over time. It would initially address assumptions such as who can participate, how benefits are distributed, and how exception scenarios are managed and reconciled. This ensures the governance model remains adaptable to the system's evolving needs, fostering effective collaboration while maintaining accountability.



Phase 3: Demonstrate

Phase 3: Demonstrate

Case study: AF Blakemore & Son Ltd retail logistics

There is a wide basis of application for the L3 solution. For this case study, the opportunity lay in optimising backhaul operations within the Blakemore logistics network. The Digital Catapult team was able to test the solution using the historic operational datasets that Blakemore made available for the project, and assess how well it addressed logistical inefficiencies in real-world situations and enhanced collaboration across the supply chain.

This is a case study of one particular use, and so should not be interpreted as a market description – this is just one example of how the L3 technology can be leveraged to create collaboration for operational gain across industry.

Operational context

Identifying supplier locations and backhaul opportunities is a complex and challenging task. For Blakemore, this means a consistently high percentage of empty miles. For suppliers that typically deliver in small quantities of between one and five pallets per shipment, transportation costs are higher, as they have even less visibility into potential partners for collaboration. The ability to coordinate deliveries with other suppliers is also limited, unless a retailer aligns the order and delivery schedules.

The L3 project looked at enhancing transportation collaboration by integrating logistics systems, aligning delivery routes with supplier distribution centres, and identifying groups of suppliers to consolidate their shipments for pickup via Blakemore's backhaul operation. This took into account vehicle capacity and other critical factors using optimisation and costing tools.

The sample dataset for suppliers (selected UK manufacturers of snack foods) focused on the movement of ambient goods within a window of several months. The vehicle data related to the fleet used by Blakemore logistics during the same period.

The L3 solution used this data on fleet operations, order information, and supplier postcodes to map the journeys to and from retail stores, suppliers, and Blakemore's distribution centres.

Methodology

Establishing a baseline
Incept established baseline KPIs by analysing historical logistic data from Blakemore, including total miles, instances of empty running in Blakemore and supplier fleets, costings, cube miles (volume moved), and associated CO2 emissions. These KPIs provided a foundational understanding of current logistics performance, and served as a benchmark for the project case study, enabling measurement of the L3 solution impact, and clear identification of cost savings, operational efficiency, and environmental benefits.

Transport optimisation
Fuuse provided the matchmaking algorithm which integrated with the SEQUENCE infrastructure. This algorithm synchronised transportation routes and reduced empty running miles by aligning delivery schedules and ensuring that trucks met necessary standards.

By using backhaul opportunities and observing delivery time windows, the routes from various Blakemore distribution centres could be optimised to increase fleet efficiency. This optimisation would reduce logistics costs and significantly lower carbon emissions.

Order optimisation
The order optimisation solution was provided by Incept, and was complementary to the L3 project scope. The eNVM (eNetwork value model) and eNVO (eNetwork value optimiser) are robust tools for this purpose.

- The eNVM analyses end-to-end costs and CO2e emissions, providing detailed and accurate assessments that help identify potential savings.
- The eNVO optimises orders, enabling retailers and suppliers to collaborate on logistics efficiency. It selects the best order type based on applicable rules and constraints (such as pick-to-zero policies, where a good is picked until there is nothing left, or the shelf life of chilled products). The system calculates the days of supply held in distribution centres and stores, and ensures that stock levels are always maintained within determined limits and delivery cycles.

Outputs

Figure 6: L3 benefits data from Incept for average end-to-end saving per case on a pallet of goods.
Based on potential savings indicated by findings from generic cost and productivity data, not AF Blakemore actual costs.

L3 Cost benefits by intervention

L3 Cost benefits eNVO order optimisation only				
	Current	L3	Var	Var %
Supplier	£ 0.44	£ 0.40	-£ 0.04	-9%
Retailer	£ 0.10	£ 0.09	-£ 0.01	-10%
	£0.54	£0.49	-£0.05	-9%

L3 Cost benefits eNVO + L3 Transport collaboration				
	Current	L3	Var	Var %
Supplier	£ 0.44	£ 0.29	-£ 0.15	-34%
Retailer	£ 0.10	£ 0.05	-£ 0.05	-50%
	£0.54	£0.34	-£0.20	-37%

L3 CO2e benefits - L3 Transport collaboration		
Supplier scope 3 CO_2e	Km reduction PA	CO_2e reduction at 20% adoption
	900,000 Km	819 tCO2e

Figure 6

Figure 7: L3 benefits data from Incept for estimated aggregate savings for a collaboration of 20 organisations. Based on potential savings indicated by findings from generic cost and productivity data, not AF Blakemore actual costs.

L3 Cost benefits by intervention

Per 20 Customers			
	Benefit per 200k cases	Benefit per 1m cases	Benefit per 10m cases
Supplier	-£ 160,000	-£ 800,000	-£ 8,000,000
Retailer	-£ 40,000	-£ 200,000	-£ 2,000,000
	-£ 200,000	-£ 1,000,000	-£ 10,000,000

Per 20 Customers			
	Benefit per 200k cases	Benefit per 1m cases	Benefit per 10m cases
Supplier	-£ 600,000	-£ 3,000,000	-£ 30,000,000
Retailer	-£ 200,000	-£ 1,000,000	-£ 10,000,000
	-£ 800,000	-£ 4,000,000	-£ 40,000,000

Per 20 Customers			
	Benefit per 200k cases	Benefit per 1m cases	Benefit per 10m cases
	0.3 tCO2e	1.6 tCO2e	16.4 tCO2e
	Tonnes reduction in CO_2e emissions		

Figure 7

Results

The Blakemore case study clearly demonstrates that the L3 solution effectively addresses three critical logistics challenges to deliver cost savings and sustainability improvements across the supply chain:

- **Increasing vehicle fill**
  The first challenge is the low vehicle fill rate, which currently averages 60%. Through eNVO order optimisation, the L3 solution improves how goods are arranged on pallets, resulting in a 9% increase in pallet efficiency.

- **Increasing vehicle fill and reducing empty running via transport optimisation**
  By integrating L3 transport optimisation and eNVO order optimisation, vehicles can be scheduled to collect additional loads on their return trips, leading to a significant improvement in vehicle fill rates, and a potential 37% reduction in transport costs for a retailer like Blakemore.

- **Reducing CO2e from empty running**
  Using the L3 solution significantly lowers the environmental impact of logistics by reducing CO2e from empty miles. For every 900,000 km reduced annually, suppliers could achieve a CO2e reduction of 819 tonnes. The L3 demonstration indicated a potential to reduce transport CO2 emissions by 15%-30%. These reductions correlate to expansion of the backhaul operation, and could be greater in other organisations when addressing other core inefficiencies within the overall logistics supply chain.

Conclusion

Conclusion

The logistics sector is a key driver of the UK economy, significantly contributing to both trade and employment. However, the industry faces ongoing challenges, including rising costs, transportation inefficiencies, and environmental impacts. These issues are exacerbated by the high percentage of empty truck journeys, which not only waste resources but also contribute to increased CO2 emissions.

The Logistics Living Lab project offers a scalable solution that reduces inefficiencies. By deploying the SEQUENCE shared distributed digital infrastructure, logistics operators can collaborate to enhance productivity, reduce operational costs, and contribute to global sustainability goals.

The project's phase 3 case study with AF Blakemore highlights the potential real-world application and benefits of the L3 solution. Blakemore leveraged the L3 platform to optimise transport routes and increase vehicle utilisation, enabling them to reduce empty running by expanding backhaul, improving pallet load intensity, and optimising the coordination of order shipments with suppliers. Using real historical data for order and transport optimisation, the company was able to validate the reduction of empty running, align supplier deliveries with existing routes, and achieve better utilisation of available vehicle capacity.

- **The results from the Blakemore case study showed that using the L3 platform enabled an improvement in vehicle fill rates by 9%, and reduction in transport costs by 37%.**
- **By reducing empty miles, Blakemore could achieve a substantial reduction in CO2 emissions, with the potential to reduce emissions by 15%-30%, demonstrating the environmental benefits of L3's collaborative approach.**

The project also developed collaborative models that promote synergy across the logistics industry, fostering innovation, more effective cooperation, and shared success. To ensure transparency, accountability, and efficiency within the system, refined governance models are key to building trust among stakeholders and enabling fair participation for all those involved.

Future opportunities

Looking forward, the project clearly identified two parallel directions of travel for iterative build out of the technology infrastructure approach:

1. Expansion of the marketplace
2. Expansion of the solution capability

Expansion of the marketplace

The data-sharing approach unlocks opportunities for collaboration in ways that may not be otherwise considered, particularly where organisational operations overlap to present the potential for collaborative value generation. Business operations don't naturally facilitate this type of consideration from a day-to-day operational perspective, or within existing business models.

"Decarbonisation is the biggest challenge of the age and the pressure on the logistics sector to play our part is significant. We must deliver this in line with our efforts to overcome challenges in trade, insufficient infrastructure and a shortage of skills.

What the Logistics Living Lab project has demonstrated is that digital technologies and close industry collaboration can play a crucial role in accelerating the journey to net zero, allowing UK logistics businesses to focus on optimising their operations to contribute to boosting growth for the UK economy."

Phil Roe, President, Logistics UK

Complementary transport use cases can naturally become the target for collaborative opportunities, and could include or support:

- Reductions in urban congestion
- Local vs national geographical optimisation of transport
- Waste removal and reuse of assets
- Other sectors with high empty running, such as construction
- Alternative modalities of transport, including rail and maritime shipping

Expansion of the marketplace

In parallel to applying more scenarios, the technology can also be enhanced to provide deeper value in existing contexts through enhanced technology functionality. These could include:

- Transactional payments
- Ensuring swift and secure settlements between stakeholders, streamlining financial processes within the logistics ecosystem.
- Intelligent facilities and systems
- Leveraging automation and intelligence to create smart-tracked cases, layers, pallets, trucks, and depots, enabling real-time monitoring and predictive decision-making.

Made Smarter Innovation | Digital Supply Chain Hub

The Made Smarter Innovation | Digital Supply Chain Hub is a digital innovation programme that empowers individuals and organisations to work together to make supply chains smarter. Developed by Digital Catapult and funded by the Made Smarter Innovation challenge, the programme is designed to transform UK manufacturing through digitally empowered supply chains that are more efficient, resilient and sustainable.

The Digital Supply Chain Hub is helping businesses realise the relevance and critical value of digital supply chain technology by improving the flow of data through supply chains and the surrounding ecosystems. The application of digital tools and deep tech solutions creates opportunities to connect systems and value chains, creating a robust data system which can be leveraged to meet the supply chain challenges of today and tomorrow.

The programme ambition is to work with all layers of the supply chain, creating a collective movement designed to make supply chains run smoother. From manufacturing and industry, materials suppliers, supply chain influencers and technology solution providers, the Digital Supply Chain Hub is building opportunities to build and support supply chains that are:

- Powered and empowered by digital technology and innovation
- Collaborative in practice
- Resilient by nature
- Adaptive to today's challenges
- Prepared for future challenges
- Fully optimised (flows)

Building on the success of the Made Smarter Innovation programme, the Digital Supply Chain Hub platform aims to advance strategic collaboration between manufacturers and digital solution providers. The platform will meet industry demand to accelerate the digitalisation of supply chain operations, driving resilience and sustainability through the application of deep tech solutions.

The platform is designed to increase the adoption of digital solutions in UK manufacturers by facilitating connections and knowledge sharing with digital solution providers and academia. The hub offers tailored matching capabilities to connect businesses with the right partners to help address specific supply chain challenges. Members can:

- Connect with businesses and supply chain professionals
- Assess data readiness and supply chain resilience
- Learn about digital supply chains with bespoke educational courses
- Discover new partners with the UK supply chain directory
- Explore case studies of real-world deep tech adoption

Members will also be able to connect and contribute to discussions through the platform's Circles feature, community forums set around key supply chain topics.
The hub is open to businesses of all sizes and can help tackle problems often encountered during the search for a suitable supply chain partner.

Visit hub.digitalsupplychainhub.uk to sign up

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