CATAPULT Digital

Logistics Living Lab (L3): Observer Gallery

Get set for the future. **Now**

MADE SMARTER INNOVATION

DIGITAL SUPPLY CHAIN HUB

Agenda

Introductions

Digital Catapult Overview

The L3 Solution

Q&A / Open Discussion

About Digital Catapult

Our mission is to accelerate industry adoption of advanced technologies, driving global advantage and growth in the UK economy

We create new opportunities through collaboration and innovation

Digital Catapult is the UK authority on advanced digital technology

Digital Catapult is a ‘not for profit’ organisation and is industry neutral

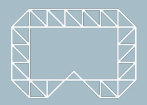
Digital Catapult Core Application Areas and Key Technologies

Virtual environments

Supply chains

Digital infrastructure

Future Networks – 5G, IoT



Immersive technologies

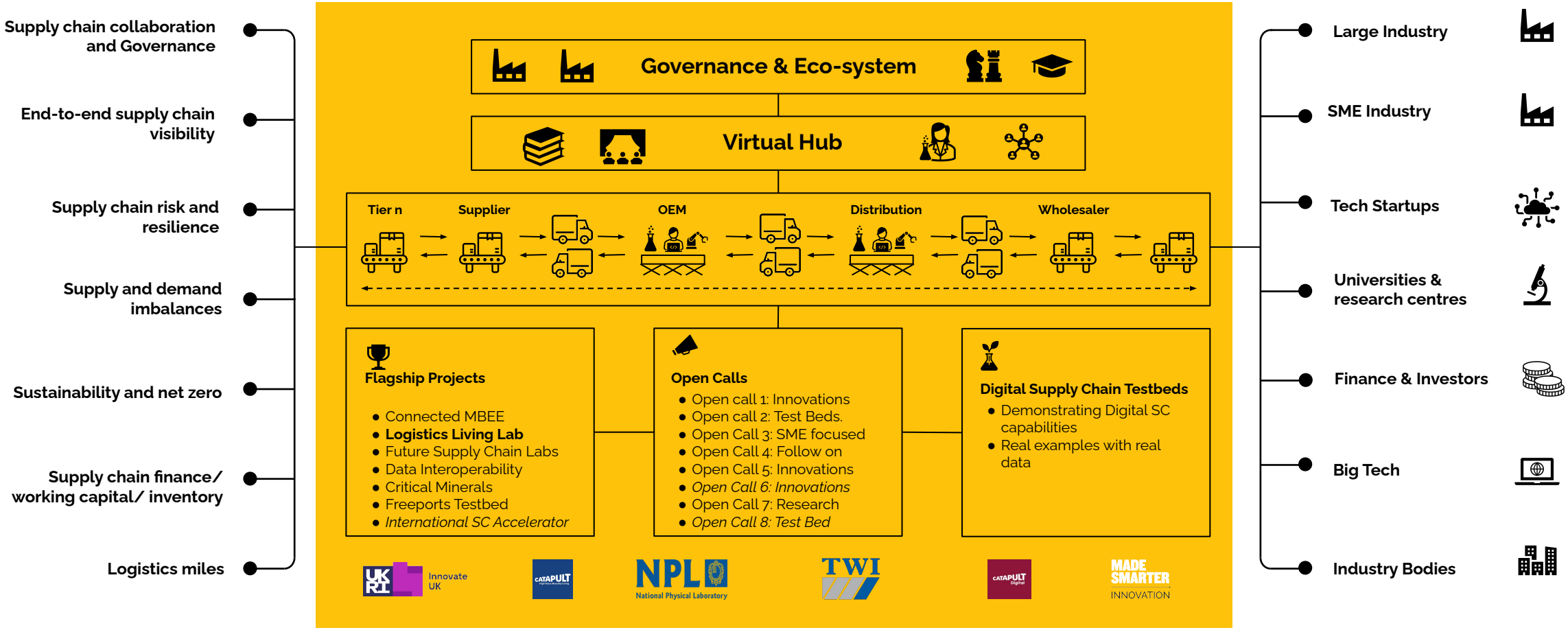
Artificial Intelligence and machine learning

Distributed ledger technologies and distributed solutions

Quantum technologies

Made Smarter Innovation: Digital Supply Chain Hub

£30M has been invested in creating a portfolio of digital capabilities to deliver smarter supply chains.



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The L3 Solution

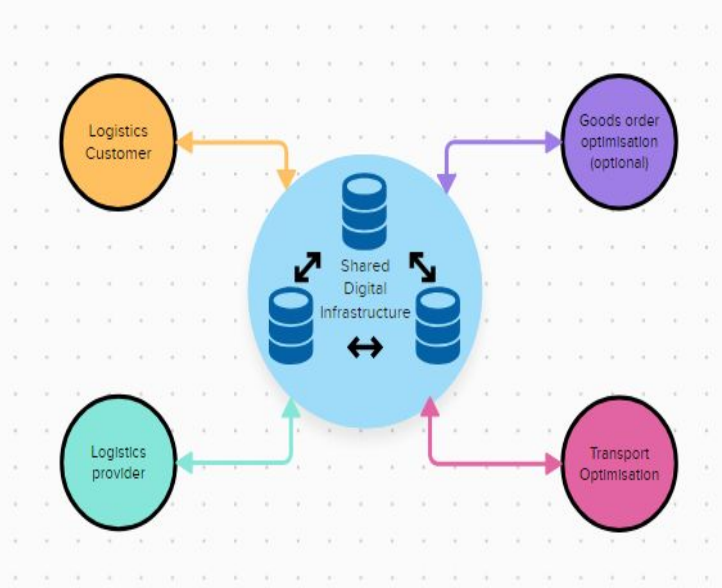
L3 Flagship Project - Logistics Living Lab

Objective: To improve efficiency, vehicle utilisation, and reduce carbon emissions within logistics, through **collaboration**, using advanced digital technology

Why? - All parties in the supply chain face increasing pressure to be more productive and efficient, whilst acting to reduce their carbon footprint.

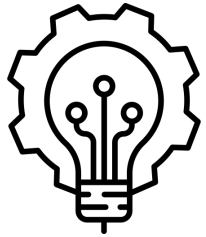
What? - A **secure shared digital infrastructure** enabling road logistics collaboration, matching spare capacity with demand utilising **already available data** and synchronising real world cross-organisation business flows.

How? - The digital solution will be applied to an existing transport network to prove value driven collaboration works.



Barriers to Collaboration

Collaboration across organisations is key to unlocking the full potential of collective resources and capabilities, creating further value in doing so.

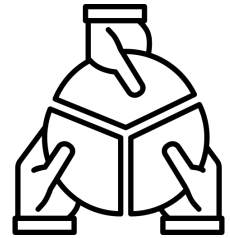


Technical Barriers

- Securely sharing data
- Ability to experiment
- Fragmented Legacy Systems

Behavioral and Organisational Barriers

- Operational Silos
- Resistance to Change
- Service Imperative



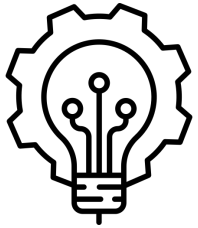
Market Barriers

- Communication & Trust
- Market structure
- Competition

Enablers of collaboration

Communication & Trust

- **Communication and trust:** Effective communication and trust are essential for any successful collaboration.
- **Shared goals:** This could include goals such as reducing costs, increasing efficiency, improving carbon footprint or enhancing customer satisfaction.



Technology and Interoperability

- **Information sharing & Security:** Sharing *already available* information seamlessly and securely.
- **Interoperability & Standardised processes:** Streamline communication and collaboration between logistics partners.
- **Effective Testing:** Ability to test and experiment in an operational setting, de-risking innovation.

Organisational Synergy & Leadership

- **Culture:** All logistics partners need to be committed to working together and sharing information.
- **Leadership:** A clear vision for the collaboration and a commitment to resolving challenges is critical.
- **Mutuality:** A willingness to share risks and benefits in order to collaborate effectively incl. sharing the costs of investments or the risks associated with new initiatives.

Visualising L3

Shared digital infrastructure for common logistics operations, ensuring **order optimisation, transport optimisation, order and capacity matching** and **data sharing** for each participant. Utilising **already available** data, L3 works **alongside** your current TMS & WMS solutions to positively augment workflows

Collaborative Partners

Supplier Orders

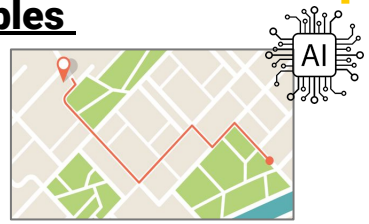
Capacity Availability

Data

Shared Digital Infrastructure

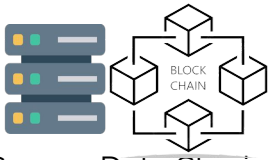
L3 Enables

Order Optimisation

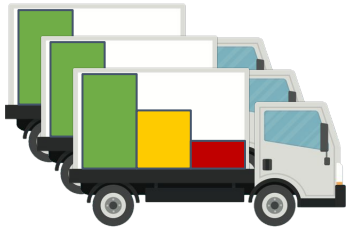


Transport Optimisation

Order & Capacity Matching

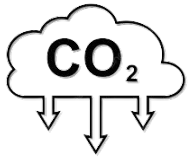


Secure Data Sharing



Less Empty Running

Data



Reduced CO2 emissions

Data

Cost Analysis & Savings

Underpinned by a Collaborative Operational Model

SMARTER INNOVATION | DIGITAL SUPPLY CHAIN HUB

Case Study:
End to end supply chain order optimisation & transport collaboration

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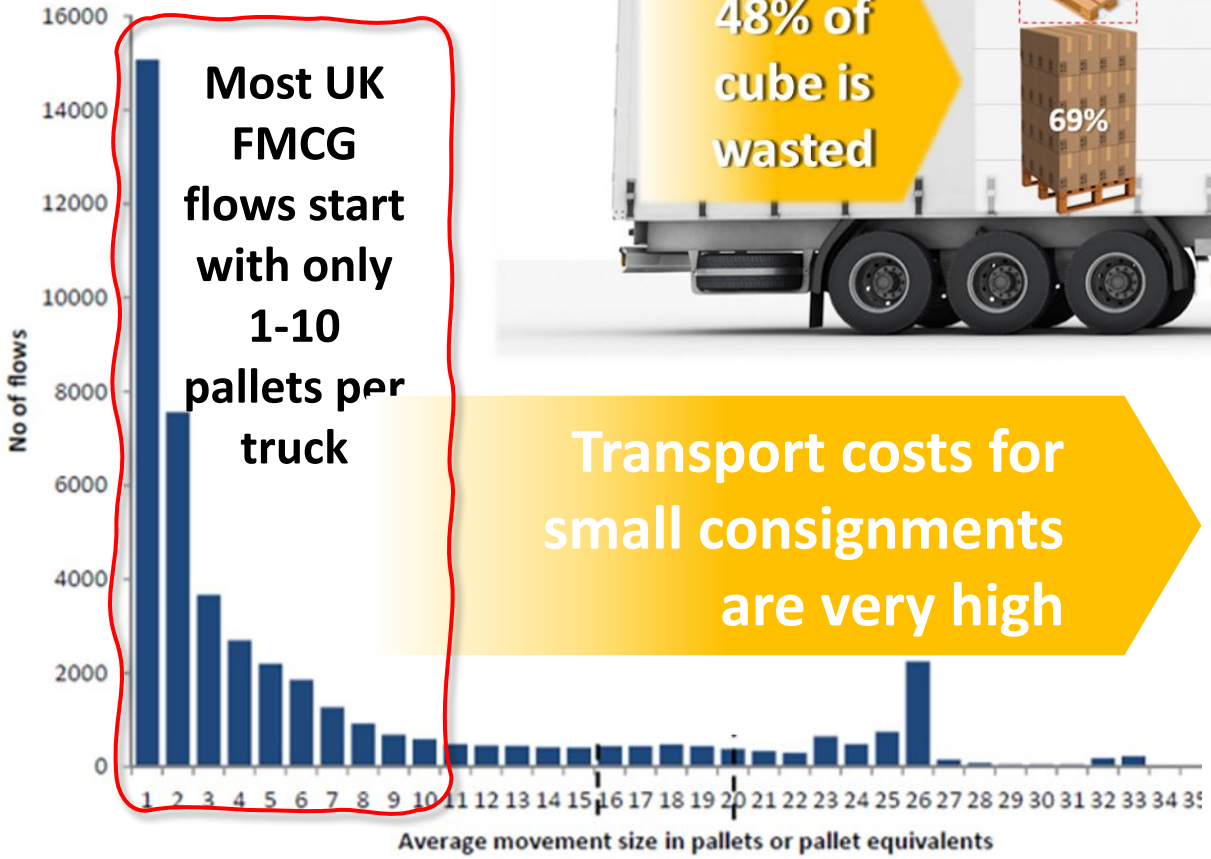
The problem areas the L3 case study aims to address

UK Food industry logistics challenges

Logistics Living Lab (L3)

incept INCEPTION CONSULTING LTD



Most UK FMCG flows start with only 1-10 pallets per truck

Transport costs for small consignments are very high

Order fulfilment costs are being driven up

Sources Eurostat 2016, Empty running - Eurostat 2017 is 23.1% - TSGB 2018 UK is 28.2% Food Supply chain KPI study DfT 2007, Graph IGD / Heriot Watt / Palmer Starfish project, Truck image ASDA

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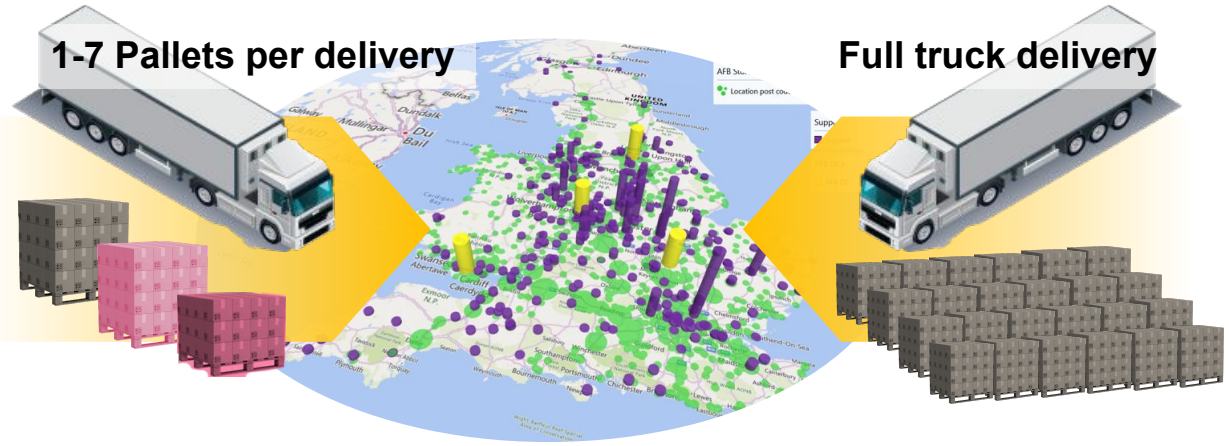
Setting the Scene

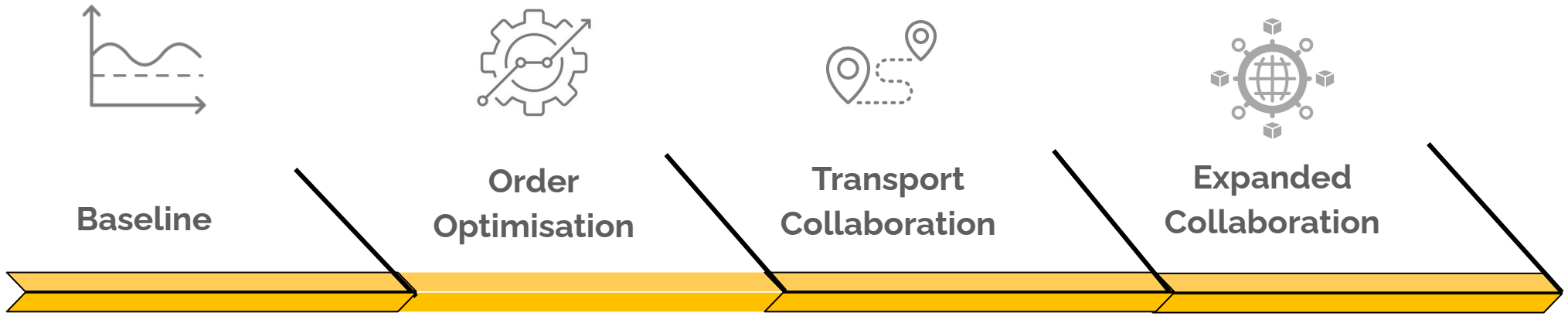
Responsible parties: Incept (data analysis), Fuuse (matchmaking), Digital Catapult (shared infrastructure)

- Many small suppliers have only 1-5 pallets per delivery resulting in high transport costs
- Suppliers have no visibility of potential partners & opportunities for transport collaboration
- And are constrained to deliver when retailers order preventing them collaborating with other suppliers unless order & delivery dates are synchronised by the retailer
- That generally result in challenges to using lower cost backhaul & shared transport options
- AF Blakemore (AFB) have significant backhaul operations
- And work on E2E flow optimisation
- But the process intensity of identifying supplier locations & opportunities to increase backhaul currently impedes reduction of empty running

- L3 created an algorithm to match store delivery routes with supplier DCs against vehicle capacity, driver hours, cost & other key constraints
- Using AFB fleet operations, order data & supplier postcodes the algorithm maps & identifies the relationships of stores to supplier & AFB DCs
- Finding over 35% of 500 suppliers were in viable postcode groups or routes for collaboration



L3 Solution High-level Scope



- Measure the baseline operational cost of transport logistics

Complementary to L3 project scope

- Orders within vehicles optimised to improve the consolidation of orders: Pallets > Layers > Cases, reducing picking effort, and increasing better utilisation of space on pallets.

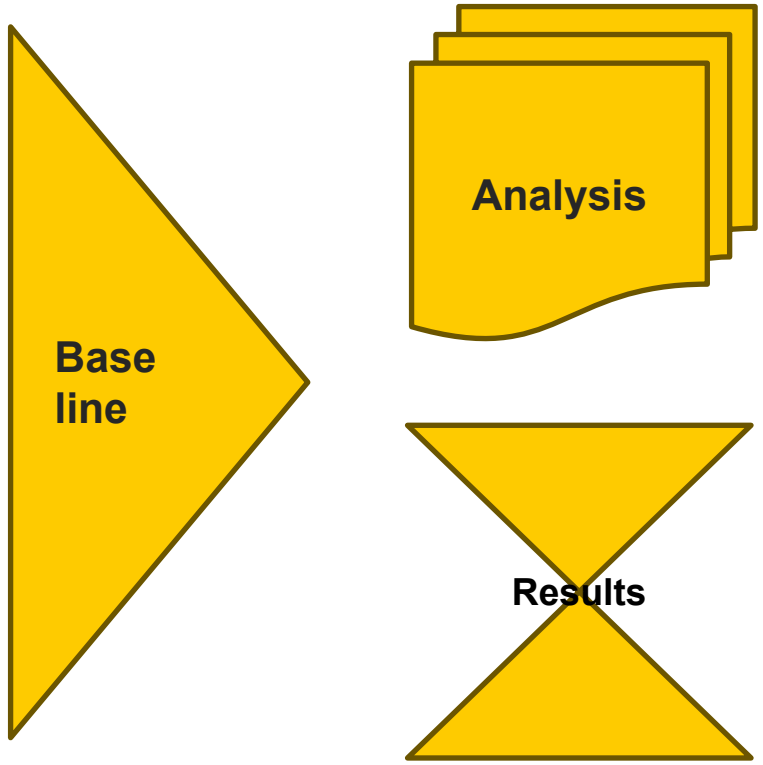
- Identify supplier transport collaboration opportunities based on geographical location.
- Model collaborative transport from supplier locations against Blakemore fleet movements.
- Comparative analysis vs baseline on Cost and CO_2.

- Expand collaboration with additional suppliers, retailers, and other transport providers within existing logistics networks.

Establishing a Baseline

UK Grocery retail distribution

- ***Has high levels of transport empty running***
- ***Small suppliers have <10 pallets per delivery causing high costs***
- ***Organisations have no visibility of potential transport collaborators***
- ***Drive to reduce inventory has driven up costly case & layer order picking***
- ***Retailer inventory systems often don't order in exact multiples***



Data for baseline KPIs

- *Fleet operations & empty running Km >6,000 deliveries*
- *Supplier pallets per delivery*
- *Current case, layer & pallet order mix*
- *Generic industry cost rates*

Baseline KPIs

- *Fleet operations & empty running KMs*
- *Supplier pallets per delivery*
- *Current case, layer & pallet order mix*
- ***E2E Costs (Generic)***

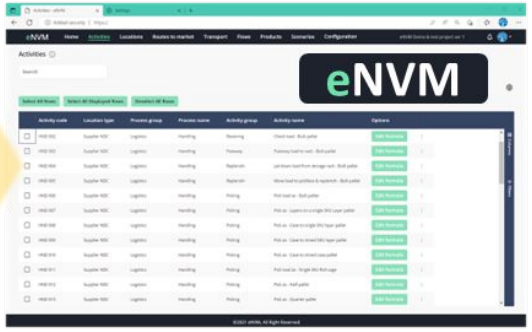
eNVM & eNVO Solutions used in L3

Responsible party: Incept

eNVM Provides E2E cost & CO_2e analysis *(Web based)*

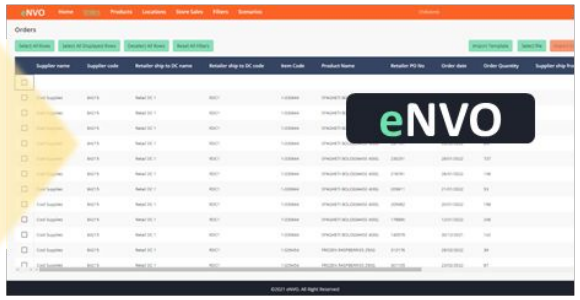
eNVM *(eNetwork Value Model)* is the cost profit packaging & CO_2e analytic

Providing detailed accurate costing to identify savings & avoided costs

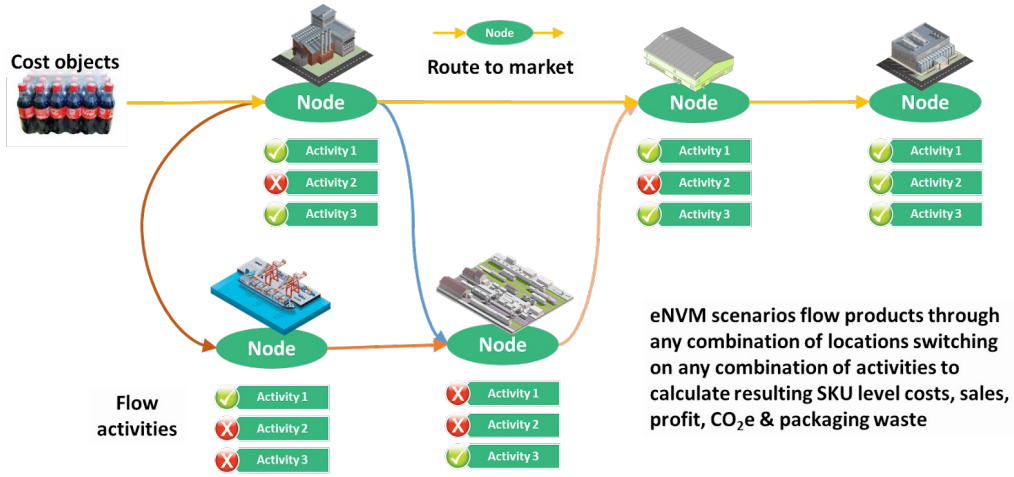


eNVO Provides order optimisation

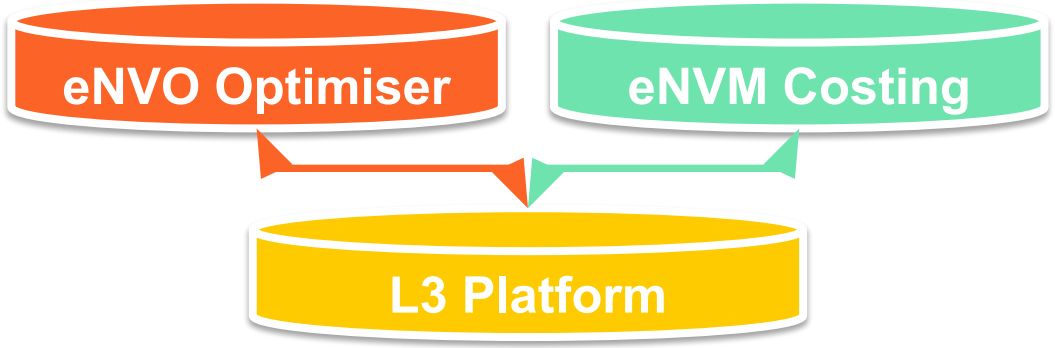
eNVO *(eNetwork Value Optimiser)* is the collaborative E2E order optimiser



eNVM Costing conceptual framework



L3 Solution map

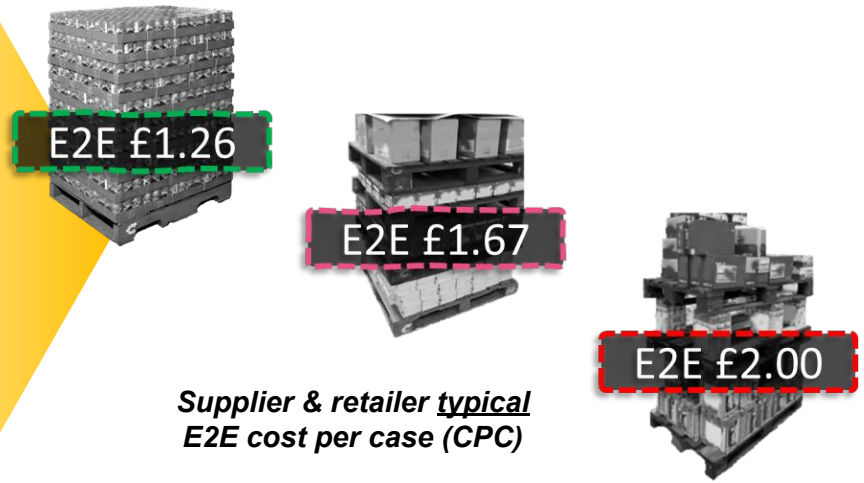


Order Optimisation approach

Responsible party: Incept

- *Optimisation can be done by retailers & suppliers can optimise collaboratively with retailers*
- *eNVO selects the best order type against a mix of rules & constraints including pick to 0 & date life on chilled*
- *Calculating SKU days of supply (DOS) in DCs & in-store while ensuring stocks are within retail DC & in-store safety stock limits & delivery cycles*
- *The L3 optimisation sample was 7,285 Ambient products (SKU) from 342 suppliers x 42,603 orders X 4.5 months*
- *Scenario target of 10 days of supply (DOS) in retail DC with 10% tolerance on DOS for 6 AFB DCs*

- *Order type mix of cases layers & pallets are a critical E2E cost driver*



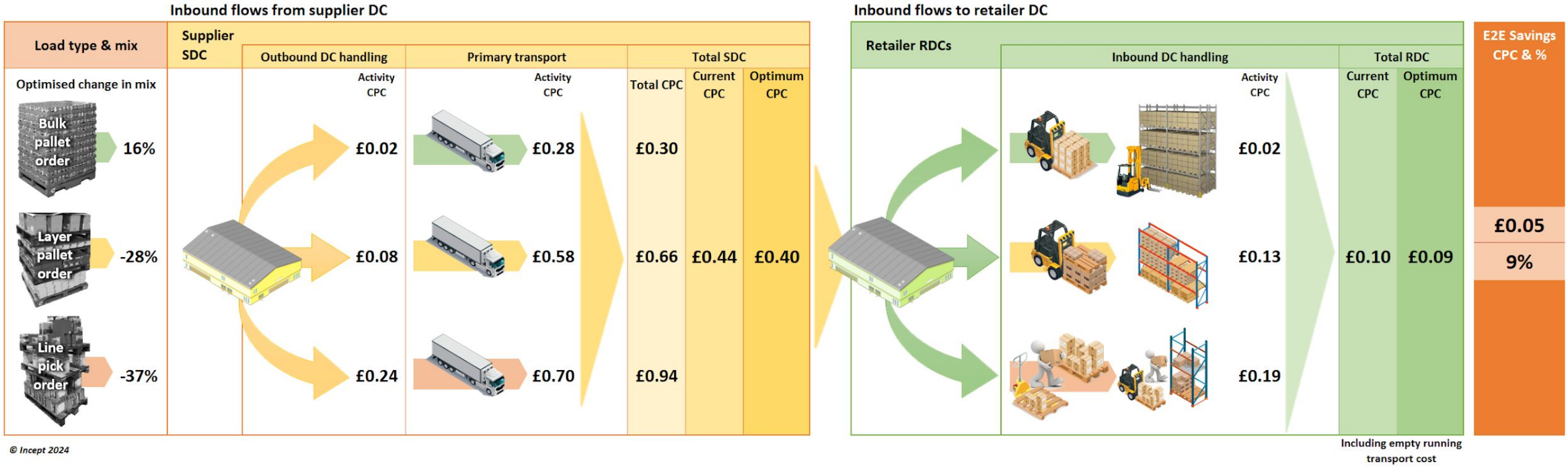
Supplier & retailer typical E2E cost per case (CPC)

- *L3 Optimisation reduces AFB case pick 37% & layer 27% while pallet increases 16%*

Order Optimisation impact

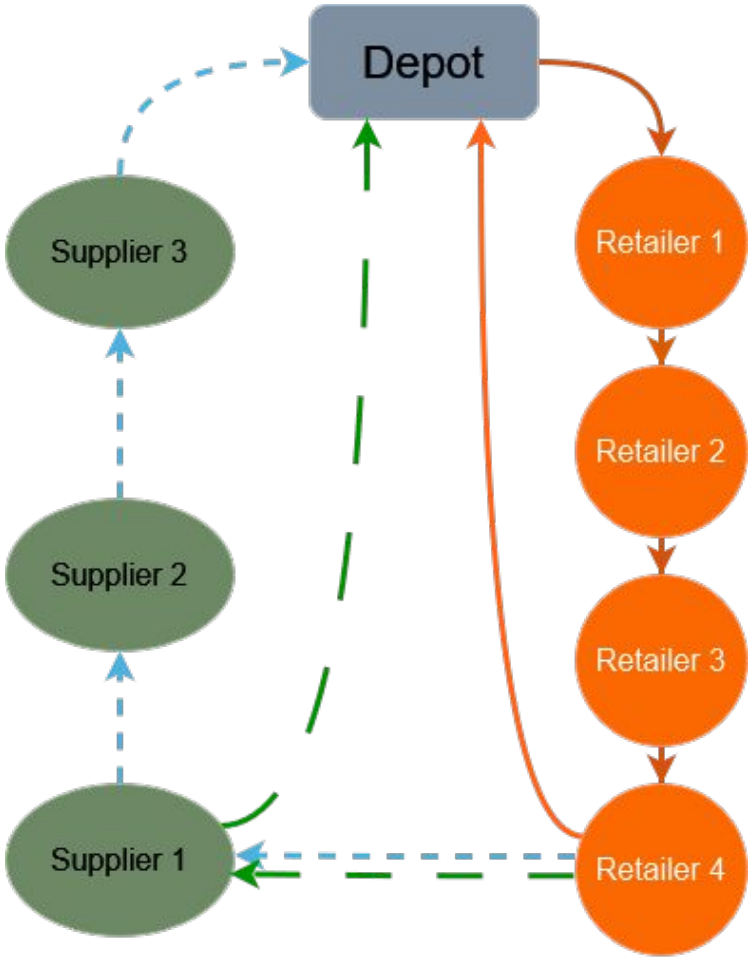
Impacts are only for order optimisation

Based on AFB changes in mix NOT AFB actual costs



- ***The change in order mix to more efficient pallets reduces impacted costs 10% with E2E savings of 5p per case***
- ***The mix of benefits changes by actor depending on the base costs & order mix & is often nearer a 50:50 split***

FUUSE: Smart Routing

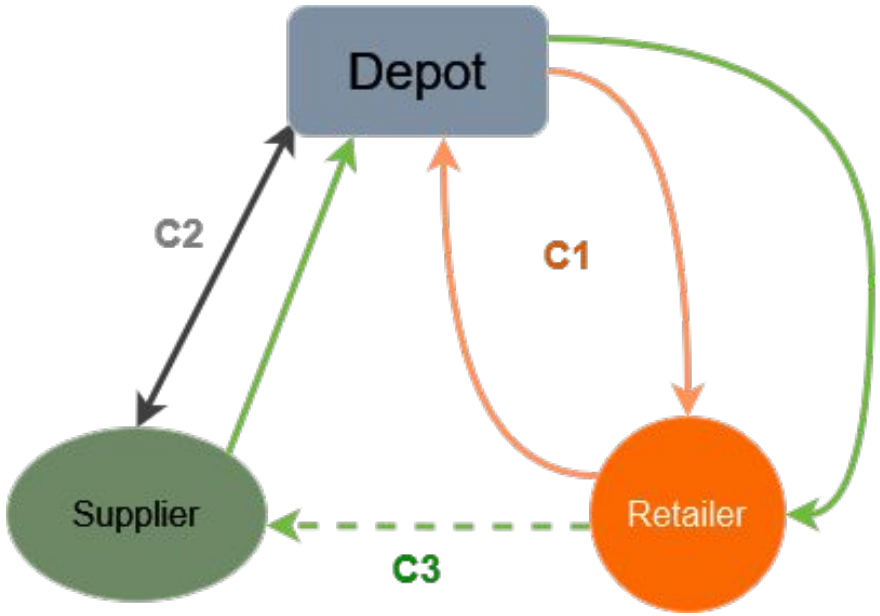


- A **current route** just visits the daily schedules retailers and return back to Depot
- Using Heuristics & Metaheuristics to find the most optimised backhaul route
- In the initial stages, the algorithm will return a **route** with one supplier added into the route
- Eventually, it can result in a **route** that can accommodate multiple suppliers

FUUSE: Algorithm Costing

- **C1 –** Cost of travel (Time and Distance) between the depot and the Retailer
- **C2 –** Cost of travel (Time and Distance) to and from the Depot and Supplier
- **C3 –** Cost of travel (Time and Distance) from Depot -> Retailer -> Supplier -> Depot

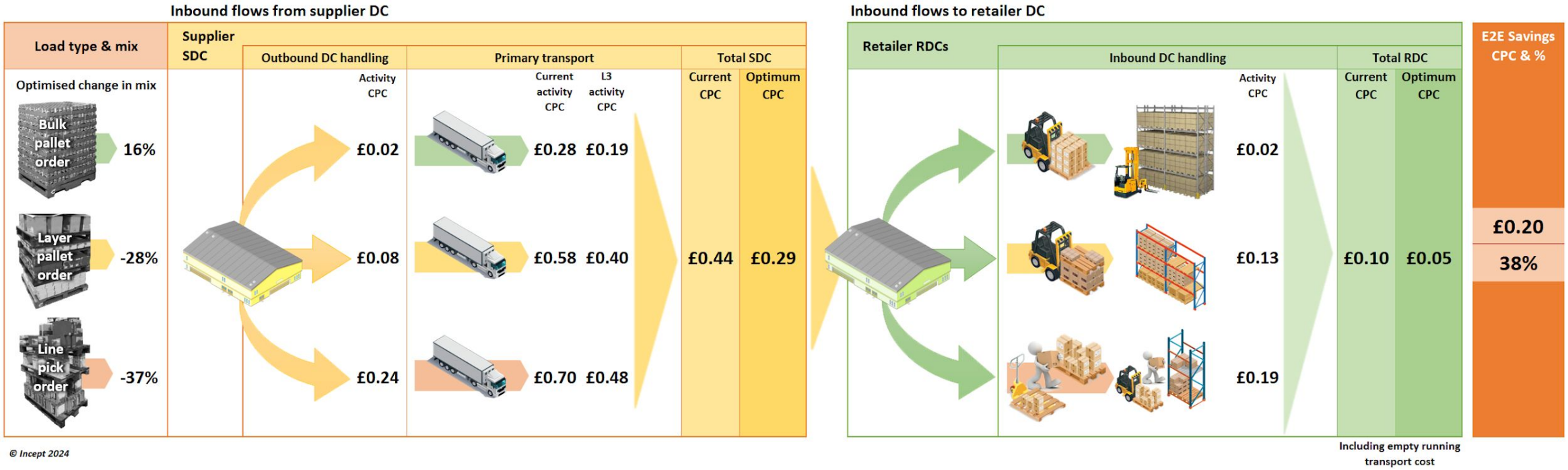
- The current route costs: C1 + C2
- Hence for the AI algorithm to insert a supplier into the route
  - Vehicle Capacity Checks
  - If **C3** < **C1** + **C2**
    - **Supplier inserted**



Transport collaboration impacts

Impacts are for order optimisation & transport collaboration

Based on Simulated supplier collaboration & AFB changes in mix NOT AFB actual costs



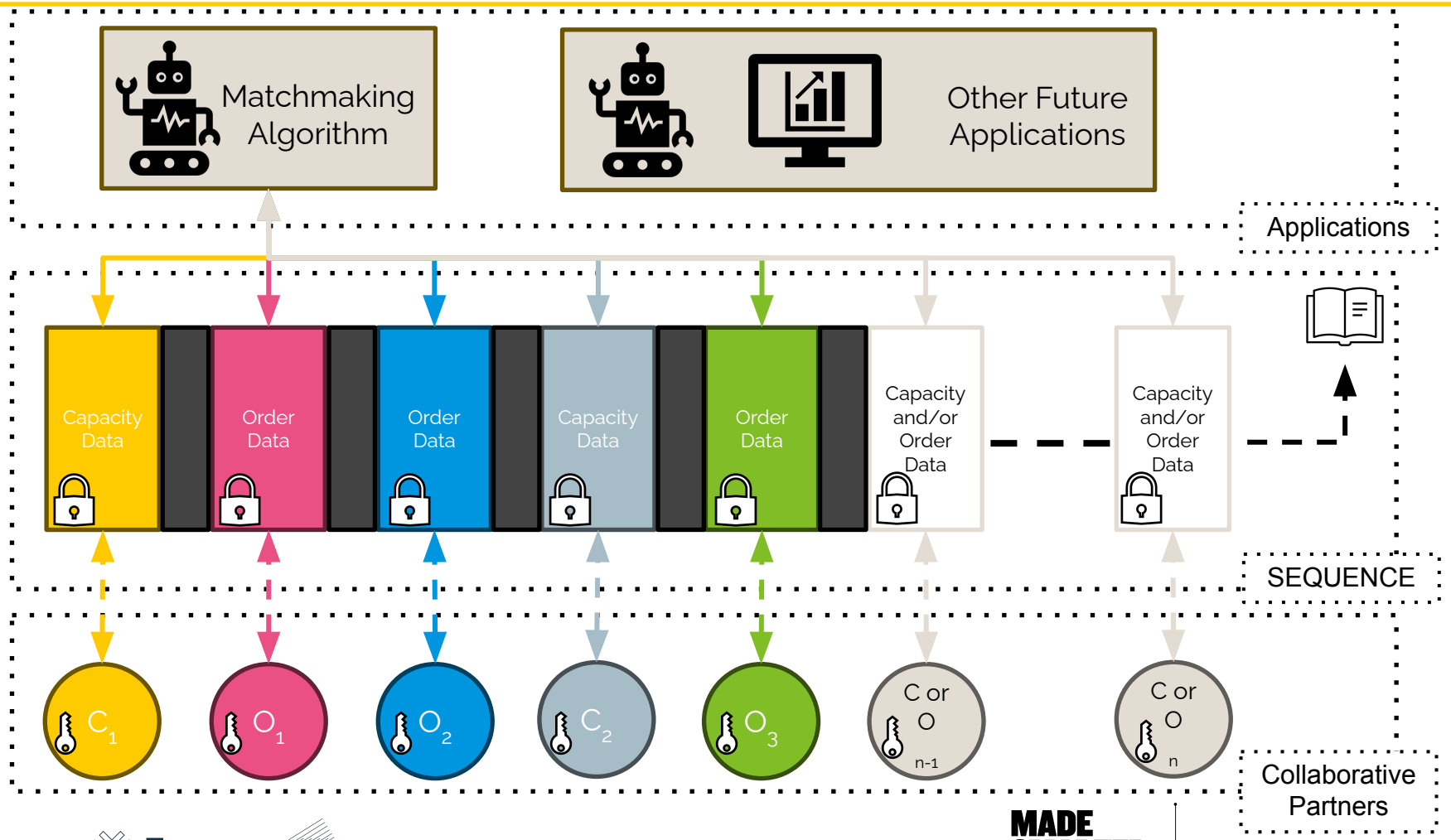
- ***Handling benefits from order optimisation remain the same while L3 transport collaboration with order synchronisation reduces supplier pallet cost from £49 to £29 moving from 7 pallets to 26 pallets per truck with 20% reduction in empty running***
- ***All costs & benefits are based on generic industry cost & productivity data for the L3 sample data***

SEQUENCE: *Digital Catapult's Shared Digital Infrastructure*

Digital Catapult has developed a tool that enables seamless and secure **data sharing** with granular **access control** across multiple parties.

A **privacy preserving** mechanism that allows actors to share order and transport capacity data, and **permission** third party algorithmic matchmaking services to access this **anonymised data** and propose matches.

An **industry scalable** solution with underlying distributed ledger technology that enables for accurate **audit trails** leading to **trusted data sharing** between actors.



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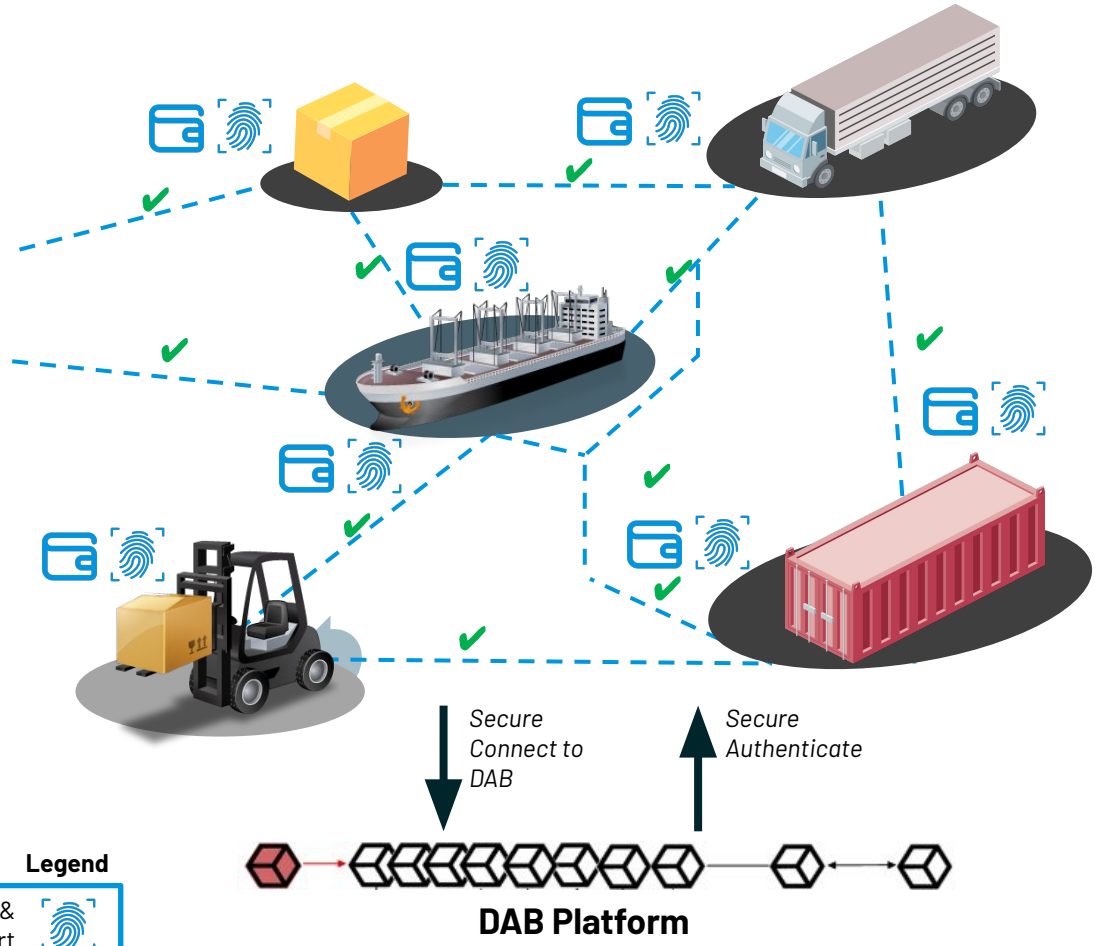
PAIRPOINT : Smart Devices & Economy of Things

Pairpoint Digital Asset Broker can enhance L3 by incorporating dynamic behaviour: real time monitoring and reporting of position and conditions, at truck, pallet or individual box level, enabling automation of supply chain networks



Unlock new business models, enabling any device to transact seamlessly with other parties (Economy of Things)

Identity and authentication

A secure way for devices to prove their identity and build trust in a network

Interoperability and automation

Trusted, secure and automated device-to-device interaction across applications/systems

Device-initiated settlements

Flexible settlement solutions built into devices, making transactions straightforward and customizable

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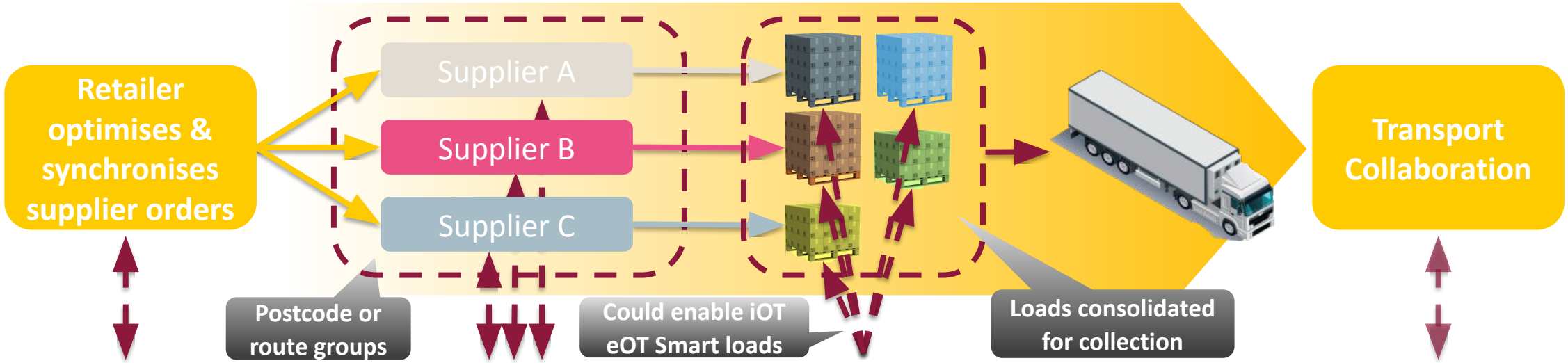
Transport optimisation approach

For use by retailers & suppliers to enable visibility & collaborative operations



L3 Infrastructure supports transport collaboration as an integrated system

- The retailer optimises order configurations & synchronises orders for collaborating suppliers so they can be collected on the same day & route & suppliers in post code groups can collaborate with each other to share transport for any customer
- The L3 algorithm matches store delivery routes to supplier DCs & enables collaborative supplier groups to consolidate ordered loads for backhaul collection considering vehicle capacity & other key constraints
- Combined with the optimisation & cost tools the L3 shared infrastructure could support adaptive Ai & iOT driven operations

L3 & The Future

What's Up Next?

- Refinement of governance models
  - Crafted to ensure **transparency, accountability and efficiency** within the ecosystem

- Creation of collaborative models
  - Created to promote synergy among stakeholders, fostering **innovation** and **shared success**

- Front-end development culminating in experimentation.
  - Focus on creating an **intuitive** user interface and experience that enhances **accessibility** and **usability** of the L3 solution putting it in a better place for **operational use**
  - Live testing will allow for **real-world validation** and **iteration** based on user feedback

Future Possibilities

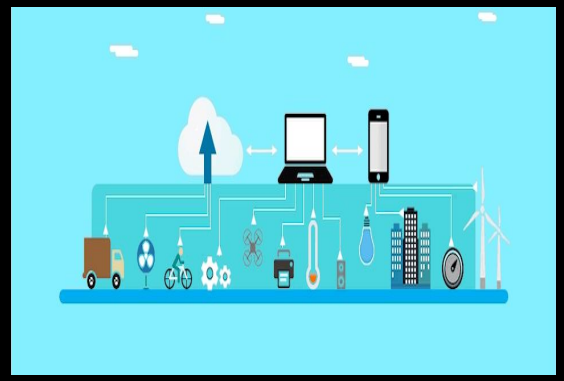
In the near future, logistics will undergo a transformative evolution, driven by innovative solutions, such as L3, and strategic advancements.

- **Multimodal Transport Matching:** seamlessly integrate various modes of transportation, optimizing routes and reducing costs while enhancing efficiency.
- **Transactional Payments:** ensuring swift and secure settlements between stakeholders.
- **Intelligent Facilities & Systems:** unparalleled automation and intelligence, with smart-tracked cases, layers, pallets, trucks, and depots enabling real-time monitoring and predictive decision making.

These advancements promise to **streamline operations**, **minimize risks**, and pave the way for a more **interconnected and responsive logistics ecosystem**, poised to meet the demands of tomorrow's global supply chains.

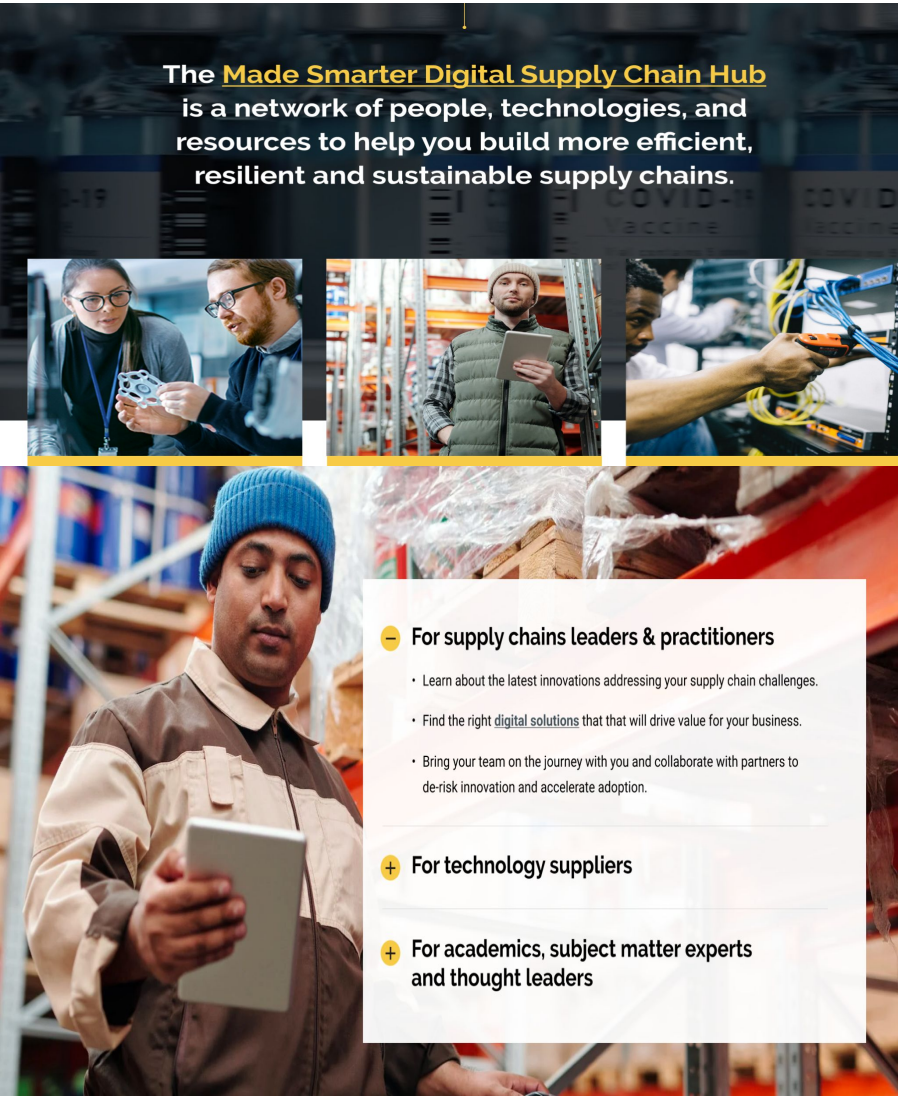
Multimodal Transport Matching

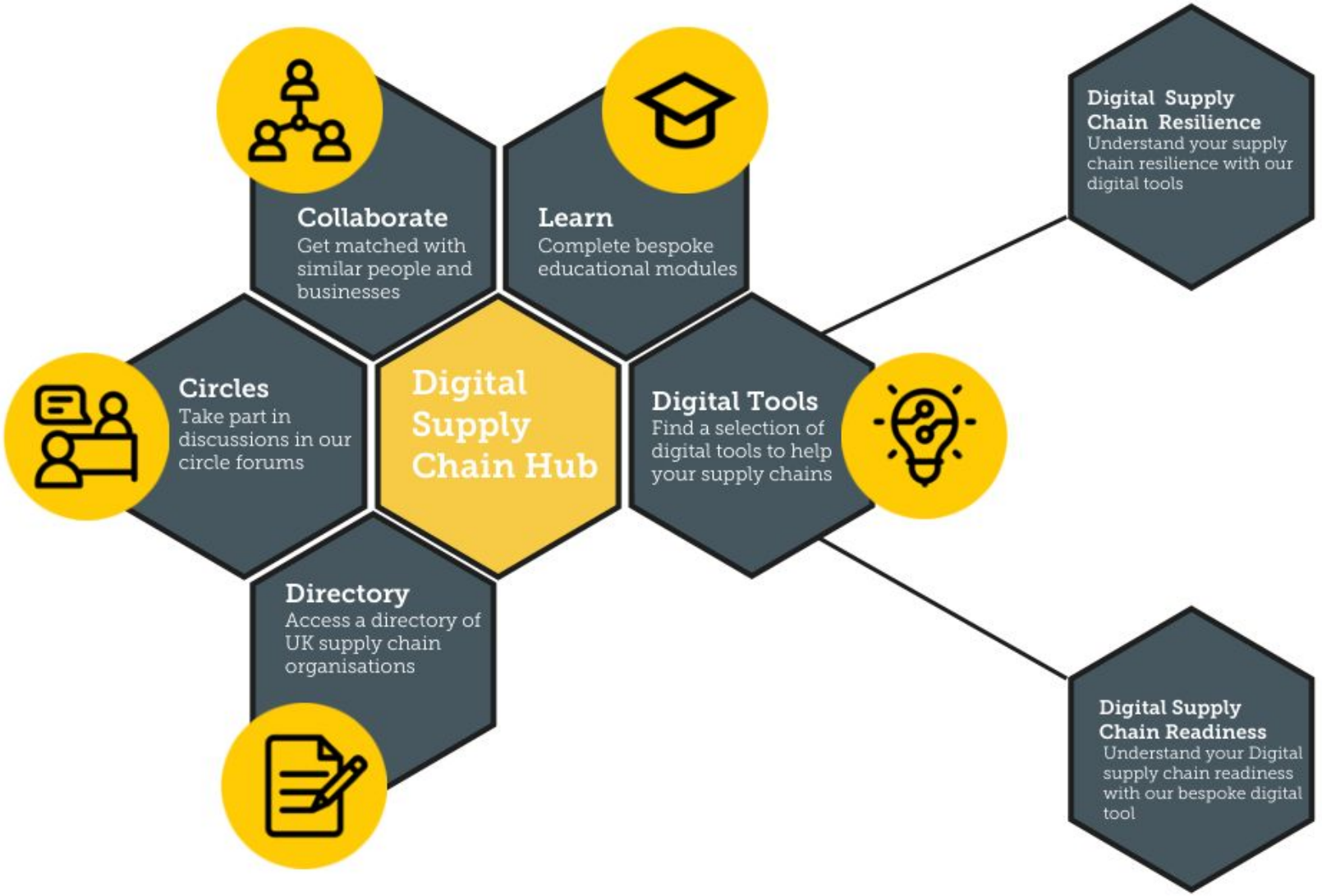
Transactional Payments



Intelligent Facilities & Systems

Digital Supply Chain Hub: collaboration platform





A hub for effective collaboration and innovation.

Launch Event for the Hub 16 July 2024
Use the QR code to register or @DSCH.UK

Get in Contact or Register your interest at
digitalsupplychainhub.uk

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DIGITAL SUPPLY CHAIN HUB

Made Smarter Innovation Digital Supply Chain Hub is delivered by Digital Catapult, funded by the Made Smarter Innovation challenge at UK Research and Innovation.

Open discussion

Supply chains **made smarter**, together.

Register to join the innovation ecosystem **digitalsupplychainhub.uk**

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