



entropy

Case Study

Supporting Fujitsu to deliver 'Smart Borders'.





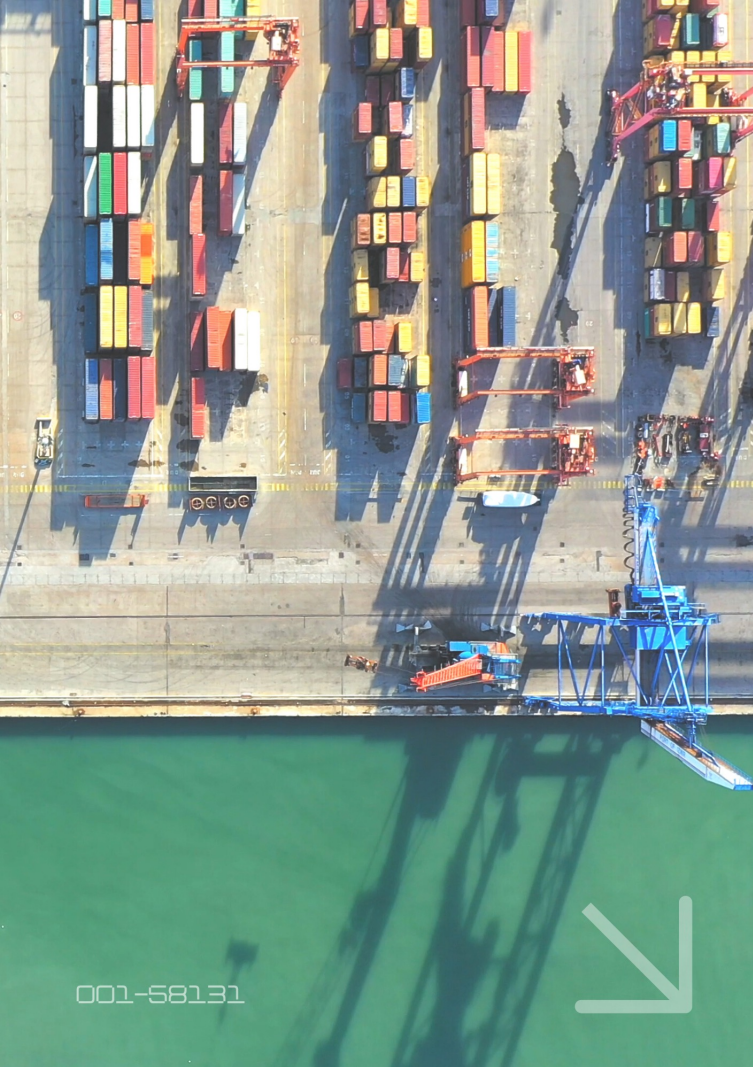
Executive summary

Bringing together a variety of data sources in a meaningful and actionable way – whilst ensuring the privacy of all the organisations involved – is no mean feat. But that is the challenge that lies at the heart of Atamai Freight – the innovative digital supply chain solution launched by Fujitsu Services UK.

Logistics and trader data has to be combined with real-time Internet of Things (IoT) data, with actionable events and insights captured in real time to improve collaboration between supply chain partners, give greater visibility of goods moving throughout the supply chain network, and ensure the security of goods moving between the various parties and territories.

It's just the kind of challenge our intelligent data orchestration technology is designed for. By looking at data in a completely different way, it is able to uncover multidimensional insights and capture events hidden in complex datasets – in real time. It can accurately notify relevant organisations of the arrival of a consignment at a port of exit, for example, or give advance warning when goods are likely to be late reaching their destination.





What is Atamai Freight?

Atamai Freight is designed to help with the movement of goods across borders – making the process easier and more efficient, with a reduction in disruption and costs. The solution comprises multiple components:

- A smart seal is used to secure loads. Fitted to the trailer of vehicles transporting goods through the supply chain, the smart seal captures data such as load integrity and GPS location.
- Data regarding the contents of the loads – the individual consignments – is captured through an intuitive web portal.
- All this data is then brought together to create 'consignment journeys' containing all the relevant information to monitor goods as they move throughout the supply chain network.
- This data is made available through an intuitive dashboard application, accessible by all relevant stakeholders throughout the supply chain.
- Finally, the journey data is written to a blockchain to help with future audit and compliance requirements.

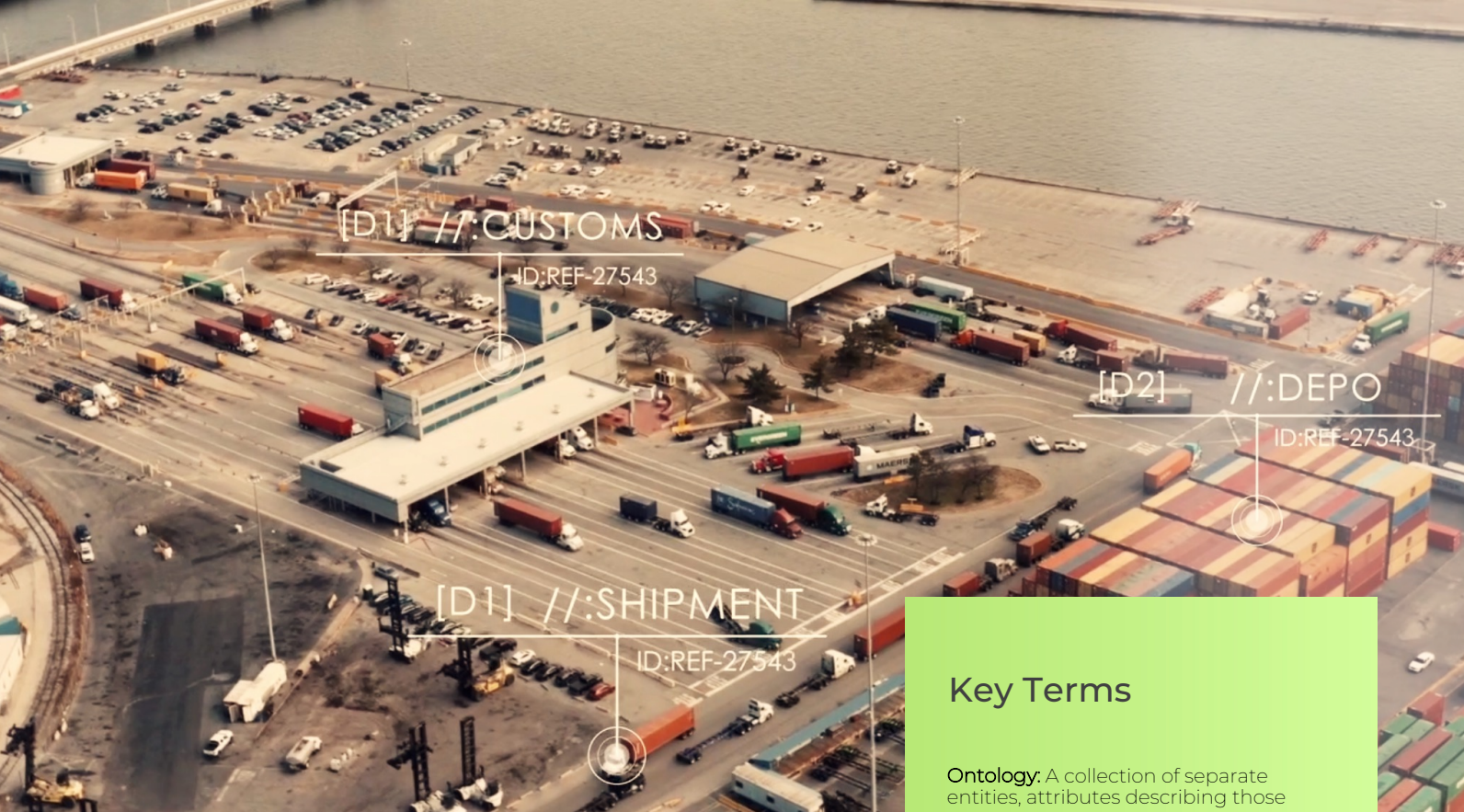
Atamai Freight was brought to market in the summer of 2022 by Fujitsu Services UK with its partners Entopy, Ubloquity and B4B group. It is already bringing business benefits to multiple parties operating across complex supply chain networks.



Atamai Freight will support the supply chain industry both domestically and internationally. Providing a tool that supports collaboration, visibility and security, Atamai ensures that loads can be trusted, data accessed and valuable insights gained.

Working with Entopy has been refreshing. Their platform is supporting some of the fundamental elements of the Atamai Freight service and we look forward to working together to grow the adoption of the Atamai Freight service and on future projects.

**Paul Luckett, Head of Digital Trader Services
Fujitsu Services UK**



Key Terms

Ontology: A collection of separate entities, attributes describing those entities and the dynamic relationships between those entities (roles, functions, etc).

Entity: A referenceable thing or place, identifiable in its own right, made up of a set of attributes.

Attributes: Elements that describe an aspect of an entity – colour, size, weight, location, temperature, etc. Some attributes are permanent, others are changeable throughout the entity's existence.

Digital twin: A digital model that mirrors a unique physical object, process, organisation, or other abstraction – i.e., an instance of an ontology, such as a consignment journey.

Abstraction: Recognising that not all attributes of an entity are relevant to each ontology, an abstraction is a representation of relevant attributes of an entity for a particular use case.

A new way of looking at data

At the heart of Atamai Freight is Entopy's intelligent data orchestration technology, which looks at data through the lens of each 'entity' involved – in this case, the goods being shipped, the transportation vehicle, the ferry ports involved and so on.

Rather than treating data in a linear way, our software creates a digital twin of each consignment journey, with the data organised using ontology – relevant entities, the properties of each entity and the dynamic relationships between them. Critically, we use a framework that recognises the changing nature of relationships between entities over time.

In the case of Atamai Freight, the main 'subject' entity is typically a consignment of goods – with multiple related entities associated with it for the consignment journey digital twin. Things like the consignor and consignee will be permanently related entities that do not change. Other aspects – such as the haulier, the transportation vehicle and the smart seal used to secure the vehicle's trailer – are related entities that may change over time. Each of these entities also has attributes that can be permanent or transient. In the case of a transportation vehicle, for example, the registration number will stay the same – whereas the vehicle's GPS location will be constantly changing.

The entities that comprise each digital twin are abstractions – only comprising attributes relevant to the use case. This enables faster and more cost-effective delivery of results, with greater flexibility and simplified maintenance. A truck may be red and have a chassis made of steel, for example, but this is not relevant to Atamai Freight operations – so it has no place in any of the digital twins.

Our software depicts data in a way that represents the real world and recognises the dynamic nature of relationships between real-world entities and the attributes of those entities. This is what enables us to capture valuable multidimensional insights in real time for the Atamai Freight service.

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We are proud to support Fujitsu in realising the vision of Atamai Freight. Atamai Freight has the potential to revolutionise the freight industry, particularly around international freight, removing trade barriers and encouraging economic growth.

Toby Mills, CEO Entopy

Targeted data capture and segmentation

The Atamai Freight service is designed to be used by multiple organisations simultaneously in a complex supply chain. So data capture is targeted – tracking every vehicle owned by each haulier all the time would cause major issues. Our software ensures data is captured only when it is relevant – GPS data is captured only when a vehicle is transporting a consignment of interest, for example.

Data segmentation is also crucial. When a single haulier transports goods on behalf of multiple traders, we make sure each user can only see the data relevant to their own activities. The data is segmented by consignment journey digital twins, with access controlled on a permission basis.



How Entropy interacts with other Atamai Freight components

The hub for data capture and distribution is Entropy's application programme interface (API), which offers a range of methods for teams to submit data and query the data orchestrated within our platform. Data is also pushed to other parts of the Atamai Freight system, as required – consignment journey status updates, for example.

The smart seals are provided and maintained by B4B Group, with relevant data from the seals interfaced to the Entropy platform via API. Other data, such as consignment and transport details, are manually entered via a web application and submitted to Entropy via API.

When a consignment journey is created, Entropy writes the details to a blockchain provided by Ubloquity. Throughout the life of the consignment journey digital twin, data is captured, attributes of entities are updated, and multidimensional events and status updates are generated in real time. All this data is made available to the Fujitsu Services UK teams via API for them to present to users through an intuitive dashboard application.



Consignment journey Digital Twin



Entropy creates an ontology-based digital twin for the consignment journey – establishing relationships between the consignment, the vehicle, ports, the origin and destination locations, and the smart seal.

Desired events and statuses are identified and become 'realisable' – i.e., they change/trigger alerts as data is added to the digital twin over time.

Using ontology, Entropy recognises the relationships between the consignment, the vehicle and the smart seal.

Using the location of the smart seal and related vehicle, and the entity of the port (which includes location), the Entropy platform captures the event of the consignment arriving at the port of exit.



01

A consignment of goods is scheduled to travel from a location in Great Britain to a location in Northern Ireland, with a haulier appointed to transport the goods.

02

The haulier collates details of the consignment it is moving on behalf of the consignor and enters the details, along with the journey information, into the Atamai Freight web portal.

03

Once complete, the journey is submitted to Entropy.

04

The consignment is loaded onto a lorry and the allocated smart seal is attached to secure the load.

05

The vehicle the consignment is travelling on arrives at the port of exit.

06

Throughout, Entropy writes updates to the blockchain to ensure data is available for future audit and compliance requirements.

07

Data of the consignment journey digital twin is made available to the Fujitsu Services UK teams via API to present to users via the dashboard application.



Flexibility to support iterative development of Atamai Freight

Atamai Freight was developed iteratively, using feedback from industry experts and early adopters of the service. From an initial proof of concept in early 2021 to the alpha pilots in late 2021 and full product launch in the summer of 2022, the Entropy platform provided critical flexibility to support this process.

To support the initial pilot phases, we deployed dedicated examples of our platform, with supporting applications to aid data entry and visualisation. We mobilised these platforms in just two weeks, enabling feedback to be gathered from trial participants, features to be tested and other aspects of the solution reviewed.

Post launch, the flexibility of our platform has supported continued development of the Atamai Freight service, with rapid release intervals. We have enabled new events to be generated when requested, data to be served in different ways to simplify the development effort of other teams, new entities, and attributes to be introduced and new queries to be run. Critically, we have been able to deliver changes rapidly.

Key to the flexibility of our platform is its underlying data architecture – the ontology framework we have deployed. It is simple to introduce new entities or new attributes for existing entities. And it allows new relationships to be established between entities quickly.

Example

- The primary use case for the Atamai product is to track and monitor consignments so the ontology is structured around a consignment journey.
- A new requirement emerged to understand the use of destination locations in real time – i.e., which locations were assigned to journeys at any given time.
- This required the ontology to flip, having the destination location as the subject entity.
- Because of the way data is structured in the Entropy platform, this was simple to introduce and was available within an hour, with the API returning in less than 0.2 seconds.
- If data was treated in a linear way, this would have required extensive development or a complex, high-latency query method.

The flexibility of our platform makes it easy to connect new feeds and use data directly from those systems – without having to first store it in a data lake or warehouse. This functionality can also be delivered to customers of the Atamai Freight service. Data such as GPS can be sourced directly from existing fleet management systems, for example, and planning data can be captured from existing transport management systems. The potential for a distributed approach to data – a concept known as data mesh – is now a real possibility for Atamai Freight users, with all the associated benefits of time and cost savings, combined with optimised service.

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