

CollMi

Technology for a more trustable and sustainable
logistics value chain



Smart Logistics

ColIMi : Technology for a more trustable and sustainable logistics value chain

With the contribution of:



- **Logimade Lda.**



- **Logislink - Terminal Logística, Lda.**



- **Trans Bag - Transportes de Mercadorias, Lda.**



- **Weasy - Web Made Easy, Lda.**



- **Loja do Chá P.N.J.A., Lda.**



- **Keyruptive Technologies, Lda.**



- **Smart Islands Hub**

Challenge & Context

The growth of e-commerce, as well as the increased expectation on the part of consumers to receive their purchases within hours of ordering, has placed considerable pressure on the logistics industry to make more efficient deliveries within cities as well as to expand their operations to rural areas. On the other hand, municipalities are concerned about the impacts caused by the increased volume of parcel deliveries by express couriers and are looking for sustainable solutions to reduce traffic, congestion and pollution within urban centers.

Collaborative micro-hubs (CMH) is a new logistical concept based on advanced game theory methodologies, in which a group of logistics companies (express and freight forwarders) collaborate among themselves by sharing means and resources for delivering parcels in a network of common logistics centers installed in strategic areas of urban centers. The main incentives for a logistics company to operate in a CMHs are to reduce operating costs, improve the quality of service and cover a wider geographical area without large initial investments and risks.

CollMi experiment focuses on solving two common problems in logistics operations, which stand at the source of many operation errors in the logistics value-chain and hinder the implementation of more efficient and sustainable operations like the ones implemented by a CMH, namely:

(1) The lack of integrated mechanism for digital communication between the different possible intervenients (sender, recipient, forwarder, shipper, consignee, receiver), being common practice the exchange of unstructured email messages to inform about the whereabouts of the parcel and to agree on important details of the shipping, such as pick-up places and times, customs clearance procedures, delivery date and place. There's an urgent need in the sector to implement intelligent EDI processes bundled in an easy to use platform that take into consideration smaller size companies that cannot afford the typical large investment of a custom made logistics management system. The main challenge to achieve such a goal is to find a common data model with an integrated authentication and authorisation by-design that fulfills the data

needs of each entity and respects the different privacy requirements and data sharing processes.

(2) The lack of trust between logistic companies to enable the implementation of collaborative operations in situations where both companies would benefit, as well as, the entire logistic process. The main obstacle for collaboration is that it is very difficult for a logistics company to trust a third-party entity managing the data sharing platform, because of the consequences that such entity could inflict in case of malintentional action. A possible solution to this problem lies in distributed ledger technology with appropriate consensus mechanisms, which guarantee that all data exchanged must be validated by all parties and cannot be changed in the future.

Solution

Despite the evidence of advantages (commercial and environmental) recognized by collaborative micro-hubs, their implementation is a complex challenge in terms of business technology, whose success is based on the ability to implement credible solutions for different transport operators in the exchange of information and execution of operations shared with each other. Smart contracts (blockchain technology) by their nature, are chosen as essential elements to support the adherence of operators to the platform.

This project aims to develop a practical solution that addresses this problem, through the application of blockchain technology (distributed ledger technologies) for the implementation of a robust digital solution that solves the collaboration and trust issues that are at the base of the implementation limitation of collaborative micro-hubs, as they have the potential to record all transactions of the micro-hub, last-mile carriers, freight forwarders and sellers, in a verifiable, permanent and transparent way for all interested agents.

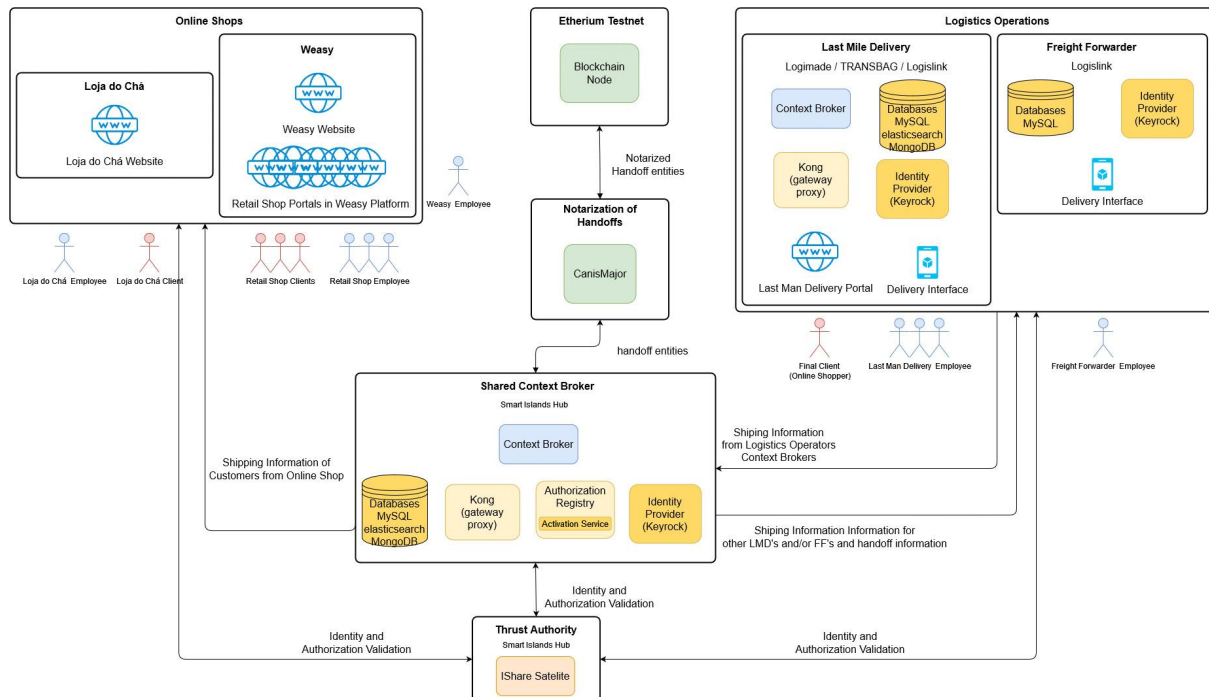
The part of i4Trust initiative in this project is to provide a reliable data-sharing framework with trustworthy access control to that data, respecting its sovereignty by making sure that: each retailer only has access to the package information of their own orders (or their clients' orders); and each logistics

operator to package information relevant to their operation - be it their own orders or those they were subcontracted to deliver or to do part of such delivery.

The main conceptual innovation of this experiment consists of collaborative logistics micro-hubs that enable co-opetition relations between otherwise traditional market competitors. The results of this project benefit the entities directly involved in the experiment operations, in terms of cost reduction and improved quality of service, and also produce spill-over effects, in terms of traffic reduction and air pollution reduction, which benefits the community. The most relevant technological contribution is a smart combination of distributed ledger technologies with iShare and FIWARE components, to enable the implementation of smart data models upon which participants can run operational trusted data sharing processes.

The retail industry is long waiting for a reliable source of information where they can check the whereabouts of both incoming and outgoing goods, independently of which specific freight forwarders, last-mile carriers, subcontracted companies and governmental agencies (e.g. customs) are involved in the process. Such a solution entails important efficiency gains, such as eliminating the hours spent calling and manually accessing digital platforms of the several entities involved in the supply chain to check the status of parcels, provide more reliable information to customers about their purchases as well as future availability of goods not in stock, and compare logistics operators performance to support strategic business decision making.

How it works



The experiment architecture divides the logistics operators into two different categories: Last-Mile Delivery (LMD) (Logimade, Logislink, Trans Bag and Logislink) and Freight Forwarder (FF) (Logislink). The LMD operator is directly contracted by the retailer to deliver the goods to the final client, while the FF is a subcontracted 3rd party needed for a part of the route. Because Logislink assumes both roles of LMD and FF, they will implement the components for the LMD since they include everything needed by the FF also. The LMD operators will all be running their own instance of a FIWARE context broker (Orion LD) and respective MongoDB databases containing the relevant context data of the packages they were contracted to deliver by the retailers.

Like the LMD's, the Smart Islands Hub (SIH) will also be running an instance of a FIWARE context broker. This fourth context broker, referred to as shared context broker, will subscribe to the waybills pertaining to the collaborative microhub present in the context brokers implemented by the LMD's and serve

as the main context information provider for all participants and retain the information regarding the handoff operations.

The access to these Context Brokers will be properly protected by instances of Kong, a gateway proxy, in each logistics operator as well as in the SIH.

With all participants properly registered as iShare parties, this package context information (Waybill) is then provided via the shared context broker to the retailers and contracted LMD's using iShare compliant access policies for identification, authentication and authorization.

The retailers in this experiment are Loja do Chá, a direct-to-consumer online shop, and Weasy which will act as a proxy to all online shops under their umbrella and offer them the tools (as a plugin) to access their (and only theirs) respective client package information.

Like the retailers, the FF and other LMD's contracted to do part of the delivery in the sphere of the micro hub in this experiment will also obtain package context information (waybill) assigned to them (that have them as the transporter) to deliver via the shared context broker in order to obtain the information needed for their legal transport document.

The retailers, other LMD and FF will subscribe to the waybill entities, present at the shared context broker, of the multiple LMD they work with (not necessarily all if the experiment was to scale) and have access to those who have them listed as the trader (or transporter of that leg of the delivery in LDM and FF cases), being notified on any change to those entries. The final customer will be able to track the state of their delivery in both the online shops' websites while in his authenticated area or in the LMD's websites unauthenticated, but providing a unique identifier provided by the LMD and passed on to him by the retailer.

All LMD and the SIH will also implement FIWARE's Identity Manager Keyrock and the retailers will use the identity provider at the shared context broker (SIH) for their authentication.

Benefits & Impact

CollMi is a B2B digital platform that allows logistics companies to share deliveries among themselves. There are 2 typical use cases in the platform. The first allows companies that do not have the resources available at a given time or are not interested in making a delivery (because of the distance or any other reason) to offer that delivery to another logistics company. The second type of use case occurs when a logistic company has a period of low activity and resorts to the platform as a source of deliveries to perform. Logistics companies experience both these situations quite frequently, specially smaller size ones, and CollMi transforms these situations from problems into business opportunities, increasing the productivity of logistics companies. Currently there's no platform on the market providing such a service, so the opportunity is quite unique.

Our proposed experiment includes the collection of data concerning the costs, time and participants' feedback from the new processes that the data sharing platform will enable. We expect that results achieved will show a relevant benefit for all stakeholders, including lower delivery costs, shorter delivery times, a wider geographical area coverage, more detailed and correct information for the end customers, less traffic, and less carbon emissions.

According to a Deloitte study entitled "Last Mile Logistics - Challenges and solutions in Spain", LMD deliveries account for 40% of the total cost of logistics operations and 25% of air pollution. A collaborative logistics micro-hub contributes directly to reducing the carbon emissions of LMD vehicles in a threefold way: (1)First, forwarders will be doing less deliveries and covering less distance to deliver bundles of delivery packages, due to the concentration of delivery of packages from different LMD in a reduced number of strategically positioned micro-hubs. (2)Second, the collaboration between LMD companies inside the micro-hub will increase the productivity of delivery routes, by having more packages delivered by distance travelled. (3)Third, optimized routes will have more stops and less travelled distances, creating optimal conditions for the introduction alternative vehicles, particularly small size electrical ones (e.g., electrical bikes) for urban areas deliveries.

The experiment contributes to the creation of qualified jobs in the logistics sector, by opening a number of new positions to manage and monitor the operations of the micro-hub, while reducing the number of unqualified and lower-paying jobs, like delivery courier and delivery driver. We expect this effect to increase significantly in the near future, as companies and end-customers become more aware of the need to reduce carbon emissions and have responsible consumption behaviors, which will increase the demand for collaborative micro-hubs.

The cooperative nature of the relation between companies inside the micro-hub is another aspect they may drive social change by opening new ways for smaller logistic companies to operate and compete with the big “market owners”, thus driving a more equitable economics where wealth is shared among a greater number of companies and its associates.

All the involved SME’s in this experiment will be able to leverage on these benefits to increase their sales. Nevertheless, it is certainly the SME’s from the logistics and software development sectors that have most to gain and are expected to see their sales increase by more than 30%. Logistics companies will accomplish this by being able to accept more deliveries and relay them to partners using the micro-hub while obtaining a fee in the process, as well as by accepting deliveries from other operators that put them on the micro-hub “market” . The software development SME will also meet this sales objective by developing and maintaining projects of logistics software management integration with the micro-hub platform.

Added value through i4Trust

First of all, the technologies; the provided components allowed us to accelerate the deployment of the proposed solution and do so with regular support along the way to navigate us through most implementation issues. There were and are still some issues to be solved or perfected in the components and their deployment, integration and documentation but the effort to solve them by the mentors was clear along the whole experiment.

The coaching and mentoring offered many insights on how to progress in the project and with the experiment in the future and is a great added value to this kind of initiative.

On another level, the networking with the other participants, although cumbersome at times, was much appreciated to find new business opportunities, synergies and to gain awareness of innovative data sharing projects being developed in other sectors.

Overall we believe that there are still some improvements to be made to make i4Trust experiment calls perfect, for example, components have much to gain by some technical improvements and better documentation on how to deploy them. Communication between the i4Trust team and the experiment partners could be improved. Scheduling and obligations should also be made clearer from the start. But the core is there: the combination of FIWARE technologies with iSHARE is a great combination for trusted data sharing by SME's.

Next steps

the consortium of CollMi realized that the data generated by the platform can be augmented with data from each logistics operator, possibly through third-party software, to create a recommendation engine that will advise companies in advance about what deliveries they should handle out for other companies to deliver as well as what deliveries should they bid and to what amount and quantity. This would not just automatise the interaction of logistics companies with our marketplace, it would also provide companies with a mechanism that increases the automation level of their entire logistics operation.

References

- Information sources, like publications in media and press, brochures, blog posts, videos, slides on SlideShare, etc.
- Others...

Authors & Contributors

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Categories

User(s):

Logistics companies, couriers, end customers of logistics companies

Key words:

Logistics, Interoperability, Co-opetition

Examples:

SmartCities, New Green Deal, Air Quality, Interoperability, Autonomous Driving...

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Founding Partners



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