

MiCoIEC Project - “Micro-hubs Colaborativos para a Economia Circular”

# Specification of the Operations Management Component of the Collaborative Micro-Hub

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# Summary

This report presents the specification of the digital platform that manages instances of collaborative micro-hubs, a virtual marketplace where logistics' operators can negotiate the delivery of parcels according to their best interest. Recipients of parcels, typically private end customers, also interact with the platform to check the whereabouts of their packages and confirm reception of goods. The specification presents an overview of the user profiles of the platform, the functional requisites addressing each user profile, non-functional requirements and a few technical implementation guidelines.

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# Introduction

Collaborative micro-hubs are a new logistical concept in which a group of delivery companies (express) collaborate among themselves by sharing means and resources of delivery of shipments in a network of common logistical centers installed in strategic areas of urban centers, essentially with a view to operating costs reduction, service quality improvement and coverage of more geographic areas without large initial investments. On the other hand, this same concept makes it possible to reduce urban traffic, with all the resulting advantages, namely the reduction of air pollution, the number of road accidents and improvement of the quality of life within urban areas. Despite the enormous advantages of collaborative micro-hubs, their implementation is a complex challenge, whose success lies in the implementation of solutions that solve the problem of trust between different transport operators in the exchange of information and execution of shared operations between them.

The circular economy brings together a set of reuse, recycling and sustainable end-of-life processes for the massive amount of products that the consumer economy produces daily, presenting itself today as the most viable and promising way to reach the necessary levels of environmental sustainability that the planet urgently needs. The advantage of the circular economy in relation to other ecologically sustainable philosophies of life is based on the fact that the processes it promotes can be introduced without significant changes in the lifestyle of modern societies. However, the effective implementation of circular economy processes depends on solutions to a set of challenges, among which the need to create economic models to encourage the continued participation of final consumers in circular economy processes, and the availability of supply of reverse logistics services (from the consumer) with adequate levels of cost and quality of service.

This project proposes to develop a practical solution that addresses these 2 problems head on, through the application of blockchain technology (distributed ledger technologies) for the implementation of a robust digital solution to solve the collaboration and trust issues that are at the base of the limitation of the implementation of collaborative micro-hubs, since they have the potential to record all transactions of the micro-hub, TEEs, producers, end consumers and collection and recycling centers, in a verifiable, permanent and transparent way for all interested agents.

On the other hand, the project provides for the creation of a new digital token (cryptocurrency), called “bit circle”, whose management will also be codified in the blockchain and which will be attributed to final consumers as an incentive to participate in circular economy processes. Both the allocation of digital tokens to end consumers and the management of transactions by exchange of services between transport companies will be carried out using smart-contracts, which are also registered in a transparent and verifiable way for all stakeholders on the blockchain.

This document presents the digital platform specification in detail, describing the context and main objectives, user profiles, functional requirements, client applications, UI mockups and nonfunctional requirements.

## Definitions

- Parcel delivery
  - A parcel delivery is any transport of goods from a properly identified sender to a properly identified recipient, irrespective of being a forward or reverse logistics operation and the type of sender or recipient.
- Circular economy parcel delivery or CE parcel delivery
  - A circular economy parcel delivery is a parcel delivery whose recipient is a circular economy operator that will reuse or recycle the content of the parcel.

## Main objectives and success goals

The main objectives of the MiCoIEC platform are the following:

- Create a digital platform where logistics operators may offer and bid deliveries of parcels according to their best interest. Depending on the type of transaction they engage, logistics operators have to pay or receive a reward for the delivery work done.
- Couriers may bid parcel deliveries and get a reward for their work.
- End customers have an opportunity to engage in the reverse logistics transport of goods for reuse or recycling whenever they have a parcel to receive.
- Circular economy operators may offer rewards for receiving parcels with goods they are interested in.

# Functional requirements

Functional requirements are defined through user stories, describing in detail what each user profile expects from the platform. According to the complexity involved, some user stories presented here will be further specified using more formal notations in other technical reports.

## User Profiles

The MiColEC platform will serve 5 user profiles: platform administrators, logistics operators, couriers, circular economy operators, and end customers.

1. Platform administrators have superuser privileges in the platform, which allow them to manage all operational data, except for information concerning the free trading of parcel deliveries.
2. Logistics operators are certified express delivery companies that can offer and bid parcel deliveries.
3. Couriers are individuals or companies that are not certified to make express deliveries but are qualified to deliver parcels. These users can only bid parcel deliveries.
4. Circular economy operators are companies certified to recycle or reuse goods.
5. End customers are individuals or companies that are recipients of parcels.

## User Stories

Platform administrator (PA)

- a) As a PA, I want to be able to login to the platform.
- b) As a logged in PA, I should be able to access a management dashboard and have access to a list of participants in the platform and parcels status.
- c) As a logged in PA, I want to be able to add a new individual or organization to the platform and define access credentials so they can use the platform.
- d) As a logged in PA, I want to be able to revoke platform access to an organization and correspondent credentials.
- e) As a logged in PA, I want to be able to define a formula to calculate a recommended price for a delivery.
- f) As a logged in PA, I want to be able to check the status of bitcircles in the platform (e.g. total amount and velocity)
- g) As a logged in PA, I want to be able to create and give bitcircles to platform users.

Logistics Operators (LOps)

- a) As a LOp, I want to be able to register (or request access) to the platform to receive access credentials.
- b) As a logged in LOp, I should be able to access a management dashboard and have access to the most recent parcel offers and bids as well as to some important statistical data of my activity in the platform.

- c) As a logged in LOp, I want to be able to add users to my organization so that individuals may access the platform.
- d) As a logged in LOp, I want to be able to get an API key that allows my organization's systems to make requests to the platform's API.
- e) As an accredited LOp, I want to be able to download the platform's backend code to be able to deploy and run it on my infrastructure.
- f) As a logged in LOp in the backend, I want to check the platform's recommended delivery price for a parcel or group of parcels.
- g) As a logged in LOp in the backend, I want to be able to add a request for delivery of a parcel or group of parcels to the platform defining metadata about the delivery.
- h) As a logged in LOp in the backend, I want to be able to accept a bid made to a parcel delivery offer I've made.
- i) As a logged in LOp in the backend, I want to be able to accept a request of a CE parcel delivery made by an end user that was previously accepted by a CEOp.
- j) As a logged in LOp in the backend, I want to be able to list available requests for delivery and bid on them at a certain price/bitcircle pair of values.
- k) As a logged in LOp in the backend, I want to be able to assign a delivery to a user in my organization.
- l) As a logged in LOp in the backend, I want to be able to view all parcel offers and bids I've made.
- m) As a logged in LOp, I want to list my pending deliveries and list each delivery details (recipient, address, etc).
- n) As a logged in LOp, I should be able to check my bitcircles balance.

#### Courier

- a) As a Courier, I want to be able to register on the platform in order to offer my services.
- b) As a logged in Courier, I should be able to access a management dashboard with most relevant information to me, e.g. latest bids status, latest undelivered parcels, and awards received.
- c) As a logged in Courier, I want to list my pending deliveries and list each delivery details (recipient, address, etc).
- d) As a logged in Courier, I should be able to check my bitcircles balance.
- e) As a logged in Courier, I want to list available open deliveries and bid with a price/bitcircles pair.
- f) As a logged in Courier, I want to validate that the declared content of a CE parcel delivery corresponds to the real content of the parcel.

#### End user

- a) As an end user, I want to be able to register on the platform to be able to access its services.
- b) As a logged in end user, I should be able to list my pending deliveries and correspondent estimation of delivery.
- c) As a logged in end user, I should be able to check my bitcircles balance.



- d) As a logged in end user, I should be able to ask for the delivery of a CE parcel delivery for an existing delivery and use bitcircles for that operation.
- e) As a logged in end user, I should be able to ask for the delivery of a CE parcel delivery for an existing delivery and use bitcircles for that operation.
- f) As a logged in end user, I want to be able to confirm the reception of a delivery.
- g) As a logged in end user, I want to be able to make an offer for a parcel delivery or a CE parcel delivery.

#### Circular economy operators (CEOp)

- a) As a CEOp, I want to register on the platform.
- b) As a logged in CEOp, I should be able to access a management dashboard with most relevant information to me, e.g. parcels I'm about to receive, received parcels, awards I gave for receiving parcels.
- c) As logged CEOp, I want to list what kind of objects I am willing to receive and the corresponding award I am available to give for them.

# UI Mockups

## Non-functional requirements

- Two-factor authentication
- All interactions between users and the platform are recorded with reference to the date and time they occurred, interface medium used, type of device used, geographical location of each interlocutor, and the respective context of interaction (request for help, service negotiation, etc).

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