



# CIRCULOOS



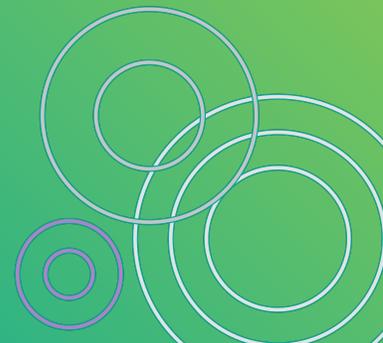
CIRCULOOS common data layer  
Partner: **ED**

## Motivation:

- MSMEs have low digitization level
- circular economy requires access to a large pool of data (available resources)
- capture all relevant data from the shopfloor to better assess sustainability indices

## Goal:

- synchronize the production lines across multiple (as many as possible) manufacturers (SMEs)
- better accuracy in assessment of sustainability indices



### 1. Creation of a unified data model

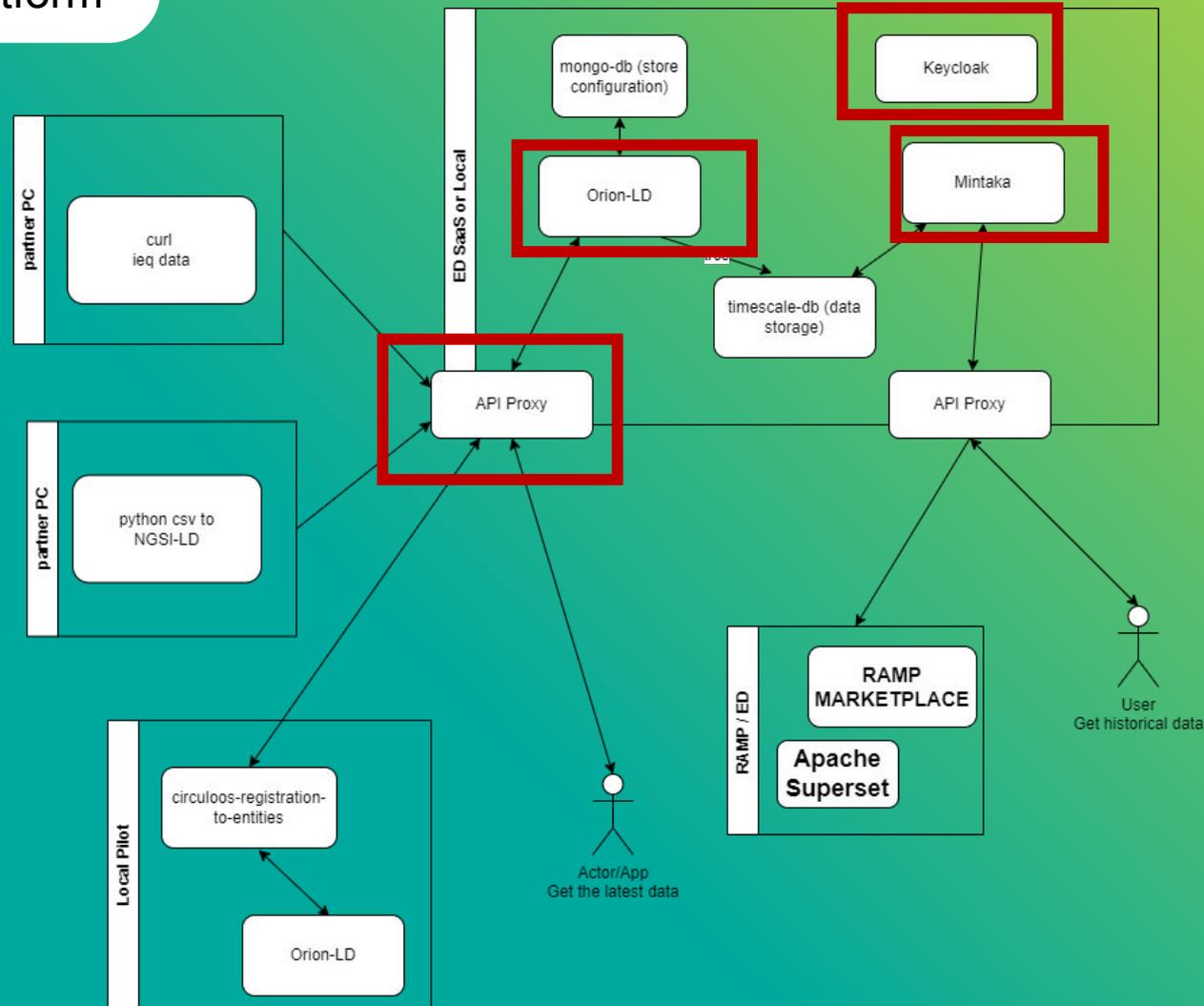
- Based on [Smart Data Models](#)
- Ensuring FAIR access, standardisation and interoperability
- All live in github:  
[https://github.com/european-dynamics-rnd/CIRCULOOS\\_Data\\_model](https://github.com/european-dynamics-rnd/CIRCULOOS_Data_model)
  - The data model is a template for registration of new material for:
    - Wood
    - Leather
    - environmental\_footprint\_indicator
    - .....

### 2. CIRCULOOS Data platform

- Based on open-source and reusable components
- Providing/fetching data based on NGS-LD standards
- User authorization and authorization mechanism
- Integration with Blockchain for trustworthiness of stored data
- Creation of Open-source IoT Agents to help pilot provide/digitization their data



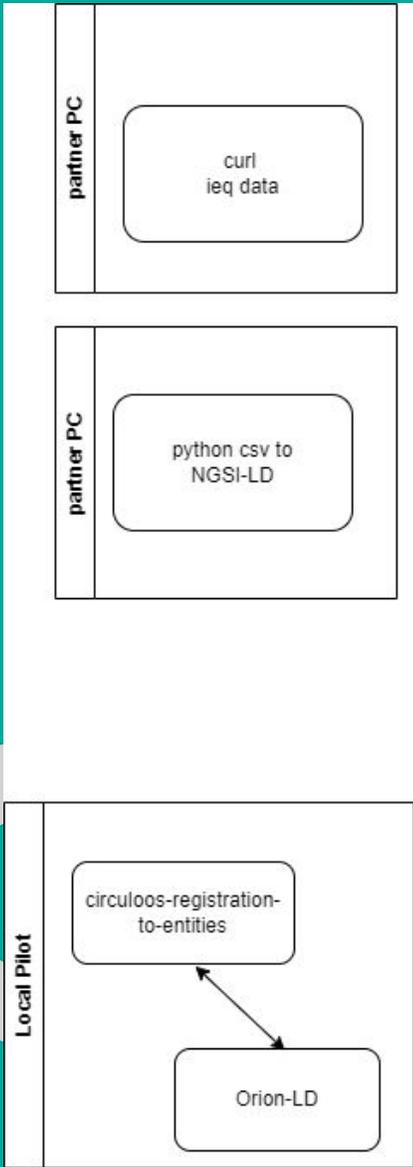
## CIRCULOOS Data platform



# Integration of pilots data



```
{  
  "id": "urn:ngsi-ld:leather:IDAS1313",  
  "type": "leather",  
  "@context": [  
    "http://circuloos-ld-context/circuloos-context.jsonld"  
  ],  
  "origin": {  
    "type": "Property",  
    "value": "vegan",  
    "observedAt": "2024-05-23T13:11:36Z"  
  },  
  "color": {  
    "type": "Property",  
    "value": "black",  
    "observedAt": "2024-05-23T13:11:36Z"  
  },  
  "surfaceSize": {  
    "type": "Property",  
    "value": "2",  
    "observedAt": "2024-05-23T13:11:36Z"  
  },  
  "thickness": {  
    "type": "Property",  
    "value": "0.3",  
    "unitCode": "MMT",  
    "observedAt": "2024-05-23T13:11:36Z"  
  },  
  "tannedProcess": {  
    "type": "Property",  
    "value": "vegetable",  
    "observedAt": "2024-05-23T13:11:36Z"  
  },  
  .....  
  .....  
}
```



### Upload CSV File

**Step 1:**  
 No file selected.

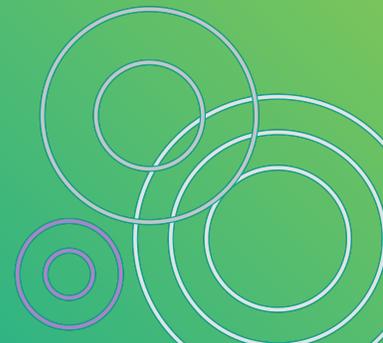
**Step 2:**

**Step 3:**

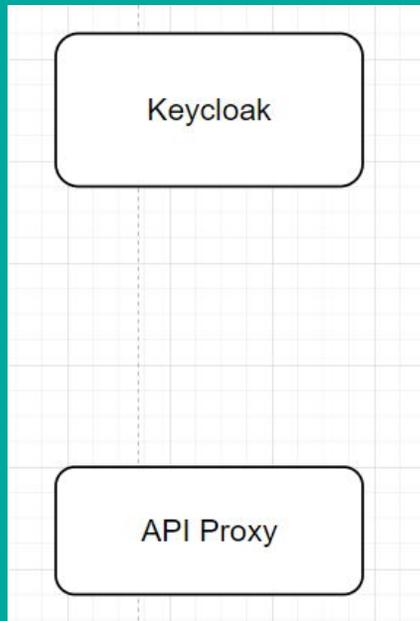
**Step 4:**

**Step 5:**

**Co-funded by the European Union** This project has received funding from the European Union's "Horizon Europe" programme under grant agreement 101092295.



## User authorization and authorization



### *Keycloak*

- 1. Identity and Access Management (IAM) Solution*
- 2. Single Sign-On (SSO)*
- 3. Supports Multiple Authentication Protocols*
- 4. Centralized User Management*
- 5. Extensible and Customizable*

### *API Proxy - Kong*

- 1. API Gateway and Management Tool*
- 2. Load Balancing and Traffic Control*
- 3. Security and Authentication*
- 4. Plugins for Extensibility*
- 5. Scalability and High Availability*



Upload the leather sheet Image

Drag and drop file here

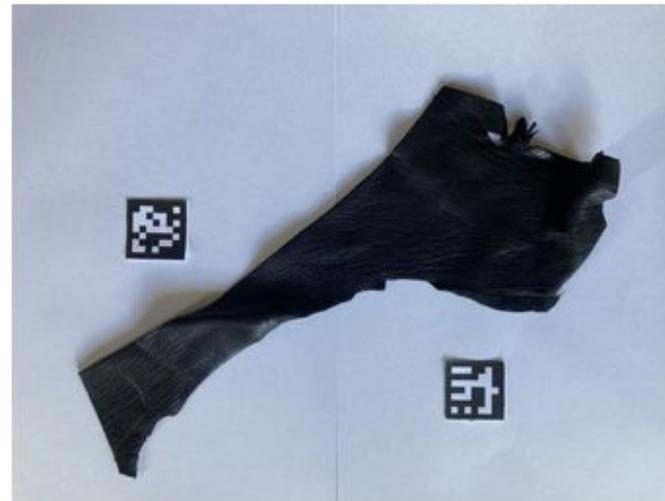
Limit 200MB per file • JPG, JPEG

Browse files

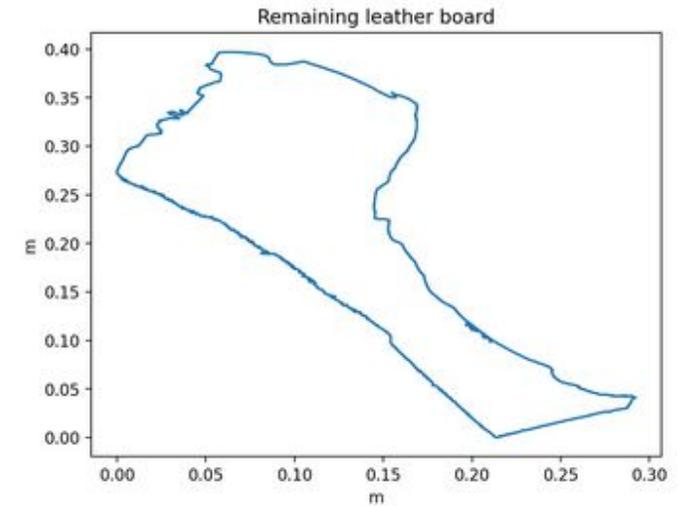
leather\_aruco\_markers.jpg ×  
184.5KB

# CIRCULOOS Leather outline with ArUco markers

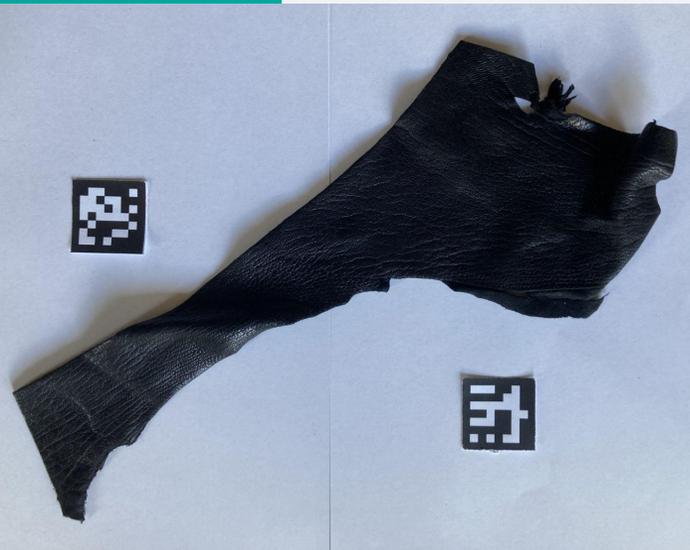
Show remaining leather board



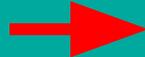
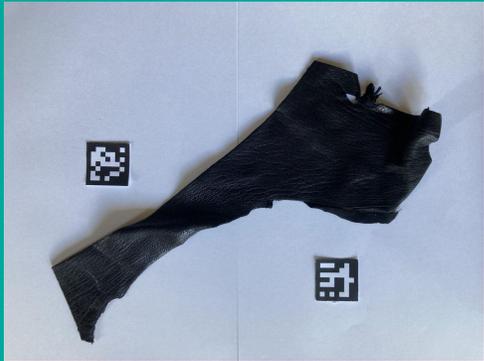
Loaded image



Area of the leather: 0.04 m<sup>2</sup>



# byproduct has a digital description



id	urn:ngsi-ld:leather:pj2qochjxk
NGSI-LD type	leather
Leather type	vegan
Kind of plant	cactus
Leather Type/tanned	tanned
Grainsided	grainside
Leather type/covered	covered/finished
Colour homogeneity	multicolored
Brightness	matte
Hardness	soft
Colour	black
Tickness (mm)	30.00



```
{
  "id" : "urn:ngsi-ld:leather:pj2qochjxk"
  "type" : "leather"
  "@context" : [
    0 : "http://circuloos-ld-context/circuloos-context.jsonld"
  ]
  "leather_type" : {
    "type" : "Property"
    "value" : "vegan"
    "observedAt" : "2024-10-01T11:10:12Z"
  }
  "kind_of_plant" : {
    "type" : "Property"
    "value" : "cactus"
    "observedAt" : "2024-10-01T11:10:12Z"
  }
  "leather_type_tanned" : {
    "type" : "Property"
    "value" : "tanned"
    "observedAt" : "2024-10-01T11:10:12Z"
  }
  "grainsided" : {
    "type" : "Property"
    "value" : "grainside"
    "observedAt" : "2024-10-01T11:10:12Z"
  }
  "leather_type_covered" : {
    "type" : "Property"
    "value" : "covered/finished"
    "observedAt" : "2024-10-01T11:10:12Z"
  }
  "colour_homogeneity" : {
    "type" : "Property"
    "value" : "multicolored"
    "observedAt" : "2024-10-01T11:10:12Z"
  }
}
```

# digitized byproducts sent to Circuloos data platform

id  
urn:ngsi-ld:leather:pj2qochjxk

NGSI-LD type  
leather

Leather type  
vegan

Kind of plant  
cactus

Leather Type/tanned  
tanned

Grainsided  
grainside

Leather type/covered  
covered/finished

Colour homogeneity  
multicolored

Brightness  
matte

Hardness  
soft

Colour  
black

Tickness (mm)  
30.00

streamlite\_aruco - Streamlit

localhost:8501

Smart\_data\_models\_C... Zimbra from VPN EuroDyn WebEmail python (58) Discord | #smart... ProofHub

Upload the leather sheet Image

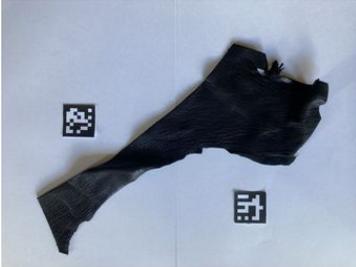
Drag and drop file here  
Limit 200MB per file • JPG, JPEG

Browse files

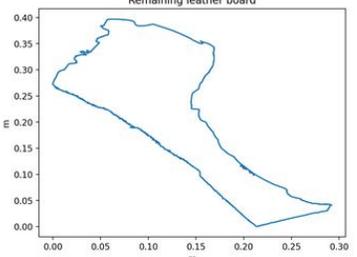
leather\_aruco\_markers.jpg  
184.5KB

## CIRCULOOS Leath ArUco markers

Show remaining leather board



Loaded image



Area of the leather: 0.04 m2

Generate NGSI-LD JSON

Check connectivity with CIRCULOOS platform

Show NGSI-LD JSON ▾

Download NGSI-LD JSON

Send data to CIRCULOOS platform

## CIRCULOOS response

Id: urn:ngsi-ld:leather:pj2qochjxk uploaded to Orion-LD: circuloos-platform.eurodyn.com correctly with response: <Response [204]>

Cancel

OK

localhost:8501

Smart\_data\_models\_C... Zimbra from VPN EuroDyn WebEmail python (58) Discord | #smart-... ProofHub Fiware Me - ProjectPlace (21) Documents - Proj... Συλλογή eurodyn/fortesie-fiware WeTTY - The Web Ter...

CONNECTING Deploy

Upload the leather sheet Image

Drag and drop file here  
Limit 200MB per file • JPG, JPEG

Browse files

# CIRCULOOS Leather outline with ArUco markers

Show remaining leather board

## Useful resources

- *FIWARE tutorials:*  
<https://github.com/FIWARE/tutorials.NGSI-LD/tree/bf3a90fa9e873fc89f2551c6eee376c6ef2f2152>
- *CIRCULOOS Data platform:*  
<https://github.com/european-dynamics-rnd/circuloos-data-platform>
- *CIRCULOOS shopfloor demonstrator:*  
<https://github.com/european-dynamics-rnd/circuloos-shopfloor-demonstrator>

**Thank you!**

