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**Global  
Summit**

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# **Trust Services for Data Spaces**

## **Live demo of an DSBA-compliant Data Space**

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**Vienna, Austria**

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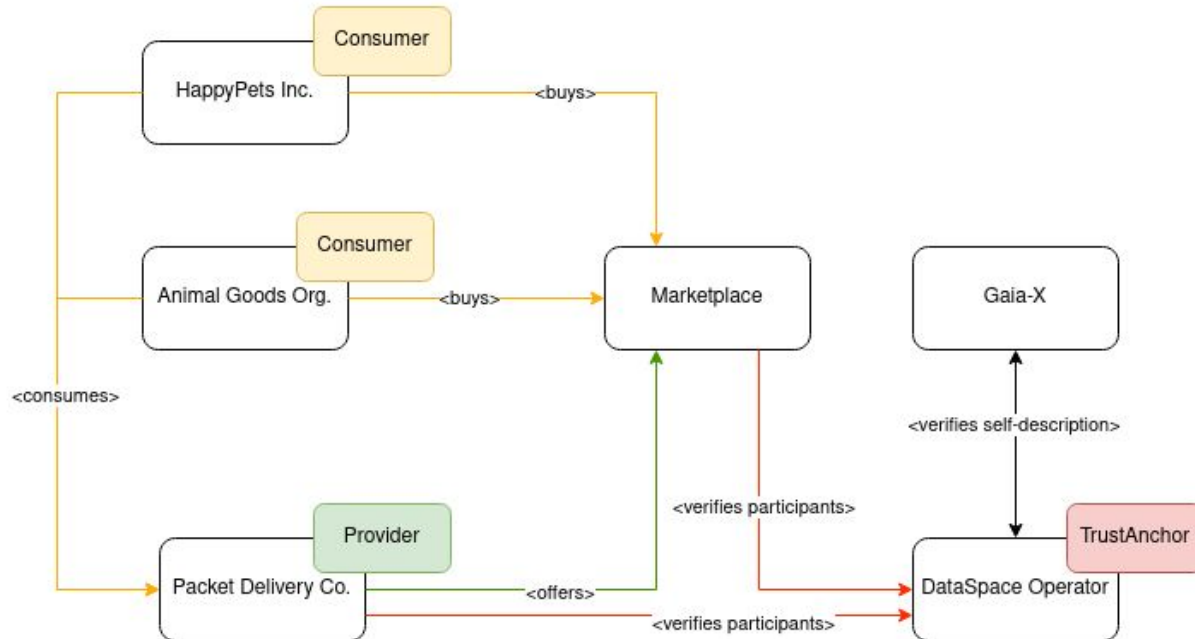
**#FIWARESummit**



# Introduction

## Use Case:

- Data exchange in an DSBA-compliant data space
- Service Provider does not need prior knowledge about consumers accessing the service
- Access rights are evaluated based on a decentralised Trust and IAM framework



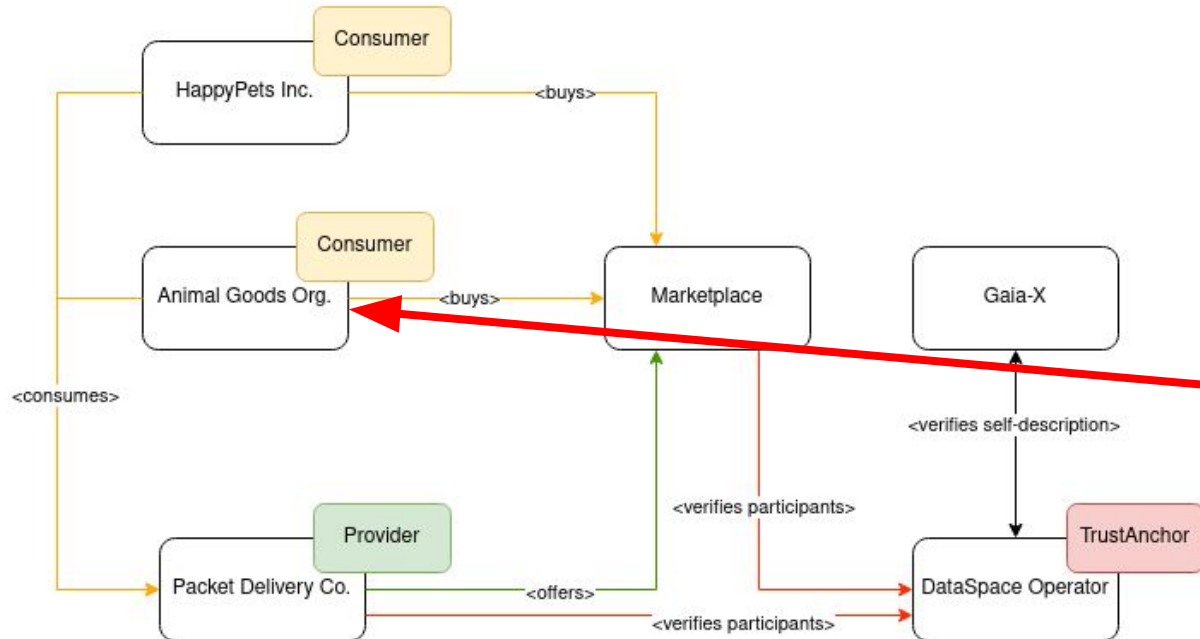
## Participants:

- **Packet Delivery**
  - Provides service for packet deliveries based on NGSI-LD
  - Orders are mapped to digital twin entities
  - Two service levels:
    - **Standard:** Read access
    - **Gold:** Read and write (certain attributes only) access
- **Marketplace**
  - Service offerings are published on public marketplace
  - Allows to purchase, acquire access to and activate services
- **Happy Pets**
  - Online retailer shop of premium pet products
  - Was already onboarded
  - Has already acquired access to the gold/premium offering
- **Data Space Operator**
  - Providing trust and onboarding services
- **Animal Goods**
  - New competitor that wishes to join the data space
  - Not onboarded to the data space yet
  - No access rights to the packet delivery service yet

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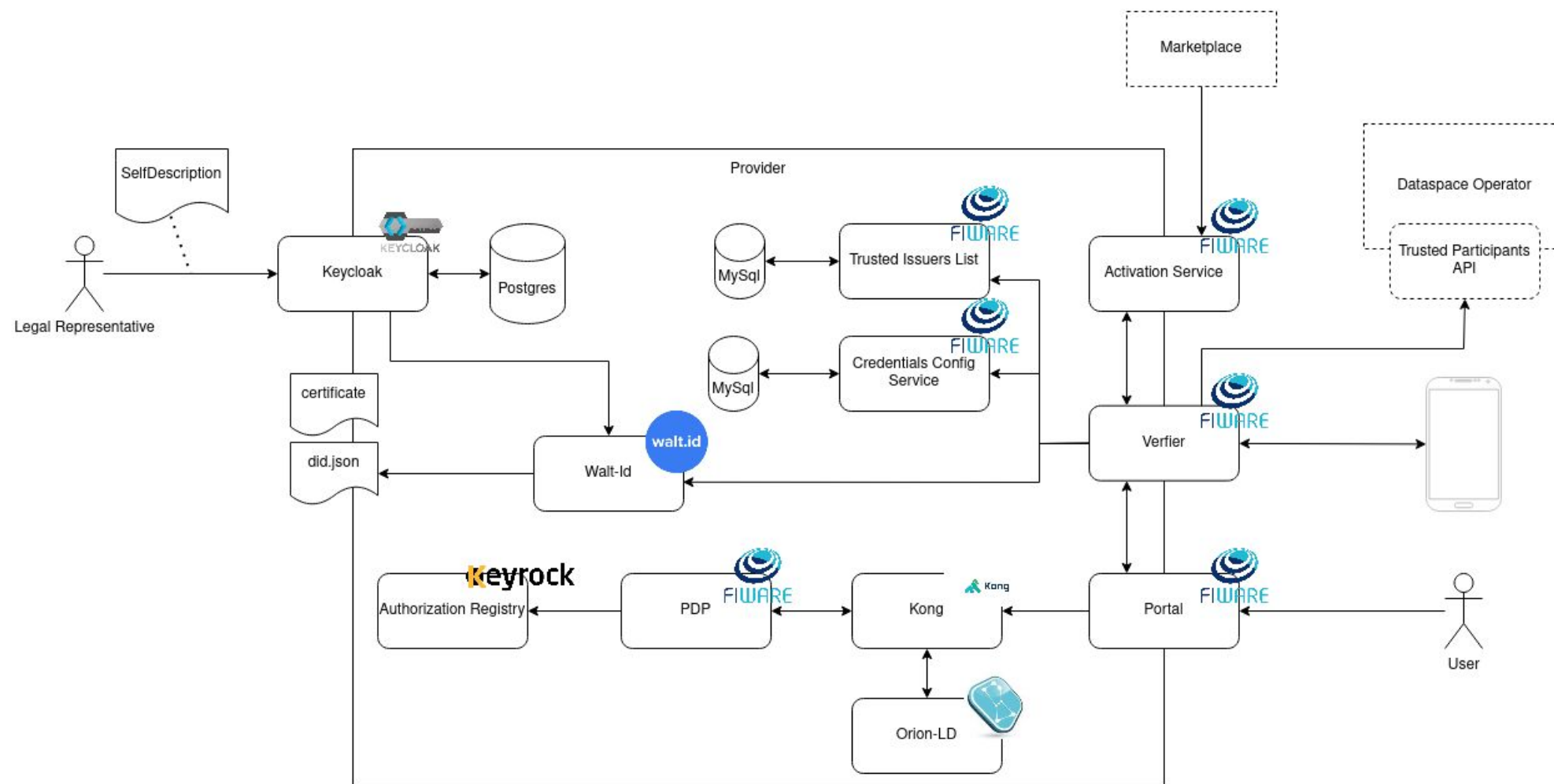
# LIVE DEMO - Happy Pets accessing Packet Delivery Service

- Happy Pets is already onboarded and has access to PDC service
  - already purchased and activated service via marketplace before
- Showing login on PDC portal using VC from Happy Pets Keycloak
- Showing access to PDC service

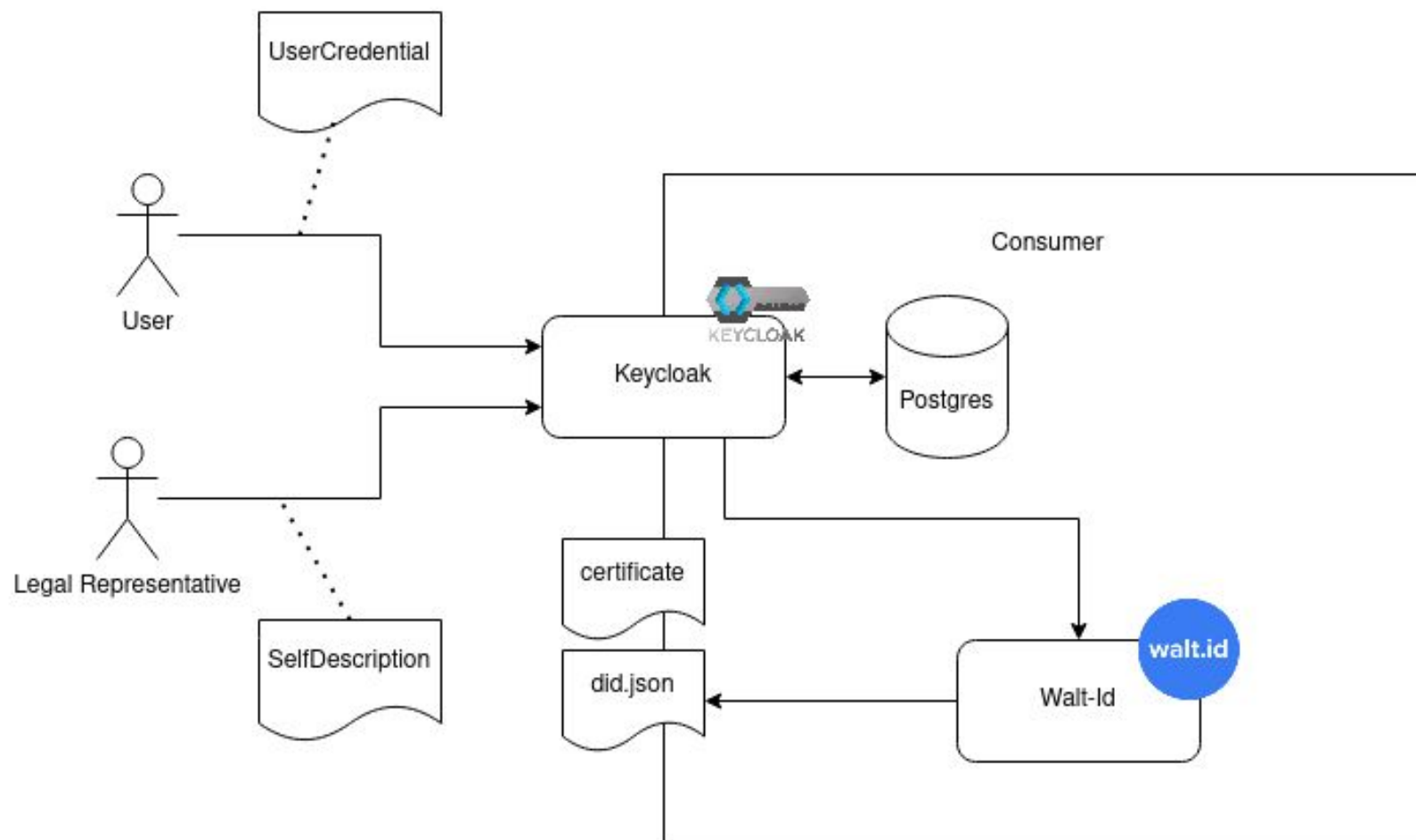
# LIVE DEMO - I

```
{
  "type" : [ "PacketDeliveryService" ],
  "@context" : [ "https://www.w3.org/2018/credentials/v1", "https://w3id.org/security/suites/jws-2020/v1" ],
  "id" : "urn:uuid:fd5c59e9-b762-4c83-b00b-ee7abc2623a0",
  "issuer" : "did:web:happypets.dsba.firmware.dev:did",
  "issuanceDate" : "2023-06-09T10:27:10Z",
  "issued" : "2023-06-09T10:27:10Z",
  "validFrom" : "2023-06-09T10:27:10Z",
  "expirationDate" : "2023-06-11T22:27:10Z",
  "credentialSchema" : {
    "id" : "https://raw.githubusercontent.com/FIWARE-Ops/tech-x-challenge/main/schema.json",
    "type" : "FullJsonSchemaValidator2021"
  },
  "credentialSubject" : {
    "id" : "2cbec738-2bdc-4539-ab23-b1c57bd9be51",
    "type" : "gx:NaturalParticipant",
    "familyName" : "Happy",
    "firstName" : "HappyPets",
    "lastName" : "Happy",
    "roles" : [ {
      "names" : [ "STANDARD_CUSTOMER", "GOLD_CUSTOMER" ],
      "target" : "did:web:packetdelivery.dsba.firmware.dev:did"
    } ],
    "email" : "prime-user@happypets.org"
  },
  "proof" : {
    "type" : "JsonWebSignature2020",
    "creator" : "did:web:happypets.dsba.firmware.dev:did",
    "created" : "2023-06-09T10:27:10Z",
    "verificationMethod" : "did:web:happypets.dsba.firmware.dev:did#92bc59cf60ac4caea1a17b48cfa9c415",
    "jws" :
    "eyJiNjQiOmZhbHN1LCJjcml0IjpbImI2NCJdLCJhbGciOiJIQUZlI1NiJ9..zSFGARxMiyFdrbfHDJ7w0tzMNgb9x1wr_emTJ-Y59grwe-fILEP
c93EA6H8Jr81gJcXf60UezNZCpQDVHy6attFW7Xc_VyGzmYuAKaxSf8_x2XrJnnqOoqg9ywlKtAMgkhU81G2SE0rFqIHZZnq3c6B9-6XR0ft0x
0znOySH3A6oiF0qnEOMHzZN7QAfbJ6BuLry6qahUust5rMKCa5Uryw-LsmyawFs1ZvSN_hTV38aGeXUGnrCets8Rqvchh64qTzqxZ9dUM79f8Y
N0yKNmPqraY6vKoM1cVTWVjei88dx8JCp0AFsJigGnASvEAz_Bx7nWwMizx9yfSx-5rNiw"
  }
}
```

# Meet the participants: Service Provider



## Meet the participants: Service Consumer





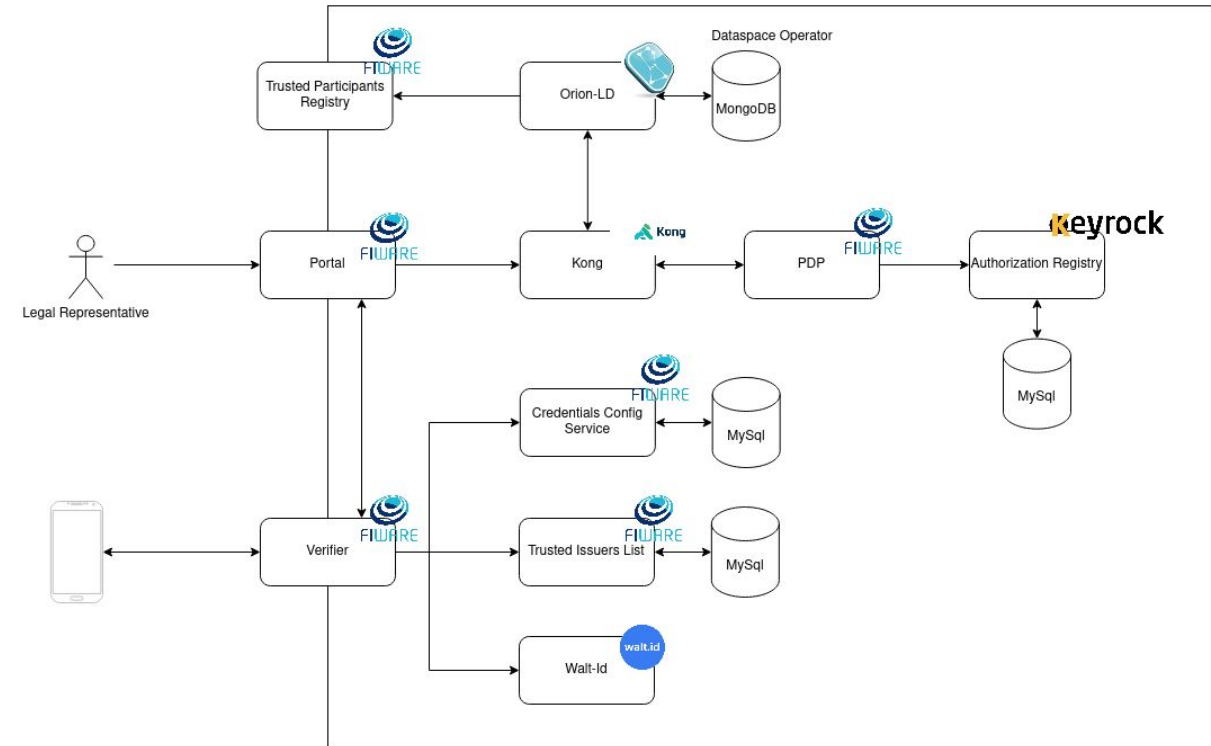
# LIVE DEMO - Animal goods login at Marketplace + Onboarding

- Show login at Marketplace by employee of Animal Goods
  - Will fail, because Animal Goods is not onboarded yet
  - Which means it is no trusted participant of the data space
- Show onboarding of Animal Goods



# Meet the participants: Data Space Operator

- Description setup operator + technical description onboarding process



# LIVE DEMO - Animal Goods login at Marketplace + Acquisition

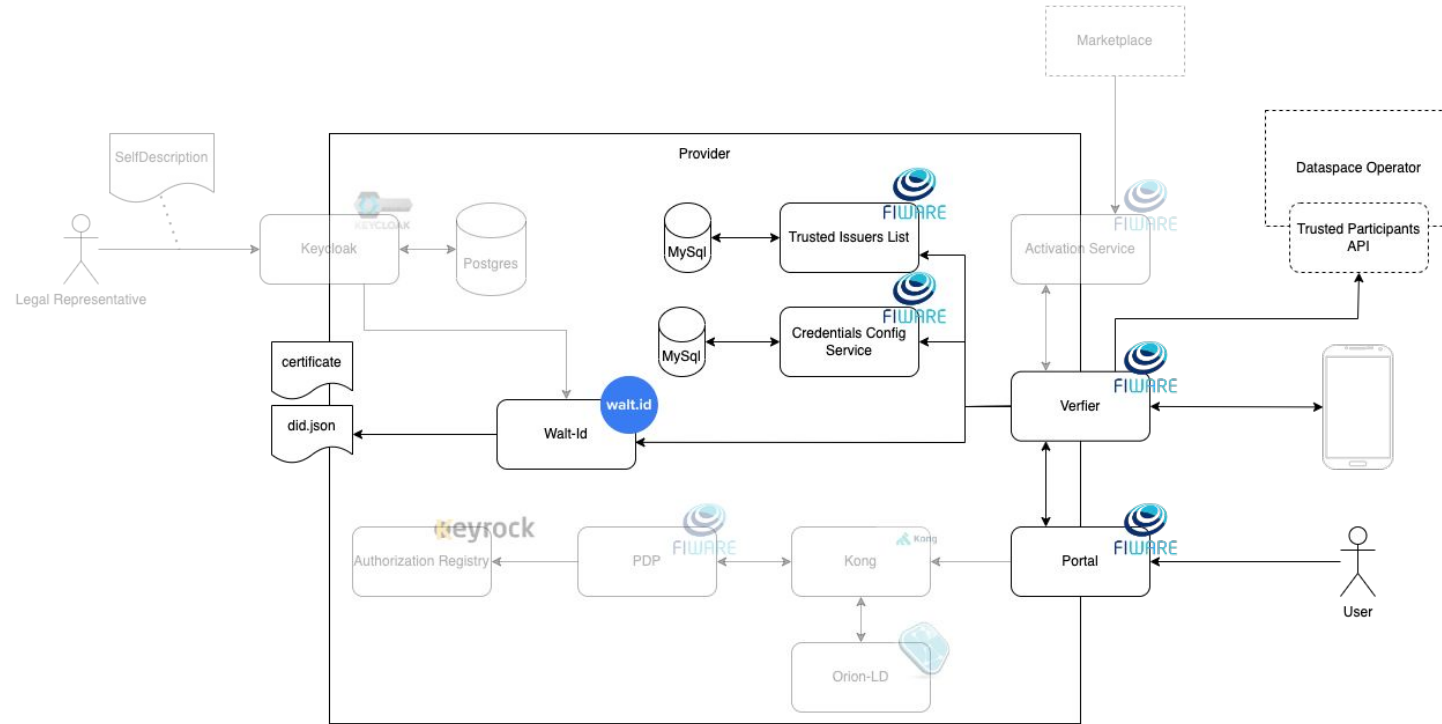
- Show login at Marketplace by employee of Animal Goods
  - will be successful, since Animal Goods has been onboarded
- Show purchase and acquisition of Packet Delivery service
  - Animal Goods will acquire **Basic Offering** (read-access only)

# LIVE DEMO - A

```
{
  "type" : [ "MarketplaceUserCredential" ],
  "@context" : [ "https://www.w3.org/2018/credentials/v1", "https://w3id.org/security/suites/jws-2020/v1" ],
  "id" : "urn:uuid:10529f37-6f50-4faf-8e62-2f7a583ae89a",
  "issuer" : "did:web:animalgoods.dsba.firmware.dev:did",
  "issuanceDate" : "2023-06-09T10:28:00Z",
  "issued" : "2023-06-09T10:28:00Z",
  "validFrom" : "2023-06-09T10:28:00Z",
  "expirationDate" : "2023-06-11T22:28:00Z",
  "credentialSchema" : {
    "id" : "https://raw.githubusercontent.com/FIWARE-Ops/tech-x-challenge/main/schema.json",
    "type" : "FullJsonSchemaValidator2021"
  },
  "credentialSubject" : {
    "id" : "6922c655-1a6e-4eae-b9ea-31b2b4c5c0f2",
    "type" : "gx:NaturalParticipant",
    "email" : "legal-representative@animalgoods.org",
    "familyName" : "Animal",
    "firstName" : "Legal",
    "lastName" : "Animal",
    "roles" : [ {
      "names" : [ "seller", "customer" ],
      "target" : "did:web:marketplace.dsba.firmware.dev:did"
    } ]
  },
  "proof" : {
    "type" : "JsonWebSignature2020",
    "creator" : "did:web:animalgoods.dsba.firmware.dev:did",
    "created" : "2023-06-09T10:28:00Z",
    "verificationMethod" : "did:web:animalgoods.dsba.firmware.dev:did#47486125ebe741de8f656dda775e8969",
    "jws" :
    "eyJiNjQiOmZhbnHN1LCJjcml0IjpbImI2NCJdLCJhbGciOiJIQUZlI1NiJ9..D73qZHRxuC4kK-86tTTquxLxin09S1V6mQRJfHhOEXEEhv1c3ptv
    miWK6YPMuWnzzi2ig6Xs_yYHLK6MXi9YF9XJsvTUMy8j5RqnkUdgEx4KPjnhqMuyglN72AoT8eeSciawKn3gMfPLsLv8-dqpezW0K7i6z3X5
    nXv6M0xAt4k00UQ0LXspBCTb_ntt60zMUBnNZXNIMrJrHpgOzVt1U2qNXhpXqf1KJLo9FU6SiZZBkzLgSmnM3E9kbNrap_lny4uNxXP_GiWT60
    1NmBBD33cHisHmrP03f_JvaZJ6D6dZqCT1pnE0W-sw3VoZarBwgUwa8tg8yd-h_YJ4_9ovA"
  }
}
```

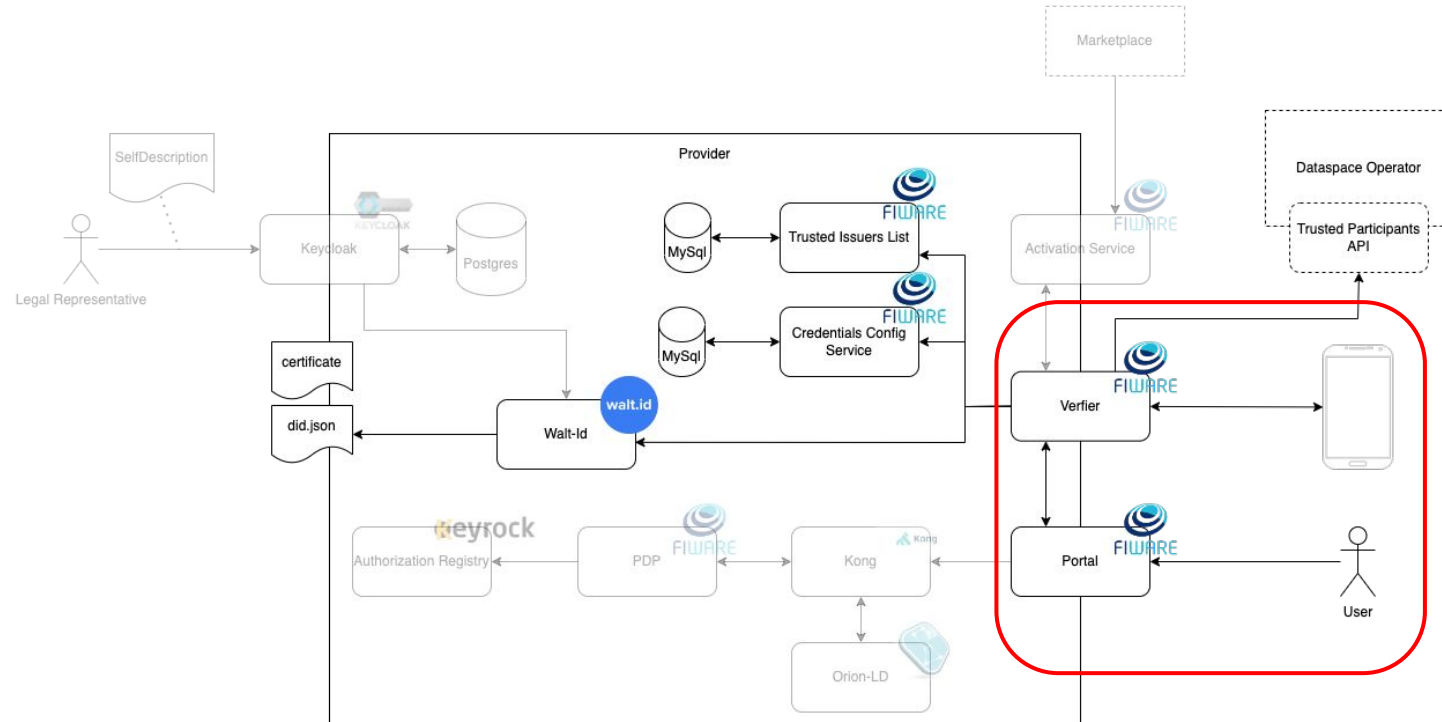
# Description of process: Login

- User performs login at portal/marketplace
- VC has been issued to user before
- VC of type for service to be logged in
- Containing roles for service issued to user
- Login follows OIDC4VP standard



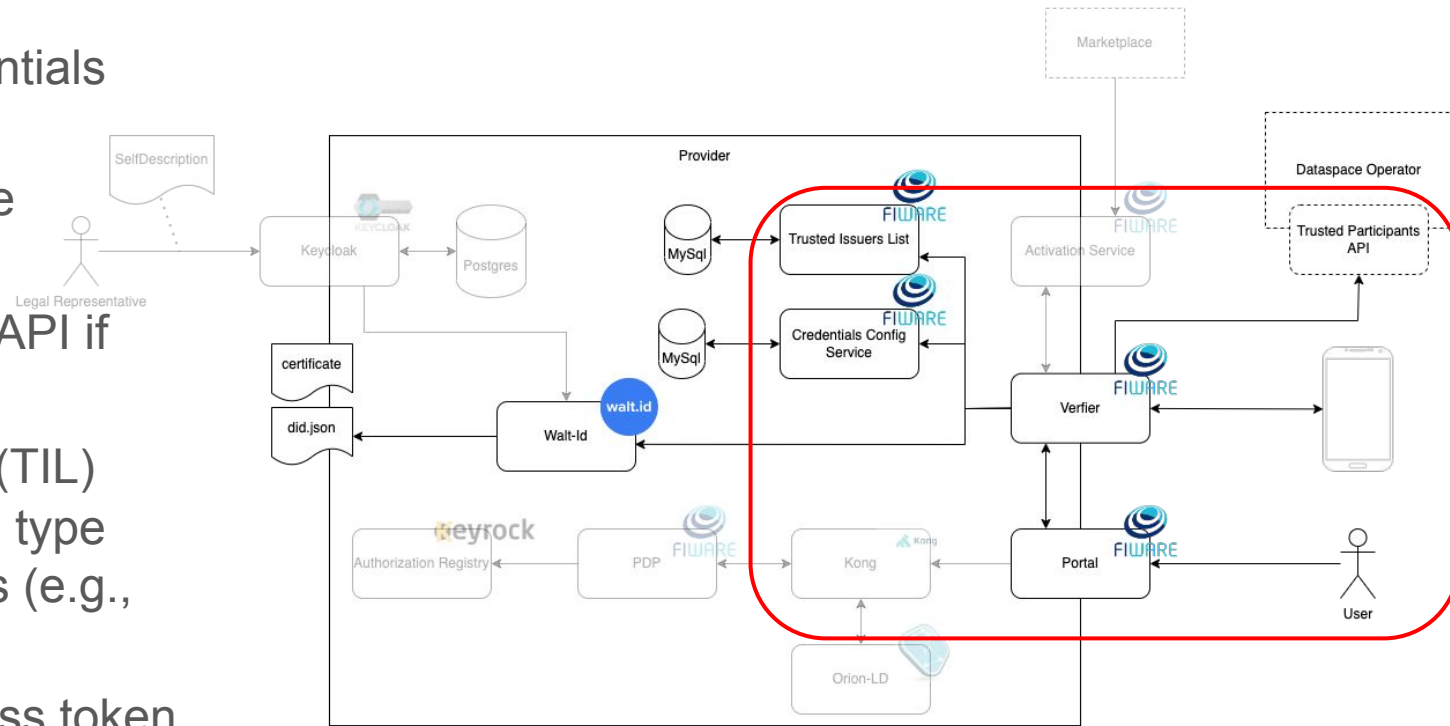
# Description of process: Login

- User initiates login
- Portal generates session, forwards it to verifier together with clientId
- Verifier requests service scope from Credentials Config Service
- QR code containing connection information is displayed
- User scans QR with mobile wallet
- Using URL in QR, wallet obtains /authentication\_response endpoint of verifier
- Wallet sends Verifiable Presentation (VP) containing the VC to this endpoint



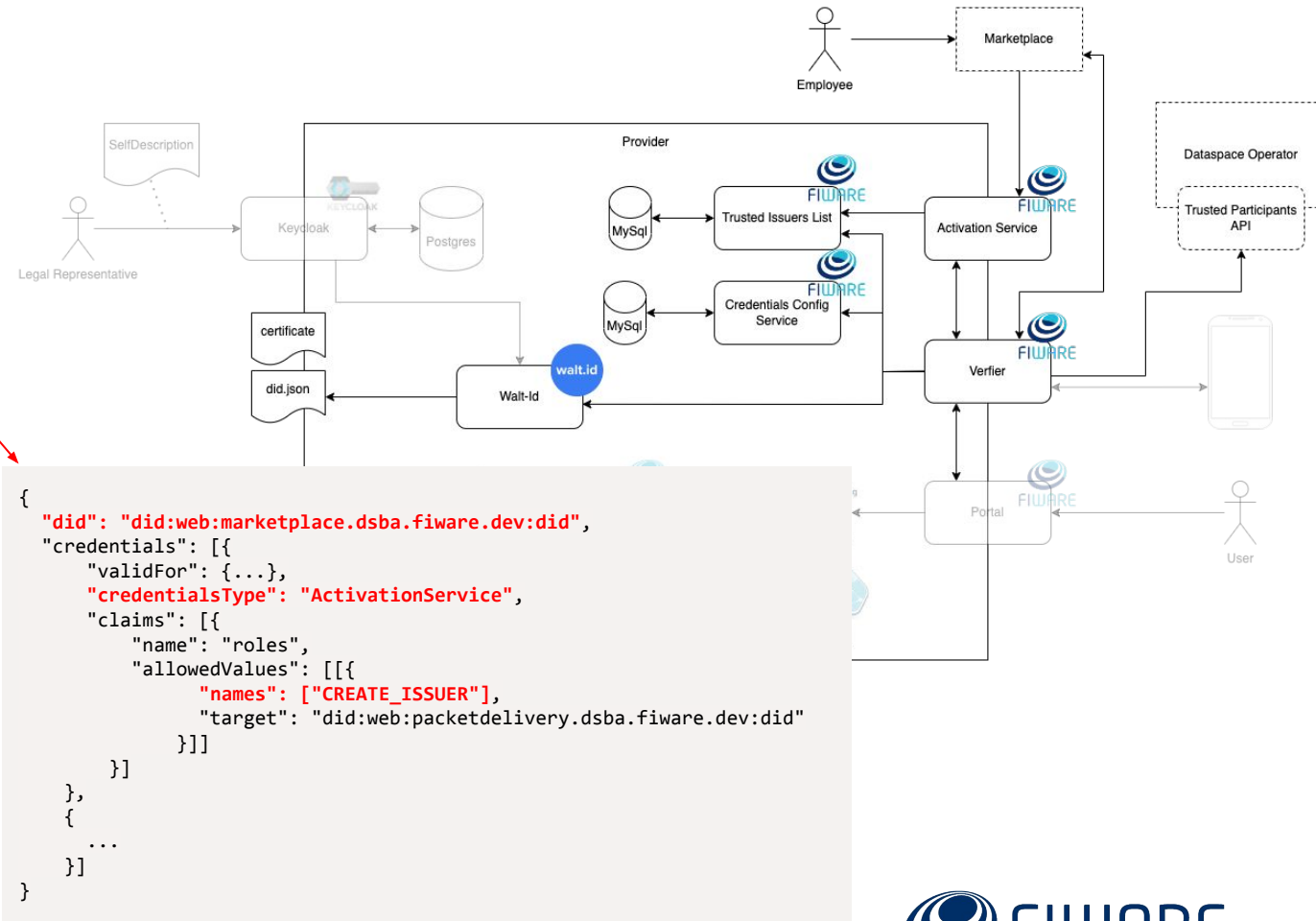
# Description of process: Login

- Verifier retrieves relevant Trusted Participants Registries and Trusted Issuers Lists from Credentials Config Service (based on credentials type and clientId)
- Verifier validates signature and validity of the credential
- Verifier checks against Trusted Participants API if issuer is trusted participant
- Verifier checks against Trusted-Issuers-List (TIL)
  - if issuer is allowed to issue VCs of such type
  - if issuer is allowed to issue set of claims (e.g., roles) contained in VC
- Verifier returns code for obtaining JWT access token
- Wallet and/or application can obtain JWT using that code against verifier /token endpoint
- User can use the service



# Description of process: Acquisition

- Employee of Animal Goods wants to acquire access to packet delivery service
- Employee is already logged in at marketplace
- TIL is protected by Activation Service (AS)
- TIL needs entry for marketplace to
  - issue VCs of type ActivationService
  - issue the role CREATE\_ISSUER
- Such VC was issued to the marketplace before

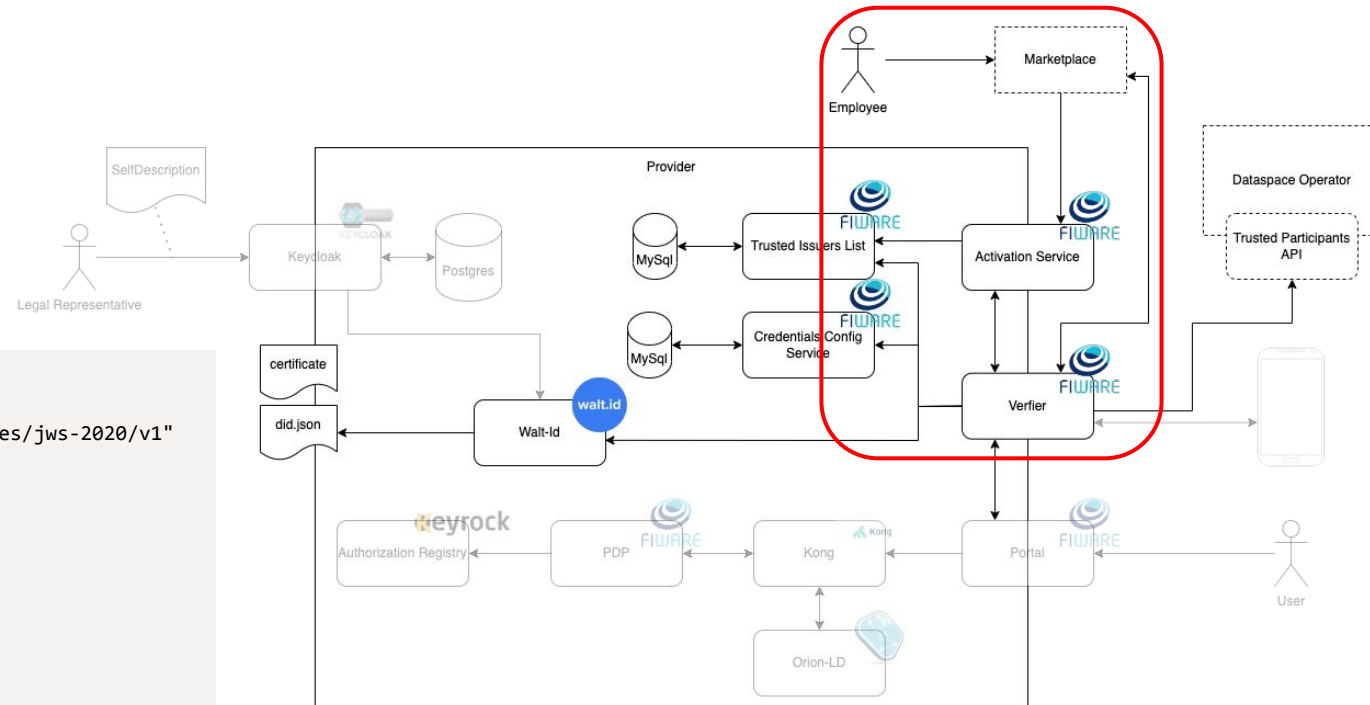




# Description of process: Acquisition

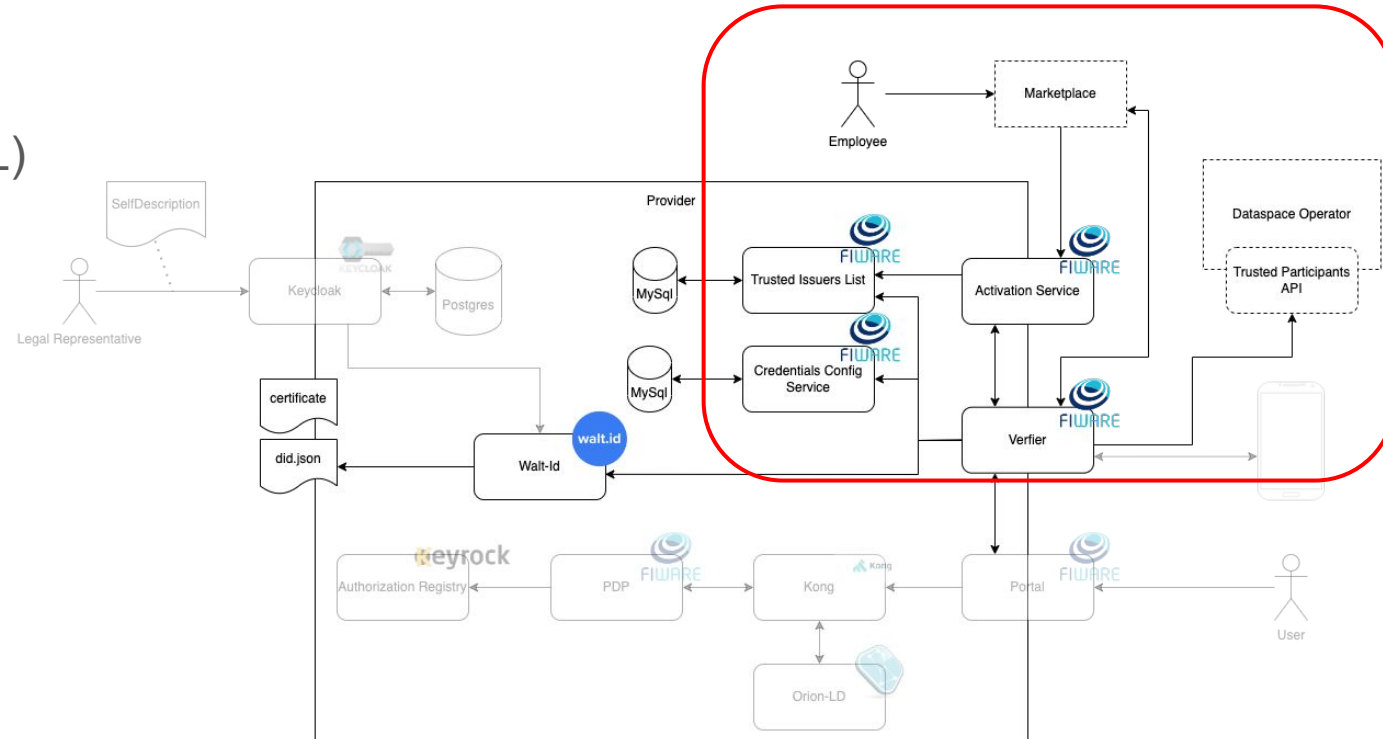
- Employee performs checkout on marketplace
- Marketplace initiates “samedevice” flow against verifier of PDC
- Marketplace sends VP to verifier /authentication\_response endpoint
  - VP contains VC of marketplace

```
{
  "type": [ "VerifiableCredential", "ActivationService" ],
  "@context": [ "https://www.w3.org/2018/credentials/v1", "https://w3id.org/security/suites/jws-2020/v1" ],
  "id": "urn:uuid:c7e7d4a1-7579-40a3-b418-59f6a9f2f6b1",
  "issuer": "did:web:marketplace.dsba.fware.dev:did",
  "issuanceDate": "2023-06-07T07:45:06Z",
  "issued": "2023-06-07T07:45:06Z",
  "validFrom": "2023-06-07T07:45:06Z",
  "expirationDate": "2032-12-08T13:05:06Z",
  "credentialSchema": { ... },
  "credentialSubject": {
    "id": "0b876000-36c7-47ed-b896-5b5ec163663a",
    "roles": [ {
      "names": [ "CREATE_ISSUER" ],
      "target": "did:web:packetdelivery.dsba.fware.dev:did"
    } ],
    "email": "marketplace@mymail.com"
  },
  "proof": {
    "type": "JsonWebSignature2020",
    "creator": "did:web:marketplace.dsba.fware.dev:did",
    "created": "2023-06-07T07:45:06Z",
    "verificationMethod": "did:web:marketplace.dsba.fware.dev:did#6f4c1255f4a54090bc8ff7365b13a9b7",
    "jws": "eyJJC.....774yv1iyiA"
  }
}
```



# Description of process: Acquisition

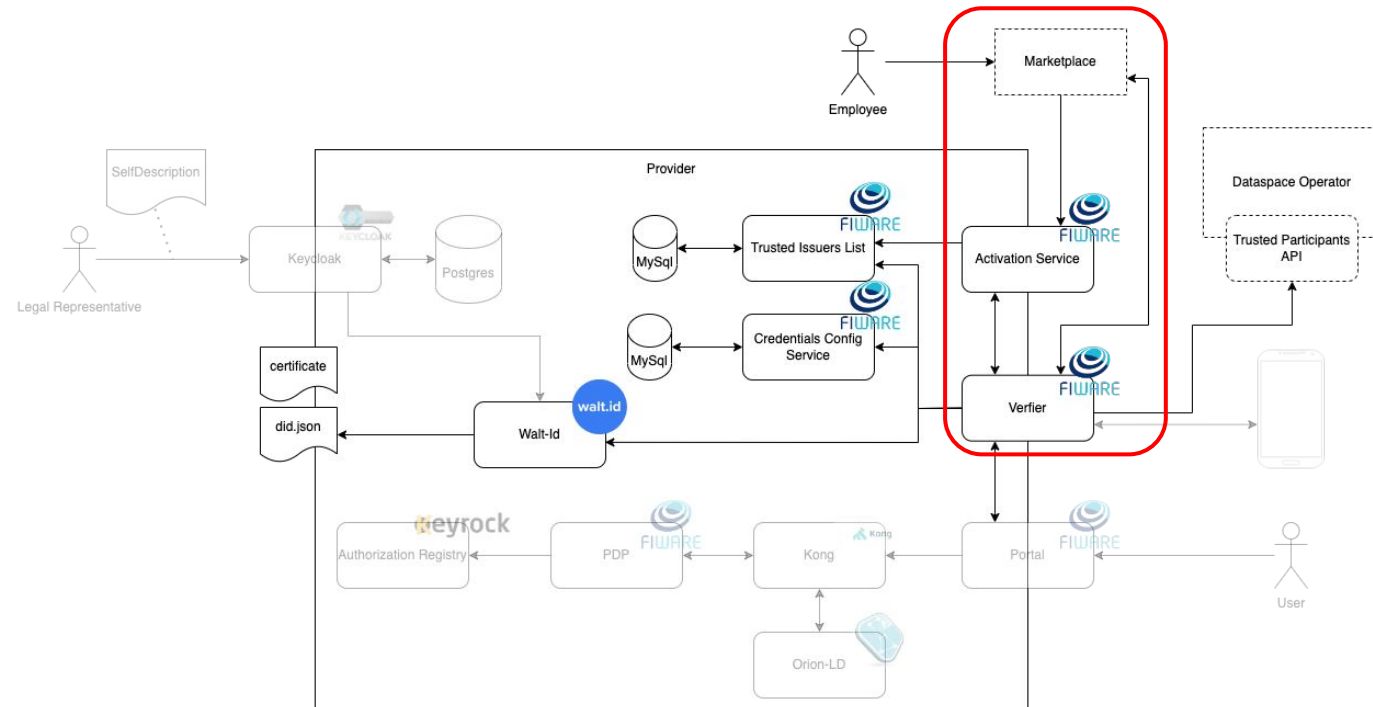
- Verifier checks against Trusted Participants API if issuer is trusted participant
- Verifier checks against Trusted-Issuers-List (TIL)
  - if issuer is allowed to issue VCs of type **“ActivationService”**
  - if issuer is allowed to issue role **“CREATE\_ISSUER”**
- Verifier returns code for obtaining JWT access token
- Marketplace obtains JWT access token from verifier /token endpoint



# Description of process: Acquisition

- Marketplace sends POST request to AS /issuer endpoint in order to create entry at TIL
- JWT access token is added to the Authorization header
- AS validates JWT with JWKS of verifier and checks for “CREATE\_ISSUER” role
- AS forwards request to TIL, issuer is created

```
{
  "did": "did:web:happypets.dsba.fiware.dev:did",
  "credentials": [
    {
      "validFor": {
        "from": "2023-06-09T07:24:25Z",
        "to": "2023-06-09T13:24:25Z"
      },
      "credentialsType": "PacketDeliveryService",
      "claims": [{
        "name": "roles",
        "allowedValues": [
          {
            "names": [
              "STANDARD_CUSTOMER"
            ],
            "target": "did:web:packetdelivery.dsba.fiware.dev:did"
          }
        ]
      }],
    }
  ]
}
```



# LIVE DEMO - Animal Goods login at portal + Service Usage

- Show login at PDC Portal by shop customer of Animal Goods
  - will be successful, since Animal Goods has been onboarded
- Show service usage of Packet Delivery service → **READ** delivery order
  - will be successful, since Animal Goods has purchased basic service access
  - is allowed to issue role which allows READ operation
- Show service usage of Packet Delivery service → **UPDATE** delivery order
  - will fail, since Animal Goods has NOT purchased premium service access
  - is not allowed to issue role which allows UPDATE operation

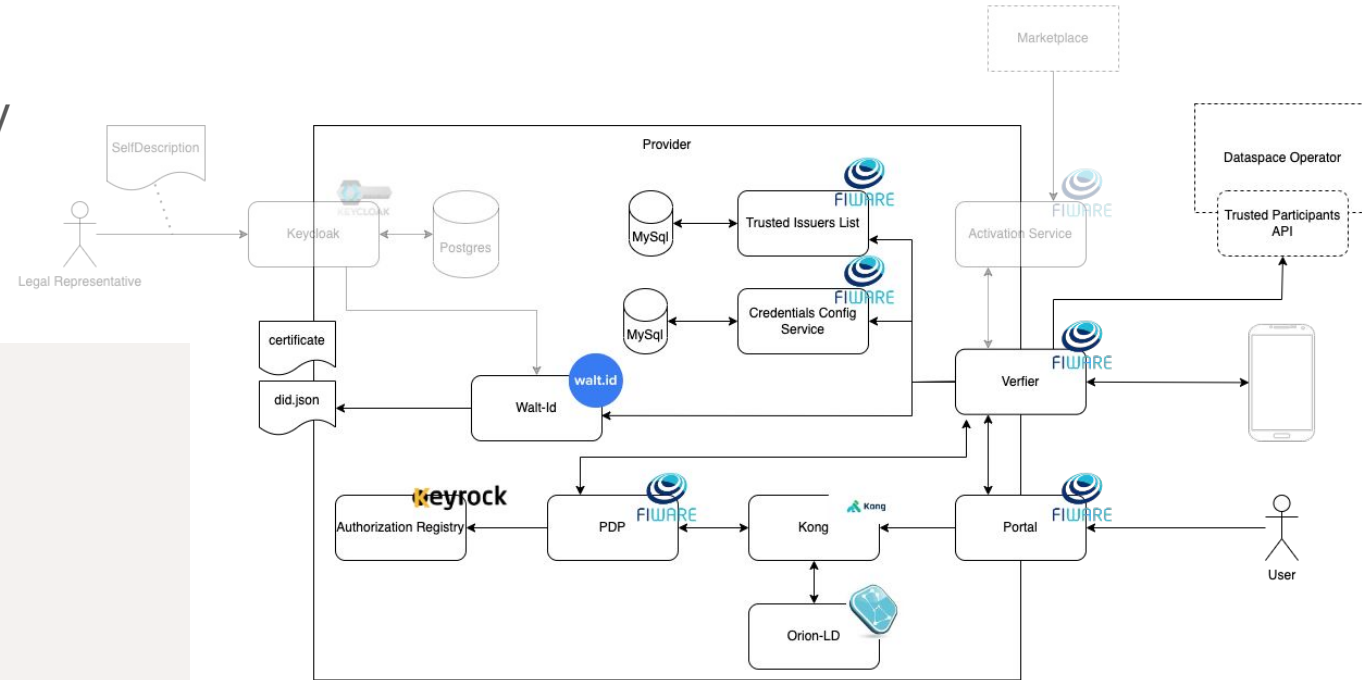
# LIVE DEMO - A

```
{
  "type" : [ "PacketDeliveryService" ],
  "@context" : [ "https://www.w3.org/2018/credentials/v1", "https://w3id.org/security/suites/jws-2020/v1" ],
  "id" : "urn:uuid:8d911f8f-064d-4b37-89df-a26954538f8f",
  "issuer" : "did:web:animalgoods.dsba.firmware.dev:did",
  "issuanceDate" : "2023-06-09T10:31:48Z",
  "issued" : "2023-06-09T10:31:48Z",
  "validFrom" : "2023-06-09T10:31:48Z",
  "expirationDate" : "2023-06-11T22:31:48Z",
  "credentialSchema" : {
    "id" : "https://raw.githubusercontent.com/FIWARE-Ops/tech-x-challenge/main/schema.json",
    "type" : "FullJsonSchemaValidator2021"
  },
  "credentialSubject" : {
    "id" : "4ebb065b-b663-47ad-808d-41064ab1f955",
    "type" : "gx:NaturalParticipant",
    "familyName" : "Animal",
    "firstName" : "AnimalGoods",
    "lastName" : "Animal",
    "roles" : [ {
      "names" : [ "STANDARD_CUSTOMER" ],
      "target" : "did:web:packetdelivery.dsba.firmware.dev:did"
    } ],
    "email" : "standard-user@animalgoods.org"
  },
  "proof" : {
    "type" : "JsonWebSignature2020",
    "creator" : "did:web:animalgoods.dsba.firmware.dev:did",
    "created" : "2023-06-09T10:31:48Z",
    "verificationMethod" : "did:web:animalgoods.dsba.firmware.dev:did#47486125ebe741de8f656dda775e8969",
    "jws" :
    "eyJiNjQiOmZhbHNlLCJjcml0IjpbImI2NCJdLCJhbGciOiJQUzI1NiJ9..EAXAhd2mHKhCwdjBUJhxPo2BKD39eKJZuVL-DAEMFxjWlikXJleDg6azf2Av7UBT0IUDEfB6_eZlNYPVfqRoBabm20hk6vsb9GGM-Ery1aKrzHKxRVAqtPjkVhAdVH4SHx9b_eipflh804IE05iMKZA0v0qrYGgMIwE-QgnuZCFCslTRxXE148Kx0PW5NDIbPxJfIkNiBtGHVsz6jXqCfa1iHj1KfITDtg7oBm0HVmtl20IkQYHaaNi9eYcE1RNS4LrDfS4Y-pJziAUdL20fbXiZz_N_nPjn-IHl3QGxAU6g-Xnq1R4M93TzO2H0KyxZwuE0TmiQSaPLwfOzsI86jQ"
  }
}
```

# Description of process: Service Usage

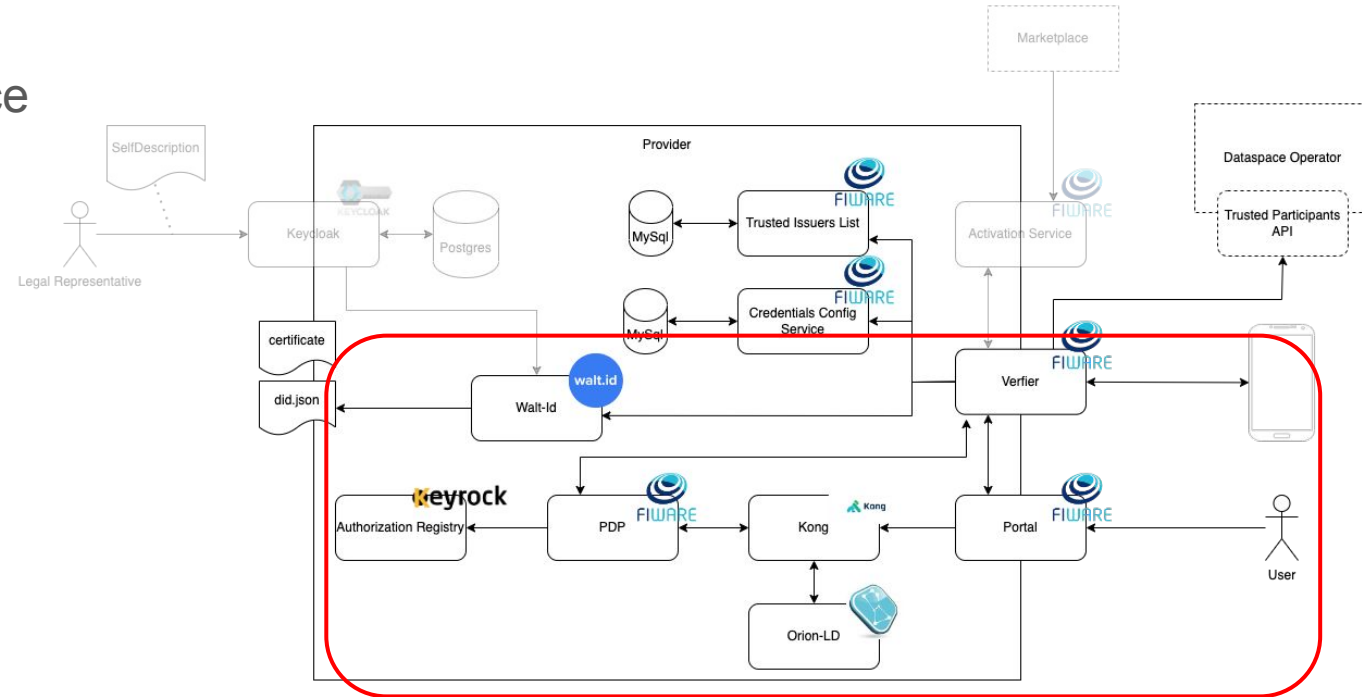
- Shop customer accesses packet delivery service
- Customer is already logged in at PDC portal
- Customer wants to retrieve info about its delivery order
- During login, customer obtained JWT access token

```
{
  "aud": ["packetdelivery-portal.dsba.firmware.dev"],
  "iss": "did:web:packetdelivery.dsba.firmware.dev:did",
  "verifiableCredential": {
    "@context": [...],
    "credentialSchema": {...},
    "type": ["PacketDeliveryService"],
    "credentialSubject": {
      "email": "prime-user@animalgoods.org",
      "firstName": "Customer",
      "id": "0dd5e819-1362-4c30-a7f1-a59652907d36",
      "lastName": "Animal",
      "roles": [{
        "names": ["STANDARD_CUSTOMER"],
        "target": "did:web:packetdelivery.dsba.firmware.dev:did"
      }],
      "type": "gx:NaturalParticipant"
    },
    "expirationDate": "2023-06-11T01:14:42Z",
    ....
    "issuanceDate": "2023-06-08T13:14:42Z",
    "issuer": "did:web:animalgoods.dsba.firmware.dev:did",
    "proof": {
      "created": "2023-06-08T13:14:42Z",
      "creator": "did:web:happypets.dsba.firmware.dev:did",
      "jws": "eyJiNjQ0MzhbHN1LCJjcmw5be1zu-r4HRxgt_EiVvL984cApXY7-GyhECVg",
      "type": "JsonWebSignature2020",
      "verificationMethod": "did:key:z6Mkq..."
```



# Description of process: Service Usage

- Customer issues NGSI-LD GET request
  - JWT access token in Authorization header
- Request is sent to Kong endpoint for PDC service
- Kong “pep-plugin” forwards request to PDP
- PDP validates JWT with JWKS of verifier
- PDP requests policy-role-mappings at Authorization Registry
- PDP evaluates NGSI-LD request and compares to obtained policies
- If policies allow requested operation:
  - Request is forwarded to Context Broker
  - Response is returned to portal





# Useful links

## Useful repositories:

- Gitops demo environment: <https://github.com/FIWARE-Ops/fiware-gitops/tree/master/aws/dsba>
- 
- 

## Documentation

- DSBA Technical Convergence Document:  
[https://data-spaces-business-alliance.eu/wp-content/uploads/dlm\\_uploads/Data-Spaces-Business-Alliance-Technical-Convergence-V2.pdf](https://data-spaces-business-alliance.eu/wp-content/uploads/dlm_uploads/Data-Spaces-Business-Alliance-Technical-Convergence-V2.pdf)
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