Open APIs for Open Minds

Identity Management and Access Control

Security and API Management Chapter

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FIWARE

FIWARE Ecosystem

- A framework of **open source platform components** which can be assembled together and with other third-party components to accelerate the development of **Smart Solutions**.

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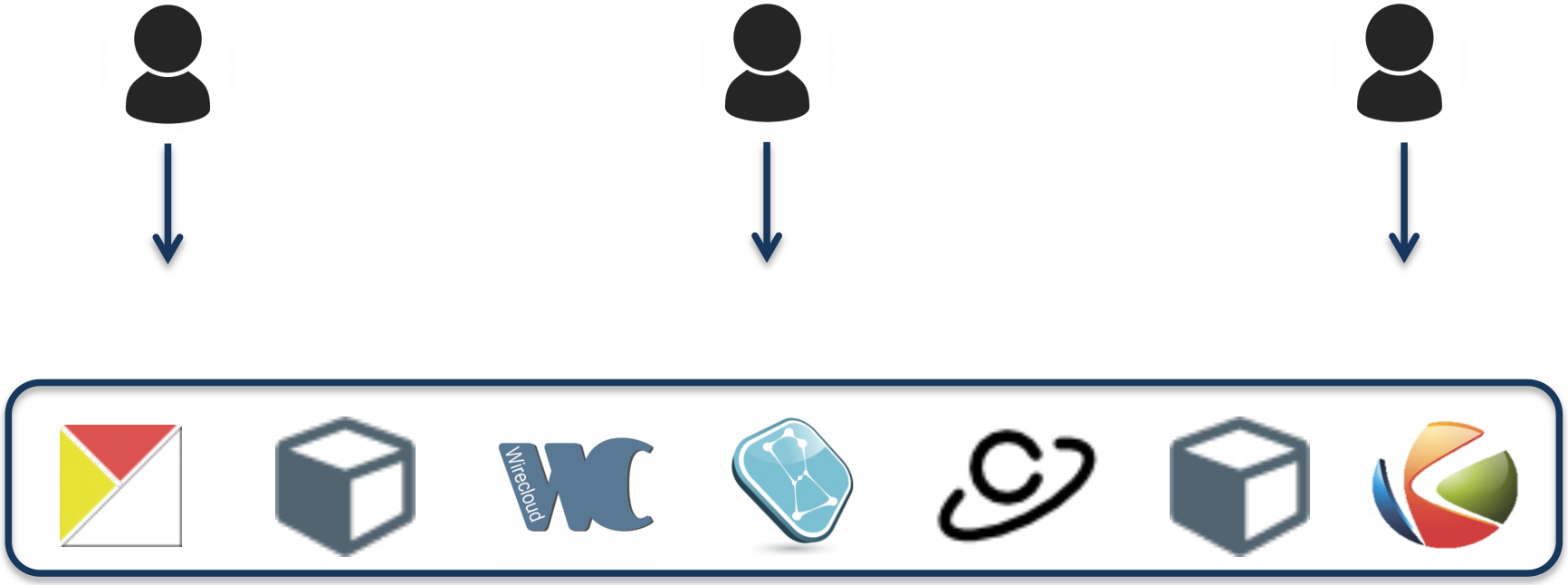

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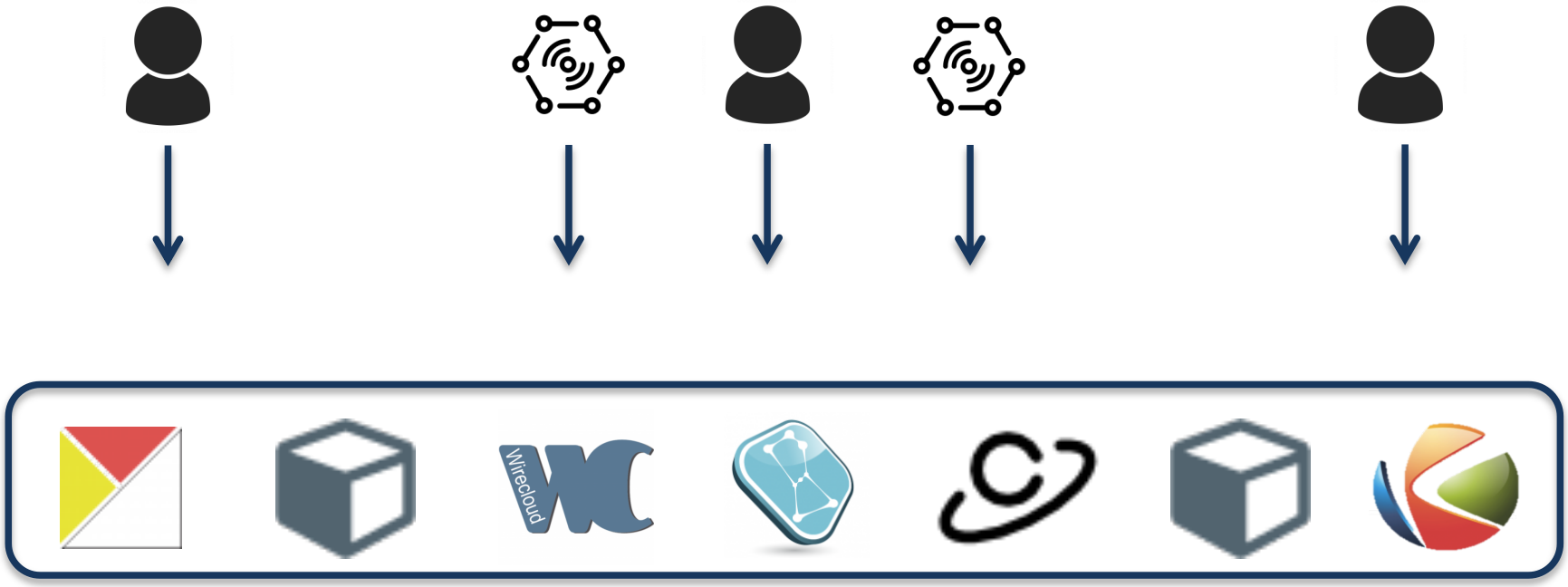

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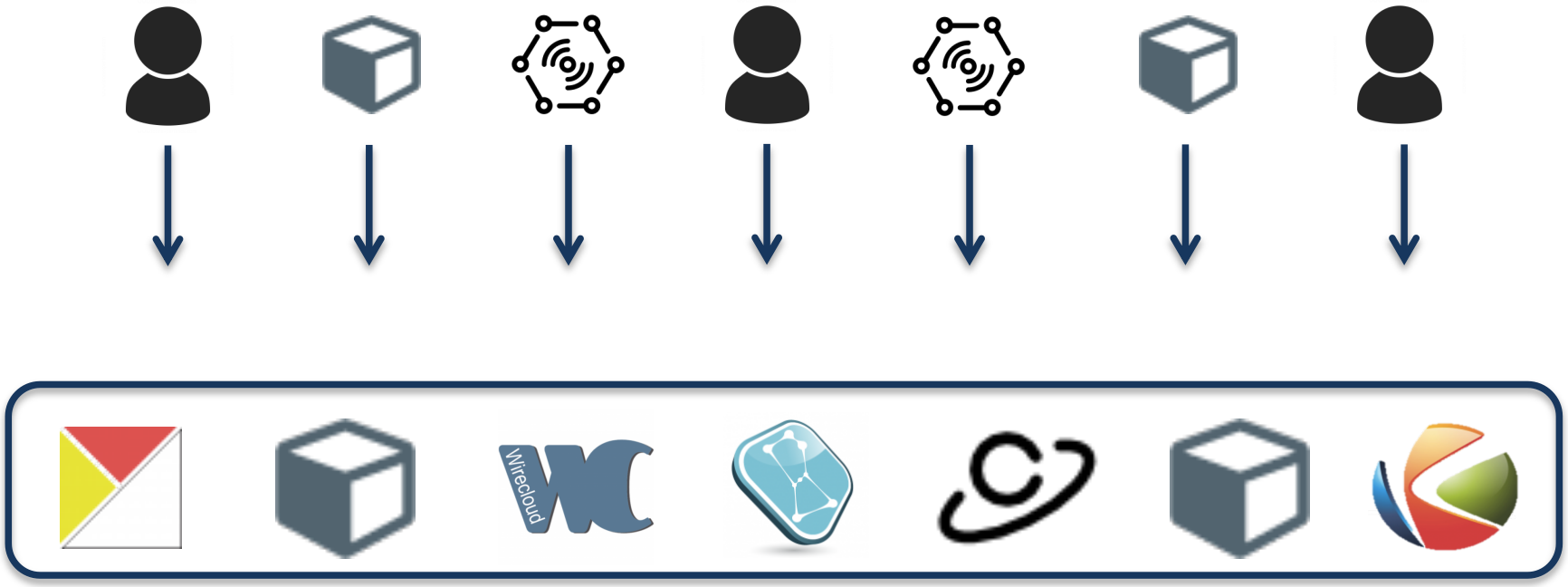

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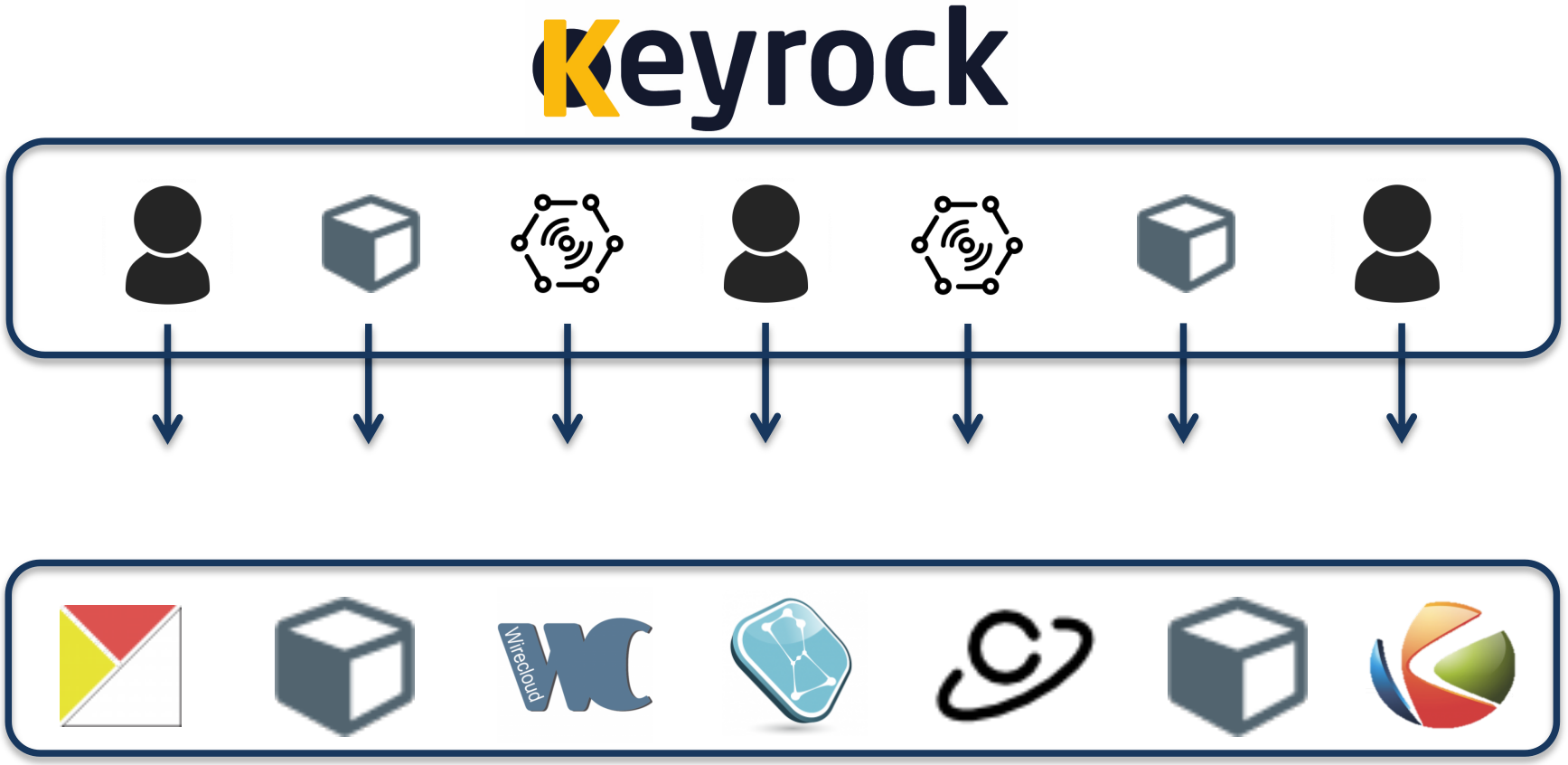

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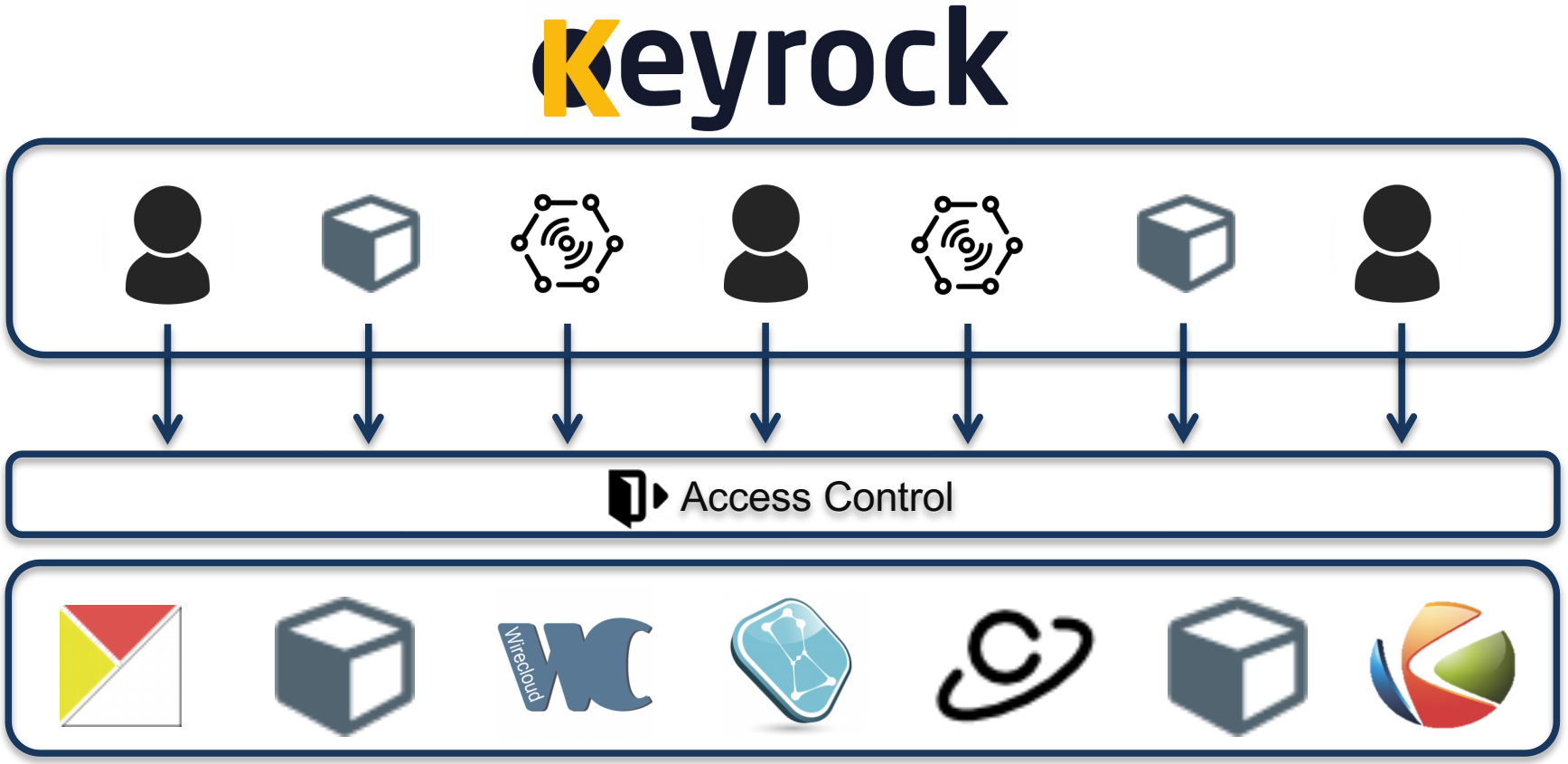

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IAM Generic Enablers

Identity & Access Control Management

- Keyrock – Identity Management
- Wilma – PEP Proxy
- AuthZForce – Authorization PDP

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https://keyrock-fiware.github.io

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Keyrock

Main features

Web Interface and Rest API for managing Identity

- Users, devices and groups management
- OAuth 2.0 and OpenID Connect - Single Sign On
- Application - scoped roles and permissions management
- Support for local and remote PAP/PDP
- JSON Web Tokens (JWT) and Permanent Tokens support
- Two factor authentication
- MySQL / PostgreSQL and external DB driver
- European eID authentication compatibility (CEF eIDAS)

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Wilma

Main features

PEP Proxy for securing service backends

- Basic and complex AC policies support
- OAuth 2.0 Access Tokens support
- JSON Web Tokens (JWT) support
- Custom PDP configuration
- Integrated with API Management tools
  - APInf & API Umbrella
  - KONG

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AuthZForce
Main features

PAP and PDP Server for managing complex AC policies

- XACML-3.0 standard-compliant
- Cloud-ready RESTful ABAC framework with XML optimization
- Multi-tenant REST API for PDP and PAP
- Standards:
  - OASIS: XACML 3.0 + Profiles (REST, RBAC, Multiple Decision)
  - ISO: Fast Infoset
- Extensible to attribute providers (PIP), functions, etc.

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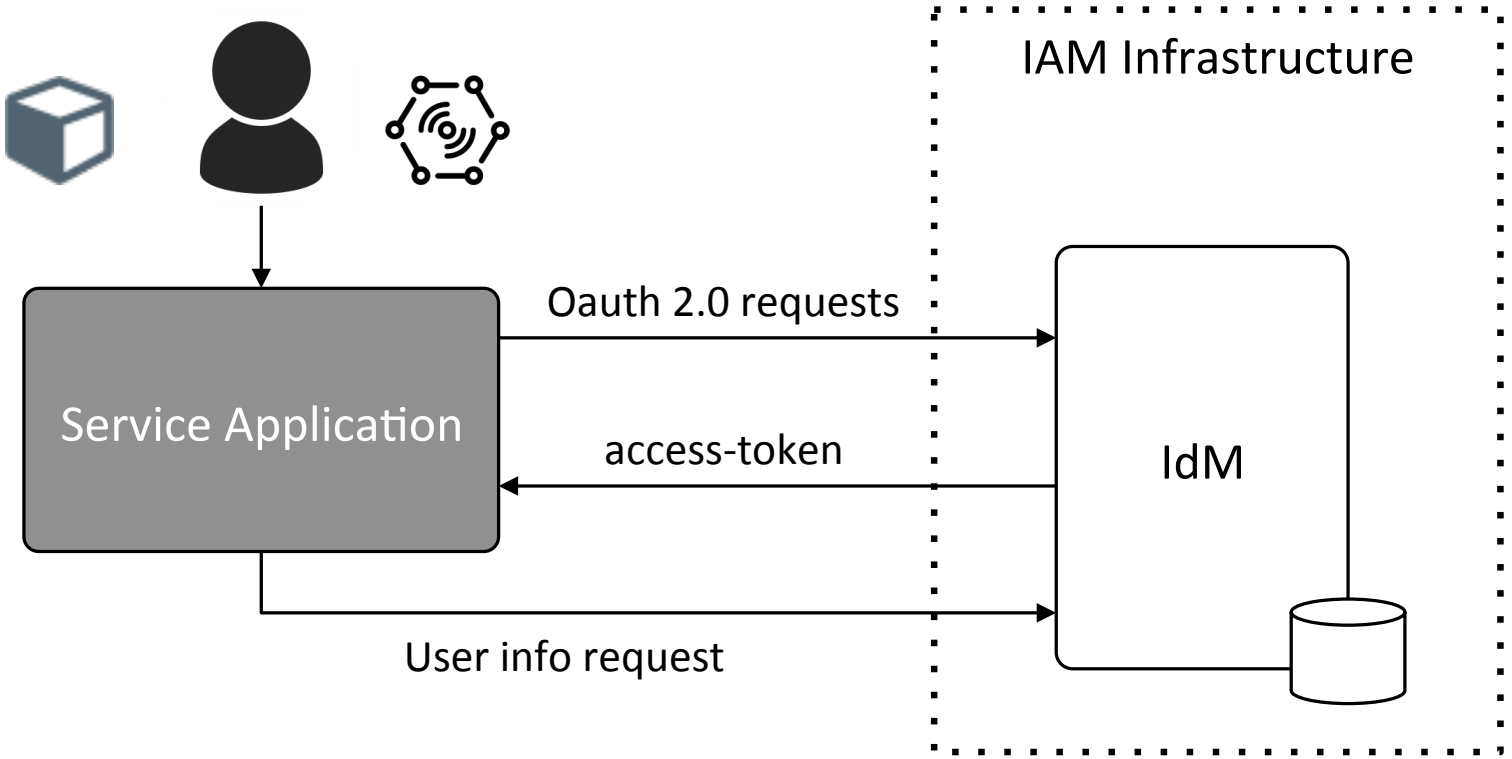
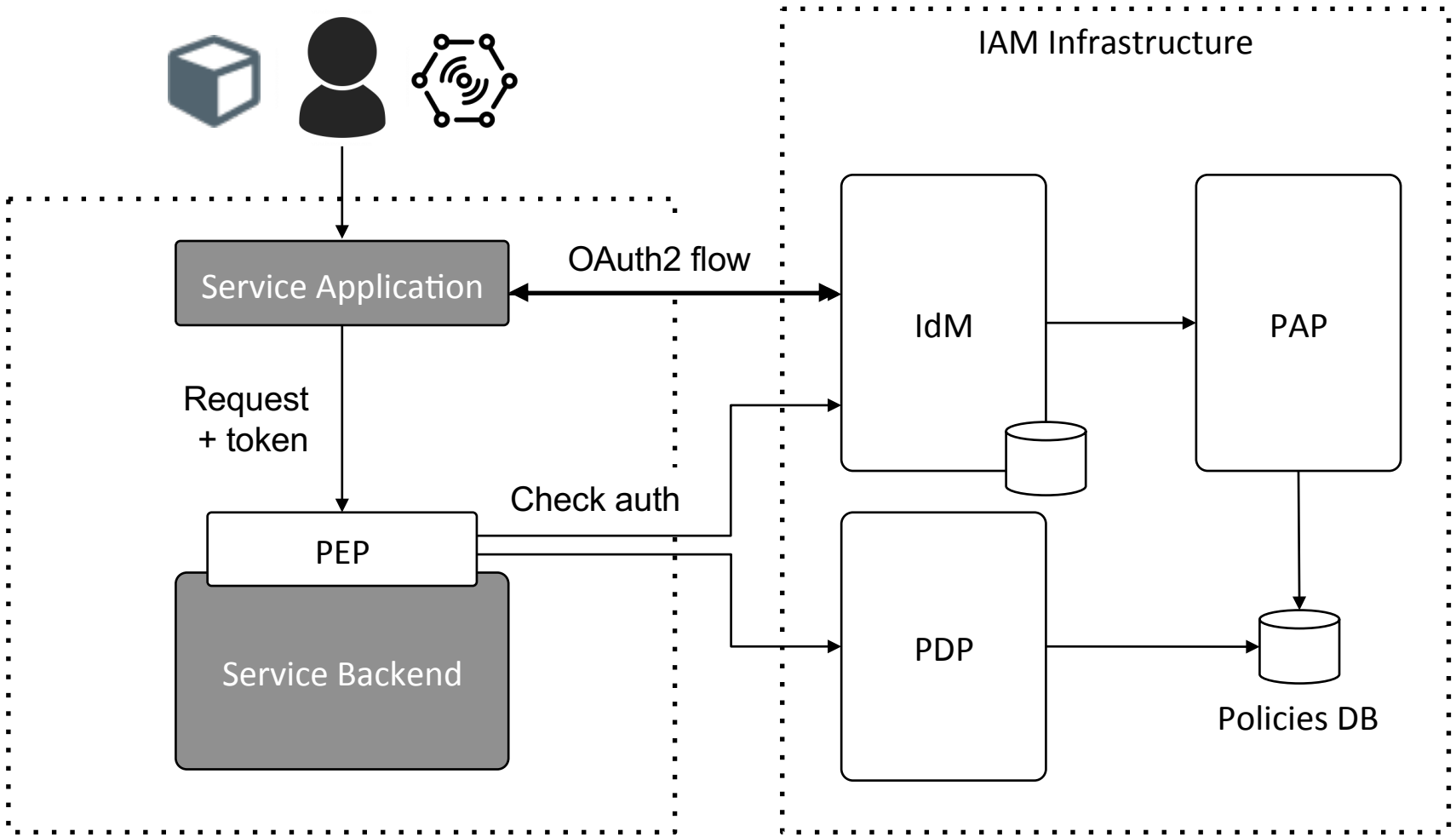
Identity and AC Management

OAuth 2.0 flow



Identity and AC Management

Accessing GEs and services



Identity and AC Management
Accessing GEs and services

- Level 1: Authentication
- Level 2: Basic Authorization
- Level 3: Advanced Authorization

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Identity and AC Management
Accessing GEs and services

- **Level 1: Authentication**
  - **Check if a user has been authenticated**
- Level 2: Basic Authorization
- Level 3: Advanced Authorization

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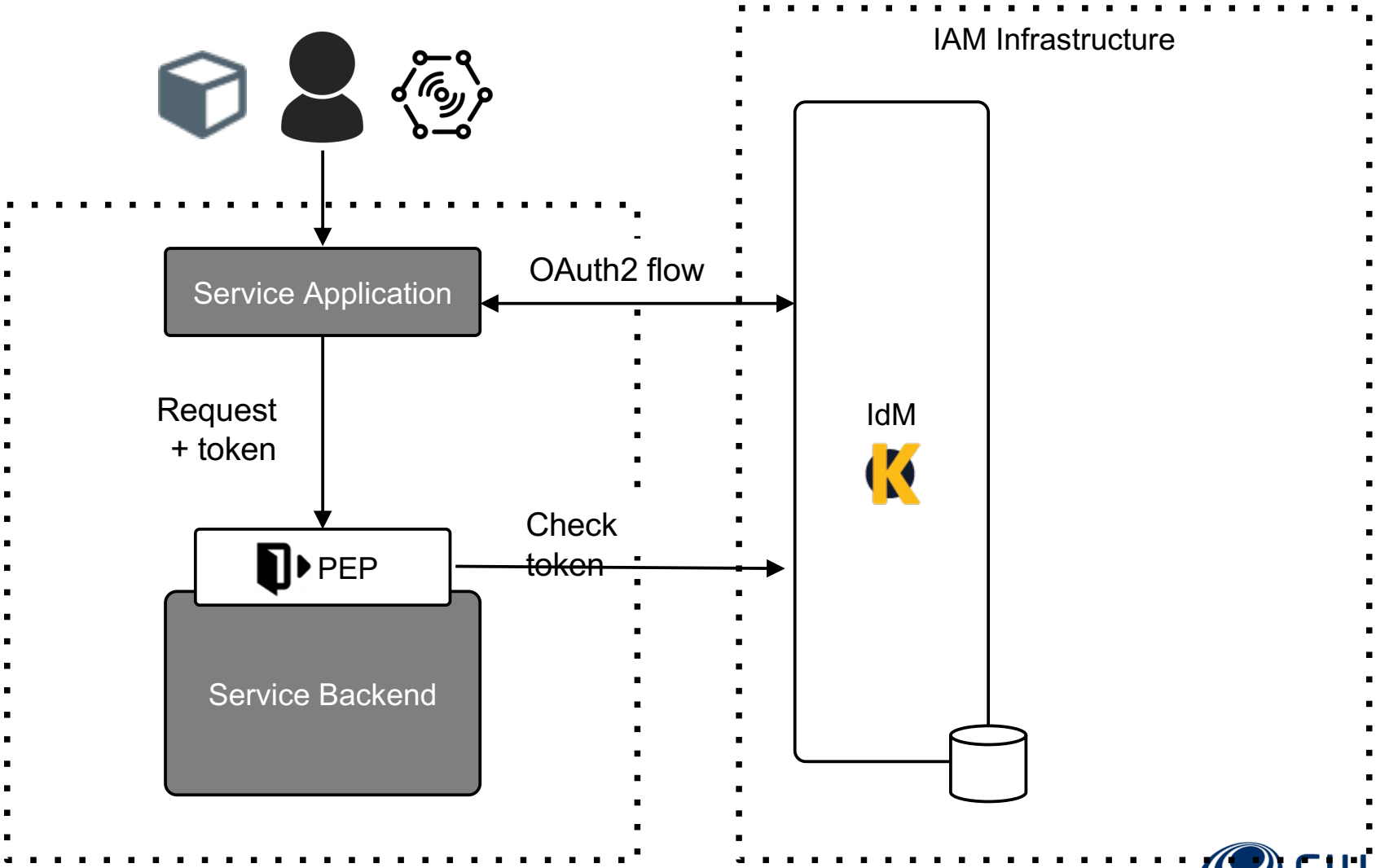
Identity and AC Management

Level 1: Authentication



Identity and AC Management
Accessing GEs and services

- Level 1: Authentication
  - Check if a user has been authenticated

- **Level 2: Basic Authorization**
  - **Checks if a user has permissions to access a resource**
  - **HTTP verb + resource path**

- Level 3: Advanced Authorization

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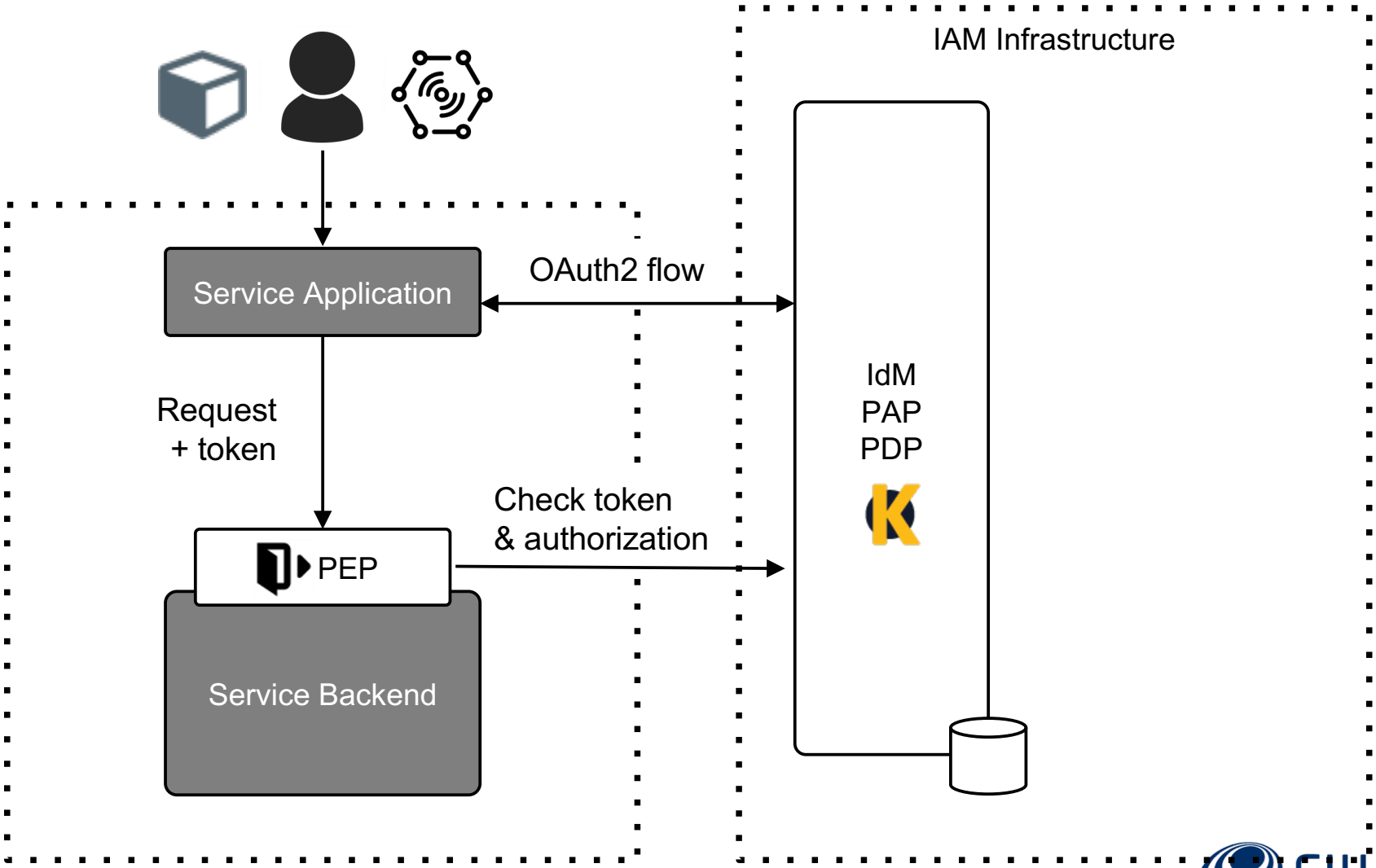
Identity and AC Management

Level 2: Basic Authorization



Identity and AC Management
Accessing GEs and services

- Level 1: Authentication
  - Check if a user has been authenticated
- Level 2: Basic Authorization
  - Checks if a user has permissions to access a resource
  - HTTP verb + resource path
- **Level 3: Advanced Authorization**
  - **Custom XACML policies**

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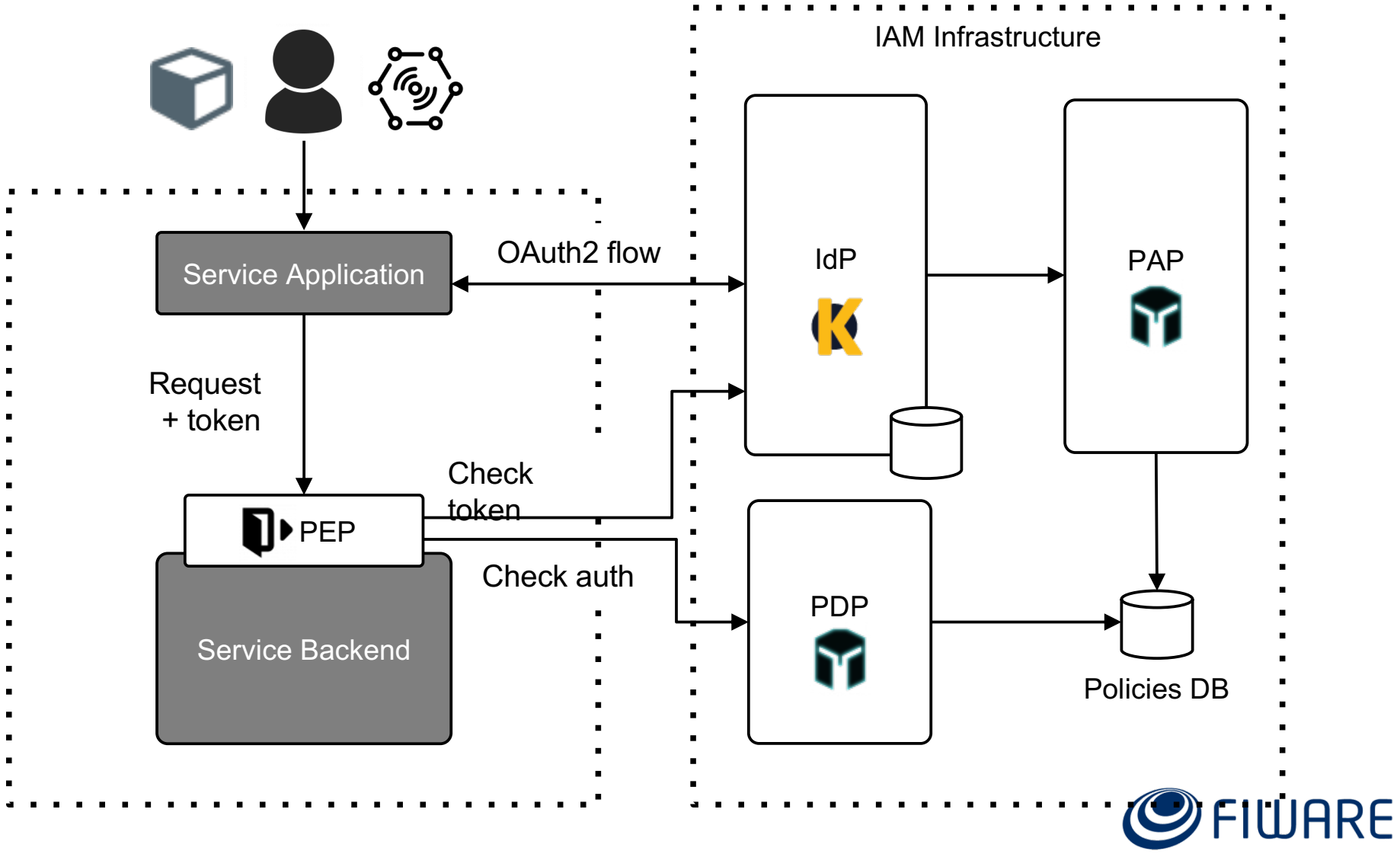
Identity and AC Management

Level 3: Advanced Authorization



Identity and AC Management
JSON Web Tokens

- A JSON Web Token (JWT) is a JSON object defined in RFC 7519 as a safe way to represent a set of information between two parties.
- The token is composed of a header, a payload, and a signature.

```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJ
pZCI6MSwiZGlzcGxheU5hbWUiOiJEZW1vIHVzZXI
iLCJlbWFpbCI6ImRlbW9AZml3YXJlLm9yZyIsInJ
vbGVzIjpbeyJpZCI6MTUsIm5hbWUiOiJNYW5hZ2V
yIn1dLCJvcmdhbml6YXRpb25zIjpbeyJpZCI6MTI
sIm5hbWUiOiJVbml2ZXJzaWRhZCBQb2xpdGVjbml
jYSBkZSBNYWRyaWQiLCJyb2xlcyI6W3siaWQiOjE
0LCJuYW1lIjoiQWRtaW4ifV19XX0.OvRSa7SwMgM
2pKq4NnmN3gYeD-aZ1PpNLRkAI82SAIk
```

```
{
  "alg": "HS256",
  "typ": "JWT"
}
{
  "id": 1,
  "displayName": "Demo user",
  "email": "demo@fiware.org",
  "roles": [
    {
      "id": 15, "name": "Manager"
    }
  ],
  "organizations": [
    {
      "id": 12,
      "name": "Universidad Politecnica de Madrid",
      "roles": [
        {
          "id": 14, "name": "Admin"
        }
      ]
    }
  ]
}
```

```
HMACSHA256(
  base64UrlEncode(header) + "." +
  base64UrlEncode(payload),
  my-secret
```

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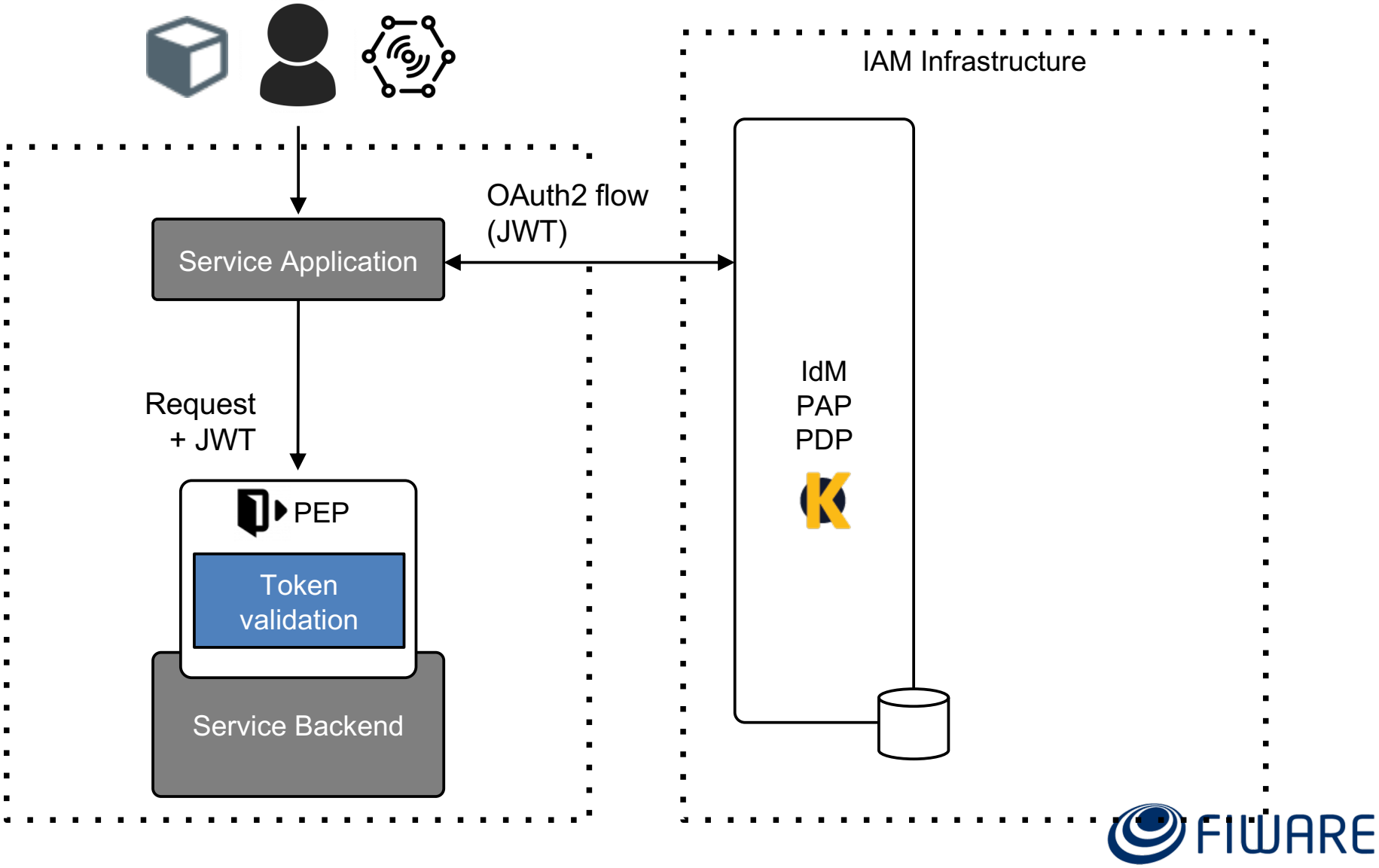
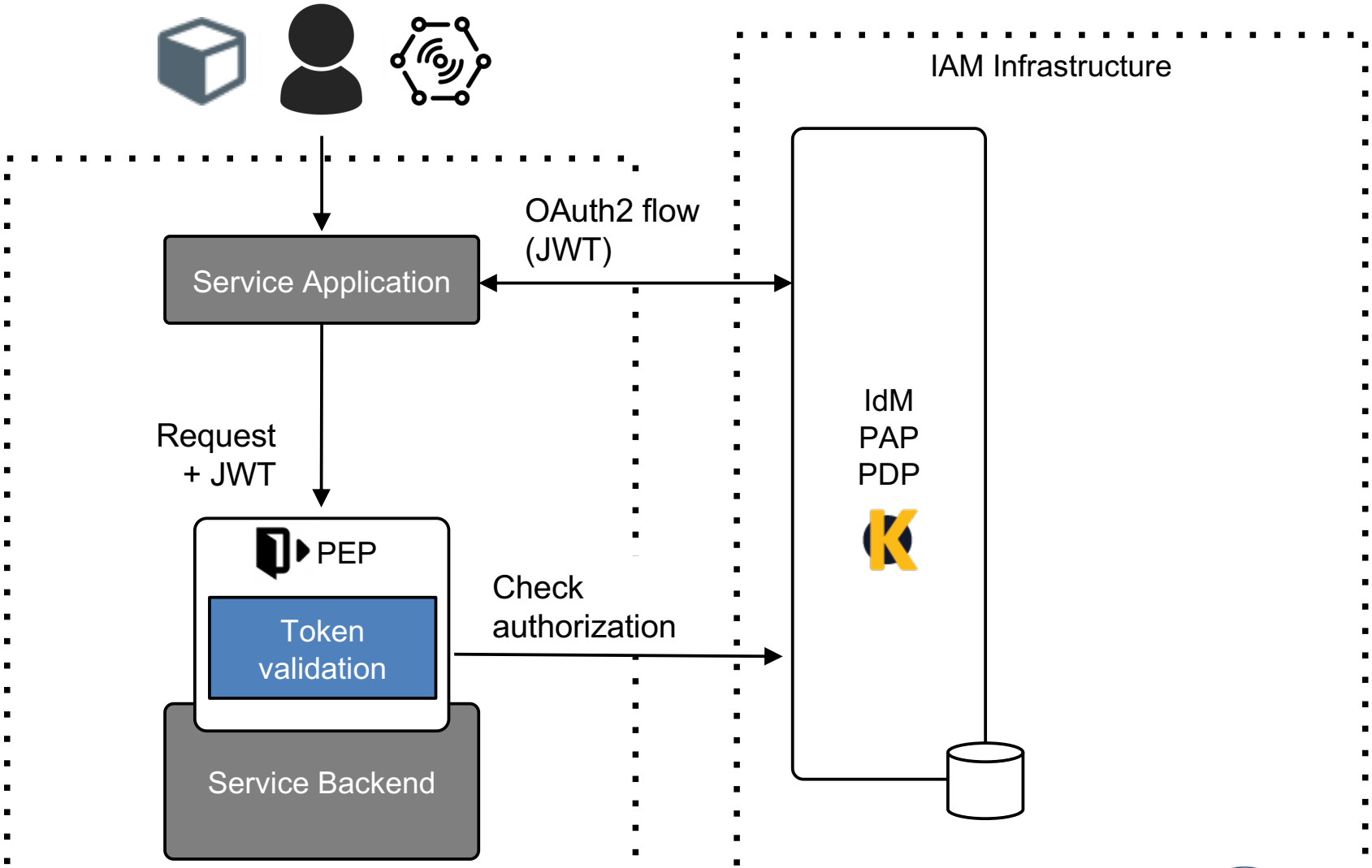
Identity and AC Management

JSON Web Tokens



Identity and AC Management

JSON Web Tokens



Keyrock
Identity attributes

- Definition of custom attributes in users' profile
  - List of attributes configurable in config file
  - Users can define the values in the UI
- The attributes are included in the users' profile returned when validating a token
- Service providers can use them for personalizing the services

- Typical use case -> Accessibility

  Research paper published at https://doi.org/10.3390/app9183813

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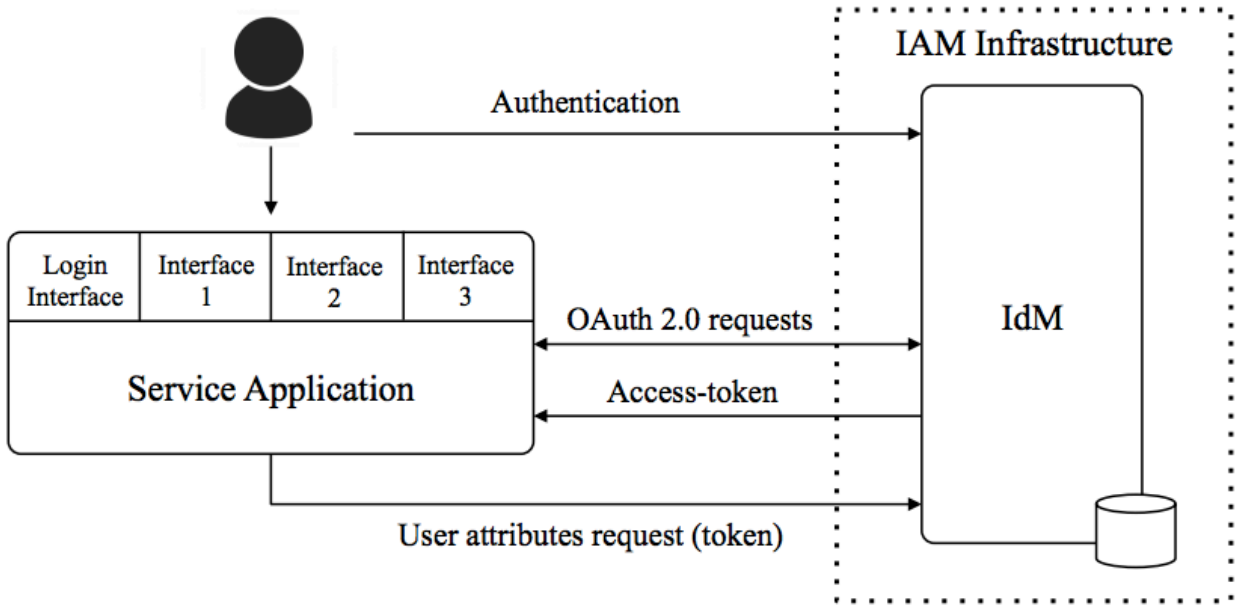
Keyrock
Identity attributes

- Typical use case -> Accessibility
  - Provide interfaces adapted to the users' functional capabilities



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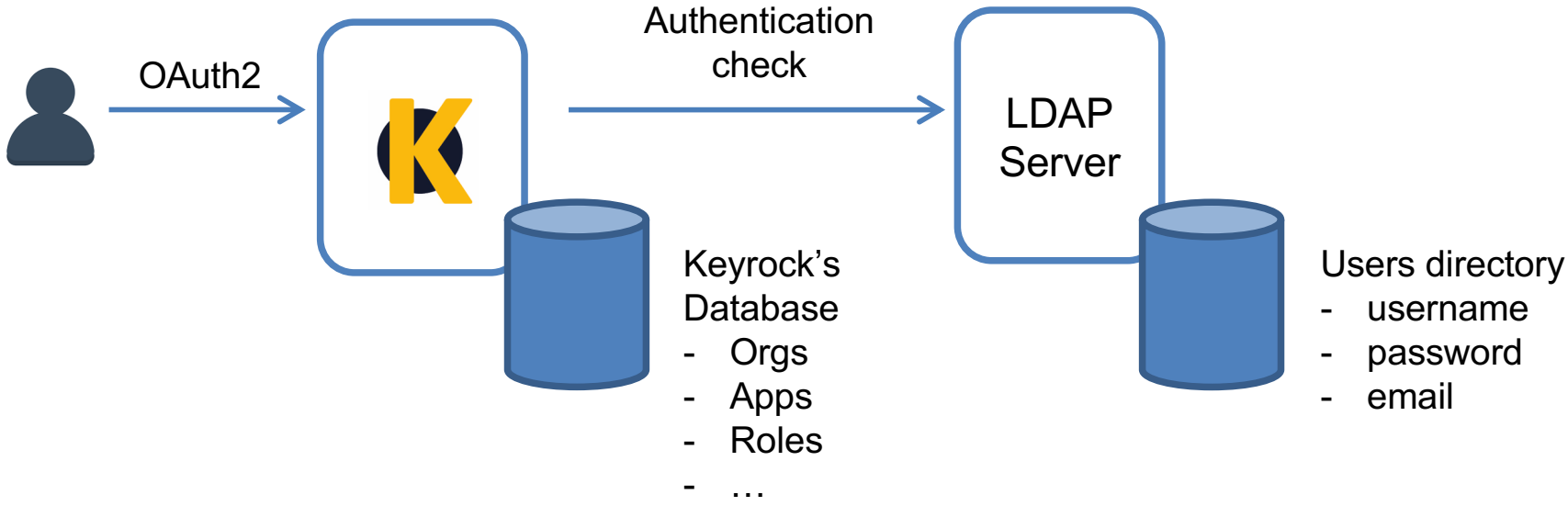
Keyrock
External DB Authentication

- SQL/LDAP External Authentication Driver



- Documentation available
  - https://fiware-idm.readthedocs.io/en/latest/installation_and_administration_guide/configuration/index.html#external-authentication-ldap

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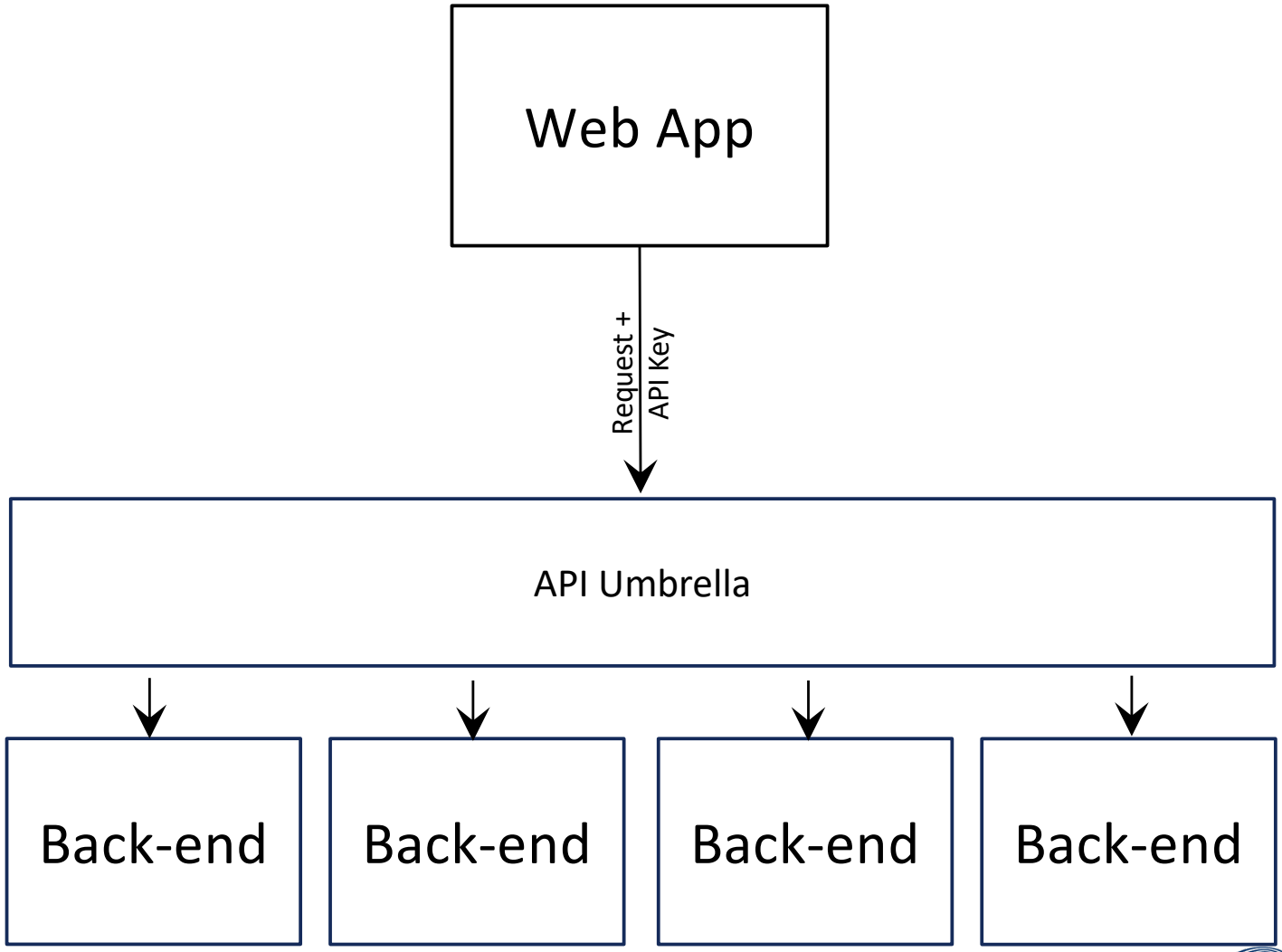
API Management

API Umbrella & PEP Proxy



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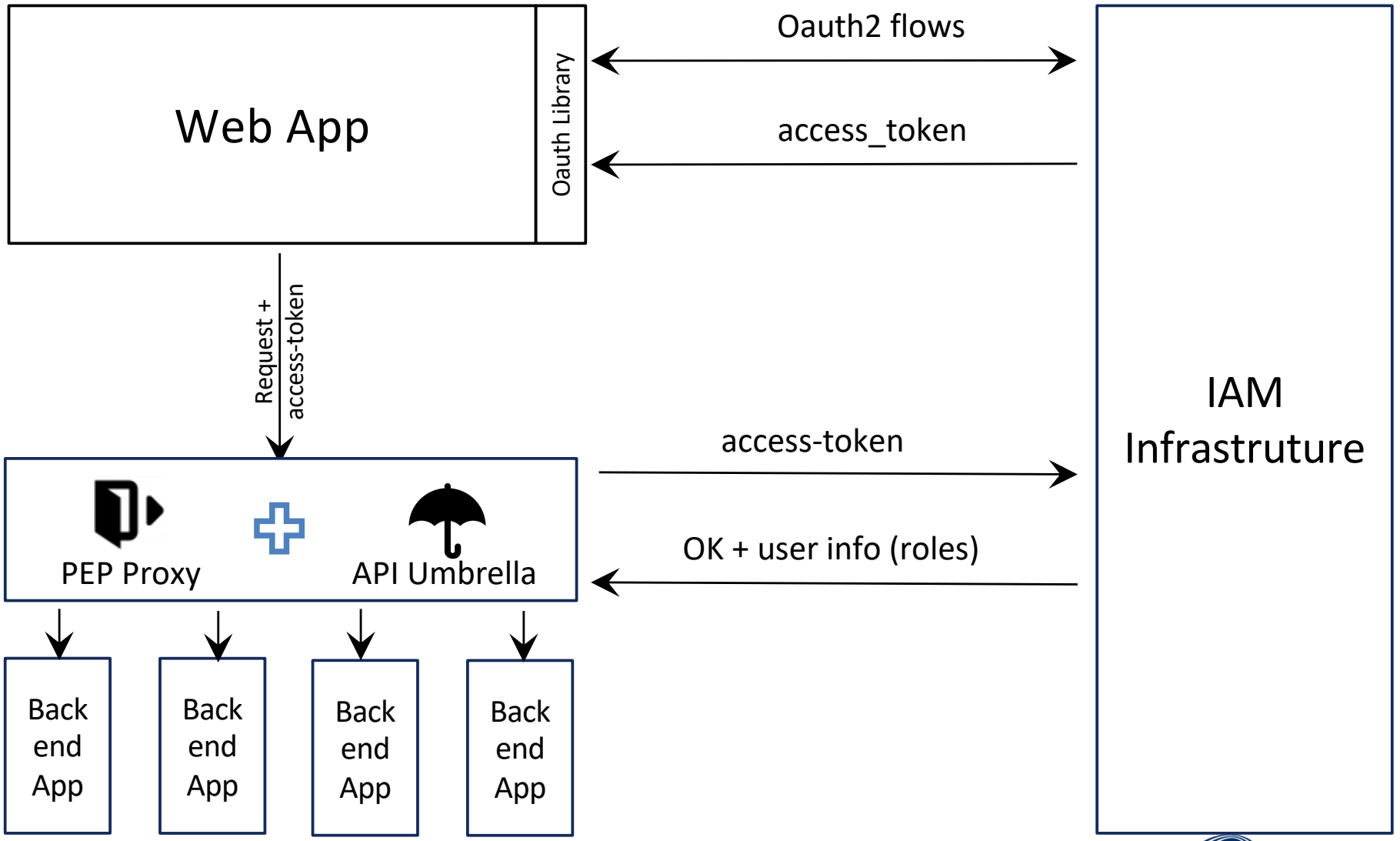
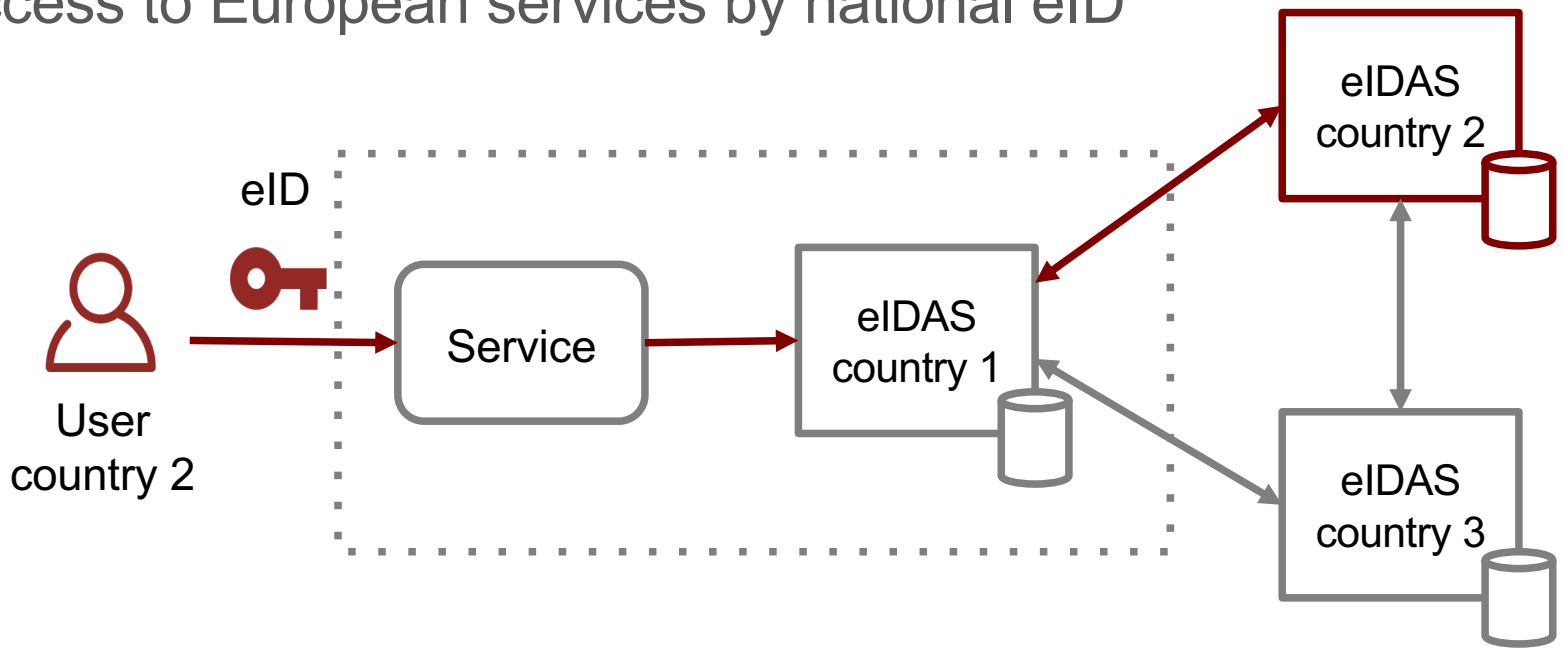
API Management

API Umbrella & PEP Proxy



eID Integration
CEF eIDAS

- **eIDAS** (electronic IDentification, Authentication and trust Services) is an EU regulation to enable secure and seamless electronic interactions between businesses, citizens and public authorities.
- Access to European services by national eID



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eID Integration
FIWARE Identity Gateway

- Integration of FIWARE Security Framework with eIDAS
- Every application registered in Keyrock can be linked to a eIDAS node
  - By an OAuth 2.0 – SAML2 gateway
- Users can then authenticate using their national eID
  - AC policies based on user eIDAS profile
- Transparent for applications providers

Co-financed by the Connecting Europe Facility of the European Union

eID FIWARE CEF

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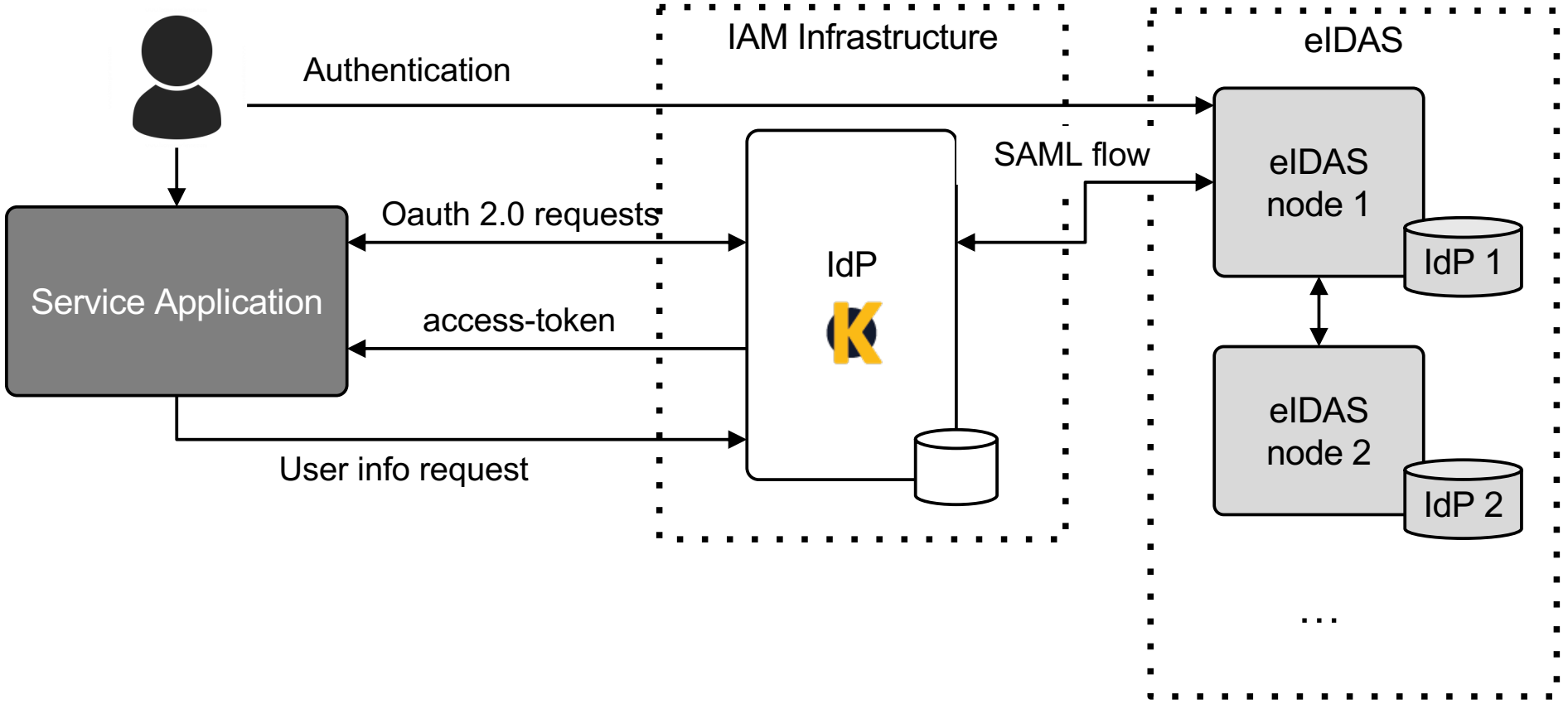
eID Integration

FIWARE Identity Gateway



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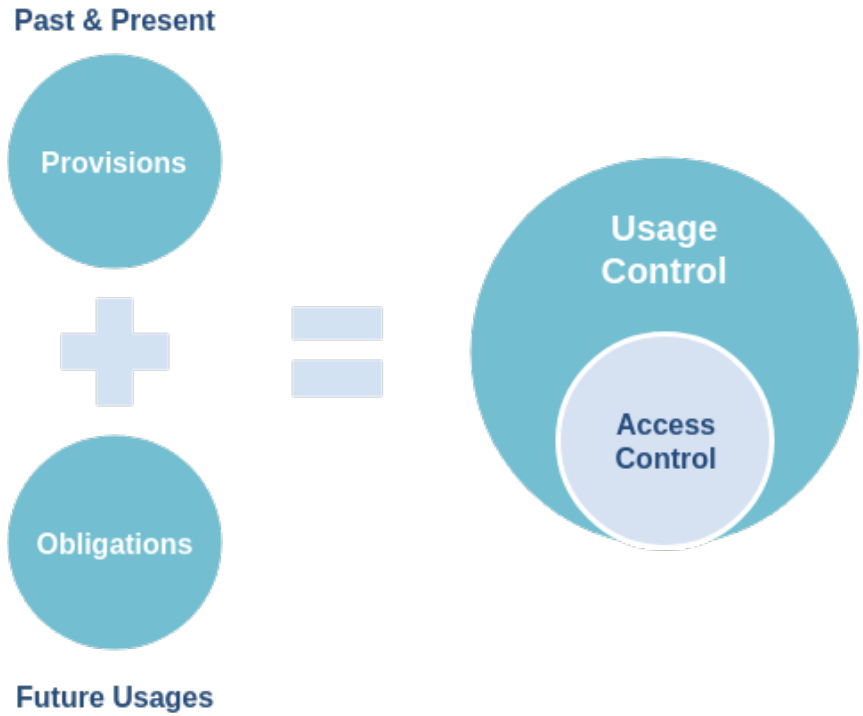
Data Usage Control

- Security Framework and **Data Usage Control**
  - Ensures data **sovereignty**
  - Regulates what is **allowed to happen** with the data (future usage).
- Integration with **Big Data** and **Processing GEs**



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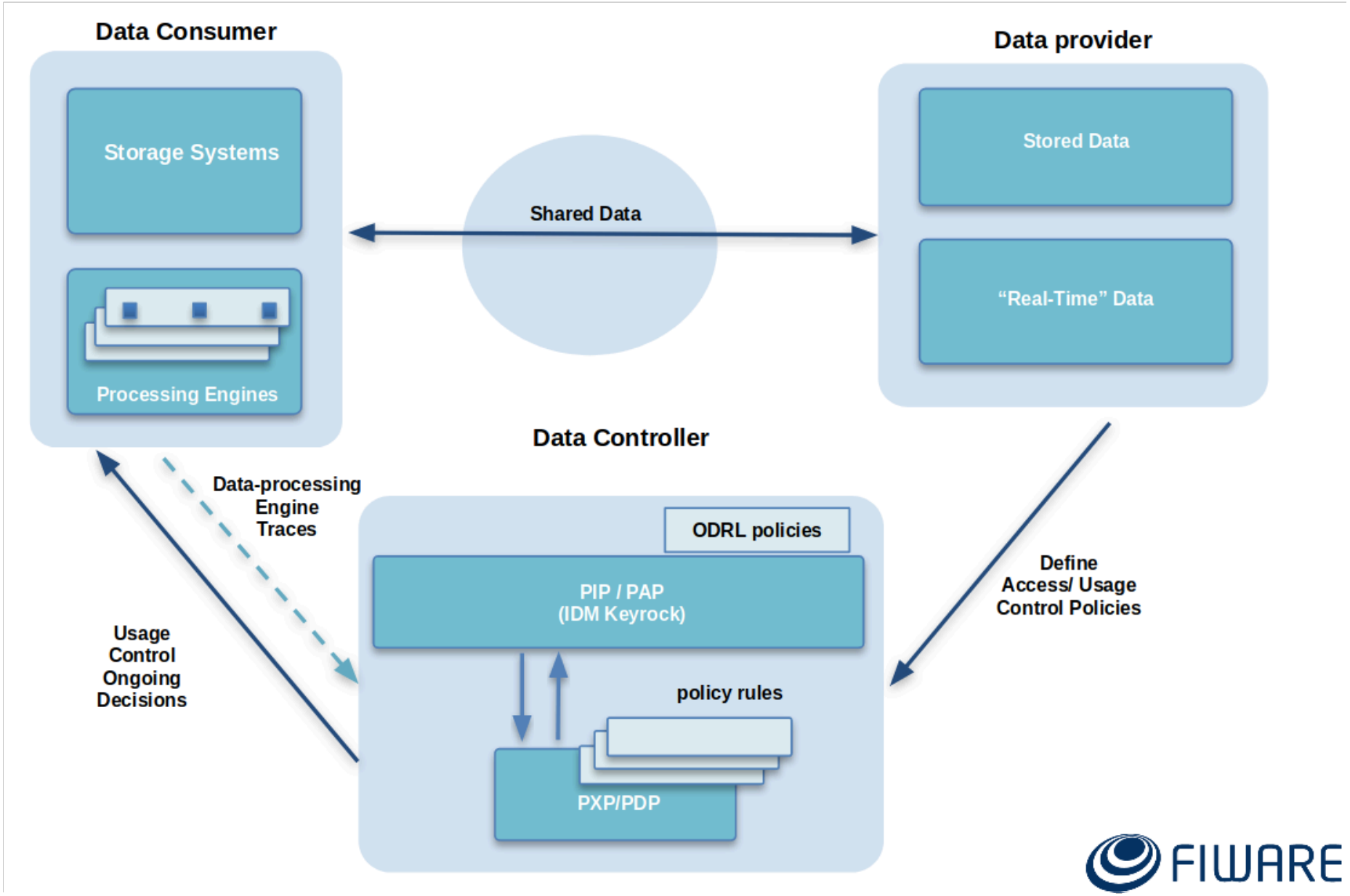

Security GEs documentation

- Identity Management – Keyrock
  - https://keyrock-fiware.github.io
  - https://github.com/ging/fiware-idm
  - https://catalogue.fiware.org/enablers/identity-management-keyrock
- PEP Proxy – Wilma
  - https://github.com/ging/fiware-pep-proxy
  - https://catalogue.fiware.org/enablers/pep-proxy-wilma
- Authorization PDP – AuthZForce
  - https://github.com/authzforce/server
  - https://catalogue.fiware.org/enablers/authorization-pdp-authzforce

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