



The technical features of Catena-X and its implementation with Tractus-X

Johannes Diemer
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At Third Eclipse Tractus-X Community Days in Stuttgart



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NextGenerationEU

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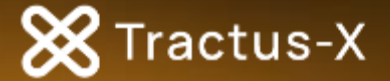
 Federal Ministry
for Economic Affairs
and Climate Action

on the basis of a decision
by the German Bundestag



Agenda

- The overarching architecture
- Matching Catena-X Services to components of Tractus-X
 - Enablement Services
 - Core Service
 - *Onboarding*
- KITs
- Deployment
- Today's Environment



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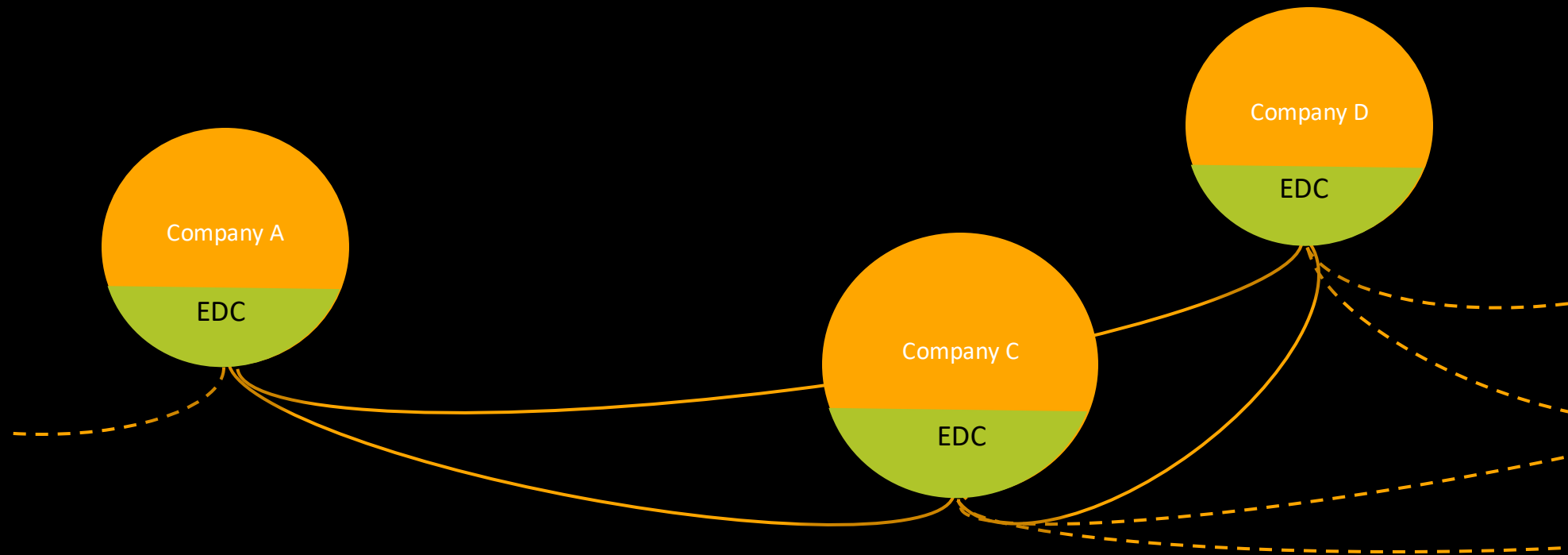


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How Catena-X works – GAIA-X Ready Architecture

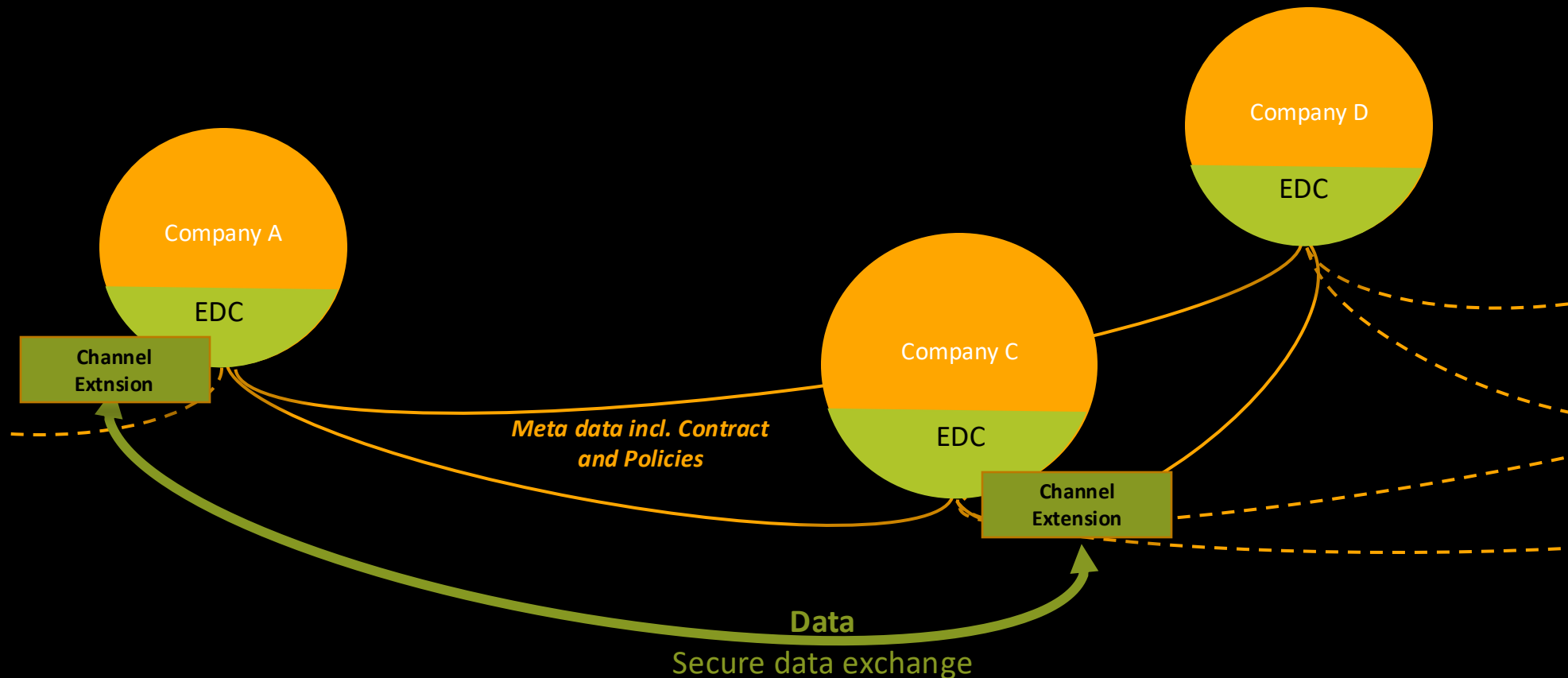
Eclipse Data Space Connector (EDC) – Secure End-to-End Communication





How Catena-X works – GAIA-X Ready Architecture

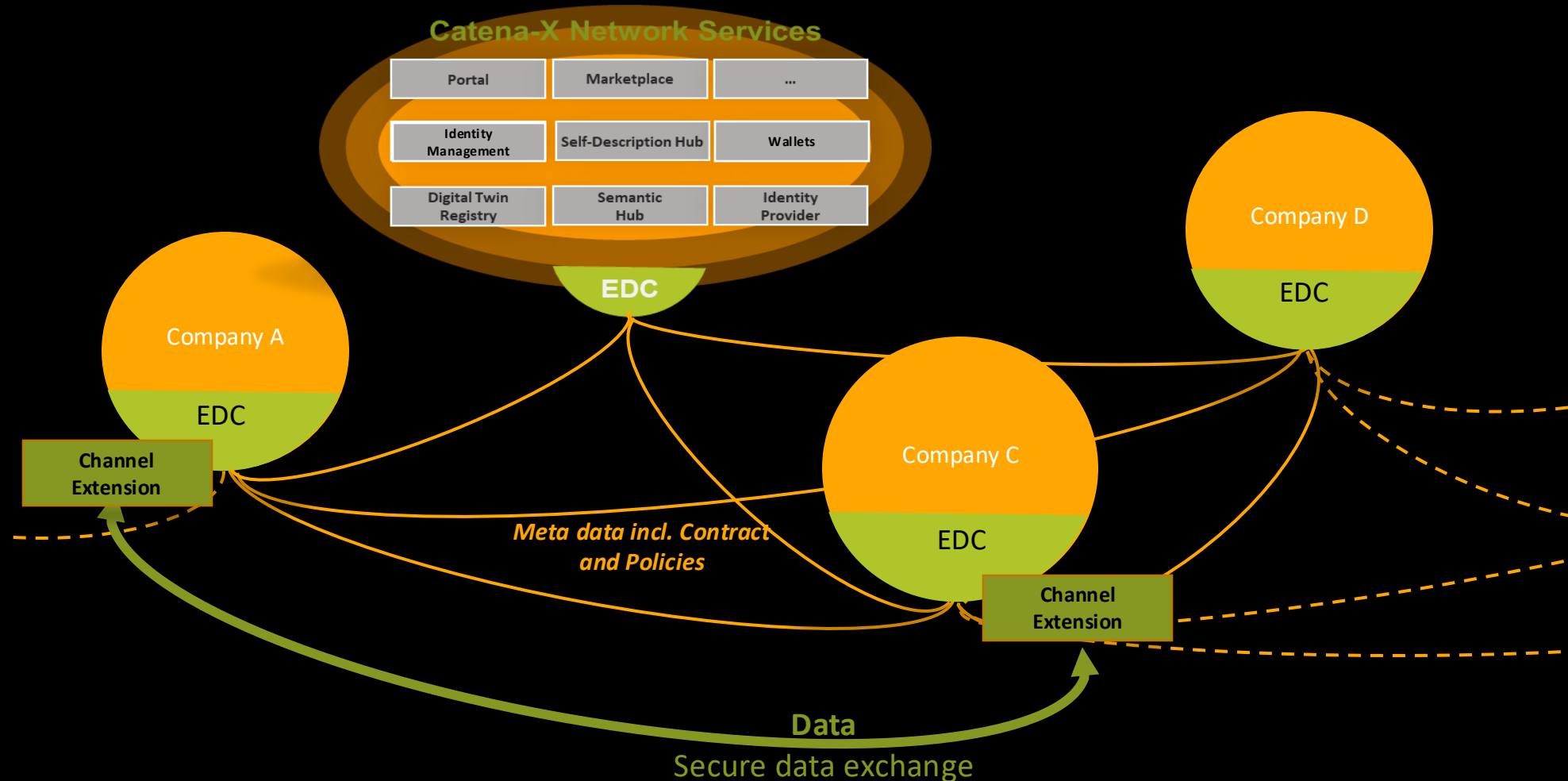
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How Catena-X works – GAIA-X Ready Architecture

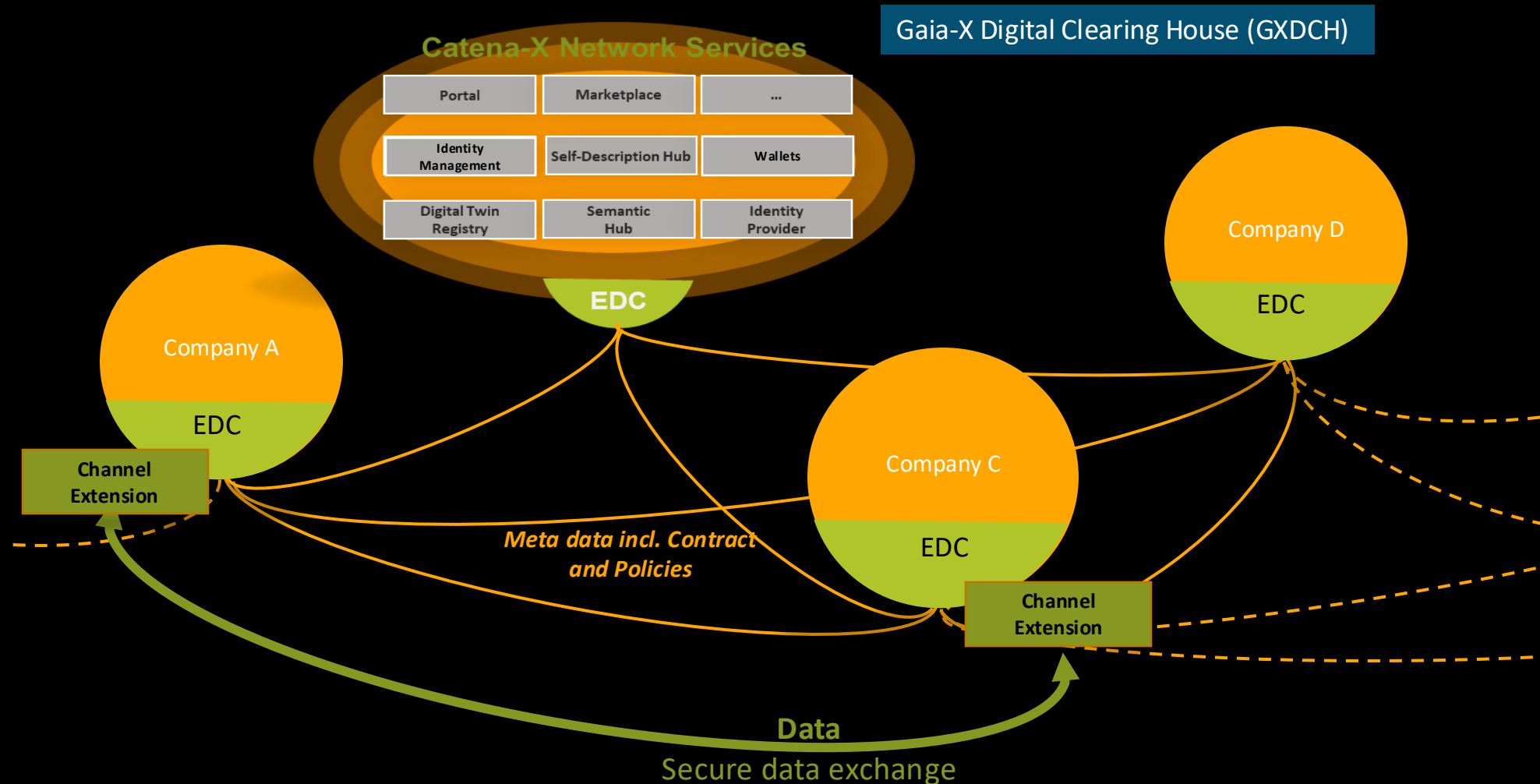
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How Catena-X works – GAIA-X Ready Architecture

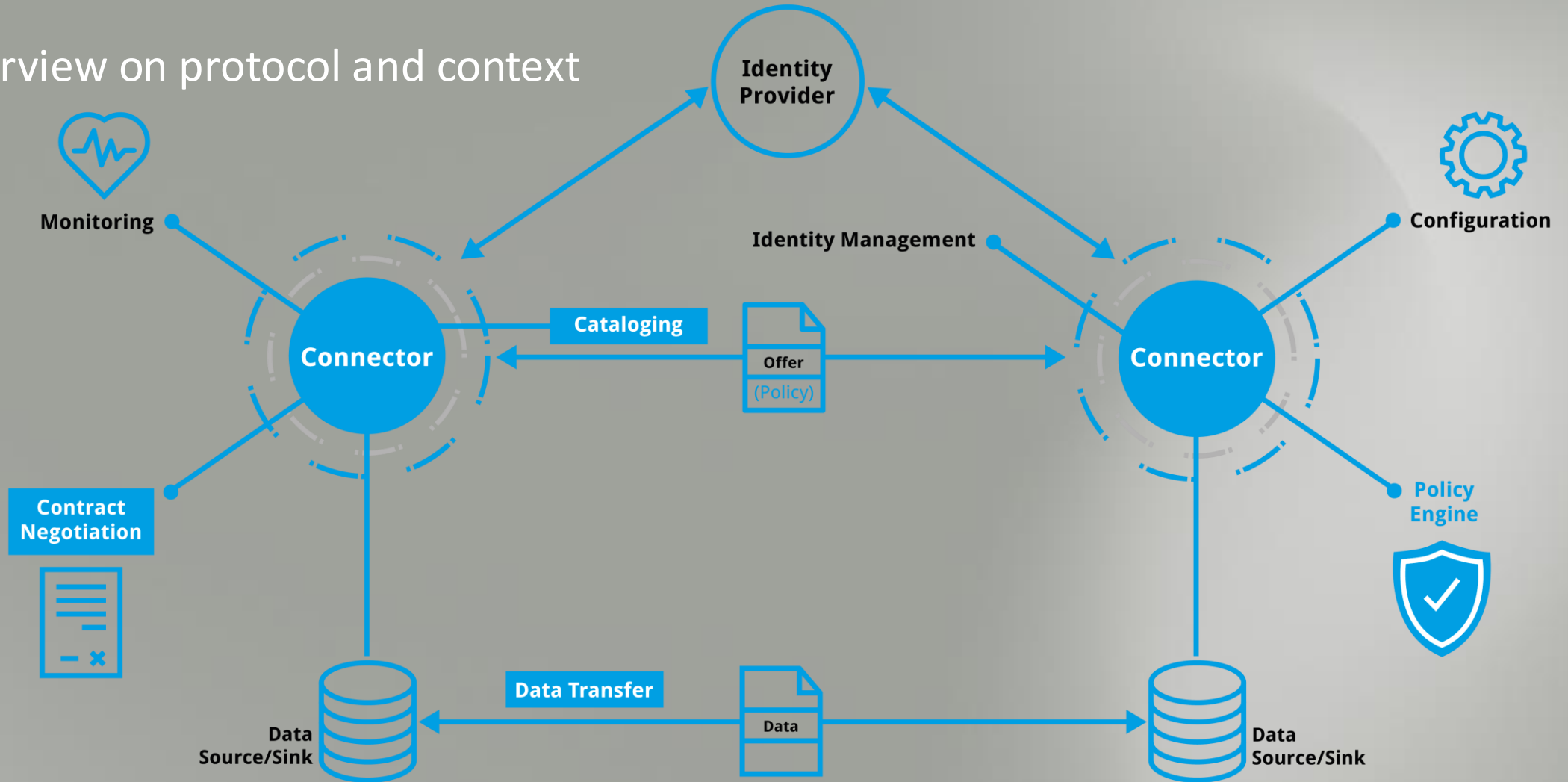
Eclipse Data Space Connector (EDC) – Secure End-to-End Communication





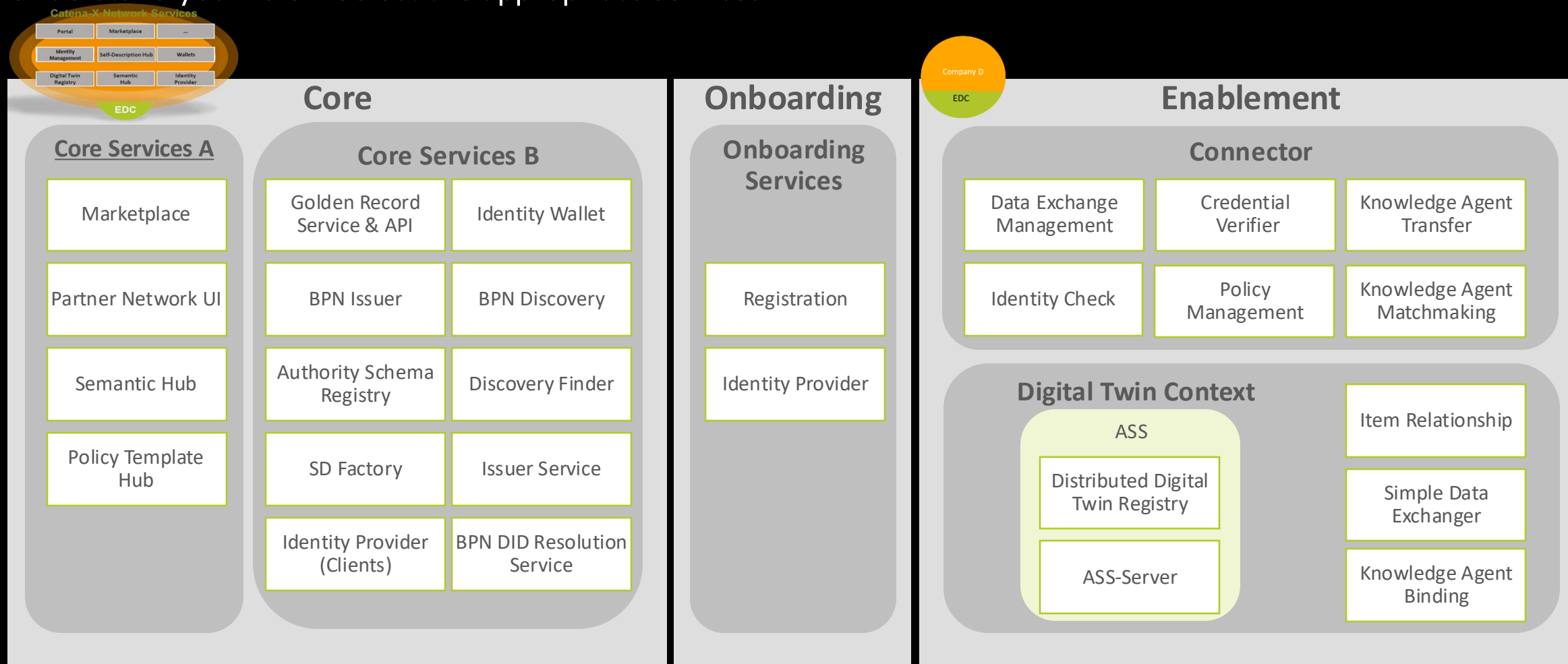
Dataspace Protocol 2024-1 of the IDSA

Overview on protocol and context



Architectural Overview – The Catena-X Services

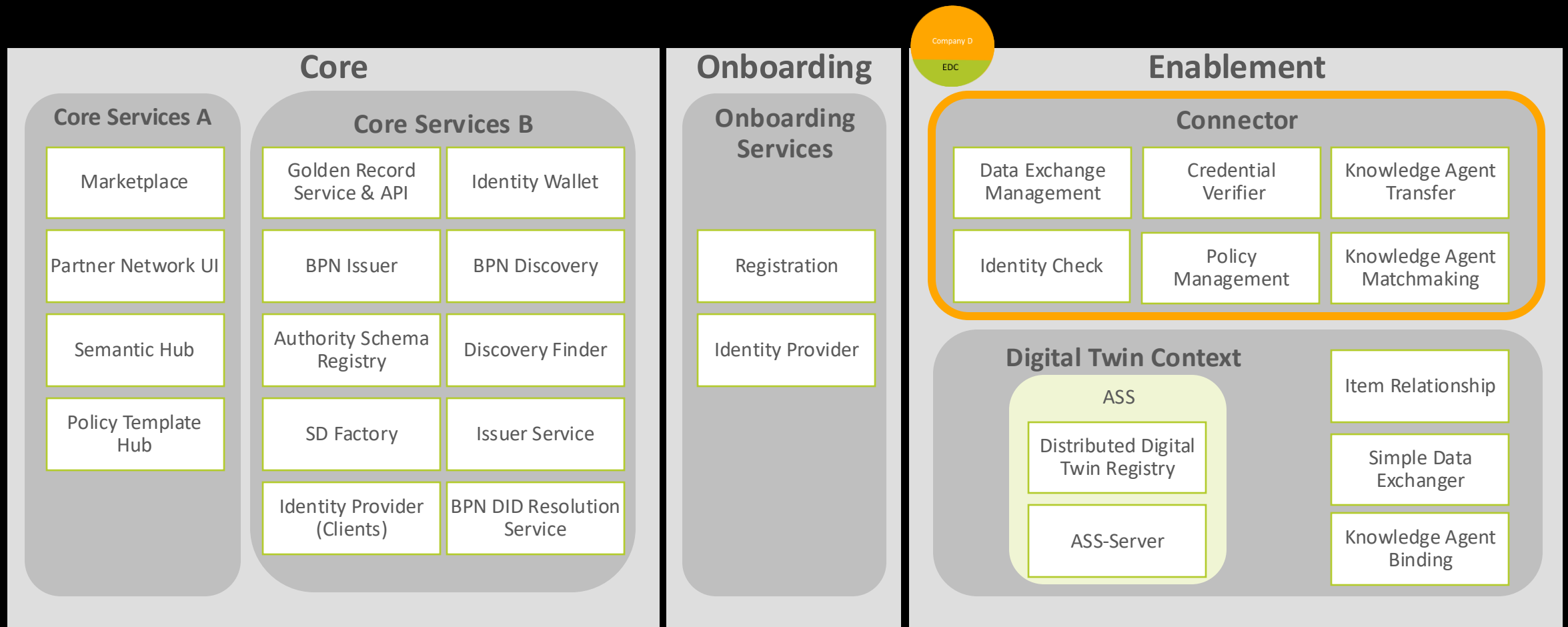
Understand your role – Select the appropriate services



Gaia-X Digital Clearing House (GXDCH)

Architectural Overview – The Catena-X Services

Understand your role – Select the appropriate services for a **data provider and data consumer**



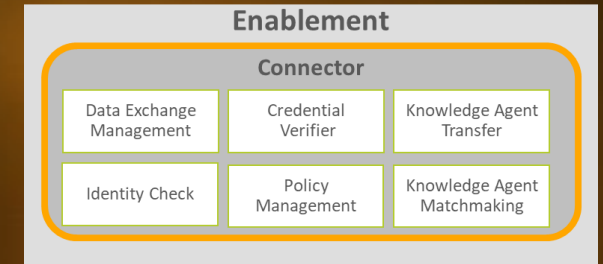
Gaia-X Digital Clearing House (GXDCH)



Enablement with Tractus-X

Enablement Components:

- Eclipse Dataspace Connector (EDC)
 - Control Plane
 - Contract and Policies Management
 - Identity Check and Credential Verification (via HashiCorp Vault)
 - Data Transfer Management
 - Data Plane
 - Transfers Data
- Requires availability of
 - A Postgres with pgadmin 4 to store and view data
 - Identity Access Management (IAM) (new via Identity Wallet (SSI))



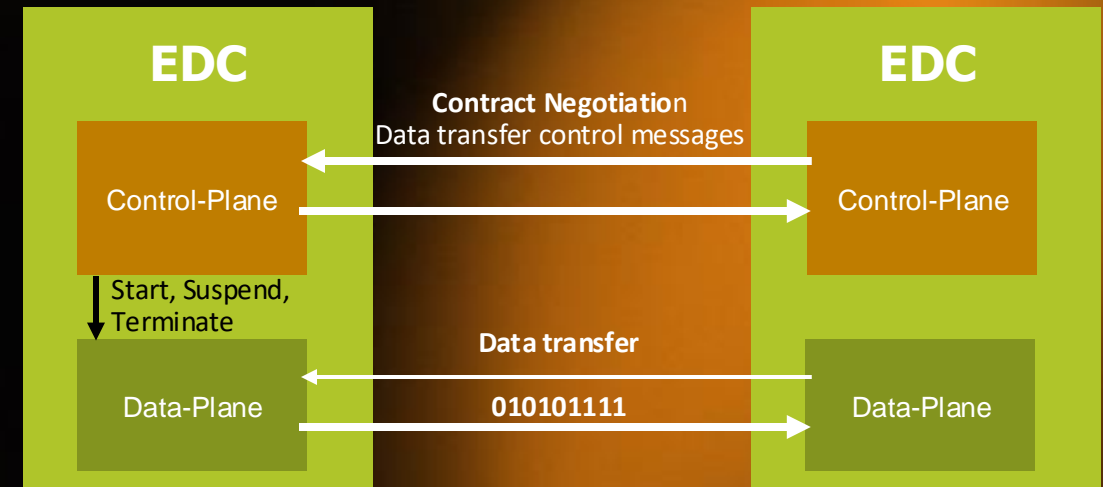
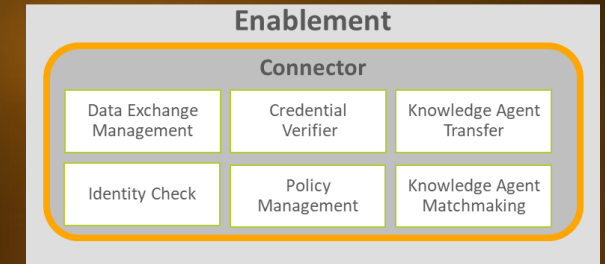


Enablement with Tractus-X

Data exchange between provider and consumer

Enablement Components:

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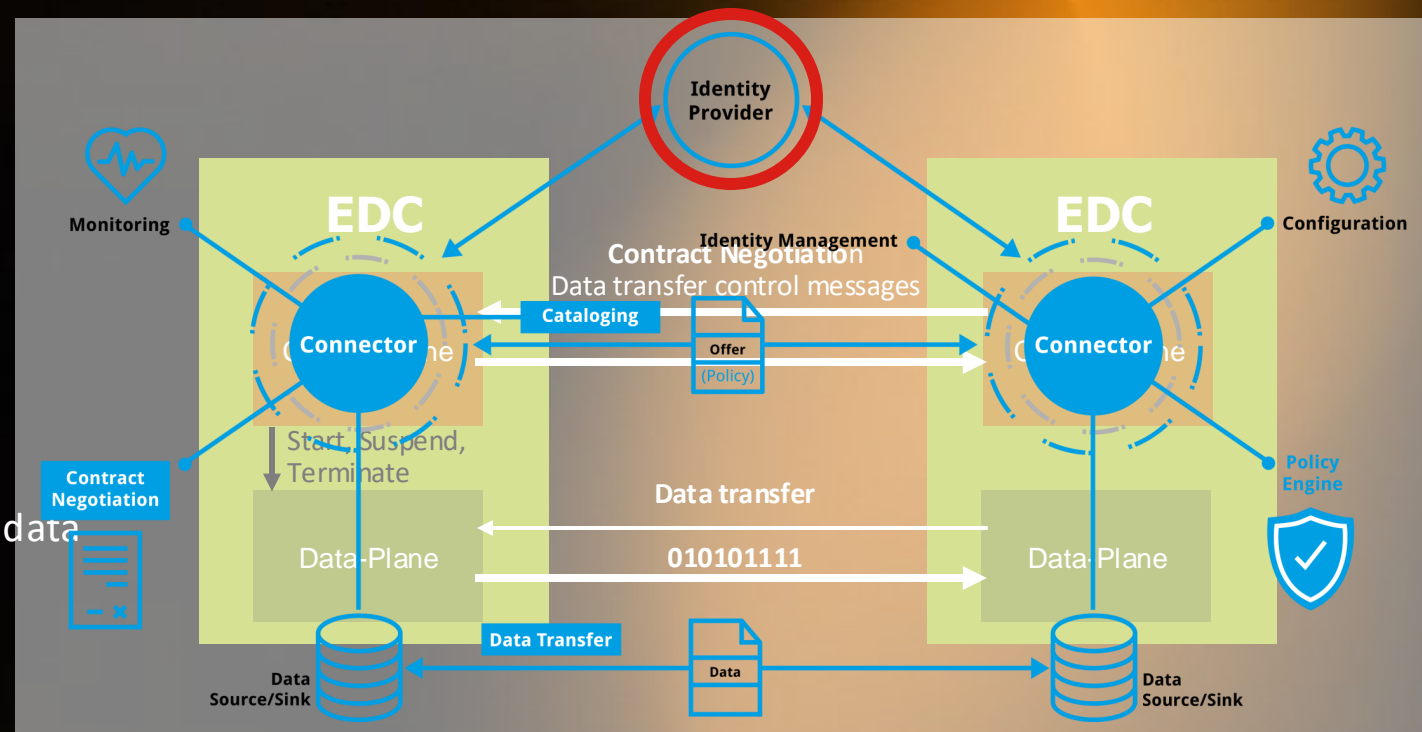
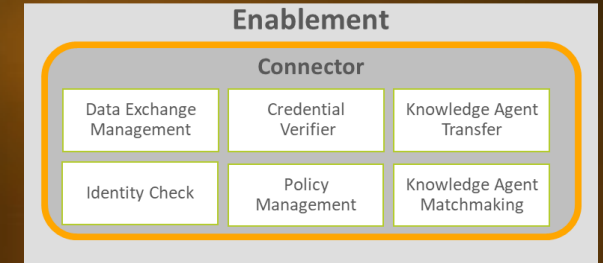


Enablement with Tractus-X

Implementing the Dataspace Protocol 2024-1

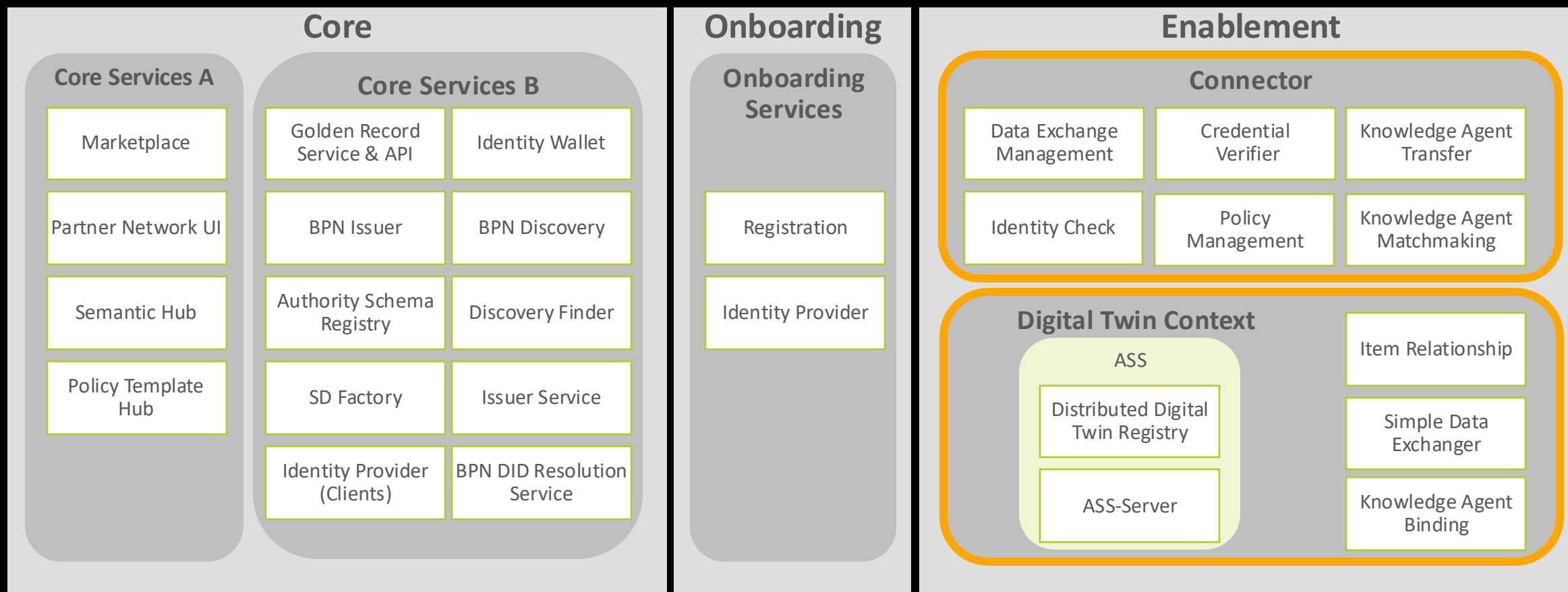
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Architectural Overview – The Catena-X Services

Understand your role – Select the appropriate services for a **data provider offering ASS**

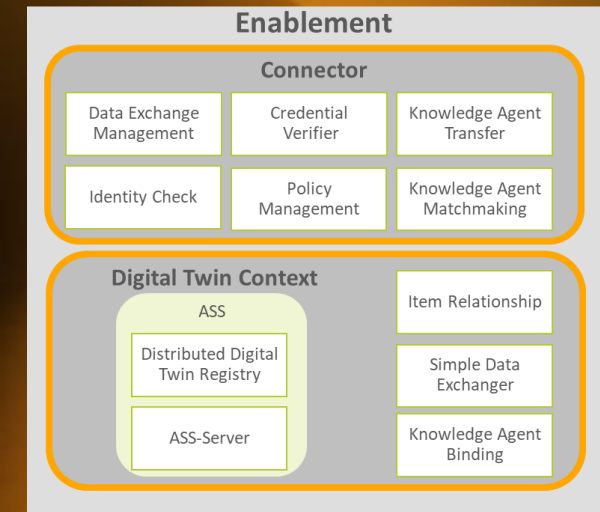




Enablement with Tractus-X:

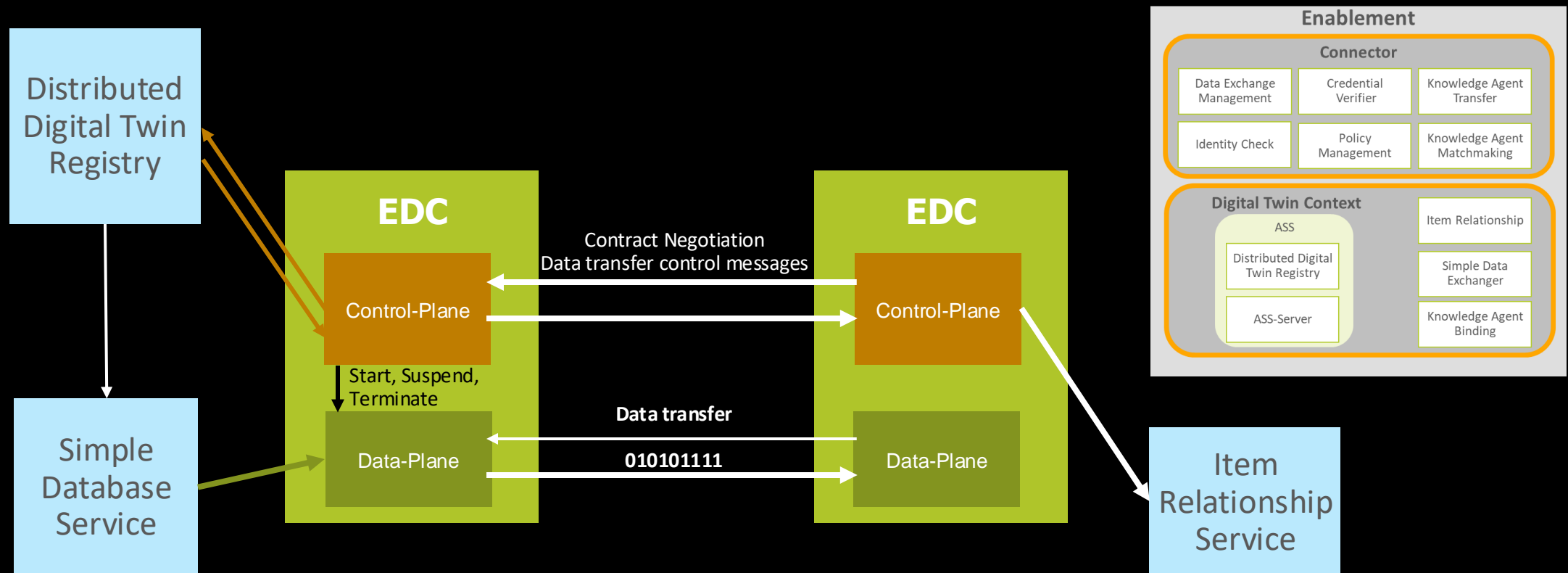
Enablement for Digital Twins:

- Digital Twin Registry
- AAS-Server (looking forward to BaSyx)
- *Simple Data Exchanger*
- *Item Relationship Service (IRS)*



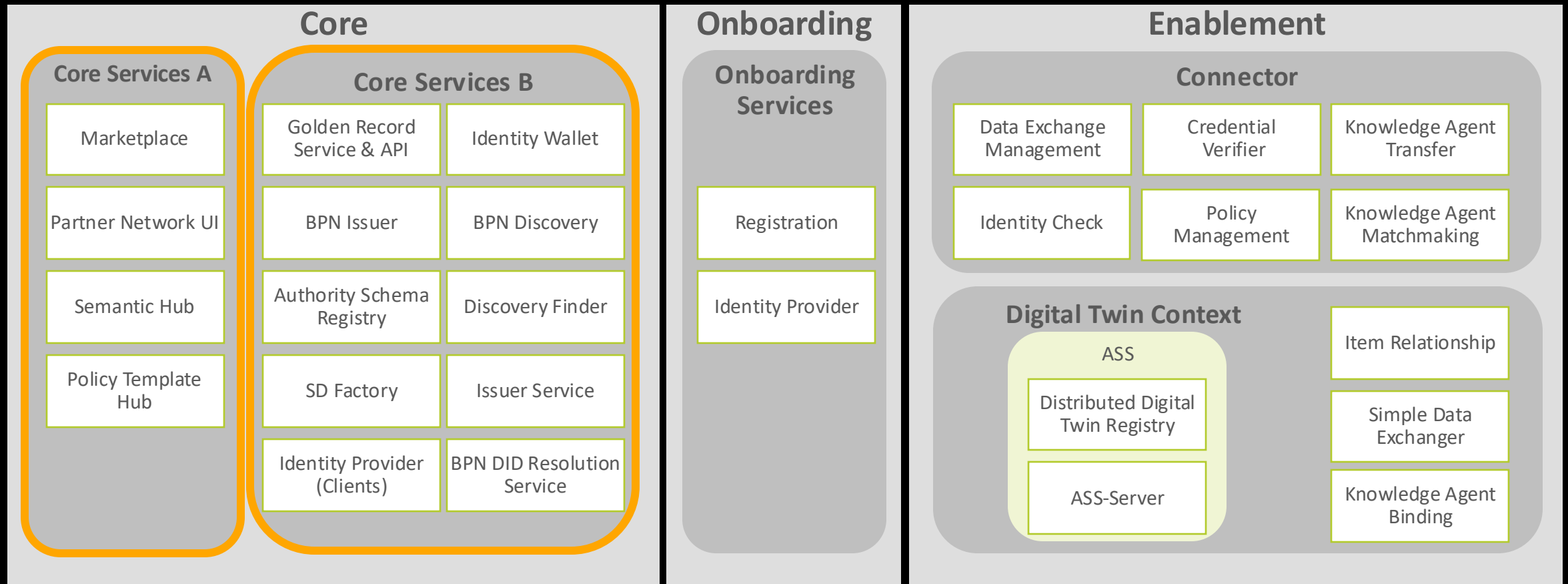
Implementation of the selected Services

Tractus-X Environment for a **data provider offering ASS and a consumer**



Architectural Overview – The Catena-X Services

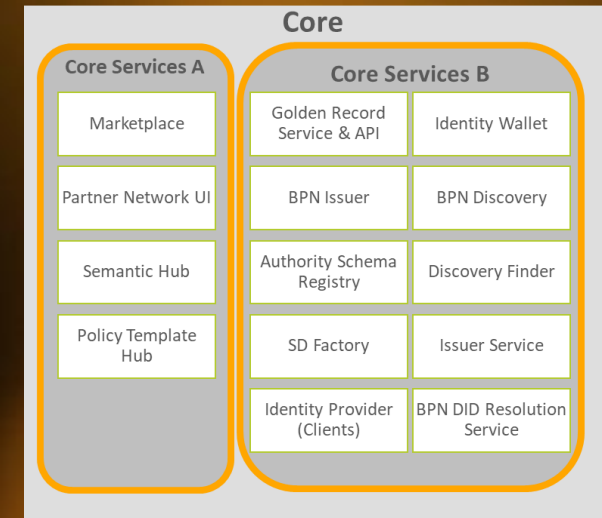
Select the appropriate services for a **operator company or core service provider**





Core Service as implemented in Tractus-X

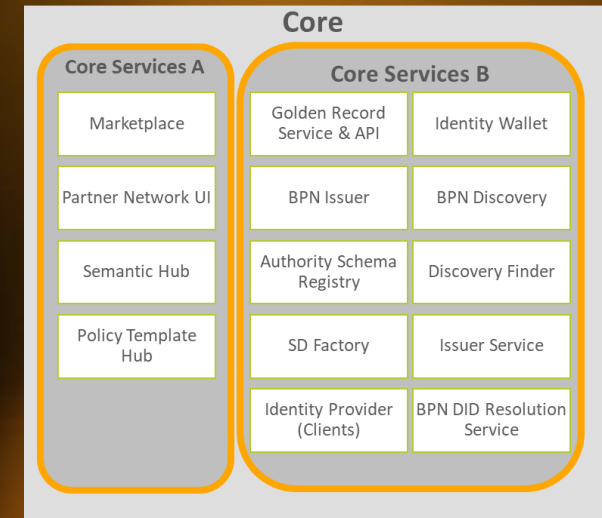
- Dezentralized Wallet (DIM) – SSI
- Hashicorp Vault
 - Secret management from all service
- BPNM
- Semantic Hub
 - Discovery Finder
 - BPN Discovery
- Policy Hub
 - Policy Template Hub
- IAM
 - Central and Shared Identity Provider (KeyCloak using Hashicorp Vault)
 - BPN DID Resolution Service (BDRS)





Core Service as implemented in Tractus-X

- Portal
 - Frontend GUI
 - Partner Network UI
 - Marketplace UI
 - Frontend Registration
 - SD Factory
 - Marketplace
 - Assets
 - This repository contains the documentation and static image content for Portal.
 - Backend
 - BPN
 - EDC Discovery
 - Partner
 - IAM (Connection to shared and central IDP)





KITs

Eclipse Tractus-X



Benefits

- KITs are the basic building blocks of Tractus-X
- There are three views for each KIT:
 - Adoption View for users
 - Development View
 - Operation View
- Includes description of used standards

Our Kits
Unlock the power of kits. Browse the latest kits, their documentation, including tutorials, sample code, articles, and API reference.

All Domains - A-Z 1

<p>Agents Kit Develop a resilient, federated, collaborative ecosystem. Centralize knowledge from data.</p>	<p>Behaviour Twin Kit Minimize the potential of usage data through activation services and simulations.</p>	<p>Business Partner Kit Get high-quality data business partner data records including the unique identifier.</p>	<p>Circularity There will be more kits coming in the next months. Stay tuned.</p>	<p>Connector Kit The IEC as a connector implements a framework agreement for sovereign cross-organizational data exchange.</p>	<p>Data Chain Kit Data Chain Kit is made for apps and services to access connected data distributed between organizations.</p>	<p>Demand and Capacity Management Kit Quick build of solutions for companies of any size to engage a collaborative capacity management.</p>
<p>Digital Twin Digital Twins enable data-level interoperability - even between devices previously unknown to each other.</p>	<p>Eco Pass Leverage the transparency of digital product passports to strengthen sustainability & compliance.</p>	<p>ESS Environmental and Social Standards Incident Management Kit</p>	<p>Industry Core Connecting Use-Cases with Core Services.</p>	<p>Manufacturing as a Service Create a federated network of networks to connect manufacturing supply and demand.</p>	<p>Modular Production There will be more kits coming in the next months. Stay tuned.</p>	<p>Online Simulation Gain increased supply chain transparency through collaborative simulation across all stakeholders.</p>
<p>PCF Product-specific CO2 footprint.</p>	<p>PURIS Predictive Unit Real-time information services.</p>	<p>Quality Quality Kit enables data provider and consumer to exchange and analyze existing data across company boundaries.</p>	<p>Supply Chain Disruption Notifications Inform partners about disruptions in the supply chain.</p>	<p>Traceability Trace parts and materials across the entire value chain to enable data-driven use cases over all n-tier levels.</p>		



Deployment of Tractus-X

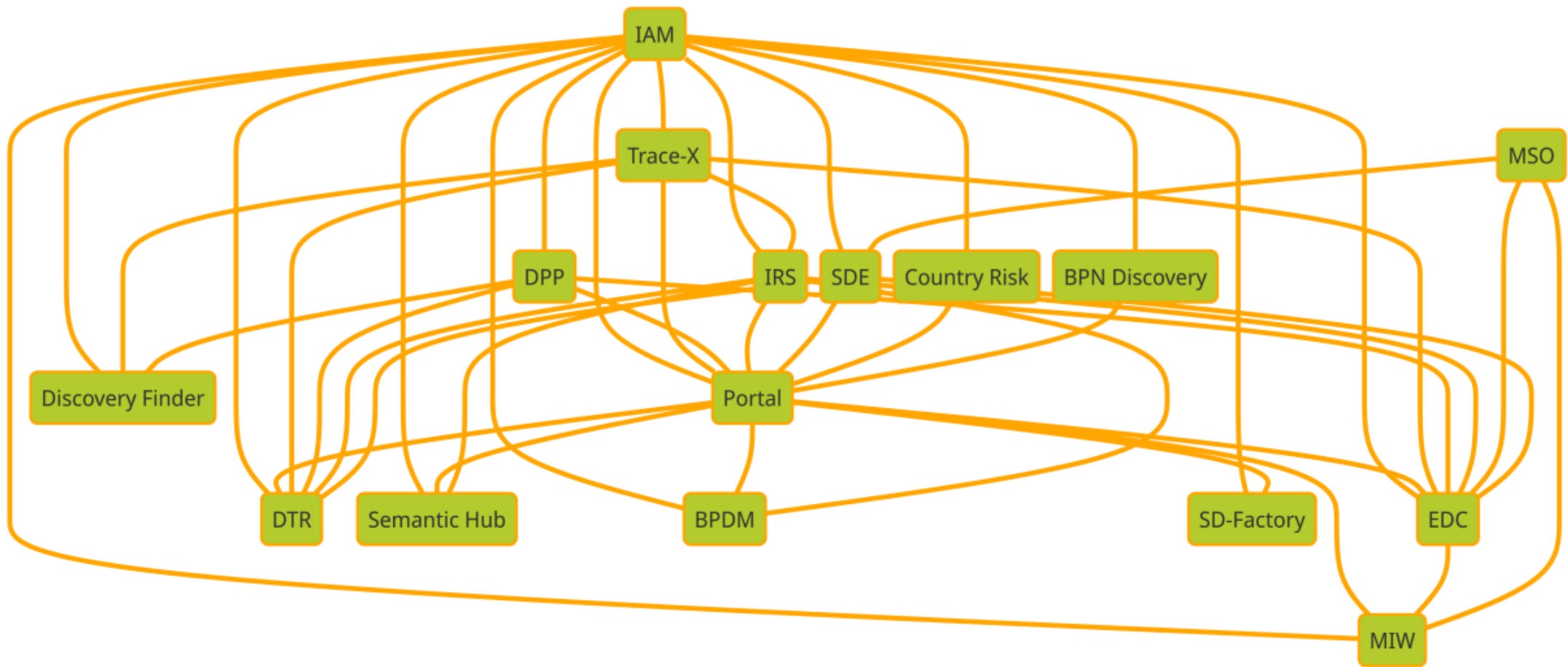
- Deployed on Kubernetes
 - Kubernetes is a portable, extensible, opensource platform for managing containerized workloads and services, facilitating both declarative configuration and automation.
- With Helm
 - Helm helps manage Kubernetes applications
 - Package manager for Kubernetes
 - Templating Engine
- Configured by using Helm Charts und Umbrella Helm Charts
 - Helm charts help define, install, and update complex Kubernetes applications. See Helm Packages managed by Helm
 - Bundles of YAML and template files (values.yaml, ...) Helm charts help define, install, and update complex Kubernetes applications.



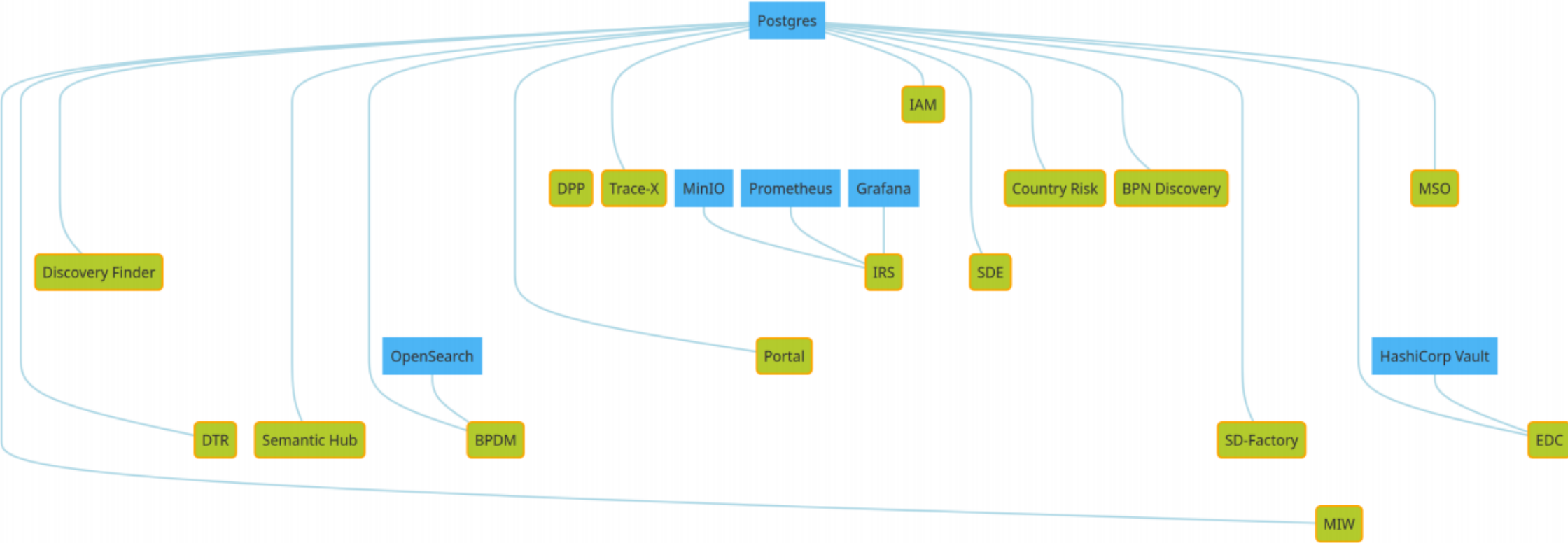
Applications



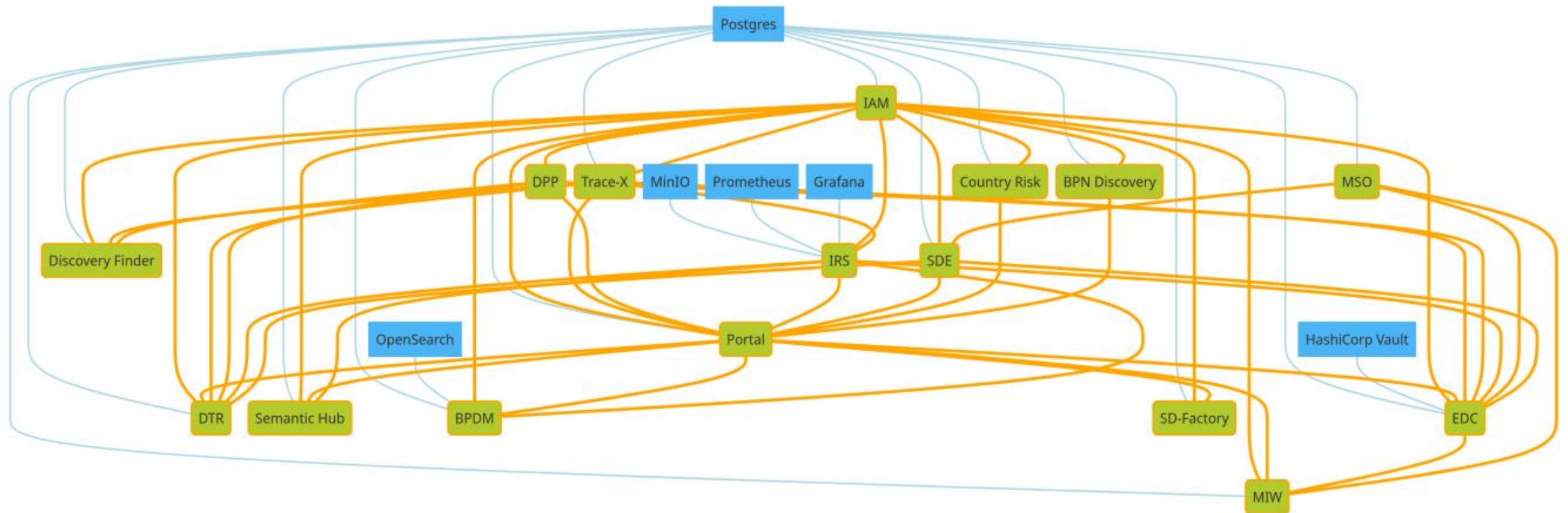
Interface dependencies



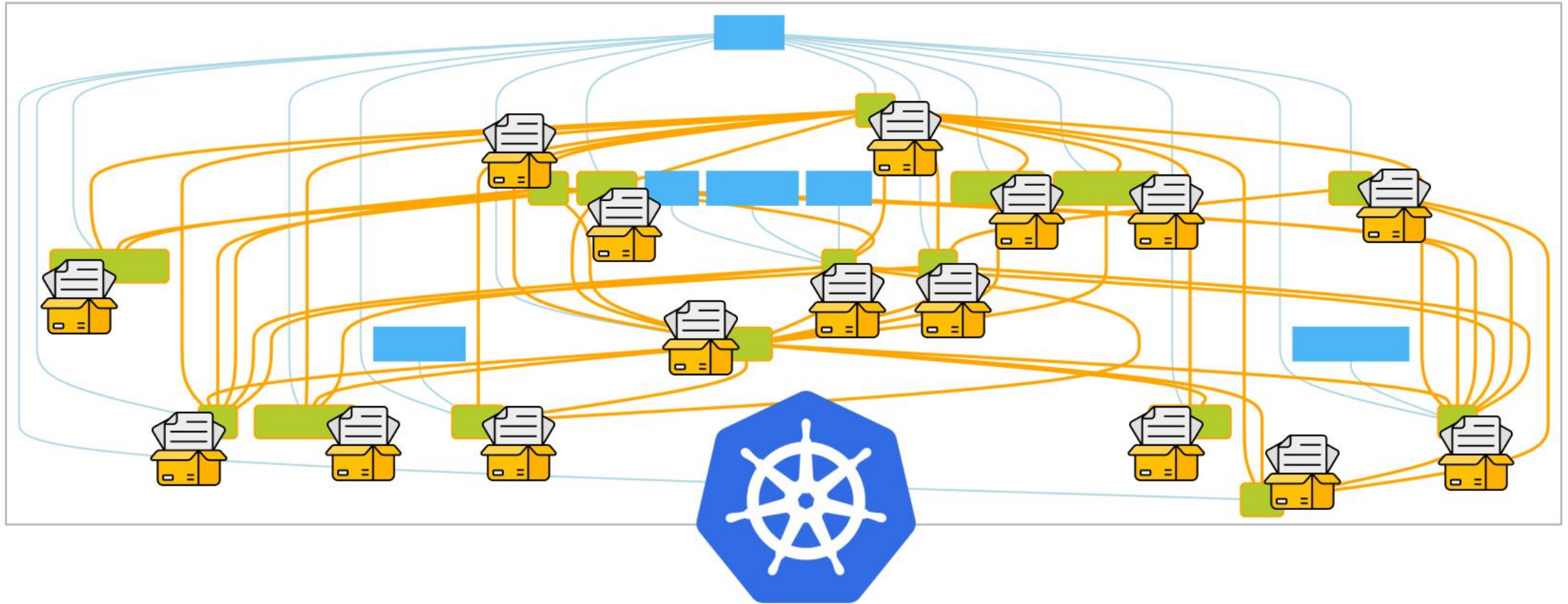
Infrastructure dependencies



Deployment scope



Helm Charts and Tractus-X





Deployment with Helm

- Install from released chart:
 - Add the Eclipse Tractus-X charts repository

```
$ helm repo add tractusx-dev https://eclipse-tractusx.github.io/charts/dev
```

- Install with your chosen components enabled

```
$ helm install \  
--set COMPONENT_1.enabled=true,COMPONENT_2.enabled=true,COMPONENT_3.enabled=true \  
umbrella tractusx-dev/umbrella \  
--namespace umbrella \  
--create-namespace
```

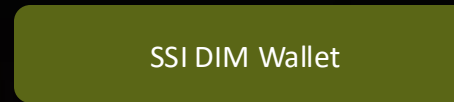
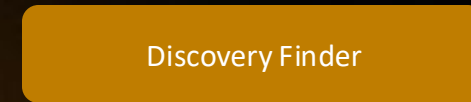
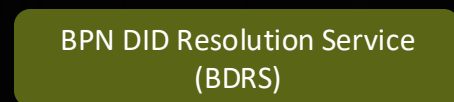
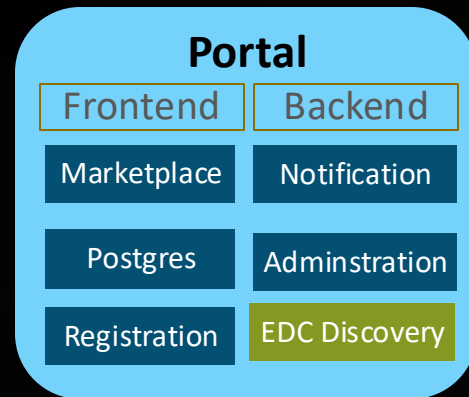
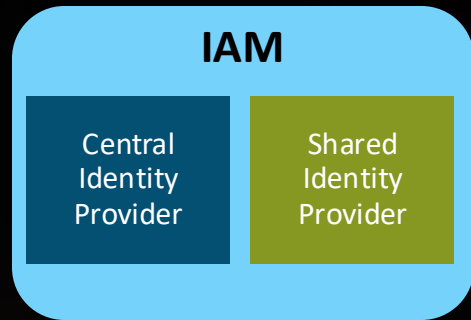
- Install from a local copy for a larger environment:
 - Clone the Github Repository
 - Configure your Helm Charts
 - Run helm

More Information on <https://github.com/eclipse-tractusx/tractus-x-umbrella/tree/main/docs>



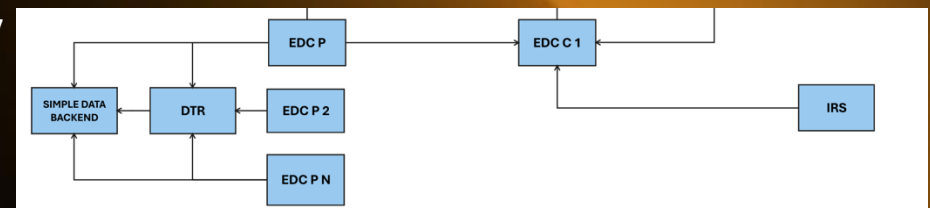
Deployment for today

Cluster Federated Services



Cluster Use Cases

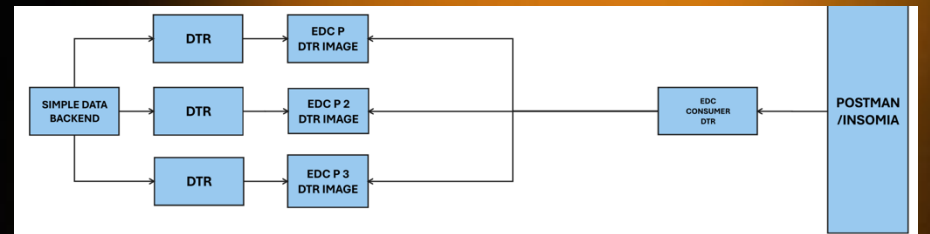
Industry Core



Digital Product Pass



Digital Twin





 Tractus X

Thank you

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