gaia-x *4* ki

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GAIA-X DSBC Mobility Working Group Session:
German hub presentation – 24.04.2023

Sascha Knake-Langhorst (DLR)
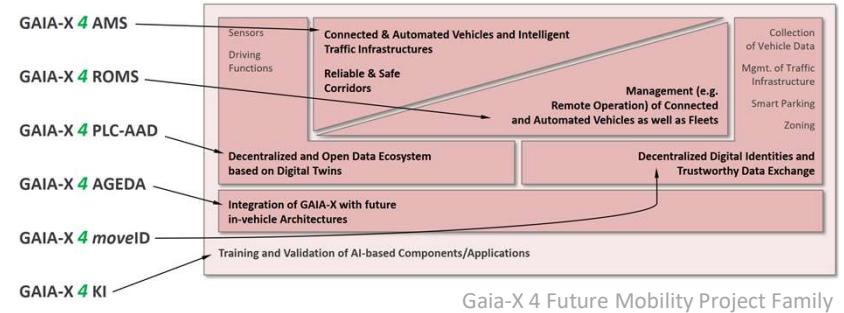
Gaia-X *4* KI - Overview

Gaia-X 4 Future Mobility Project Family

- Project Gaia-X 4 KI: Training and Validation of AI-based Components and Applications

- Project life span: Jun 2021 – May 2024 (36 months)

- Budget: 20 Mio. € (13,5 Mio. € Funding)

- 14 Partners (industry, SME and research)

- First Project of Gaia-X 4 Future Mobility family (lighthouse project)

- Goal: Building a **Gaia-X-based data and service ecosystem** for training and validating automotive-relevant **AI applications**

- Focus:
  - Develop Gaia-X compliant technologies
  - Focus areas are automotive production and CAD

| Industry	SME	Research
Capgemini engineering	CONWEAVER	DLR
Continental	HighQSoft	Fraunhofer
IAV	reuschlaw Legal Consultants	Hochschule Offenburg offenburg.university
intel	STTech The Digital Disruptors	Leibniz Universität Hannover
T··Systems·		Technische Hochschule Ingolstadt

Gaia-X 4 KI Consortium
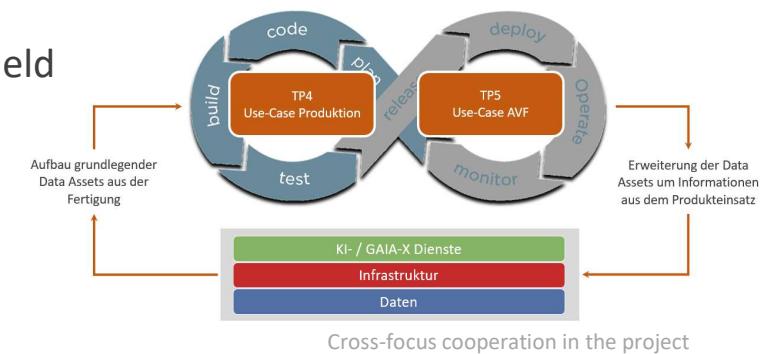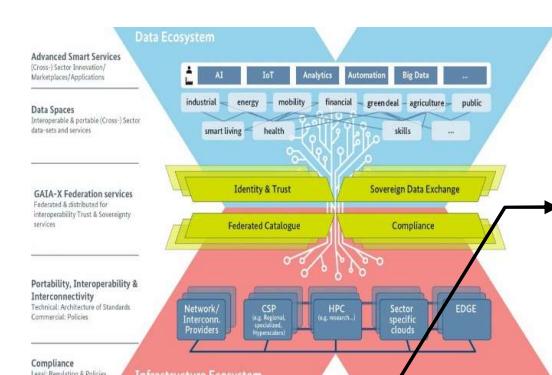
Gaia-X *4* KI - Mission
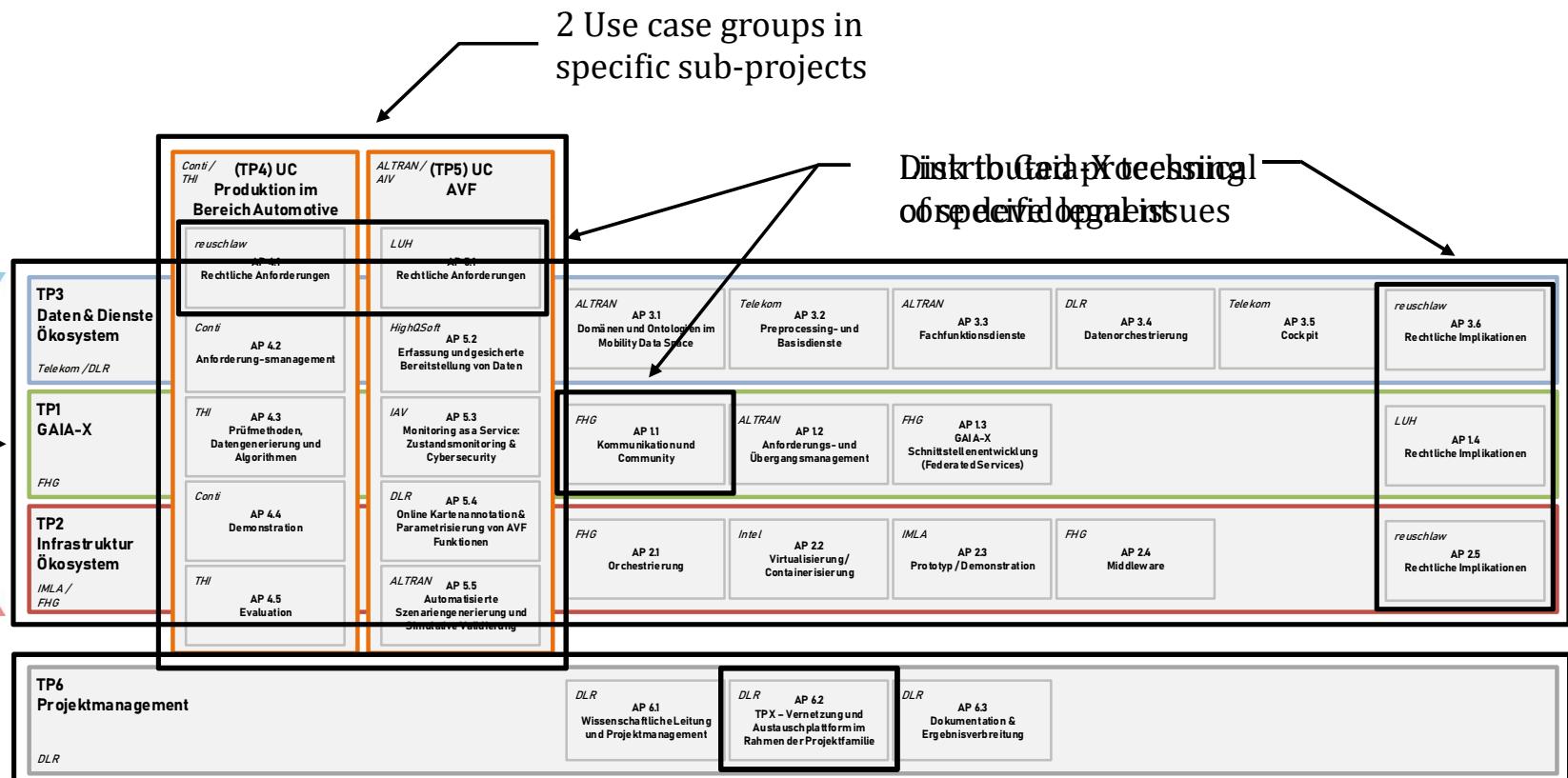
- Research and development of suitable approaches and applications through **implementation and demonstration of relevant use cases**

- Gaia-X: Which **technical and methodological components** are required...

  - in an integrated and consistent IT infrastructure in the given application field

  - for integrated data management

Cross-focus cooperation in the project

- AI in production: What possibilities does GAIA-X offer...

  - in the AI-based **optimization of manufacturing processes**

  - in the **utilization of relevant data assets** for applications in a later product life cycle

- AI in vehicle automation: What opportunities does GAIA-X offer…

  - in the **integration and standardization of data and services** through the GAIA-X ecosystem in function development, testing and in simulated and real operation

Gaia-X *4* KI – Structure

2 Use case groups in specific sub-projects

Distributed technical of specified legal issues

Inkl. Gaia-X technical processing of selected legal issues

(TP4) UC Produktion im Bereich Automotive
Conti / THI

(TP5) UC AVF
ALTRAN / AIV

reuschlaw AP 4.1 Rechtliche Anforderungen

LUH AP 5.1 Rechtliche Anforderungen

TP3 Daten & Dienste Ökosystem
Telekom /DLR

Conti AP 4.2 Anforderung-smanagement

HighQSoft AP 5.2 Erfassung und gesicherte Bereitstellung von Daten

ALTRAN AP 3.1 Domänen und Ontologien im Mobility Data Space

Telekom AP 3.2 Preprocessing– und Basisdienste

ALTRAN AP 3.3 Fachfunktionsdienste

DLR AP 3.4 Datenorchestrierung

Telekom AP 3.5 Cockpit

reuschlaw AP 3.6 Rechtliche Implikationen

TP1 GAIA-X
FHG

THI AP 4.3 Prüfmethoden, Datengenerierung und Algorithmen

IAV AP 5.3 Monitoring as a Service: Zustandsmonitoring & Cybersecurity

FHG AP 1.1 Kommunikation und Community

ALTRAN AP 1.2 Anforderungs– und Übergangsmanagement

FHG AP 1.3 GAIA-X Schnittstellenentwicklung (Federated Services)

LUH AP 1.4 Rechtliche Implikationen

TP2 Infrastruktur Ökosystem
IMLA / FHG

Conti AP 4.4 Demonstration

DLR AP 5.4 Online Kartenannotation & Parametrisierung von AVF Funktionen

FHG AP 2.1 Orchestrierung

Intel AP 2.2 Virtualisierung/ Containerisierung

IMLA AP 2.3 Prototyp / Demonstration

FHG AP 2.4 Middleware

reuschlaw AP 2.5 Rechtliche Implikationen

THI AP 4.5 Evaluation

ALTRAN AP 5.5 Automatisierte Szenariengenerierung und Simulative Validierung

TP6 Projektmanagement
DLR

DLR AP 6.1 Wissenschaftliche Leitung und Projektmanagement

DLR AP 6.2 TP X – Vernetzung und Austauschplattform im Rahmen der Projektfamilie

DLR AP 6.3 Dokumentation & Ergebnisverbreitung

3 Gaia-X specific sub-projects matching the Gaia-X basic structure

Link to Gaia-X 4 Future Mobility (TP X)
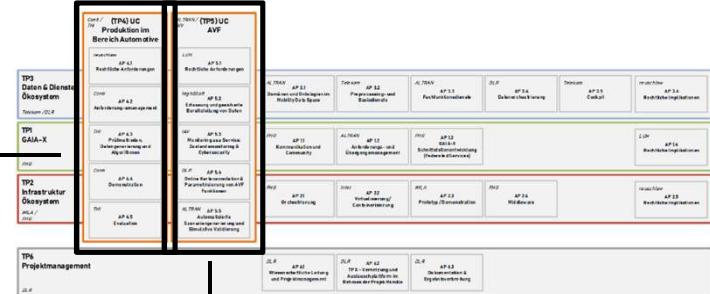
GAIA-X *4* KI – Use Cases

- Concept
  - **Development** and elaboration **of a systematization**
  - **Basis for implementation** (requirements, constraints, user stories)
  - → **EDC* as technological basis**
- Development of a total of nine use cases
  - Technical implementation already started
  - → **Step-by-step integration** of Gaia-X technologies

- Sub-Projekt 4 (Production)
  - AI supported AOI (automatic optical inspection)
  - Automatic Optical Quality Control
  - Digital Twin in Manufacturing
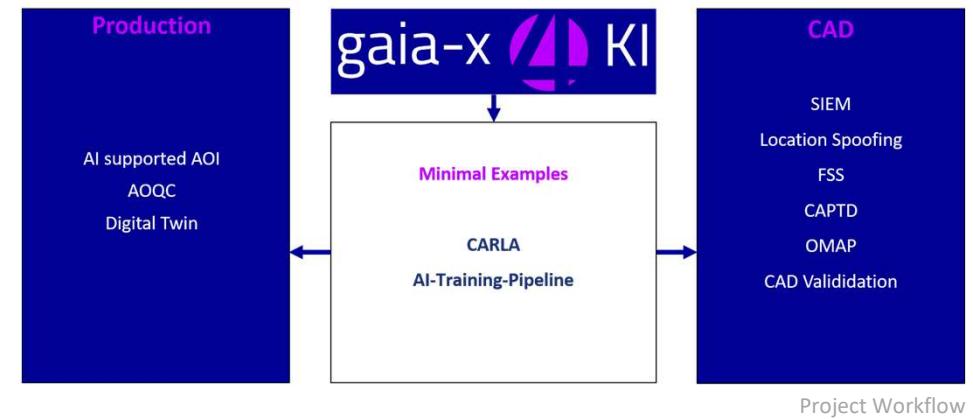
- Sub-Project 5 (CAD)
  - SIEM
  - Location Spoofing
  - COSMOS
  - CAPTD
  - Online map annotation & parameterization
  - CAD Validation

*) EDC: Eclipse Dataspace Components

GAIA-X *4* KI – Minimal Examples

- Motivation
  - **Early start** in operational development work
  - Promotion of **cross-structural working**
  - Gathering **practical experience** with Gaia-X
- → Results of the Minimal Examples as basis for Use Cases

Project Workflow

- Minimal Example **CARLA**
  - Cloud-based connection and utilization of the simulation framework CARLA
  - Ambition: Linking of large amounts of data with complex software services
  - Connection point to other projects of the family

- Minimal Example **AI Training Pipeline**
  - Cloud-based process chain for training AI functions
  - Very good example for exploring the requirements of an open data and service infrastructure
  - Service can be used across applications after completion

GAIA-X *4* KI – Minimal Example CARLA (1/2)

What is CARLA?

- CARLA is a simulation software to support development, training and validation of autonomous driving systems.
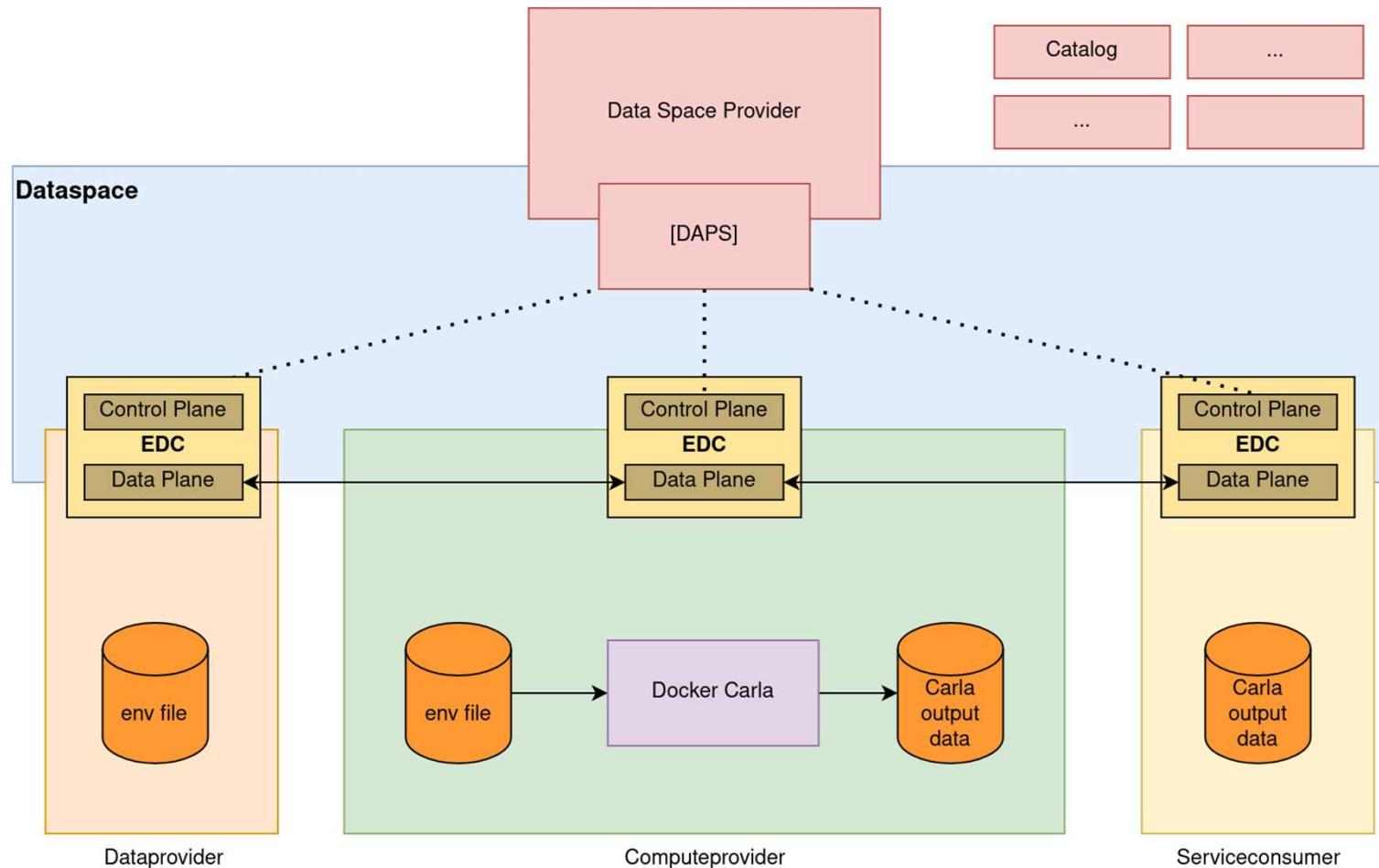
Why is GAIA-X 4 KI using CARLA?

- CARLA is used for **first implementations** for Gaia-X technologies

- The consortium is working **colaboratively** on the Minimal Example

- The **results** are the basis for other use cases

Example pictures from CARLA (carla.org)

GAIA-X *4* KI – Minimal Example CARLA (2/2)
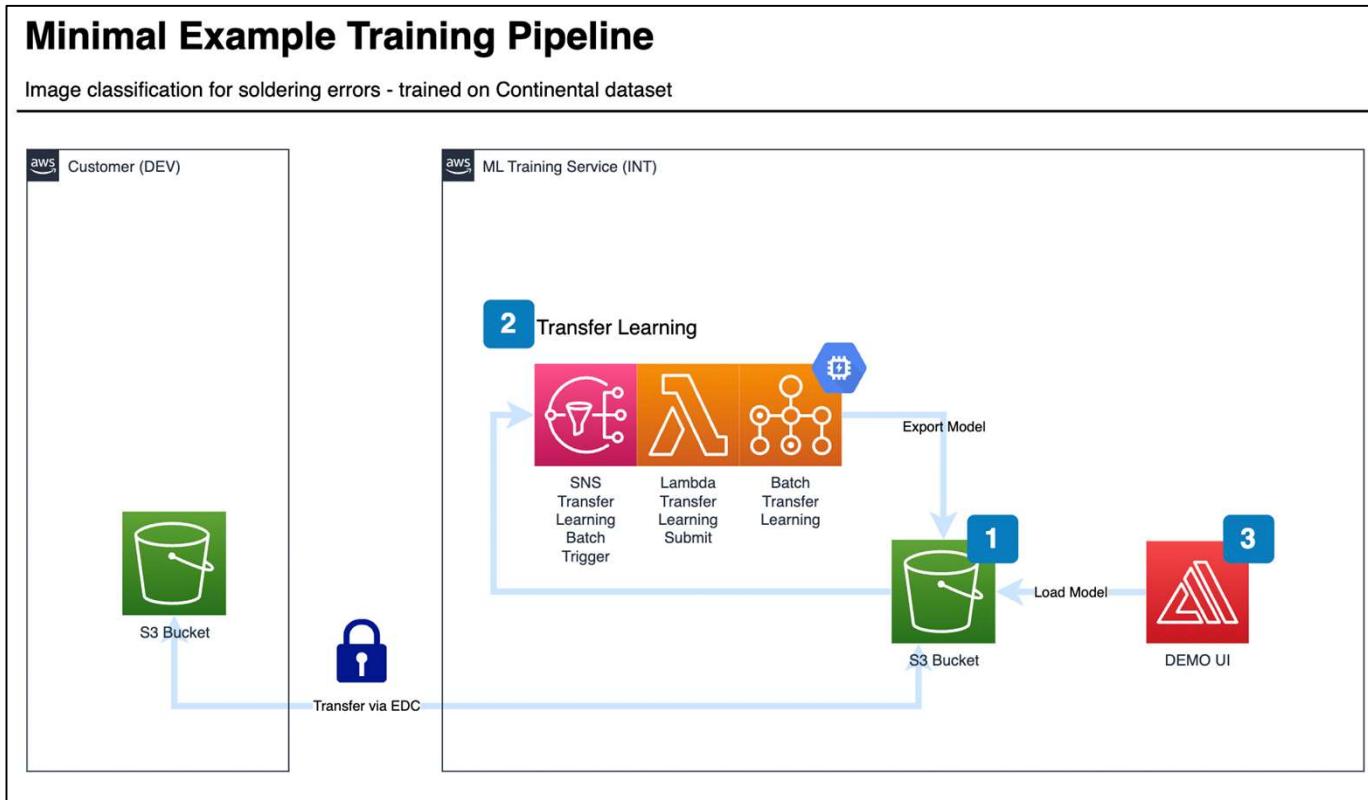
Minimal Example CARLA is used for:

- first implementations of technologies

- and is used as a basis for other use cases
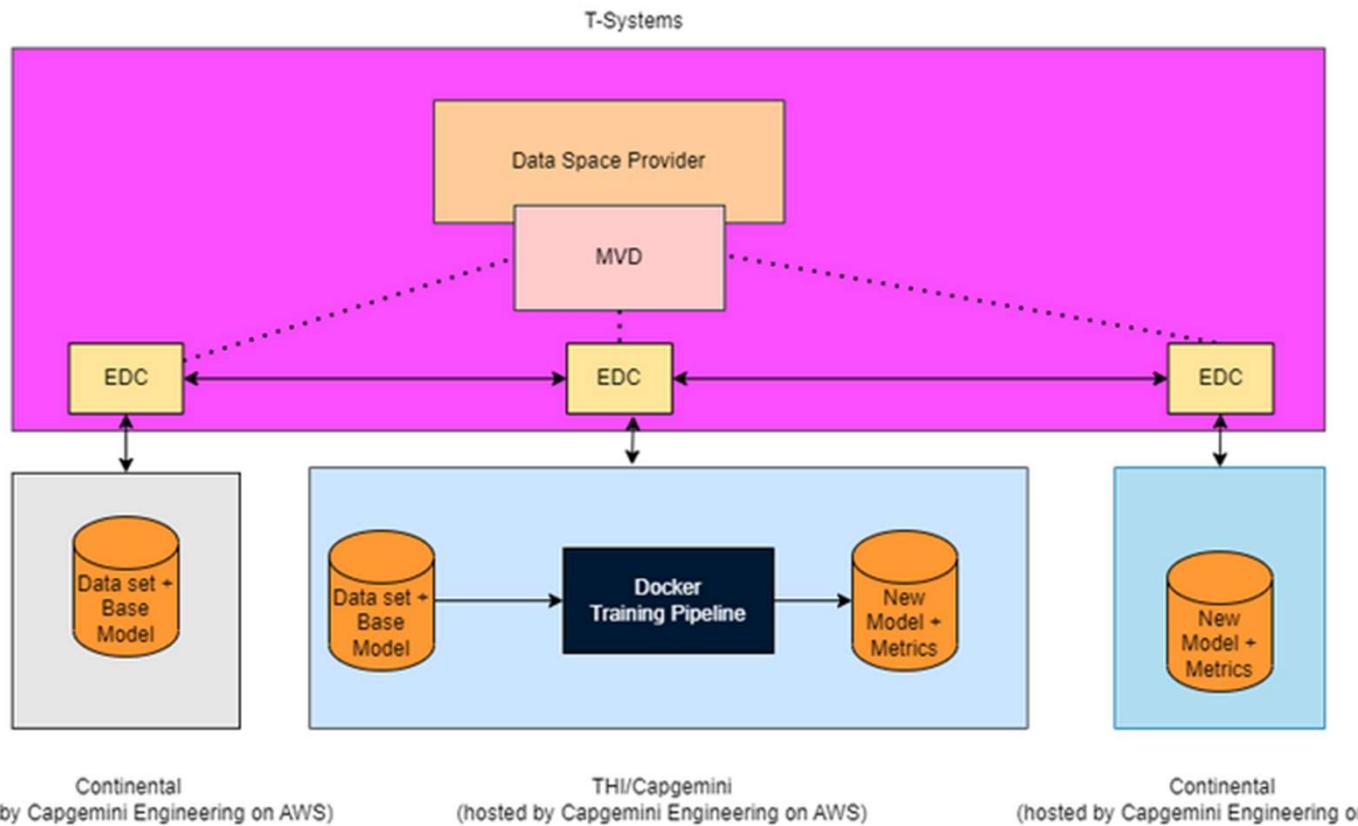
Picture shows current implementation.

# GAIA-X *4* KI – Minimal Example AI Training Pipeline (1/2)

Minimal Example Training Pipeline

Image classification for soldering errors - trained on Continental dataset
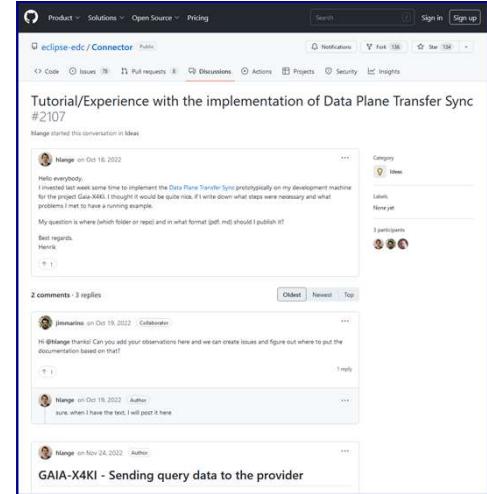
- Using Gaia-X for transfering data between Customer (e.g., Continental) and Machine Learning company.

- Gaia-X ensure that the Customer and the Machine Learning company trust each other.

# GAIA-X *4* KI – Minimal Example AI Training Pipeline (2/2)

GAIA-X *4* KI – Summary and state of work (1/2)
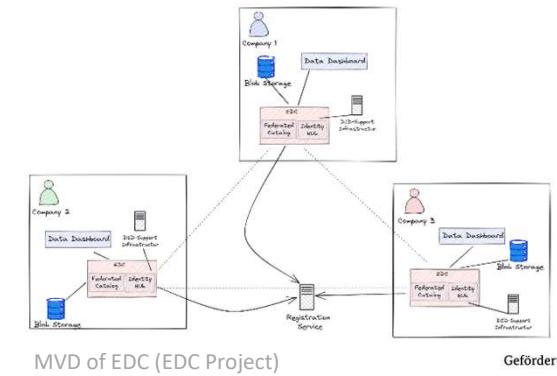
Exchange of experience with the EDC project

- Use of the Gaia-X Trust Framework and the EDC enables connectivity to the major European data space initiatives

- Impulses and **experiences with Gaia-X**

  - Active exchange with the EDC project

  - Contacts with other implementation projects (openGPT-X, EONA-X,...), e.g.

    - Best practice workshop on EDC between Gaia-X4KI and EONA-X on 08.02.2023

    - Engineering based exchange on current technical status of the projects

    - Discussion about the deployment of the control plane and the data plane (as a speciality of the EDC architecture)

MVD of EDC (EDC Project)

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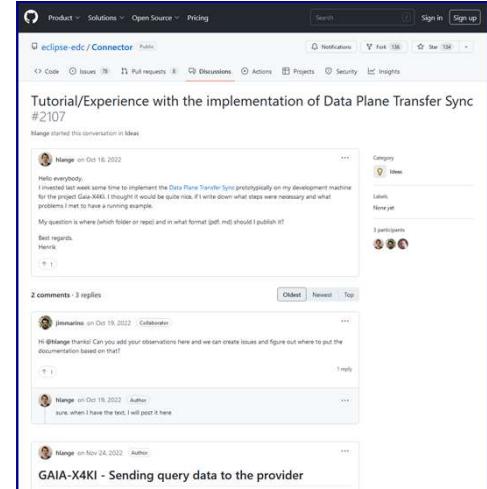
# GAIA-X *4* KI – Summary and state of work (2/2)

- EDC seems to be

  - most mature connector technology available

  - is widely spread and de facto standard in the Gaia-X community right now

- Nevertheless there are **specific project needs** and fields of work **uncovered**, e.g.

  - Monitoring of transfer processes

  - Transfer of large files
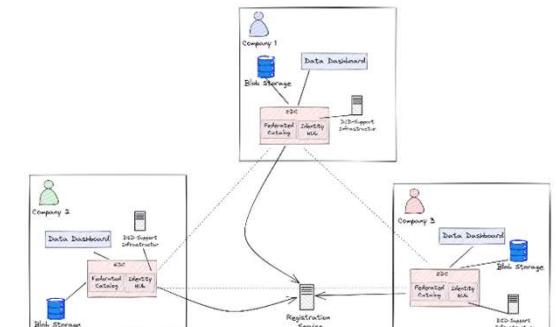
  - → **Transfer of requirements** to the EDC project

  - Streaming of data (Use Case SIEM)

  - → Dialogue towards EONA-X about **possible co-use of developments**

- Operational work is ongoing

- → **Minimal Examples have made a big contribution** for us!

Exchange of experience with the EDC project

MVD of EDC (EDC Project)

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und Klimaschutz

aufgrund eines Beschlusses
des Deutschen Bundestages

GAIA-X *4* KI

Thanks a lot for your attention!

Project Website

https://gaia-x4ki.eu (german)

https://gaia-x4ki.eu/en (english)

Feel free to contact our team!

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Be part of gaia-X for future mobility.