Reliable AI and Data Optimization

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RAIDO Project Overview

Duration: 1 Jan 2024 – 31 Dec 2026 (36 months)
Total Partners: 29

Project Pillars:

- Automated data enrichment
- Green AI optimization and deployment
- Explainability and trustworthiness
- Cross-domain AI integration via pilots

Key Objectives & Expected Impacts:

- **Scientific**: High-quality knowledge on synthetic data, XAI, Green AI
- **Economic**: Reduced energy & time costs, SME competitiveness
- **Societal**: Inclusive AI, improved trust, lower emissions

RAIDO

RAIDO: Reliable AI and Data Optimization #@APP-FORM-HERIAIA@#

No	Participant organisation name	Short Name	Type	Country
1*	INSTITUT "JOŽEF STEFAN"	JSI	Research Center	Slovenia
2	UBITECH LIMITED	UBITECH	SME	Cyprus
3	NETCOMPANY-INTRASOFT SA	INTRA	Industry	Luxembourg
4	AYESA ADVANCED TECHNOLOGIES SA	AYE	Industry	Spain
5	FUJITSU TECHNOLOGY SOLUTIONS (LUXEMBOURG) SA	FTS	Industry	Luxembourg
6	METAMIND INNOVATIONS IKE	MINDS	SME	Greece
7	TRINITY COLLEGE DUBLIN	TCD	University	Ireland
8	THE AWARENESS MOVEMENT	AWM	NGO	Cyprus
9	KRECHNOLOGIES	KRE	SME	Belgium
10	KINGSTON UNIVERSITY HIGHER EDUCATION CORPORATION	KU	University	UK
11	HELLENIC DYNAMICS PLC	HELD	SME	UK
12	QUEEN MARY UNIVERSITY OF LONDON	QMUL	University	UK
13	VLAAMSE INSTELLING VOOR TECHNOLOGISCH ONDERZOEK N.V.	VITO	Research Center	Belgium
14	SIDROCO HOLDINGS LIMITED	SID	SME	Cyprus
15	COMMUNAUTE D' UNIVERSITES ET ETABLISSEMENTS UNIVERSITE BOURGOGNE - FRANCHE - COMTE	UBFC	University	France
16	UNIVERSITE DE FRANCHE-COMTE	UFC	University	France
17	EIGHT BELLS LTD	8BELLS	SME	Cyprus
18	MATHEMA SRL	MATH	SME	Italy
19	ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS	CERTH	Research Center	Greece
20	UBITECH ENERGY	UBE	SME	Belgium
21	CYBERJAB LIMITED	CYBERJAB	SME	Ireland
22	DIMOSIA EPICHEIRISI ILEKTRISMOU ANONYMI ETAIREIA	PPC	Industry	Greece
23	AXON LOGIC IDIOTIKI KEFALAIOUXIKI ETAIREIA	AXON	SME	Greece
24	ADRESTIA EREVNITIKI IDIOTIKI KEFALAIOUXIKI ETAIREIA	ADRESTIA	SME	Greece
25	LOGOS RICERCA E INNOVAZIONE	LRI	SME	Italy
26	JESSA ZIEKENHUIS	JESSA	Healthcare	Belgium
27	TWI ELLAS ASTIKI MI KERDOSKOPIKI ETAIREIA	THL	SME	Greece
28	MPAI STORE LIMITED	MPAI	SME	UK
	Associated Partner			
29	INDIAN INSTITUTE OF TECHNOLOGY, KHARAGPUR	IITKGP	Research Center	India

Expected Outcome

Projects are expected to contribute to the following outcomes:

- **Optimized AI solutions**: optimizing model design and data usage to maximize accuracy and robustness
- Ensure in general, the pipeline of **high-quality**, **representative**, **unbiased** and **compliant training data** for AI development in all relevant sectors
- Support **data preparation** and **AI training** processes that lead to **efficient** and more **trustworthy AI**

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- **Main objectives:** To this end, the main objectives of this project will target on the following components:

- **Objective 1: To automatically enhance and augment data for energy efficient AI**

- **Objective 2: To generate large volumes of diffused and synthetic annotated data**

- **Objective 3: To optimise learning processes and models without quality degradation**

- **Objective 4: To present an AI benchmarking solution boosting technical accuracy and robustness for green**

- **Objective 5: To enhance the explainability, fairness, and transparency of the AI approaches**

- **Objective 6: To present an appropriately evaluated AI framework with progress monitoring, and feedback to ensure continuous improvement**

- **Objective 7: To efficiently optimise and automate the AI E2C pipeline and performance**

Concept Structure

The RAIDO approach is built upon four (4) well-defined pillars:

- **PILLAR 1: Automated enrichment of data for AI systems**
- **PILLAR 2: Optimised architectures for Lightweight AI models**
- **PILLAR 3: Ethical and unbiased data for Trustworthy AI training to boost AI explainability (XAI), trustworthiness and transparency offering measurable KPIs, benchmarking and progress monitoring**
- **PILLAR 4: Flexible and energy efficient E2C deployment powered by an AI-Orchestrator**

Use Cases

1. **SMART GRID domain: Smart Grid energy management optimal planning**
2. **SMART FARMING domain: Fermentation control for fungi**
3. **HEALTHCARE domain: Digital health solutions for preventive pharmacogenetics (PGx) testing focusing on personalized health/medicine**
4. **ROBOTICS domain: Industry 5.0 robotics powered by advanced AI models for complex manufacturing and predictive maintenance**

Architecture and Concept

RAIDO

Key Performance Indicators

- Computing Efficiency
- Data Efficiency
- Accuracy
- Reusability
- FAIRness
- Security & Privacy
- Explainability Trustworthiness
- Reproducability
- Energy Consumption
- Reliability
- Robustness
- Safety
- Ethical AI
- Operations Cost
- Flexibility & Scalability

Research Tools

- Decentralisation
- ExplainableAI
- Data Curation
- Modelling & Visualisation
- One-shot Learning
- Lifelong Learning
- Data Mining
- Transfer Learning
- Data Distillation

Technology Enablers

- Adversarial Networks
- Blockchain& NFT with IPFS
- Model & Data Repositories
- Federated Learning
- Cloud & Edge Computing
- Diffusion Architectures

Key Knowledge Modules

- Artificial Intelligence
- Green AI Orchestration
- Digital Twin
- Data Lakes
- Data Orchestrator

Use Cases

UC1: Energy optimisation with enhanced data in connected and distributed objects powered by embedded processors

Pilot 1: SMART GRID domain: Smart Grid energy management optimal planning

UC2: Data for AI pipeline in healthcare for Explainability & Trustworthiness

Pilot 3: HEALTHCARE domain: Digital health solutions for preventive pharmacogenetics (PGx) testing focusing on personalized health/ medicine

UC3: AI capabilities in robotics and small objects with long-term autonomy

Pilot 4: ROBOTICS domain: Industry 5.0 robotics powered by advanced AI models for complex manufacturing

Pilot 2: SMART FARMING domain: Autonomous drone navigation for AI powered smart farming operations

Architecture and Concept

The architecture consists of 9 building blocks, namely:

1 Intelligence Pre-processing Layer

2 Data Enrichment Layer

3 Green-AI orchestration Layer

4 AI-model Optimisation Layer

5 Physical Layer (PHY)

6 RAIDO information Layer

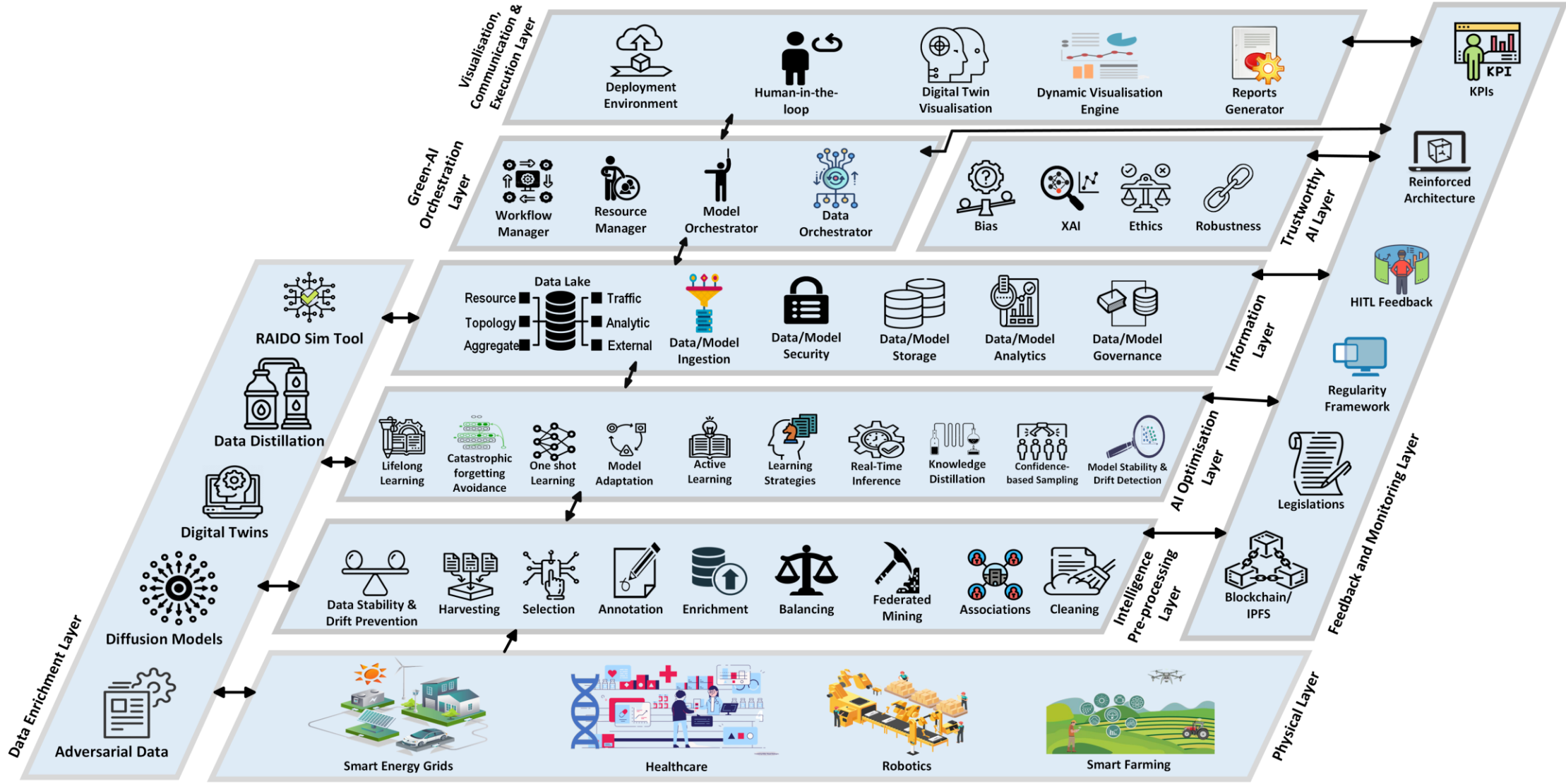
7 Visualisation Communication and Execution Layer

8 Trustworthy AI Layer

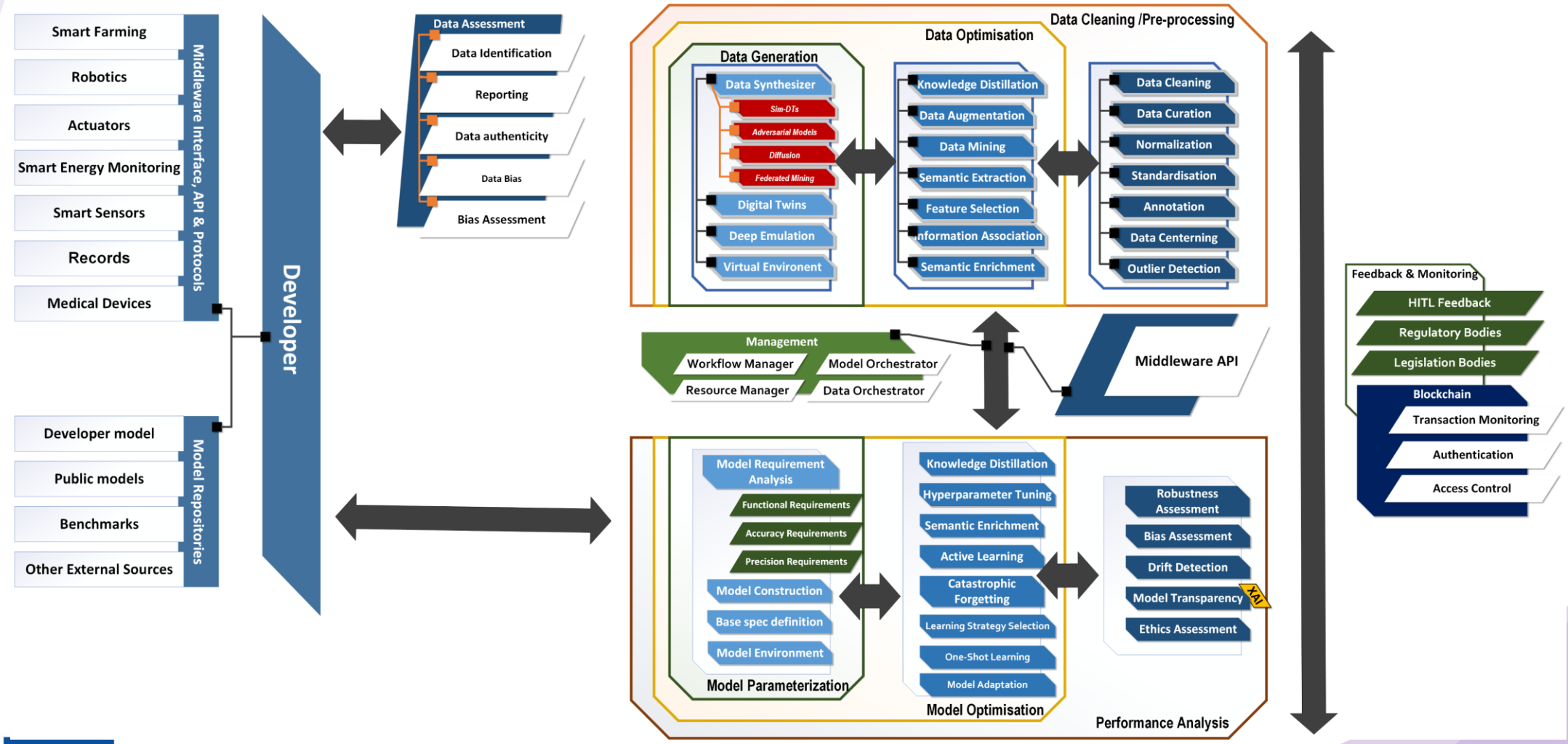
9 Feedback and monitoring Layer

Each layer has a number of different functionalities that can run either in a centralized, a distributed or a hybrid fashion

Architecture and Concept



Application Flow



Application Flow

The user selects a) To process Data b) To process Models (assumes data are already processed/available)

a) For data processing we have (Data Enrichment Layer)

1. Data Generation (Sim-DTs/GANs/Diffusion/Federated Mining)
2. Data Optimisation (Distillation, Augmentation, Balancing)
3. Data Cleaning/Pre-processing (Cleaning, Curation)

b) For Model processing we have (AI-model Optimisation Layer)

1. Model Parameterisation
2. Model Optimal Design
3. Model Performance Analysis

RAIDO Current status

- Third plenary meeting has just completed
  - Ran trial reporting at 9 months: no major alarms
  - Consortium is working well together
  - Significant amendment is currently being processed

- Midterm review (18 month) scheduled for September
  - Scientific section progressing well
  - Some delays with the pilot use cases and integration

Some thoughts on coordinating EU projects

- Personal experience has been positive:
  - 4 EU networks of excellence: NeuroCOLT, NeuroCOLT2, PASCAL, PASCAL2
  - 3 EU projects: KerMIT, CompLACS, RAIDO

- Not always easy to combine with personal research agenda:
  - Co-coordination of HumaneAI Network of Excellence worked well

Some thoughts on coordinating EU projects

- Projects are collaborative: coordinator is not seen as ‘the boss’
  - Best to develop a consensual project ethos
  - Distributed responsibility with individuals answering to the steering committee
- Extreme example was PASCAL, PASCAL2:
  - Money was allocated based on performance and contribution
  - All participants could apply for funding through a project portal
- Proved very impactful
  - Visual Objects Challenge (VOC), Recognising Textual Entailment (RTC)

Some thoughts on coordinating EU projects

- CompLACS project: Composing Learning for Artificial Cognitive Systems
  - Brought together an exceptional team of theoretical and applied researchers with applications in robotics and drones
  - David Silver went on to lead the AlphaGo project at DeepMind together with at least another four researchers from the project

Thank you for your attention!