s-X-AIPI project

Artificial Intelligence toolset for European Process Industry with self-X abilities and MAPE-K methodology

Funded by the European Union

This project receives funding in the European Commission's Horizon Europe Research Programme under Grant Agreement Number 101058715

s-X-AIPI project

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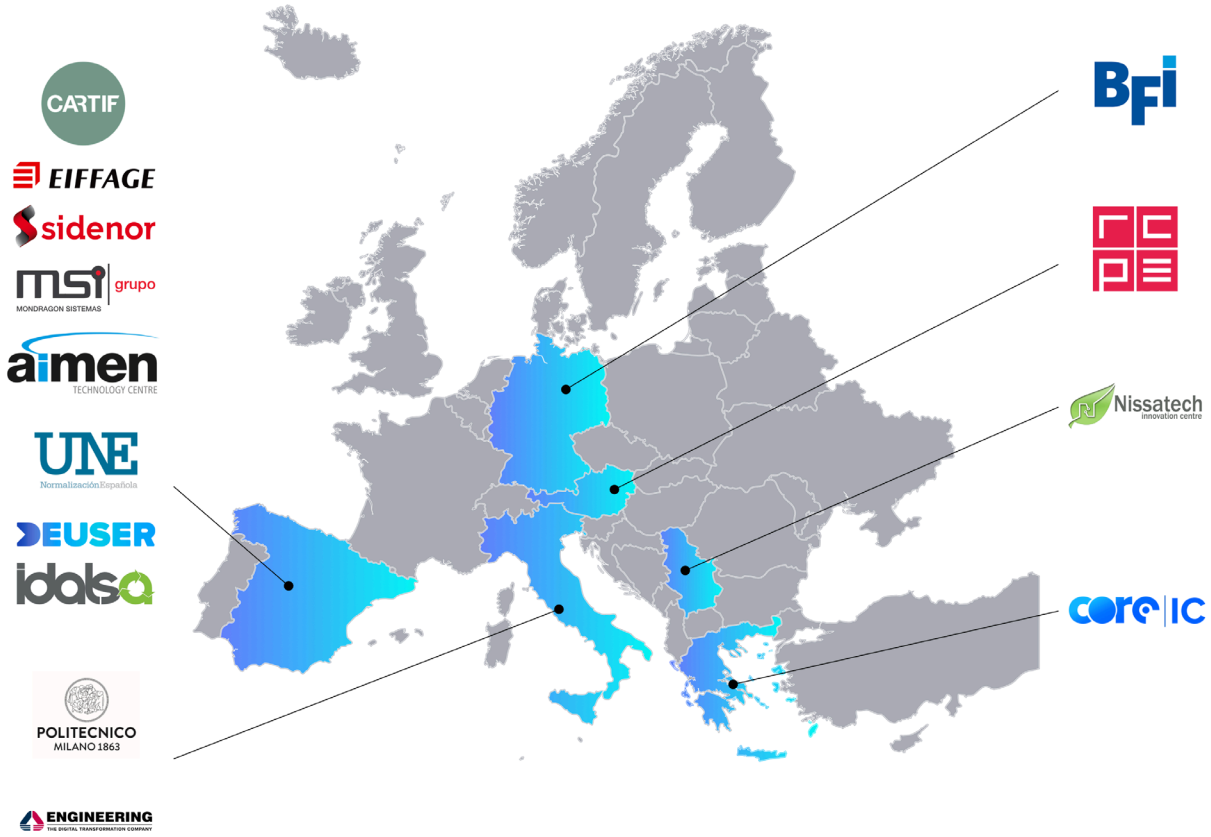
2. Overall s-X-AIPI vision
3. Context
4. Objectives
5. Use Cases
6. Expected Impact
7. Activities Progress and Next Steps

s-X-AIPI Horizon Europe Project

14
Partners

6
Countries



5,3M€
Budget

36
Months

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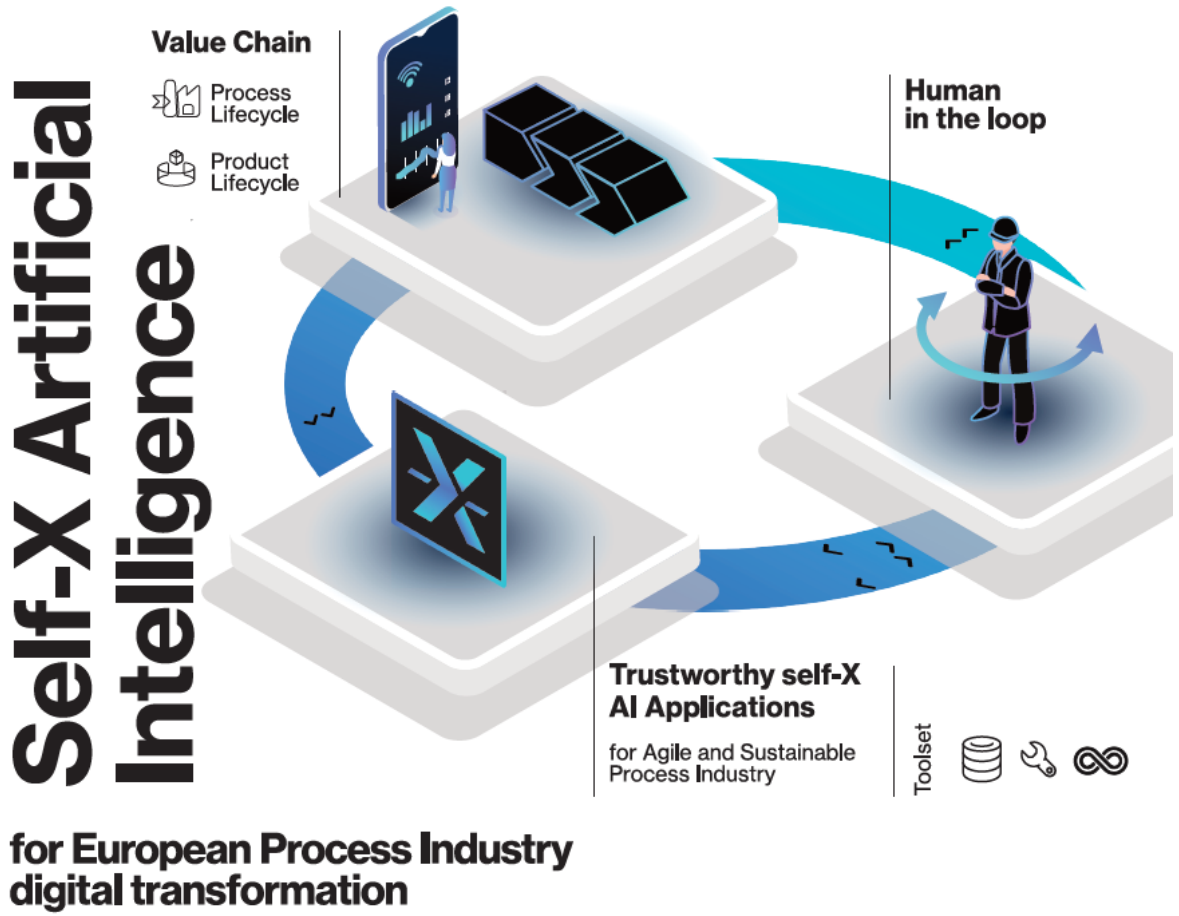
Overall s-X-AIPI vision

4 use cases

Steel	Pharmaceutical
Asphalt	Aluminium



Productivity increase	Scrap reduction	CO2 reduction	Resource Reduction
↑5-30%	↓20%	↓0.8-35kt/y	↓2-15%

Context / AI integration

Challenges

- Complexity
- Instability
- Unpredictability
- Value chain

AI requires

- High Quality data
- Data curation
- Domain expertise
- Cost-effectiveness

AI needs

- Less human involvement
- Autonomy
- “Changes” in the AI creation process

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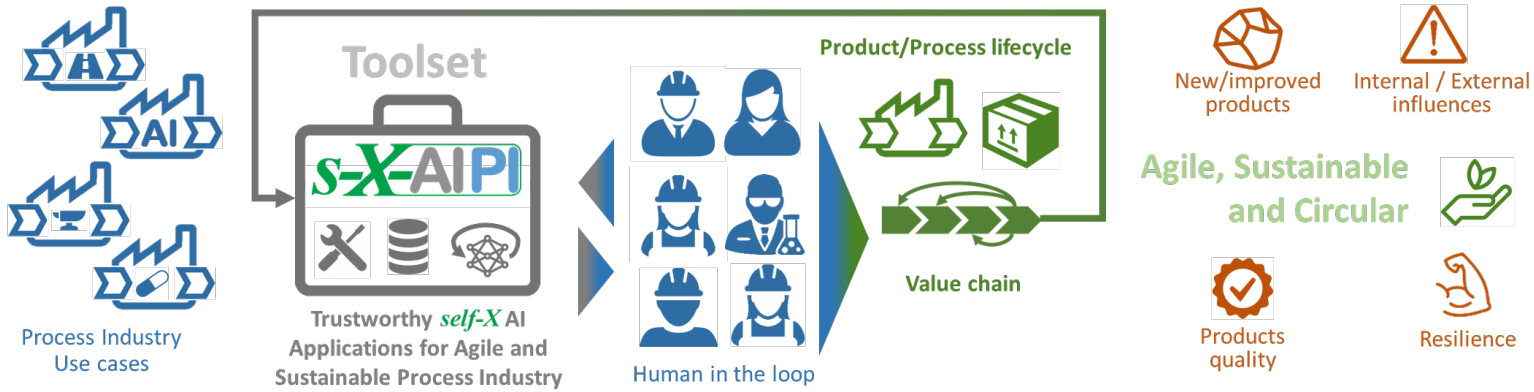
s-X-AIPI objectives

- Overall objective
  - Research, develop, test and experiment an innovative self-X AI toolset
- Process industries
  - Workers agility of operation
  - Performance improvement
  - AI-based sustainability tools
    - For the design, development, engineering, operation and monitoring of their plants, products and value chains.



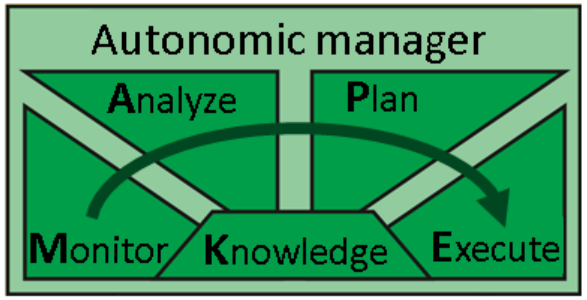
Cutting-edge technology: Autonomic computing meets AI

self-X

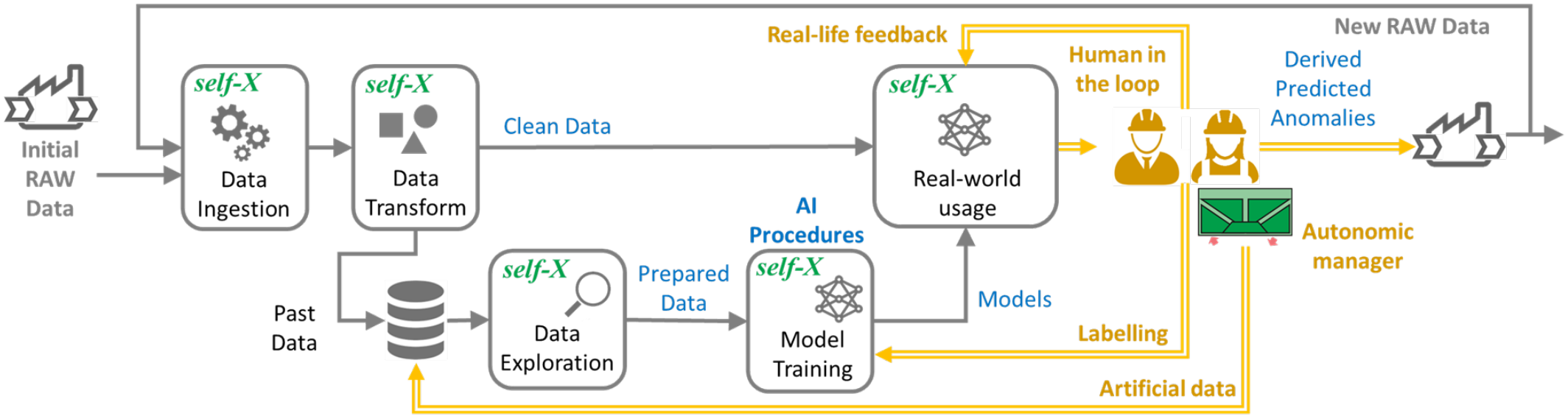
self - healing

self - configuration

self - managed



- Autonomic computing: "*computing systems that can manage **themselves** given high-level **objectives** from administrators*"



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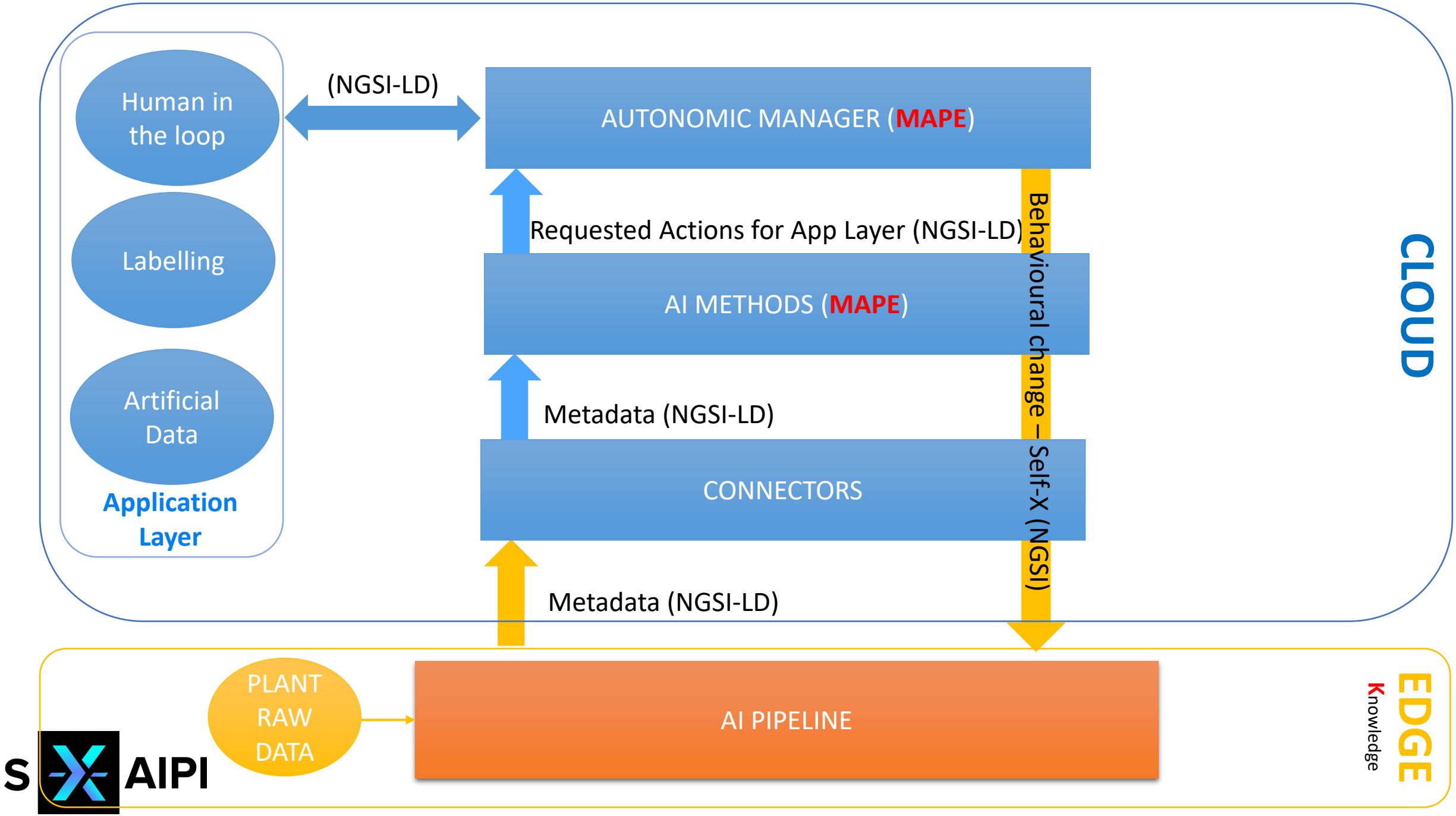
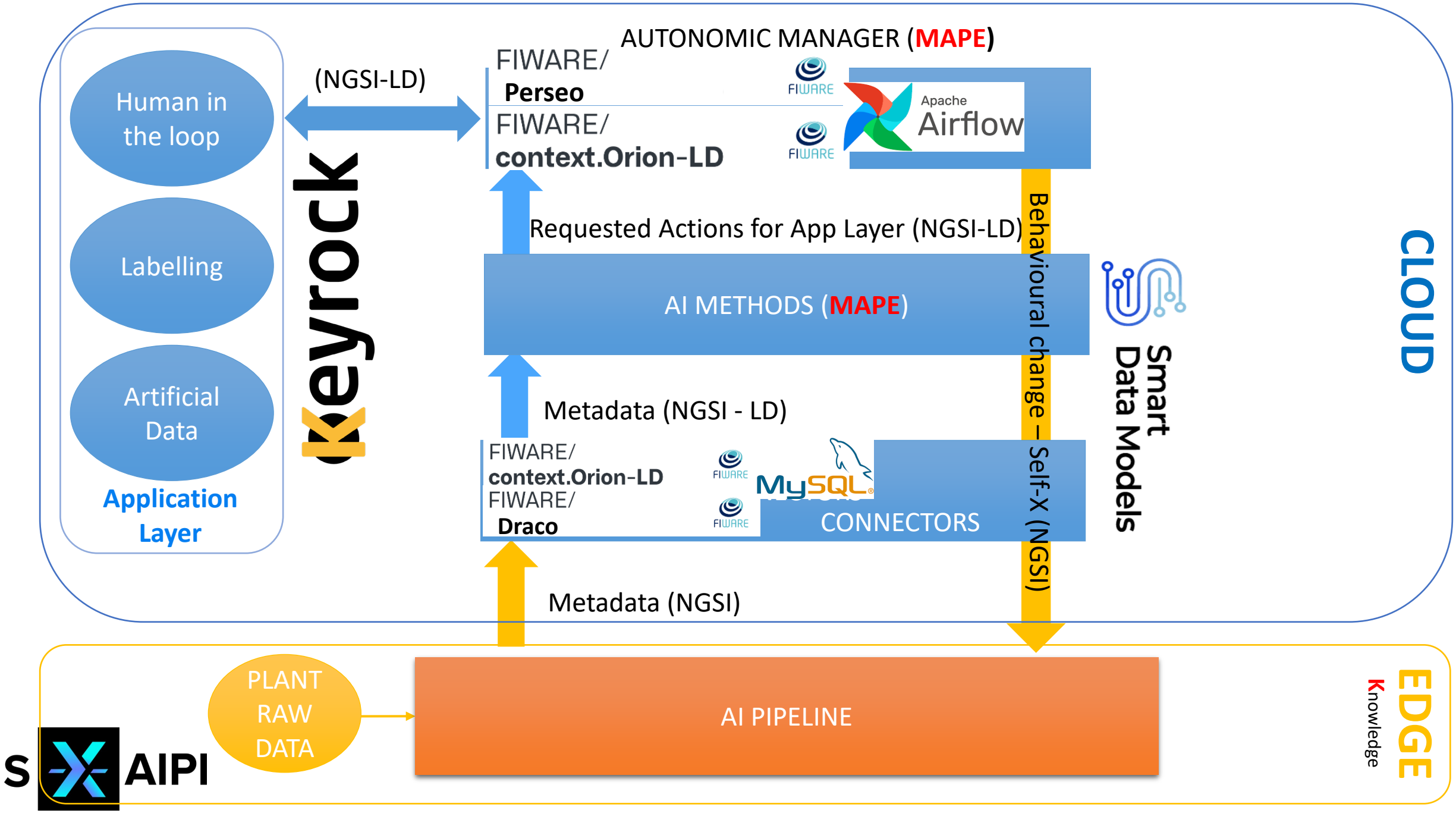

Human in the loop
Labelling
Artificial Data
Application Layer
(NGSI-LD)
AUTONOMIC MANAGER (MAPE)
Requested Actions for App Layer (NGSI-LD)
AI METHODS (MAPE)
Metadata (NGSI-LD)
CONNECTORS
Metadata (NGSI-LD)
Behavioural change – Self-X (NGSI)
CLOUD
PLANT RAW DATA
AI PIPELINE
EDGE
Knowledge
S AIPI


Human in the loop
Labelling
Artificial Data
Application Layer
(NGSI-LD)
keyrock
AUTONOMIC MANAGER (MAPE)
FIWARE/ Perseo
FIWARE/ context.Orion-LD
Apache Airflow
Requested Actions for App Layer (NGSI-LD)
AI METHODS (MAPE)
Metadata (NGSI - LD)
FIWARE/ context.Orion-LD
FIWARE/ Draco
MySQL
CONNECTORS
Behavioural change – Self-X (NGSI)
Smart Data Models
CLOUD
Metadata (NGSI)
PLANT RAW DATA
AI PIPELINE
EDGE
Knowledge
SXAIPI

sAIPI

Use Cases

Asphalt, steel, aluminium, & pharmaceuticals

4 representative industrial use-cases will be implemented, validating the potential of the developed AI technologies in real-world scenarios.

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Steel use-case

Focuses on optimising the use of scrap to produce high-quality steel products, while avoiding downstream surface quality problems and reducing process energy intensity.

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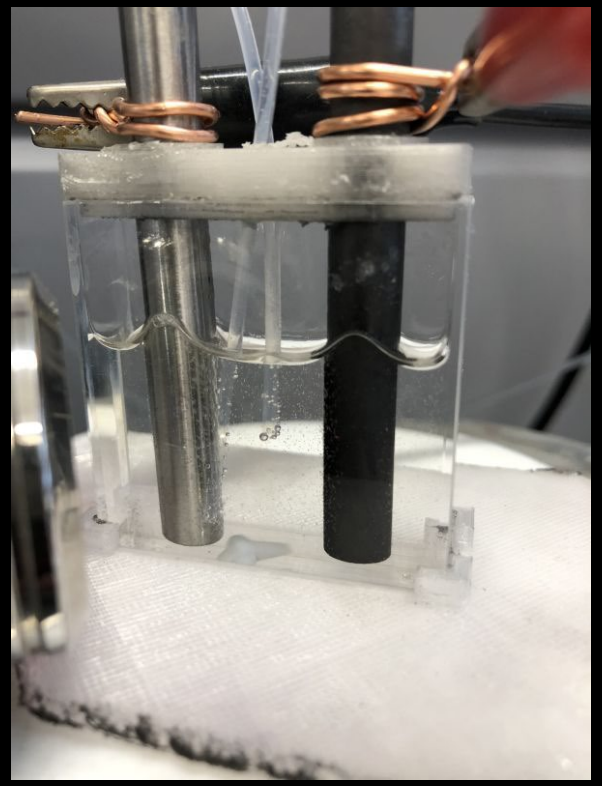
Asphalt use-case

Focuses on the AI use for the circularity of the asphalt value chain, the quality control of feedstock and of the final product and the overall sustainable performance of the process.

Funded by
the European Union

Pharmaceutical use-case



Focuses on predicting the optimal settings for the manufacturing process of chemicals and active pharmaceutical ingredients when dealing with solid or liquid suspensions.

It will employ Machine Learning (ML) based control strategies while keeping human experts involved in the decision-making loop.

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Aluminium use-case

Focuses on optimizing recycling processes from scrap, reducing the melting power on time, optimizing metal yield, and improving liquid aluminium quality leading to a decreased rate of downstream quality rejections.

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Expected Impact

Position European industry as a leader in the digital transition

Improve the environmental sustainability of industrial production

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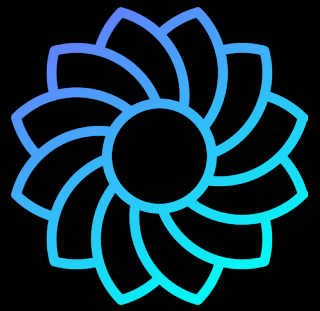
Expected Impact



Enable circular manufacturing and re-manufacturing systems

Empower and improve the human position in the industrial production

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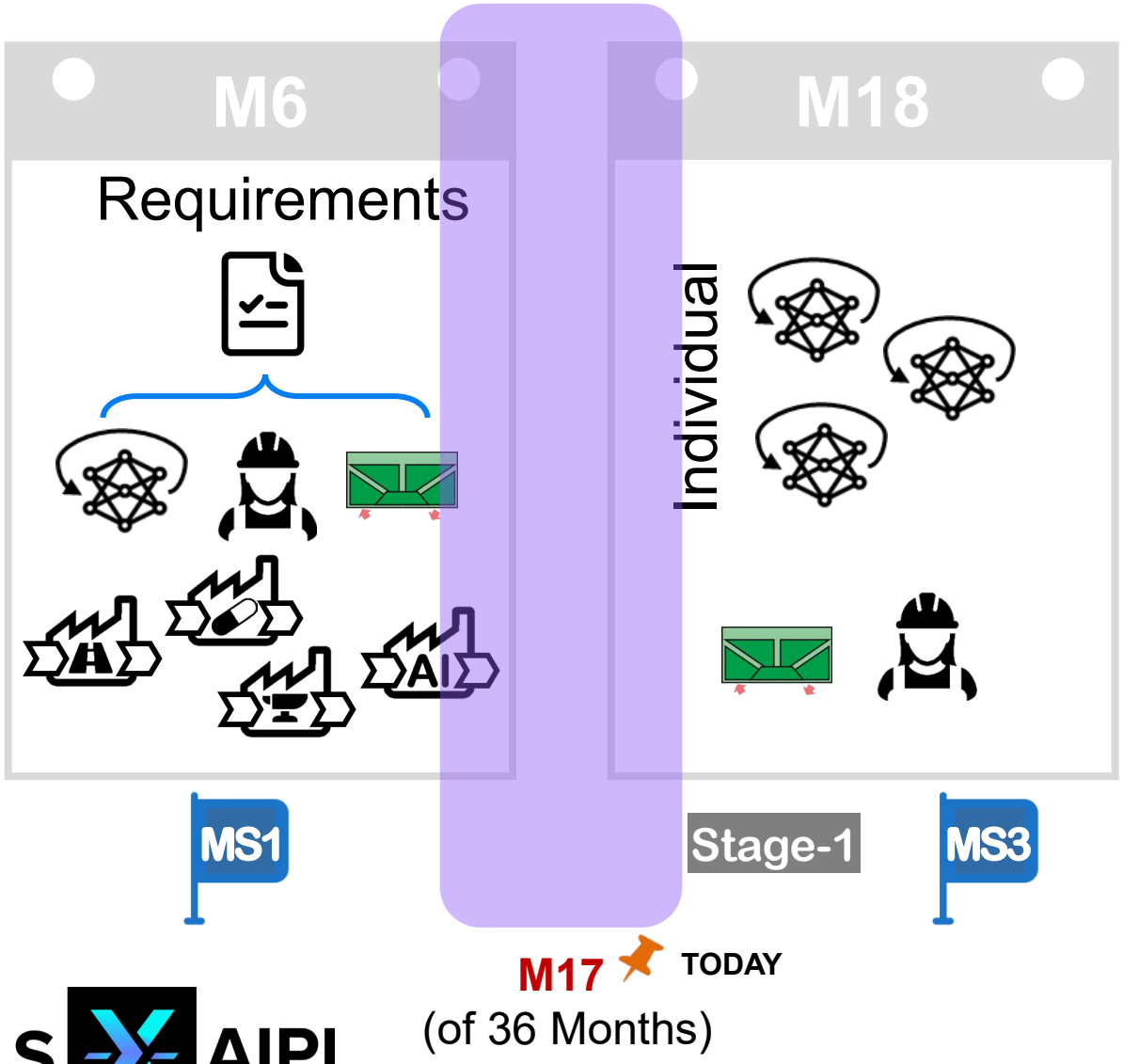
Activities & Progress



- MS1 - Definitions of the requirements of basic methodology and architecture for self-X AI solutions
  - Agreement on the definition and implementation of the AI-data pipeline blocks
  - Stakeholders
  - self-X abilities and capabilities
  - Architecture
  - Integration

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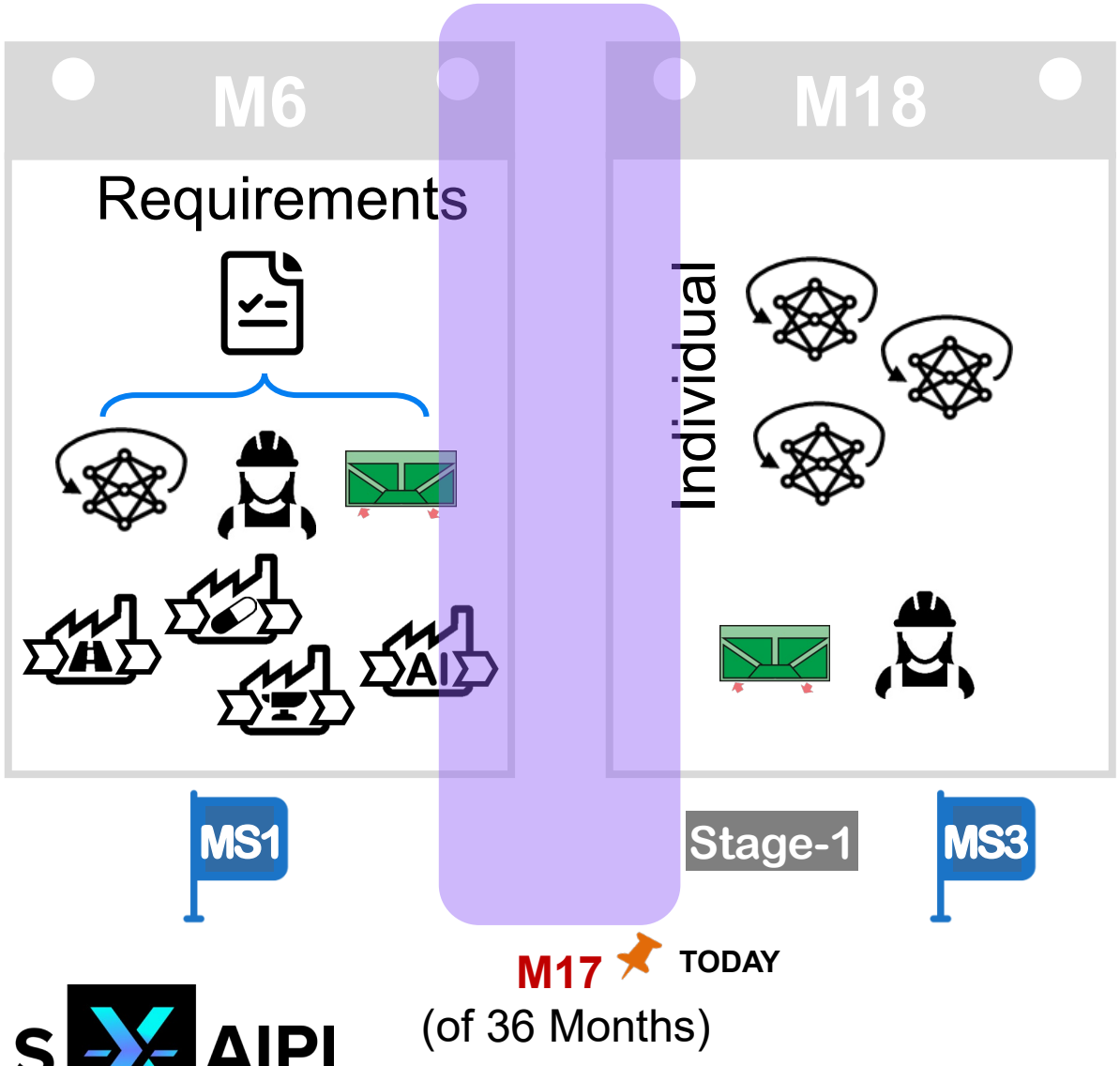
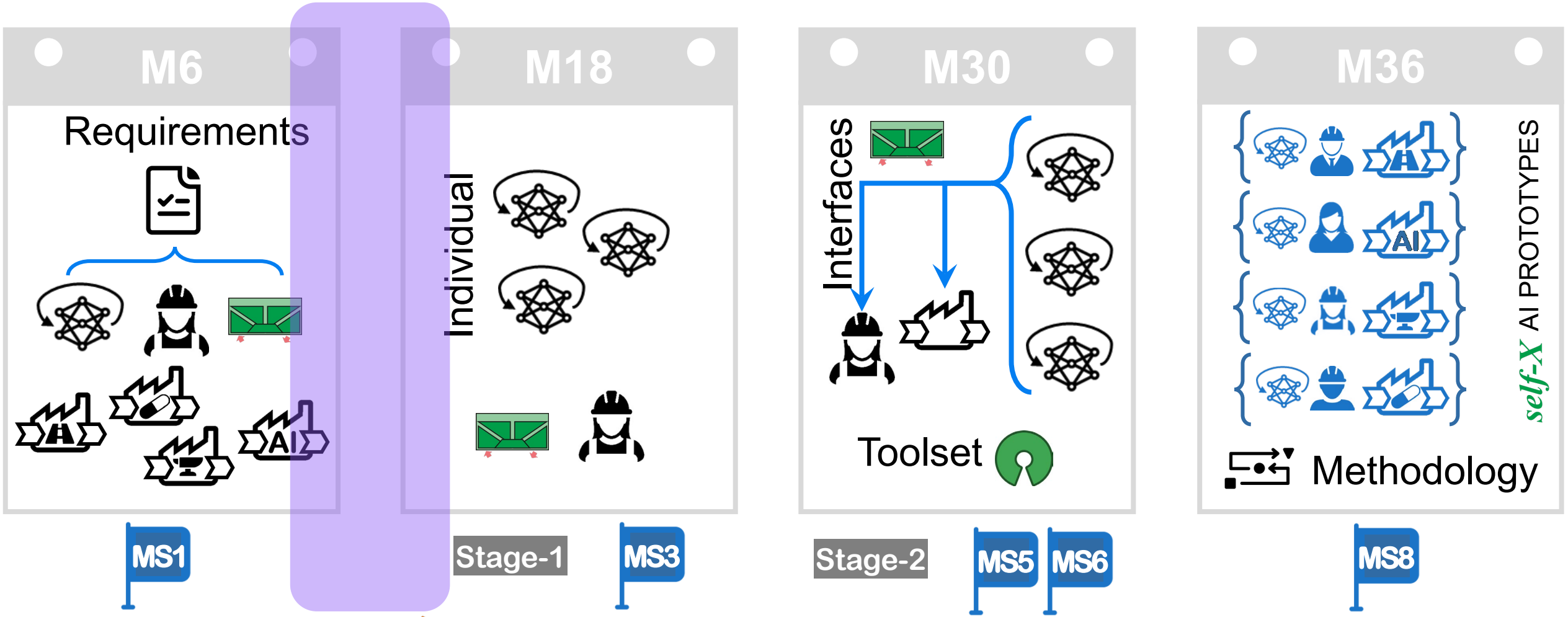
Activities & Progress



- MS3 - Initial version of the self-X AI solutions involving human collaboration and validation of the autonomic and self-X technology for individual AI modules in laboratory industrial relevant environment
  - Initial AI procedures
    - Model Training
  - Data analytics (ingestion, transformation and exploration) in all use cases
  - Metadata for self-X abilities
  - Perceptors
  - AI Methods for metadata
  - Initial infrastructure (AM)

Next Steps


M6
M18
M30
M36
Requirements
Individual
Interfaces
Toolset
Methodology
self-X AI PROTOTYPES
MS1
Stage-1
MS3
Stage-2
MS5
MS6
MS8
M17
TODAY
(of 36 Months)

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Thank you!

Join us

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TWITTER	@S-X-AIPIPROJECT

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