INTEROPERABILITY BETWEEN AI4EU EXPERIMENTS AND THE FRAUNHOFER MINING PLATFORM

Fraunhofer Institute for Intelligent Analysis and Information Systems IAIS

Dr. Jens Fisseler, AI4Media Workshop on the European AI-on-Demand Platform

Sources: PxHere/Pixybay

Fraunhofer IAIS

Source: nobeastsofierce/stock.adobe.com

Agenda

01 **Introduction**

02 **Use Cases**

03 **Technical Description of the Mining Platform and its Services**

04 **Interoperability**

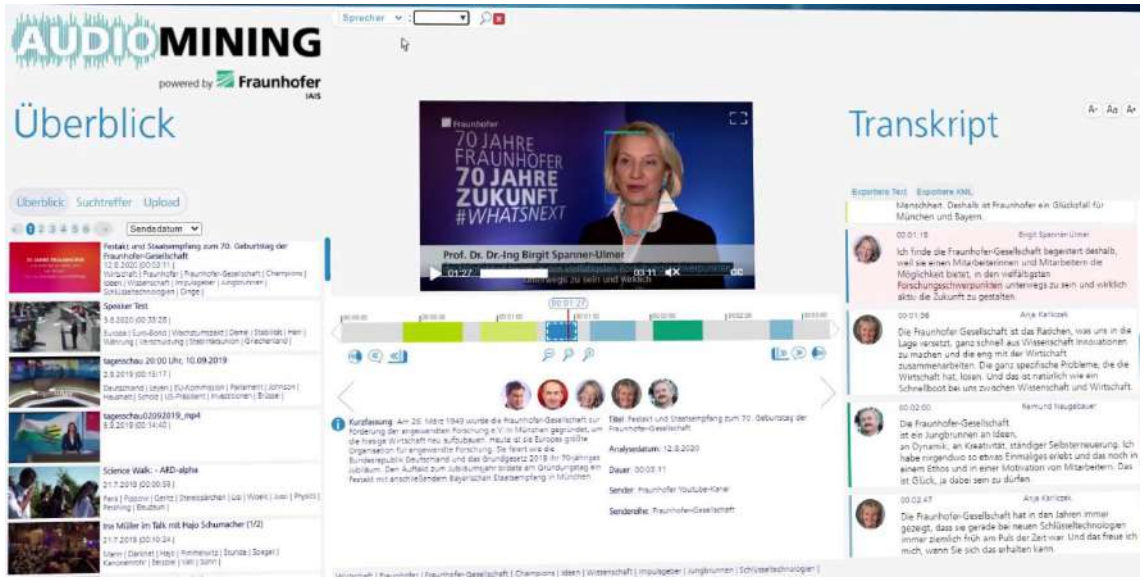
05 **Conclusion**

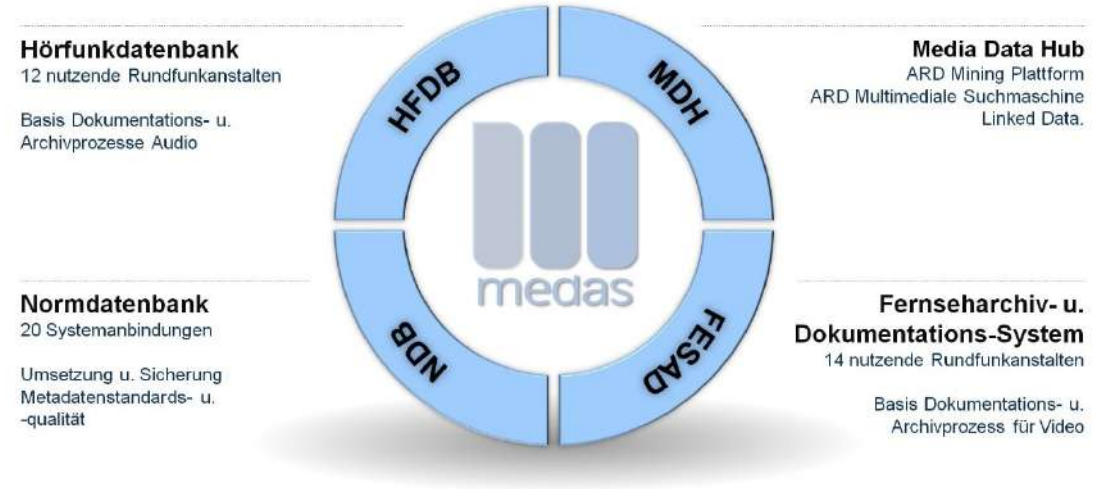
01 Introduction

Source: Siawi_art/stock.adobe.com

Project Context

- Fraunhofer IAIS Audio Mining speech recognition system
- Strategic partnership with WDR/ARD in use of artificial intelligence in media
- Participate in development of the Media Data Hub
- Increasing demand for AI-based solutions to automate content analysis for multimedia production processes





Mining Platform automatically extracts insights from media assets at scale

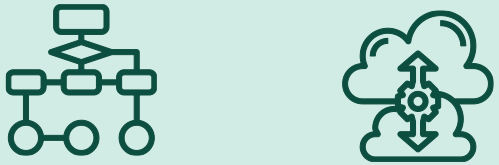
Mining Platform Features

Multimodal, AI-based analysis services

Integrates AI-based services for extracting insights from text, audio, image and video data

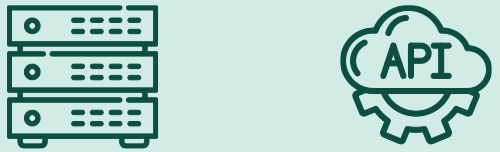
Extensible and Scalable

Workflow-based system allows easy customization and extension, and can be scaled according to need



Easy Integration

Can be deployed on a Kubernetes cluster in the cloud or on-premises, and can be integrated via a REST API



Icons from Flaticon.com

Fraunhofer IAIS

- Already in productive use, processing 100,000 media assets per day
- Scalable up to 1,000,000 media assets per day on the same hardware
- Ongoing development and improvement both of the Mining Platform as well as of the mining services

Source: Fraunhofer

02

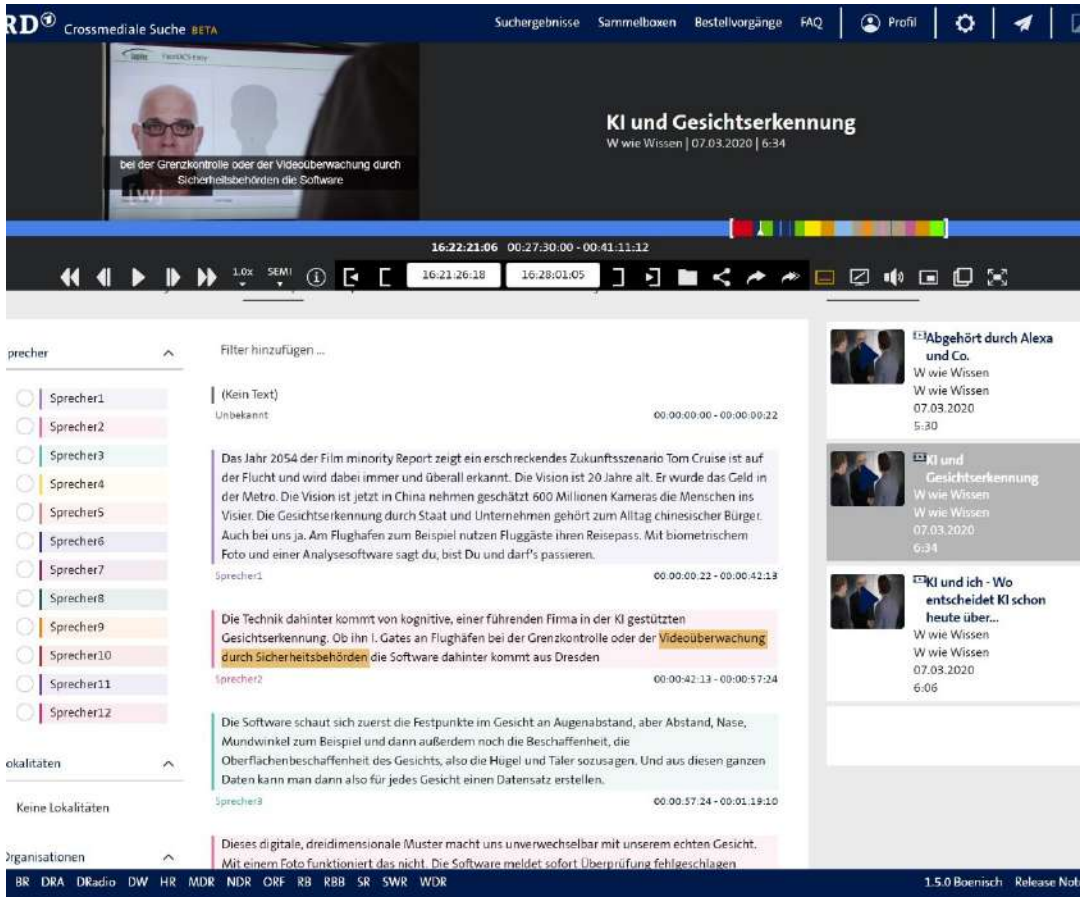
Use Cases

Source: Siawi_art/stock.adobe.com

ARD/Fraunhofer Mining Platform

Cross-media Search Application

- Part of ARD medas
- Ingested media assets are automatically processed by the Mining Platform
- Comprehensive content analysis with AI-based services
- Extracted metadata immediately available for use in search application

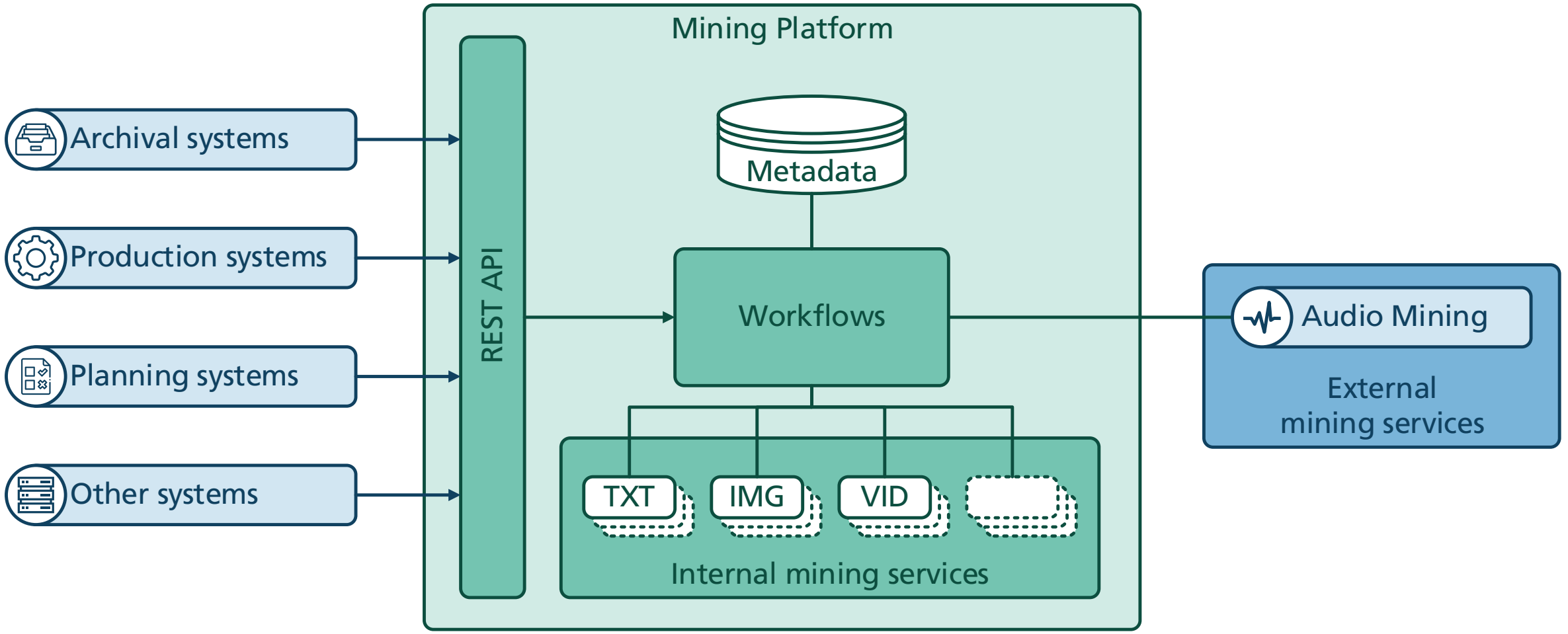


Visualization of transcribed speech in the medas multimedia search application

03 Technical Description of the Mining Platform and its Services

Source: Siawi_art/stock.adobe.com

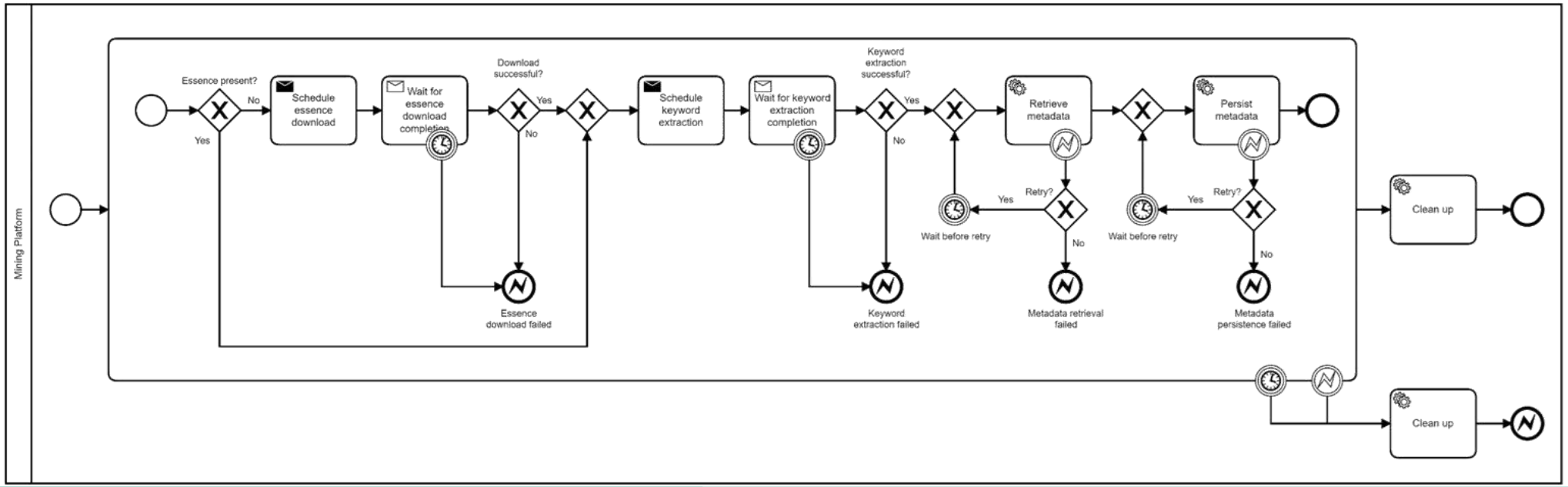
System Architecture and Components



Icons from Flaticon.com

Workflow Orchestration

- BPMN workflow engine orchestrates processing steps
- Domain-specific language for workflow modeling
- Flexible combinations of mining services
  - Named entity recognition, followed by disambiguation and linking
  - Speech recognition, followed by text mining
- Scheduler for resource management and prioritization of tasks



AI-based Mining Services

Text mining services

- Keyword extraction
- Named entity recognition
- Entity disambiguation & linking
- Tagging
- Topic modelling

Audio mining services

- Tried and tested technology
- LSTM & TDNN
- Upcoming features
  - Speaker detection
  - Language detection
  - …

Image & video mining services

- Face detection and recognition
- Under development
  - Object detection
  - Concept detection
  - Cut and scene detection

Icons from Flaticon.com

04 Interoperability

Source: Siawi_art/stock.adobe.com

Source: https://pixabay.com/de/photos/legosteine-duplo-lego-bunt-2458575/

Reasons for Interoperability

Don’t reinvent the wheel

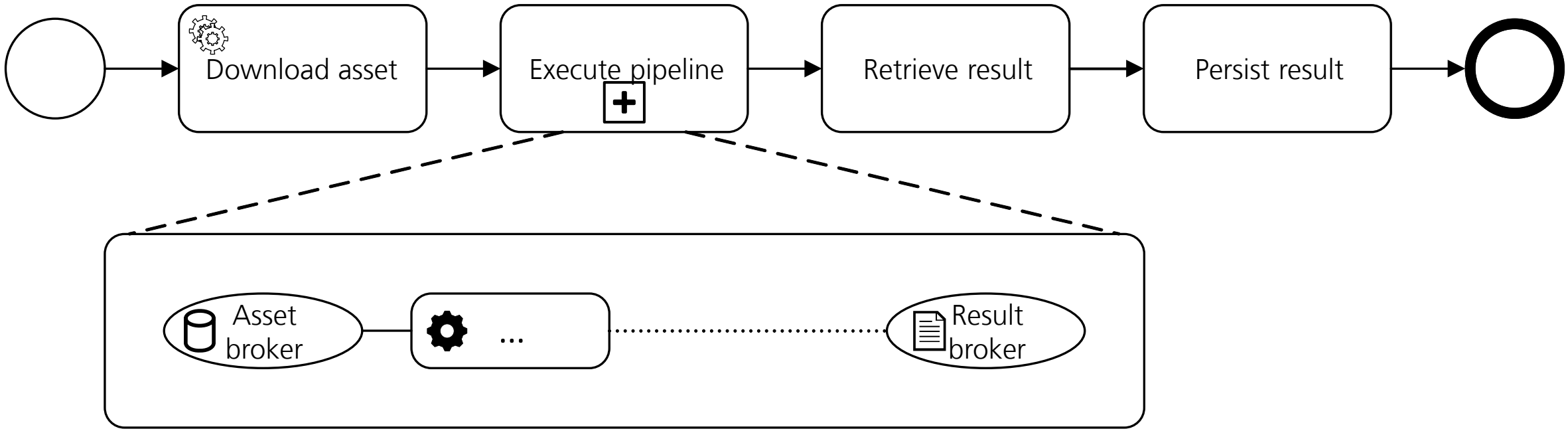
- Use AI4Experiments pipelines within mining workflows
  - Quickly integrate new mining services
- Use mining services in AI4Experiments pipelines
  - Tried and tested services
  - Implement training pipelines
- No free lunch

Interfaces need to be adapted

Fraunhofer IAIS

Adapt AI4Experiments Pipeline to the Mining Platform

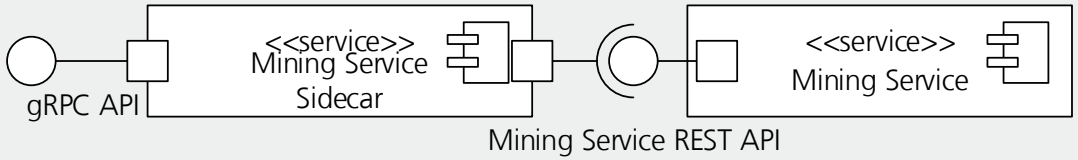
- Execute AI4Experiments pipeline as a mining service
- Convert data between mining workflow and AI4Experiments pipeline



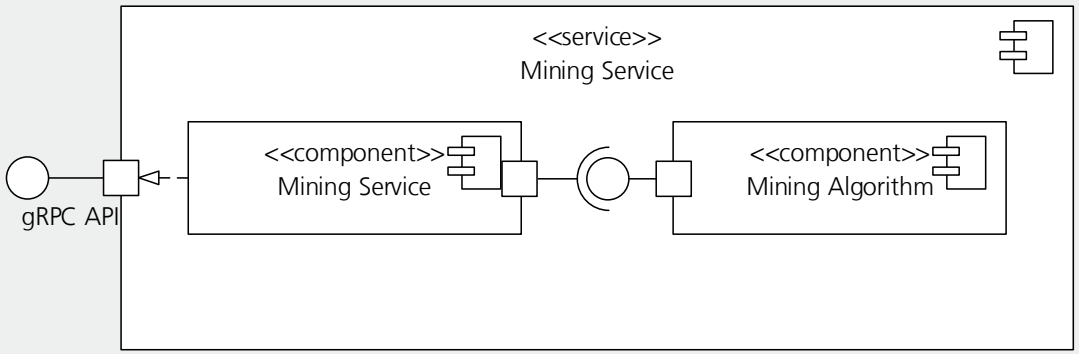
Adapt Mining Services to AI4Experiments

- Mining services implement REST API
- AI4Experiments containers use gRPC
- Alternative approaches
  a. Implement reusable sidecar containers for different modalities (text, audio, image, video)
  b. Implement AI4Experiments mining service framework

a.



b.



05 Conclusion

Bildquelle: Siawi_art/stock.adobe.com

Conclusion

- A lot of potential synergies between Mining Platform and AI4Experiments
- Technical challenges for integration

Reuse and cooperate to develop AI-based media analysis services and workflows

Contact

Fraunhofer Institute for
Intelligent Analysis and Information Systems IAIS

Schloss Birlinghoven
53757 Sankt Augustin
Germany
https://www.iais.fraunhofer.de/

Dr. Jens Fisseler
Team Lead Media Analysis Platforms
jens.fisseler@iais.fraunhofer.de

Fraunhofer IAIS

Disclaimer

Responsible contact: Dr. Jens Fisseler
E-Mail: jens.fisseler@iais.fraunhofer.de