

Co-organised by

**TrustWorthy**  
**AI Cluster**

Working towards a Trustworthy AI



# *Trustworthy AI: Landscaping verifiable robustness & transparency*

Wednesday 29 May 2024



#TrustWorthyAICluster

Sibling projects under the EU call HORIZON-CLA-2021-HUMAN-01

**AUTOFAIR**



Funded by  
the European Union

## Efficient Explainable Learning on Knowledge Graphs

The goal of ENEXA is to develop explainable Machine Learning approaches for real-world Knowledge Graphs with a focus on human-centred explanations.



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## The objectives of the project are to develop:

- intelligent solutions for knowledge extraction,
- tensor-based storage solutions,
- defeasible reasoners,
- scalable embedding techniques, and
- co-constructive explanation model.

## Partners



### DATEV eG

DATEV offers software for accounting, personnel management, business consulting, tax computation, company organization and many other business tasks. It has more than 540,000 customers.



### National Center for Scientific Research Demokritos (NCSR)

NCSR is the largest self-governing research organization in Greece. The Institute of Informatics and Telecommunications of NCSR Demokritos focuses on research and development in the areas of Telecommunications, Networks, Web Technologies and AI.



### Paderborn University

ENEXA is led by the DICE group at Paderborn University. The group is dedicated to research at the interfaces between humans, machines and data.



### European Union Satellite Centre

The European Union Agency supporting the EU in the field of Common Foreign and Security Policy by analysing data from space based assets.



### University of Amsterdam

The University of Amsterdam (UvA) is one of the leading universities world. Research within ENEXA is conducted by the Intelligent Data Engineering Lab which is part of the UvA's Informatics Institute.



### webLyzard technology

Web Intelligence and Visual Analytics - The Leading Big Data Platform for Semantic Search and Data-Driven Communication

## Use representation trichotomy of knowledge graphs to improve performance and explainability

### Tensors

<b>Scalability</b>	employs efficient data structure: <i>hypertrie</i>
<b>Robustness</b>	sensitive to incompleteness, inconsistency
<b>Semantics</b>	focus on assertions, not terminology
<b>Explainability</b>	black-box
<b>Queries</b>	no formal algebra

### Embeddings

<b>Scalability</b>	long training time
<b>Robustness</b>	can deal with incompleteness, inconsistency
<b>Semantics</b>	focus on assertions
<b>Explainability</b>	black-box
<b>Queries</b>	neighborhood search

### Formal Logics

<b>Scalability</b>	very large search space
<b>Robustness</b>	sensitive to incompleteness, inconsistency
<b>Semantics</b>	exploitation of assertions and terminology
<b>Explainability</b>	models can be verbalized
<b>Queries</b>	formal algebra

## ENEXA Industry Use Cases



Use Case

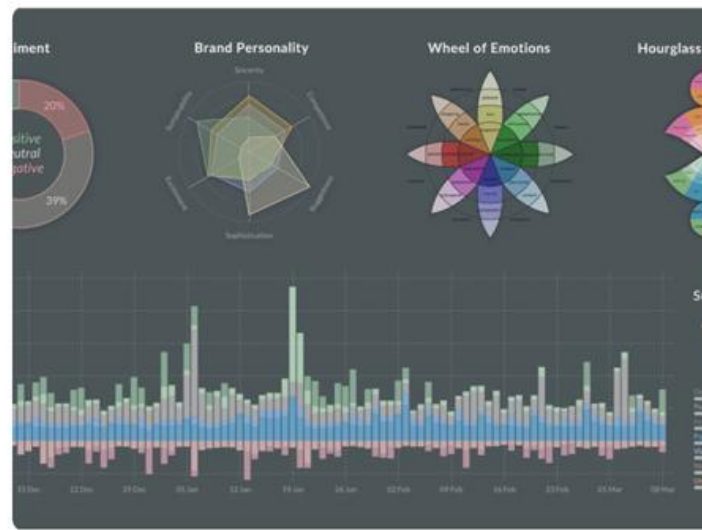
### Geospatial Intelligence

Using knowledge graphs to improve classification in satellite imagery.



European Union Satellite Centre

24 Oct 2022



Use Case

### Brand communication

Improving brand communication through data driven techniques



webLyzard technology

24 Oct 2022



Use Case

### Business Processes

Improving business process through efficient explainable document extraction.



DATEV

24 Oct 2022

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## SatCen:

- 13M data products and 87 PB delivered with a rate of 26.500 products, i.e., ca. 150 TB/day
- analysis of natural hazards and impact assessment

## WebLyzard:

- 100 M documents per day
- similarity analysis and disambiguation
- knowledge graph completion
- scalability
- explainability

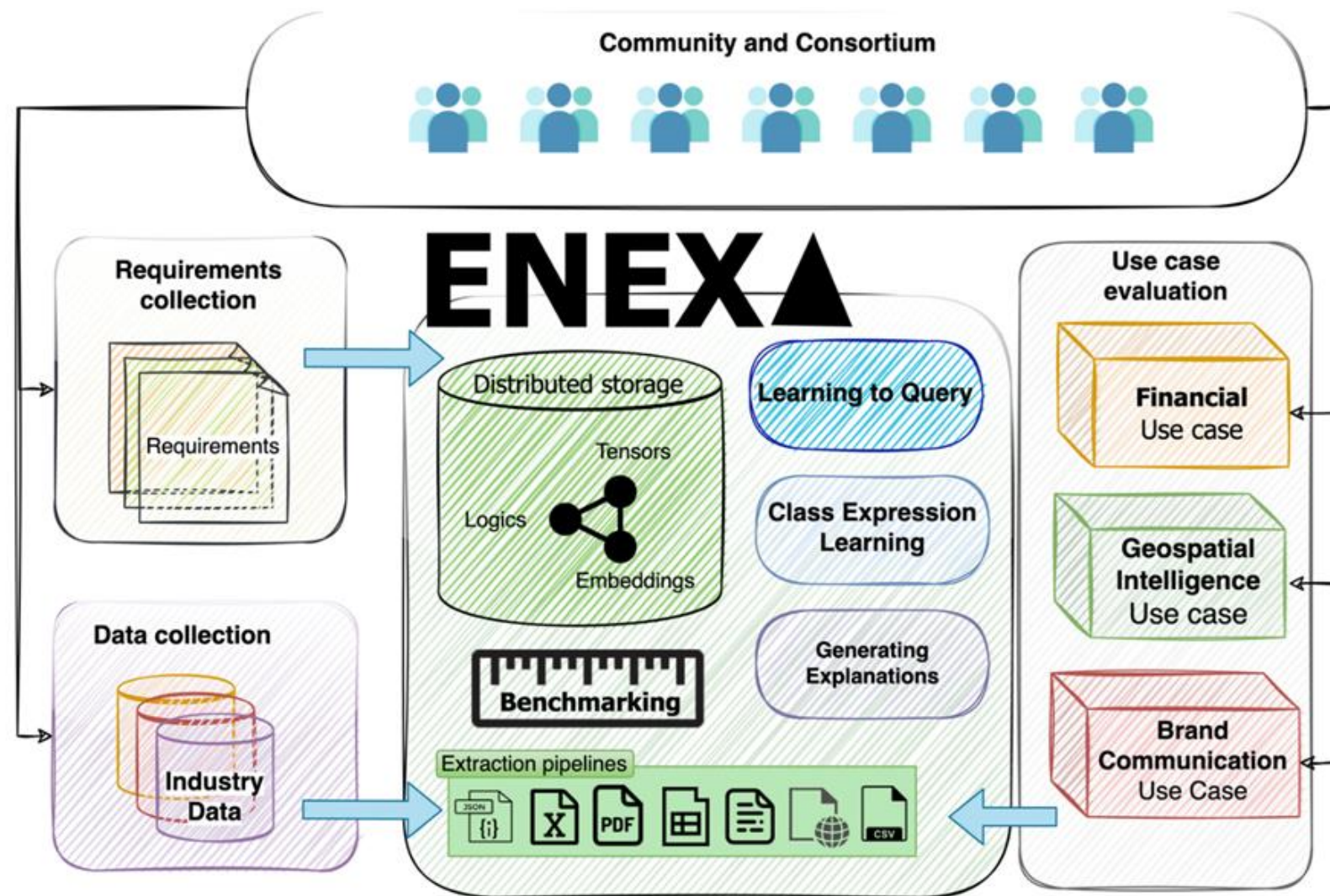
## DATEV:

- 2,8B digital documents a year
- automatic knowledge extraction from documents
- efficiency
- explainability

# TrustWorthy AI Cluster

Working towards a Trustworthy AI

- Modular
- Reproducible
- Explainable



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# *Thank you!*

More information: <https://enexa.eu/>

Implementation: <https://enexa.eu/documentation/index.html>

 <https://www.linkedin.com/company/enexa-eu-project/>

 [https://x.com/enexa\\_eu](https://x.com/enexa_eu)

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**AUTOFAIR**



**EVENFLOW**  
Adapt Learning and Reasoning for Complex Event Processing



**SAFEXPLAIN**



**TupleJ**  
TRUSTWORTHY AI



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