

AI4DiTraRe:

Studying Applied AI across Leibniz Science Campus DiTraRe Use Cases

ANNA JACYSZYN AND HARALD SACK

FIZ Karlsruhe – Leibniz Institute for Information Infrastructure

Anna.Jacyszyn@fiz-Karlsruhe.de



Leibniz ScienceCampus
Digital Transformation
of Research



DiTraRe

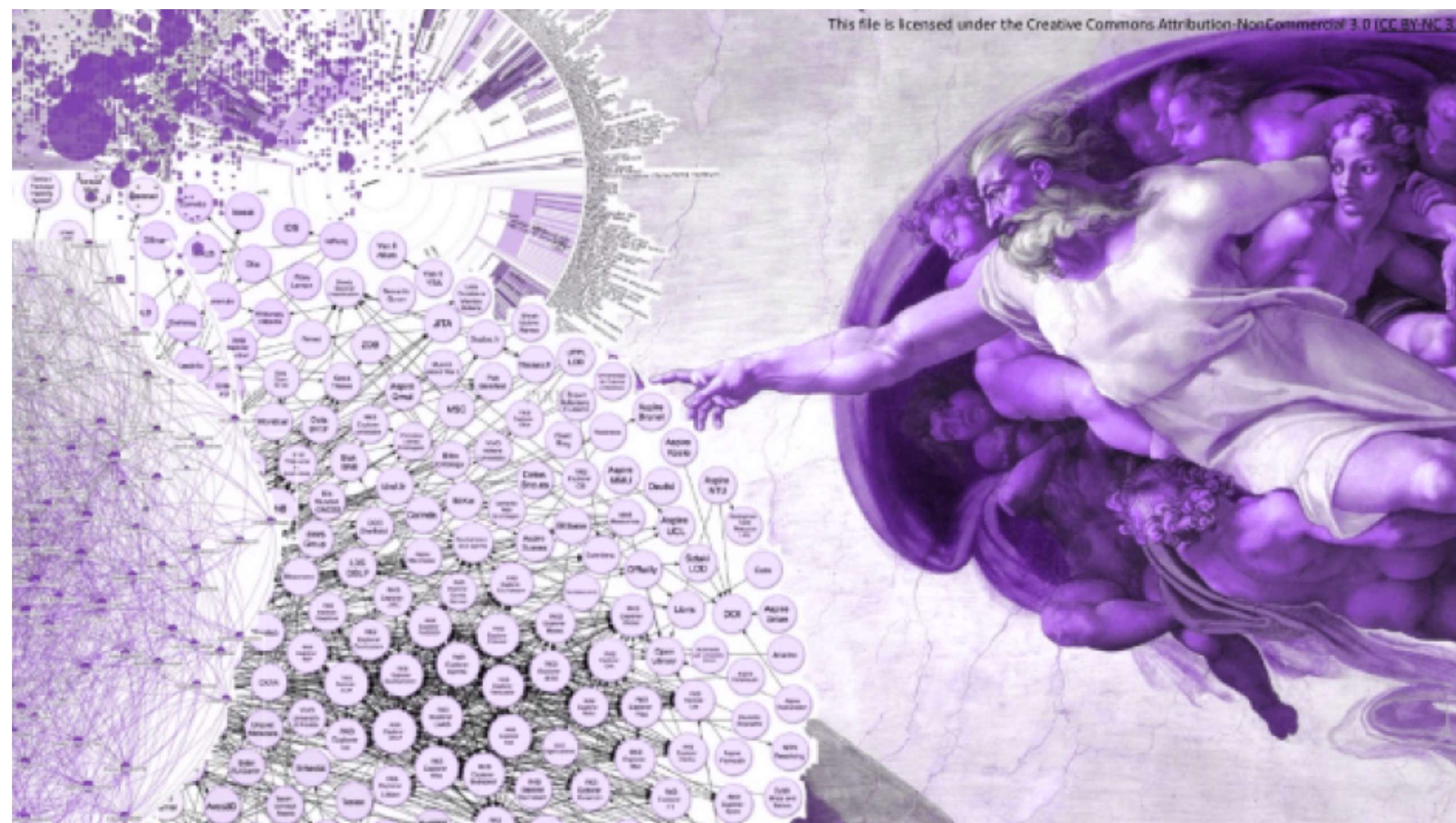
← Check out the Leibniz Science
Campus **DiTraRe** website!
And find us on: LinkedIn, Mastodon,
YouTube, Zenodo.

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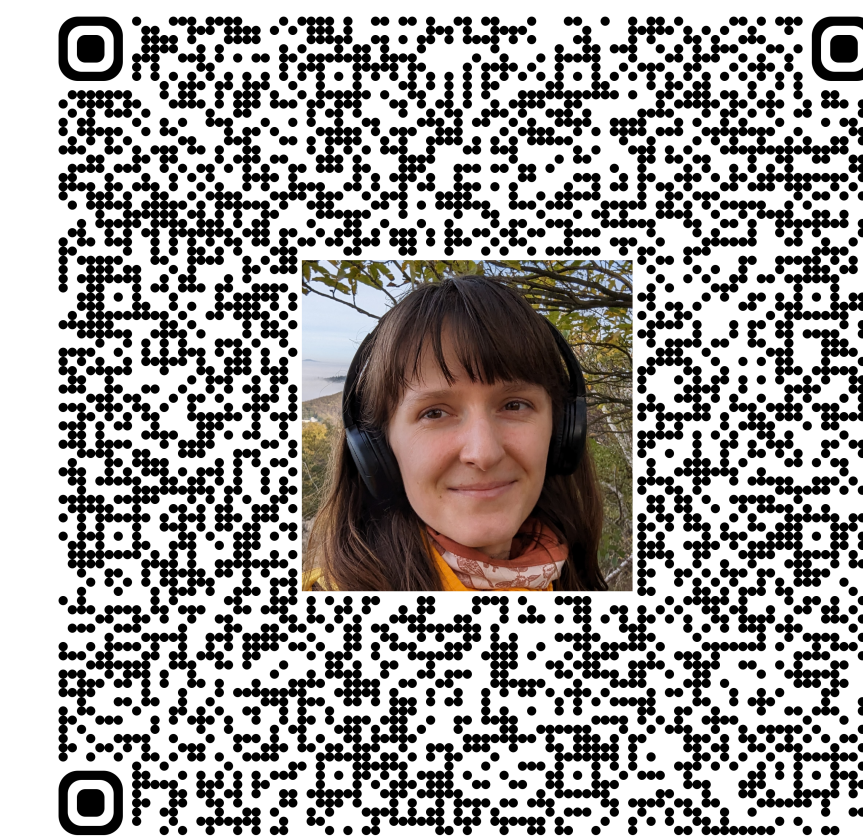
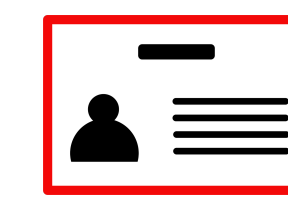
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Abstract

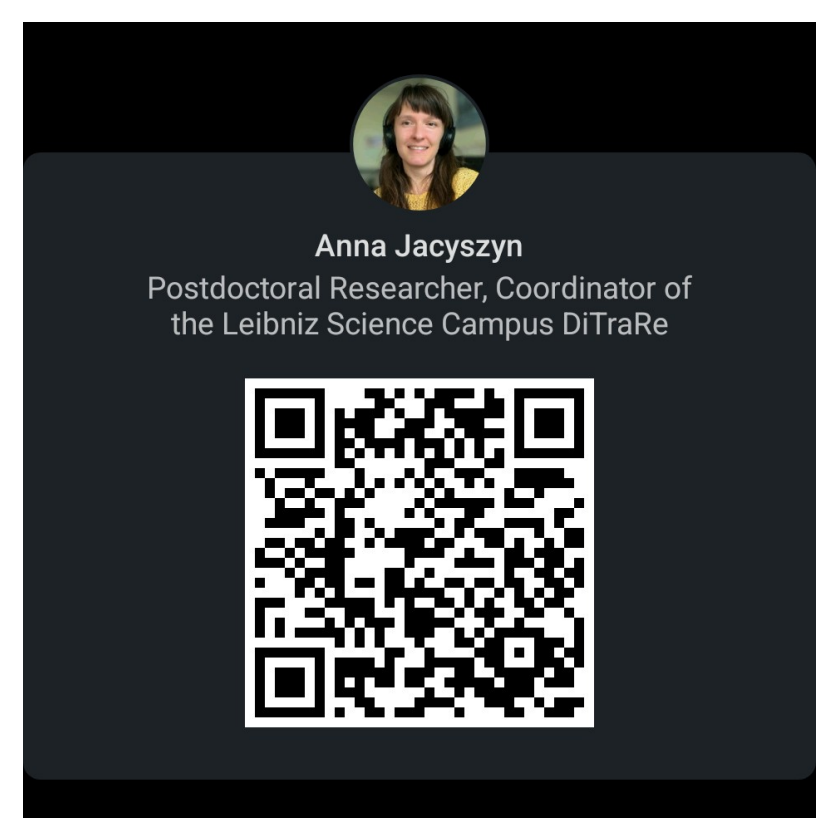
DiTraRe connects researchers from diverse disciplines to investigate the effects of digital transformation. A **special focus is set on AI** as an additional facet to the process. The DiTraRe dimension *Exploration and Knowledge Organisation*, **AI4DiTraRe**, investigates multiple AI methods and apply them in DiTraRe use cases. We also study the overall perception, practices, and effects of applied AI in the interdisciplinary environment.



About Ania



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Introduction: FIZ KDAI

- The AI4DiTraRe consists of experts from the **Knowledge-Driven AI** group (KDAI, formerly Information Service Engineering, ISE) at FIZ Karlsruhe.
- The group is led by Prof. Harald Sack, who is also the **spokesperson** of DiTraRe.
- Our goals:
 - Create specific **solutions** for the research questions of our use cases.
 - **Generalise** these solutions by making them transferable into other disciplines.
 - Create a **networking environment** – find other research groups which deal with similar issues.
 - Interconnect other consortia on **meta-level**, i.e. by collaborating with NFDI.
 - Create a **knowledge graph** for DiTraRe based on NFDIcore ontology.

DiTraRe Use Cases x Dimension *Exploration and Knowledge Organisation*



Sensitive Data in Sports Science

KIT Institute of Sports and Sports Science (IfSS)

- **Use Case:** Research Data Center (RDC) Motor Performance.
- **Goal:** Add semantic layer to make the RDC interoperable and connect to other databases.
- **Means:** Create an **ontology** and build a **knowledge graph**.
- **Challenges:** Experts in AI are needed to build and sustain a knowledge graph. Data privacy.
- **Chances:** Interlinking motor research data with other health indicators.
- **Collaborators:** Sarah Rebecca Ondraszek (FIZ KA), Jörg Waitelonis (FIZ KA), Katja Klemm (KIT IfSS), Claudia Niessner (KIT IfSS), Christian Rose (KIT IfSS).



Chemotion Electronic Lab Notebook

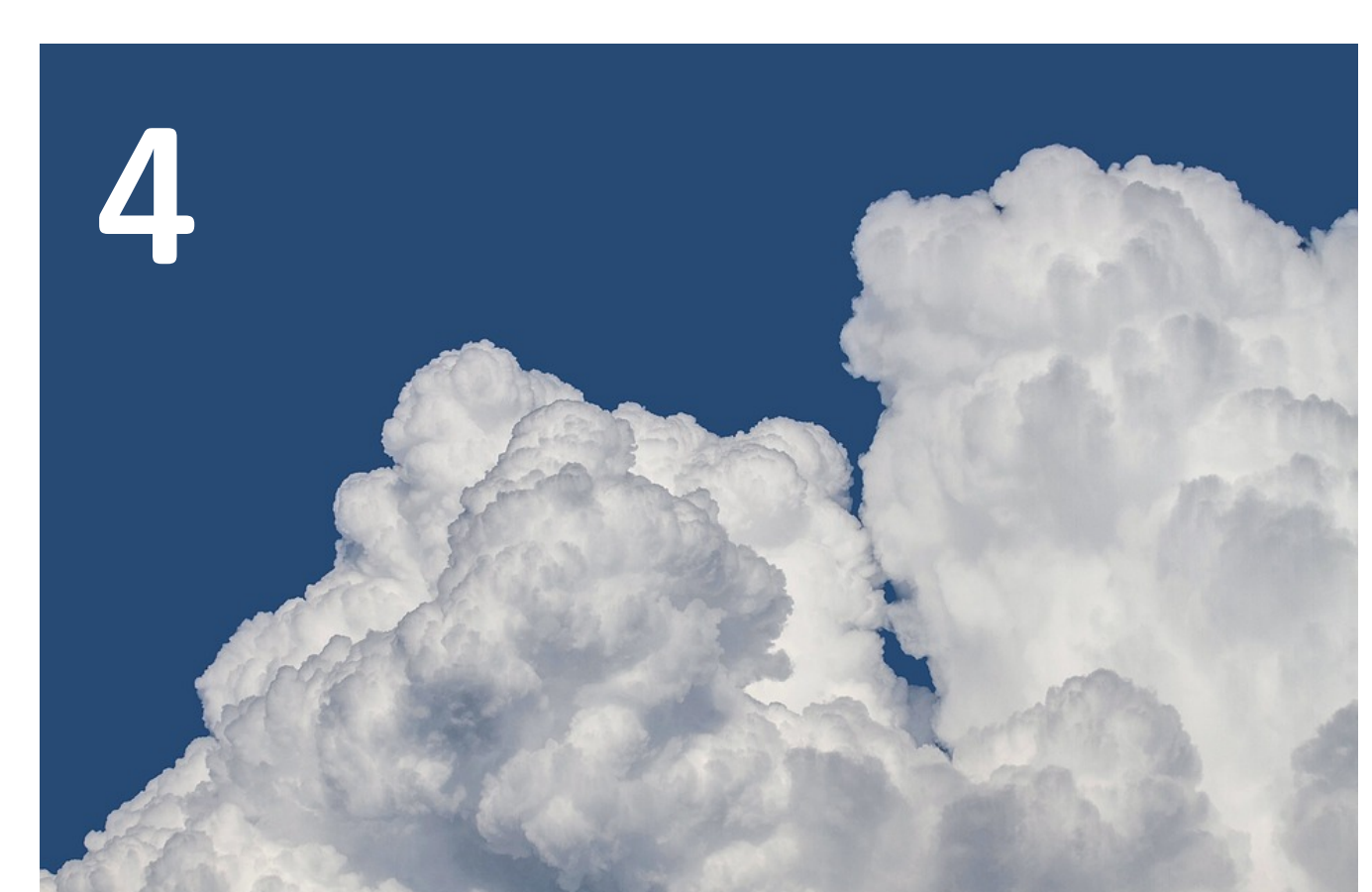
KIT Institute of Biological and Chemical Systems (IBCS)

- **Use Case:** Chemotion Electronic Lab Notebook and repository.
- **Goal:** Support further development of Chemotion by adding a semantic layer.
- **Means:** Finalise the **ontology** and build a **knowledge graph**. Collaborate with NFDI4Chem.
- **Challenges:** Experts in AI need to closely collaborate with domain experts.
- **Chances:** Connecting Chemotion to other knowledge graphs existing in chemistry.
- **Collaborators:** Ebrahim Norouzi (FIZ KA), Jörg Waitelonis (FIZ KA), Nicole Jung (KIT IBCS).



AI in Biomedical Engineering KIT Institute of Biomedical Engineering (IBT)

- **Use Case:** Machine learning in cardiology, electrocardiograms studies.
- **Goal:** Support development of ML models to diagnose heart failures + predict the intensive care unit length of stay based on ECG.
- **Means:** Apply **LLMs** together with standard **ML methods**.
- **Challenges:** Novel studies – more training and evaluation data needed.
- **Chances:** Improving patients' screening, shortening the ICU length of stay prediction procedure.
- **Collaborators:** Genet Asefa Gesese (FIZ KA), Silvia Becker (KIT IBT), Axel Loewe (KIT IBT).



Publication of Large Datasets KIT Institute of Meteorology and Climate Research (IMK)

- **Use Case:** Climate research repositories, containing multiple datasets.
- **Goal:** Standardise and automatise meta-data.
- **Means:** **Neurosymbolic** methods. Collaboration with RADAR.
- **Challenges:** Multiple, i.e. developing one standard, standardising historical data.
- **Chances:** Simplify usage of climate research repositories.
- **Collaborators:** Sven Hertling (FIZ KA, Uni Mannheim), Genet Asefa Gesese (FIZ KA), Tobias Kerzenmacher (KIT IMKASF), Sabine Barthlott (KIT IMKASF), Sibylle Hassler (KIT IWU), Peer Nowack (KIT ITI).

