DiTraRe: AI on a Spider's Web. Interweaving Disciplines for Digitalisation

Leibniz ScienceCampus
Digital Transformation of Research

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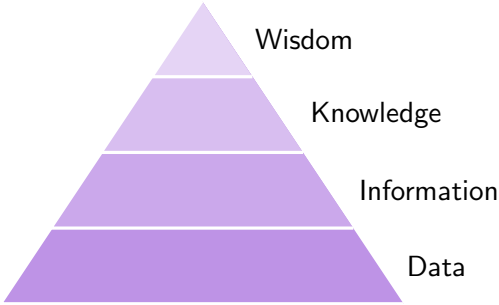
with DiTraRe-Strudy Group, Matthias Razum, and Felix Bach

FIZ Karlsruhe – Leibniz Institute for Information Infrastructure, Germany

Sci-K Workshop @ ISWC, 12th November 2024

Digitalisation

DIKW pyramid *(Ackoff 1989)*



↻ Understanding

Digitalisation

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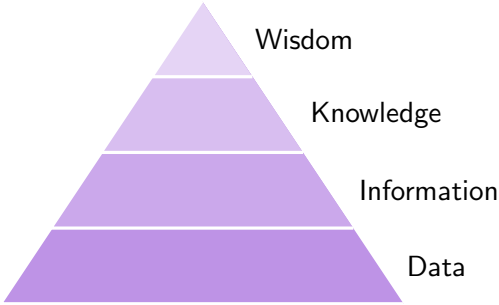

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- Bringing back wisdom to lower levels

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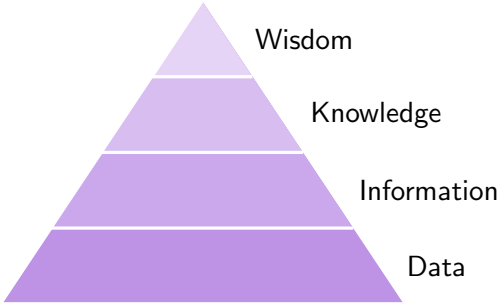

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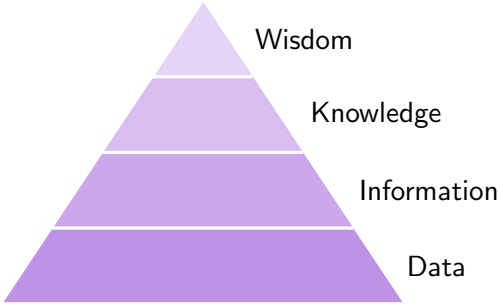

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- Digitisation
- Digitalisation
- Digital transformation

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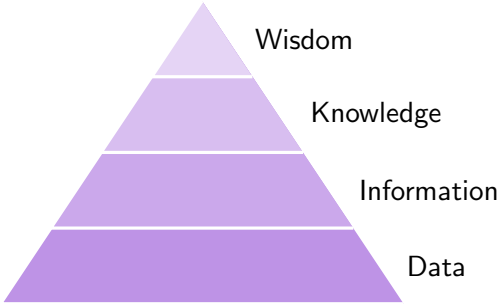

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Within DiTraRe we aim to improve the whole cycle.

DiTraRe = Digital Transformation of Research

Leibniz ScienceCampus
Digital Transformation of Research

- Funded by the Leibniz Association 2023–2027
- FIZ Karlsruhe + Karlsruhe Institute of Technology (KIT), Germany
- Analyse the process of digitalisation of research in a multilevel interdisciplinary approach
- Very broad, general scope

DiTraRe Use Cases

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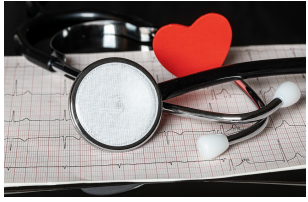
Sensitive Data in Sports Science

KIT Institute of Sports and Sports Research



AI in Biomedical Engineering

KIT Institute of Biomedical Engineering

Chemotion Electronic Lab Notebook

KIT Institute of Biological and Chemical Systems

Publication of Large Datasets

KIT Institute of Meteorology and Climate Res.

From Use Cases to Research Clusters

Use Cases

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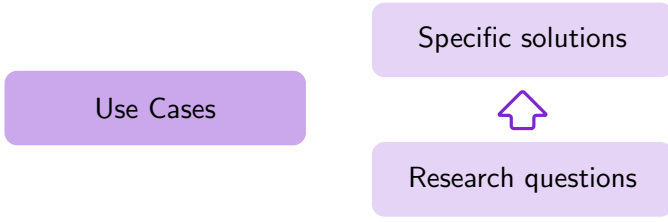
Use Cases

Research questions

From Use Cases to Research Clusters



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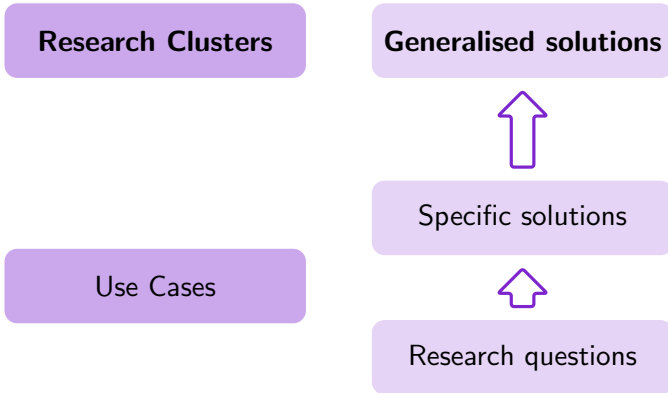

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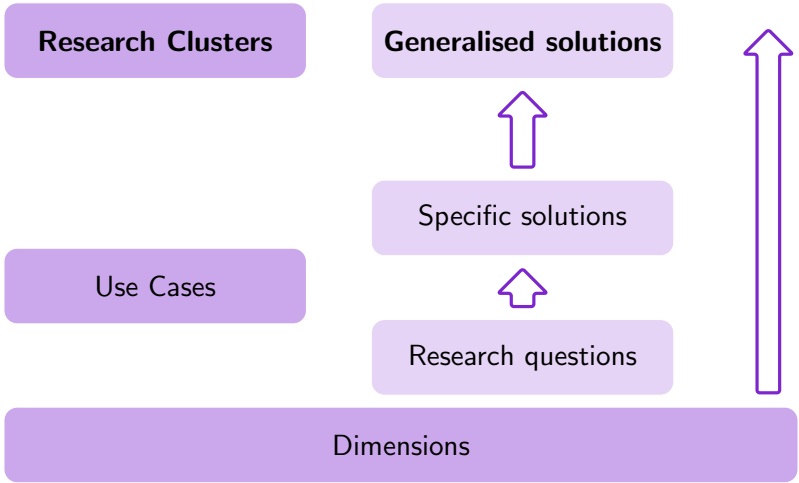

DiTraRe Dimensions

- Exploration and knowledge organisation
  Applied AI (e.g. NLP, LLMs, KG, ML methods), influence and effects.

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  Digital tools tailored precisely to the needs of researchers.

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- Reflection and resonance
  Dialog between research and society, interactive process.

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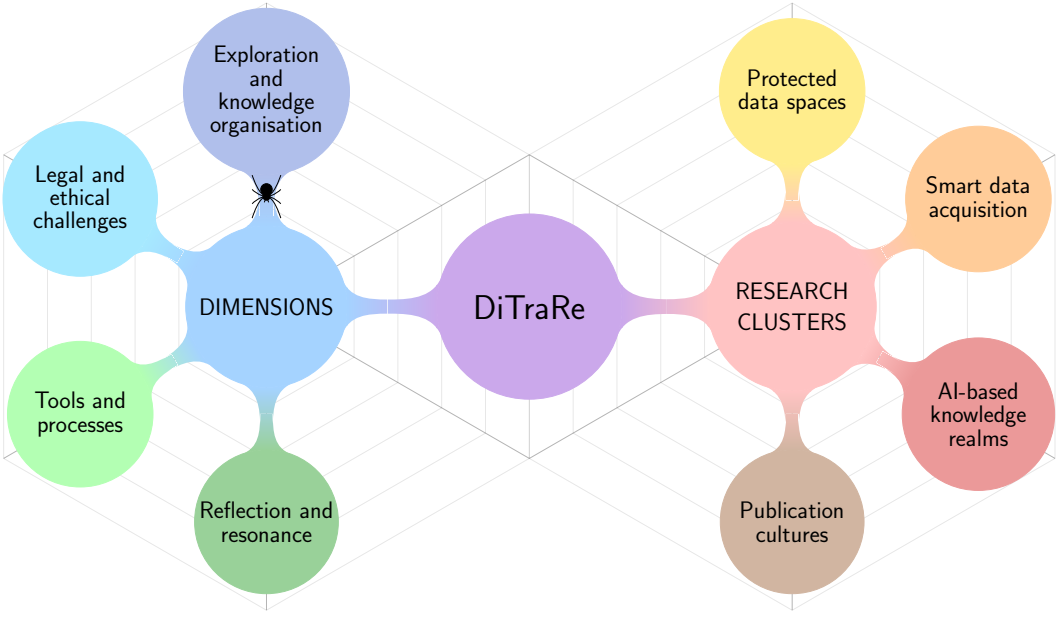

FIZ KA: Information Service Engineering (ISE)

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UC: Sensitive data in sports science

- A platform to collect, publish, and share motor performance data (MO|RE)
- Reuse existing ontologies in sports domain
- Connections between motor performance and other health indicators
- Datasets combining protected and non-protected data in a single KG

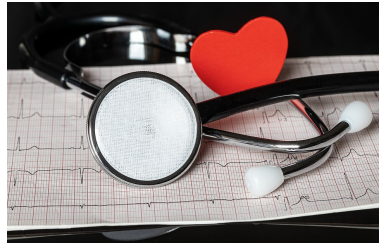
→ *KG to enhance data analysis and interpretation.*

UC: Chemotion Electronic Lab Notebook

- Electronic Lab Notebook (ELN) – for chemistry lab data management
- Process of digitalisation still far from being completed
- I.e. data curation in a repository still done partially manually
- Reaction description module – free text, problematic to standardise – could LLMs help?

→ *Support automation of ELN.*

UC: AI in biomedical engineering



- Computational modelling of a human heart
- Firstly: test different ML models for ECG (P-wave) annotation
- Application with high-risk patients: prediction of length of ICU stay and mortality
- A raw ECG as an input and incrementally add external information (text, image) to a multimodal LLM

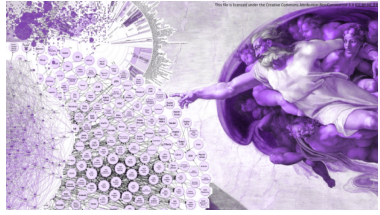
→ *Reduce number of utilised parameters and make the procedure non-invasive.*

UC: Publication of large datasets

- Multiple internal and external datasets in use
- Data non-uniform and very often non-standardised, metadata chaos
- Extremely large sizes make it additionally challenging
- Can AI increase functionality of climate repositories?

→ *Support creation of a uniform data management platform.*

Overarching activities and synergies



- Study synergies between research clusters (i.e. usage of clinical data).
- Formulate and answer our own research question in the AI domain (i.e. LLMs applications and their consequences in different use cases).

→ *What role does the AI play in the broadly understood digital transformation of research?*

Summary

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- Role of AI: brings another level

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→ How did digitalisation change your field?

→ How is your research affected by the usage of AI?

→ Anna.Jacyszyn@fiz-Karlsruhe.de

DiTraRe

FIZ Karlsruhe
Leibniz Institute for Information Infrastructure

KIT
Karlsruher Institut für Technologie

Leibniz-Wettbewerb

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Thank you for your attention!

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