E4.5 ELSA-Training curriculum for Data Scientists

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FAIR Data Spaces

Universität zu Köln

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- Feedback from the Community
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AP4.5 Targets-Tasks-Deliverables

- Targets
  - Foster ethics awareness of data professionals via training
  - Prepare an ELSA training curriculum to support ethical use of research data by GAIA-X innovators
  - Exploit the outcomes of AP2 and transfer this knowledge to practising data scientists.
- Tasks
  - Landscape Analysis (UzK)
  - ELSA in Data Science Workshop Series (UzK)
  - Development of ELSA Training Curriculum (UzK)
  - Outreach and Liaise with GAIA-X partners (FhG)
- Deliverables
  - Assessment of existing approaches
  - Workshop Series
  - ELSA- Training curriculum Version 1 , 2

Landscape Analysis

Guidelines, Existing courses and the profile of the Data Scientist

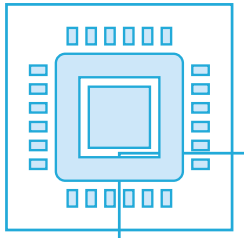
Landscape Analysis

- The guidelines issued by a variety of international organisations
- The existing ELSA training approaches, as manifested in tertiary education courses
- Construct a profile of the data scientist

Landscape Analysis-Guidelines

Visualization by Sinclair, Stéfan and Geoffrey Rockwell. *Voyant Tools*.
https://voyant-tools.org/?corpus=ad6de10ab2522553b734ca0c66036c95&panels=cirrus,reader,trends,summary,contexts

Existing ELSA Training Approaches-Teaching Scope

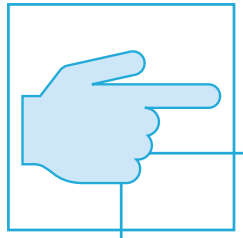


Computer Science

- Privacy
- Security
- Algorithms and inequality/justice/fairness, bias
- Transparency, accountability and responsibility
- Data validity

Professional and Business skills

- Code of Ethics from a professional body
- Codes of Conduct
- Professional Decision Processes Training
- Professional and leadership skills for computer science students, specifically in senior project classes

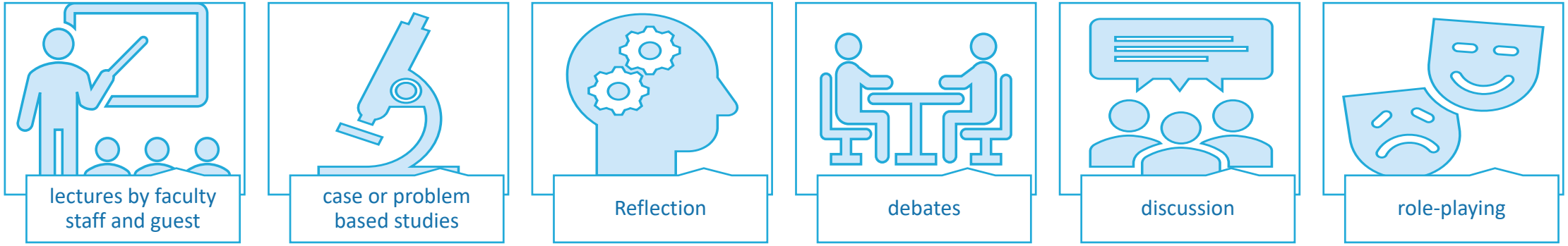


Ethical and Legal topics

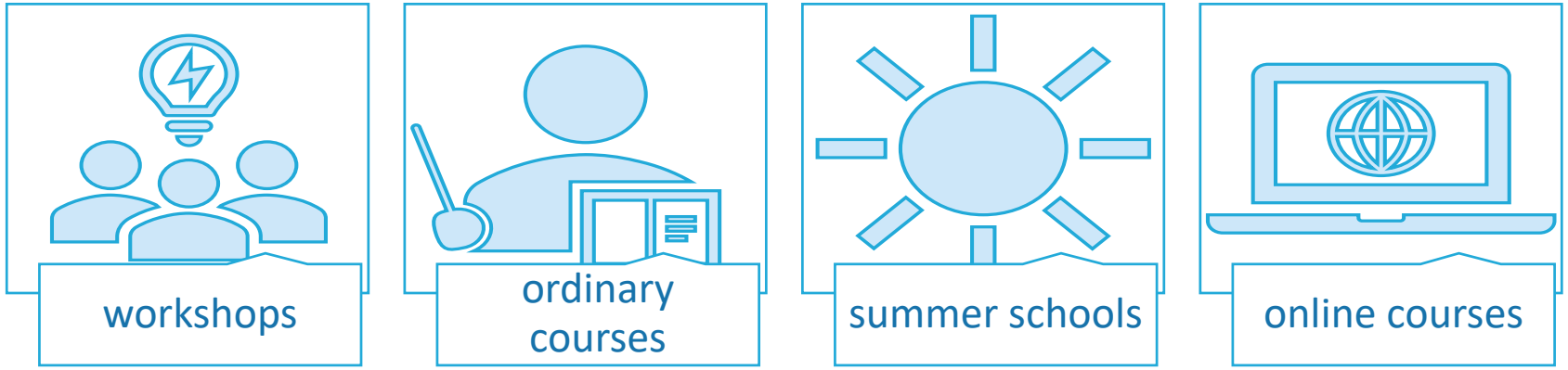
- Philosophical frameworks and moral theories
- Legal frameworks
- Human rights, risk and liabilities
- Privacy and civil liberties
- Work and labour
- Social responsibility
- Social context and stakeholders
- Ethics washing and environmental impact

Existing ELSA Training Approaches- Teaching Methods and Course Format

Methods



Format



The profile of the Data Scientist

Now:

- Mostly with tertiary education degrees
- Computer science, engineering or other relevant degrees
- Few institutions offer ELSA courses for Data Scientists, and even fewer employers demand ELSA education/experience

In the Future:

- Heterogeneous education level
- Job transitioning from other sectors
- Data scientists will not form a homogeneous group, which is the target group of today's ethics curricula

Feedback by the Community

Workshops and Surveys

Workshop Series First, Curriculum Version, and Survey Feedback

- 1st ELSA Workshop 1.6.2022
- 2nd ELSA Workshop 14.6.23
- ELSA Training Curriculum for Data Scientists Version 1.0 31.8.2023
- Feedback Survey March 2024
- Other smaller workshops and presentations 2022-2023

Feedback

- Subjects: The most popular subject is Data protection, followed by Basic legal concepts, Transparency and explicability, and Stakeholder identification
- Format of training: Workshop series on specific topics (2-3 days per topic)
- Level of knowledge offered and Target audience: depends on the format and duration
- Provider: Academic Institutions as independent programs addressed to all that are interested

ELSA Curriculum for Data Scientists

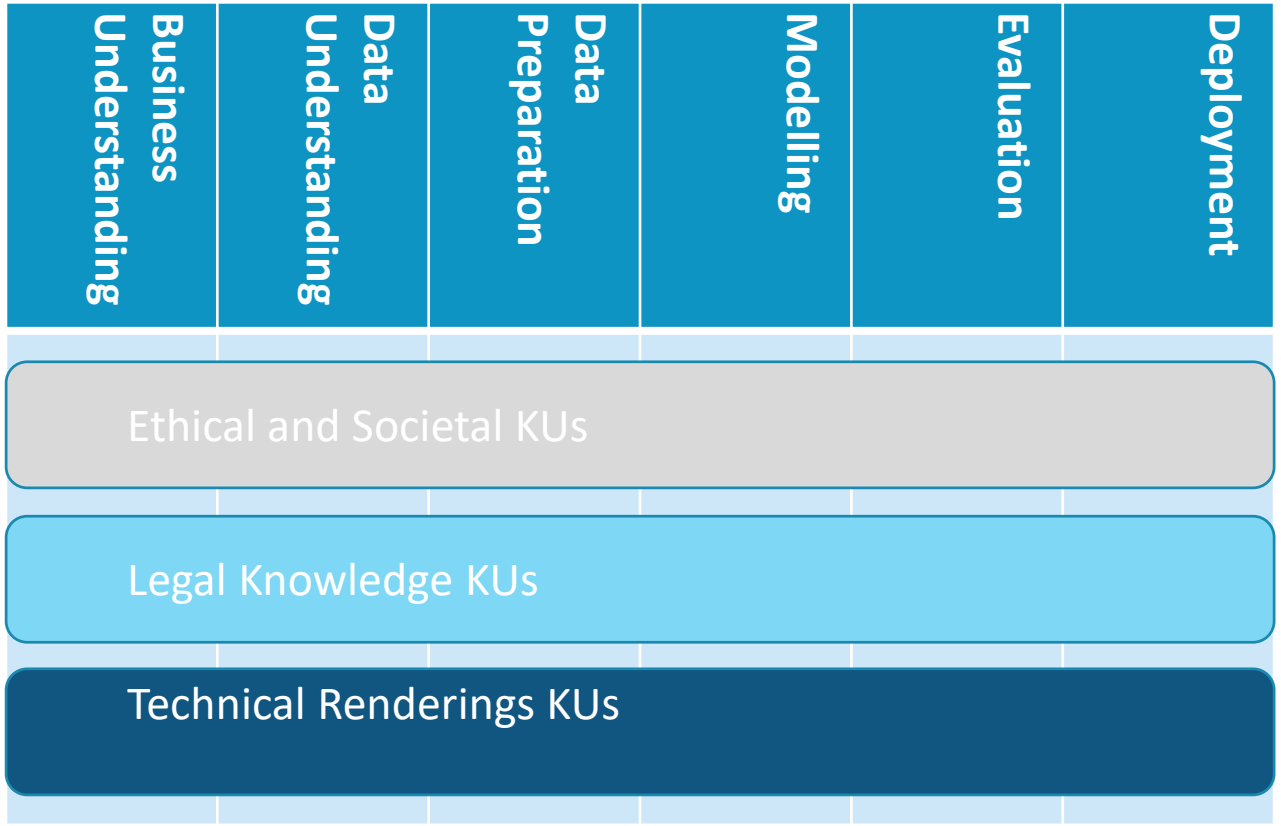
Final Version

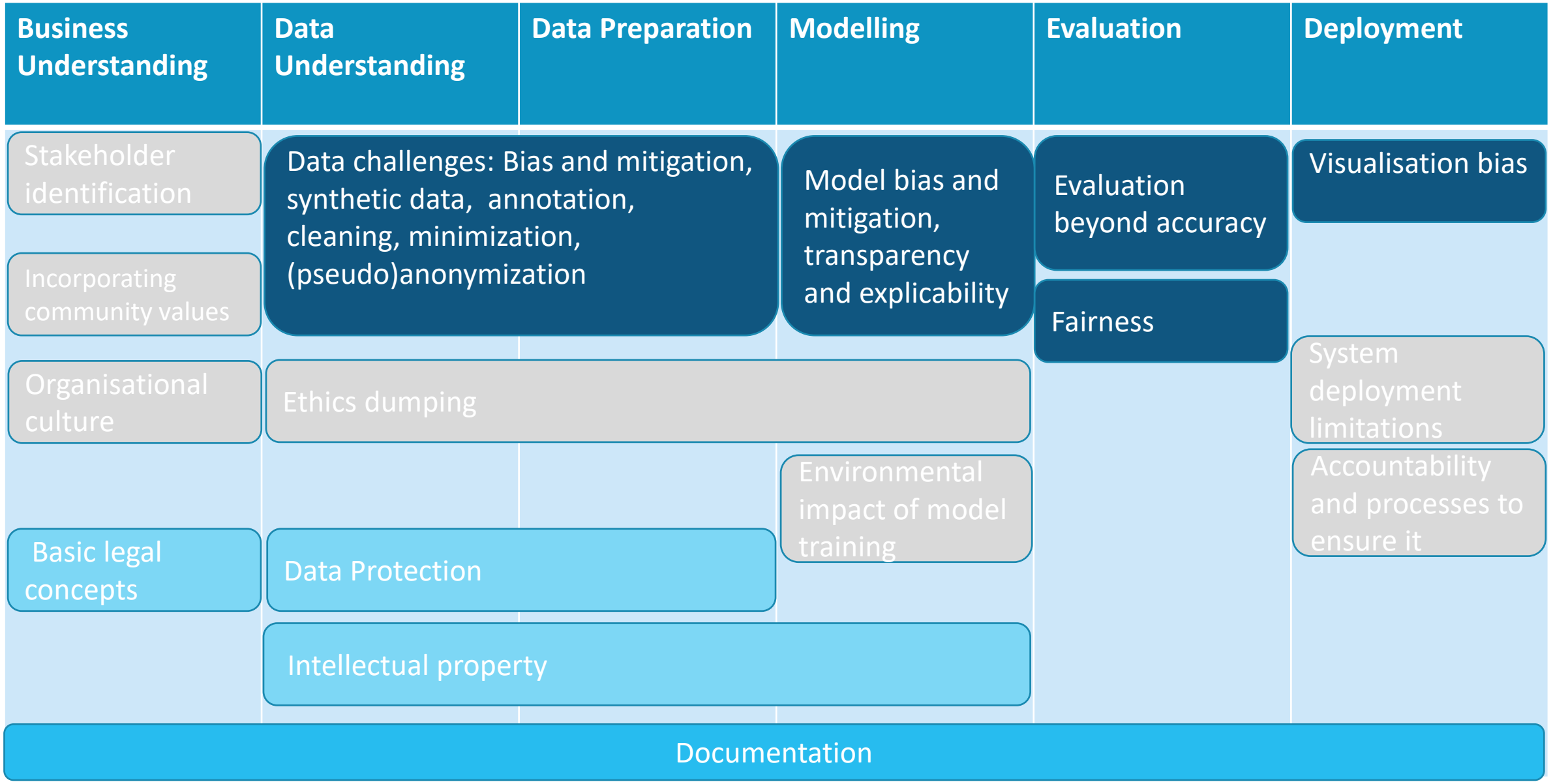
Curriculum Vision and Objectives

- Awareness of Ethical Legal and Societal Aspects of Data Science
- Establish a common language with the relevant domain experts in order to cooperate to find appropriate solutions
- Incorporate ELSA in the data science workflow as an integral part of the Data Science Project Lifecycle

Curriculum Structure

- Vertical: Modules that correspond to the CRISP-DM phases
- Horizontal: Knowledge Units (KUs) for each Module:
  - Ethical and Societal KUs
  - Legal Knowledge KUs
  - Technical Renderings KUs

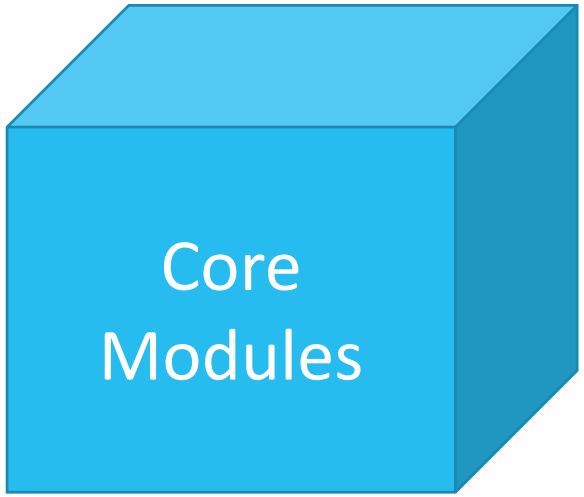




Implementation Strategies

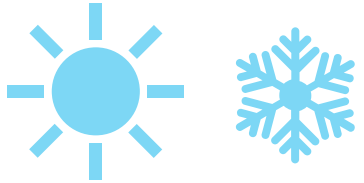
- The Curriculum, as presented, assumes a generic audience with little knowledge of ELSA - not always the case
- Implementation strategies
  - Introductory course assuming little or no knowledge of ELSA
  - Selection of modules that fit the roles of the target audience
  - Adaptation of the content according to the application domain of the target audience
  - A combination of the previous two categories

Core Modules



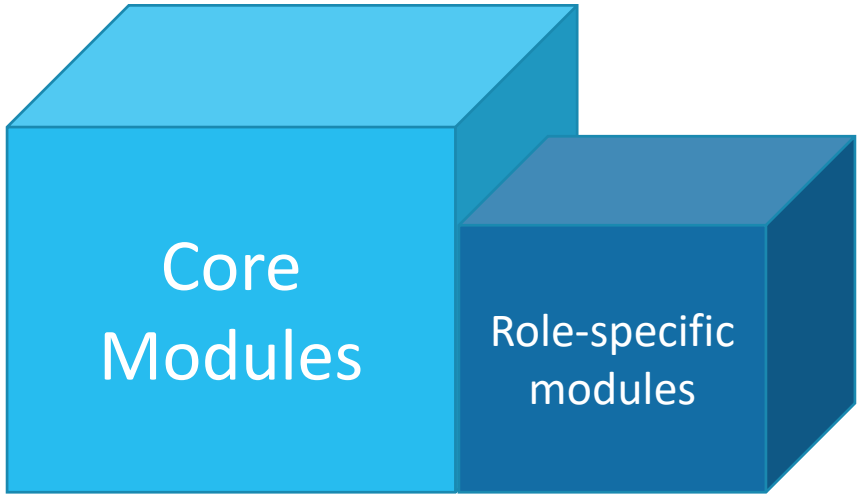
Community values
Data protection
Bias and Fairness
Documentation

1-2 weeks



Summer/Winder school

Role-specific modules

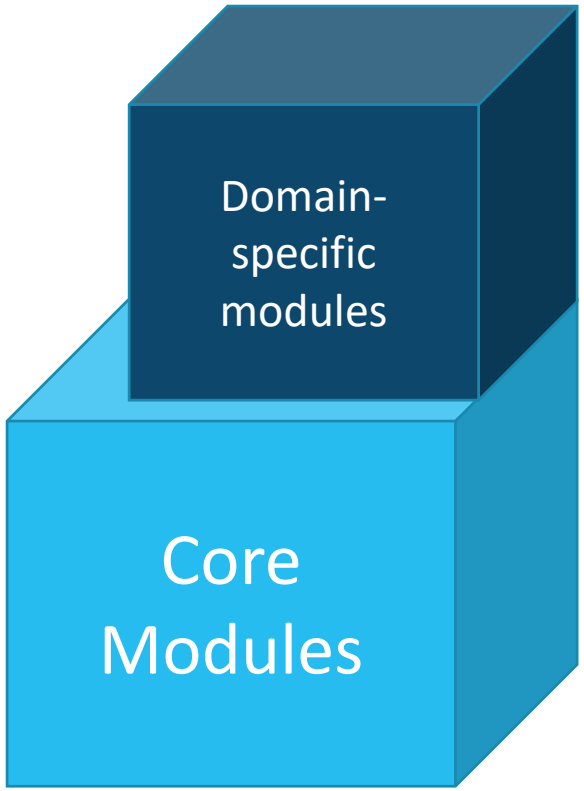


Deep dives into specific knowledge areas

2-3 days

Workshops

Domain-specific modules

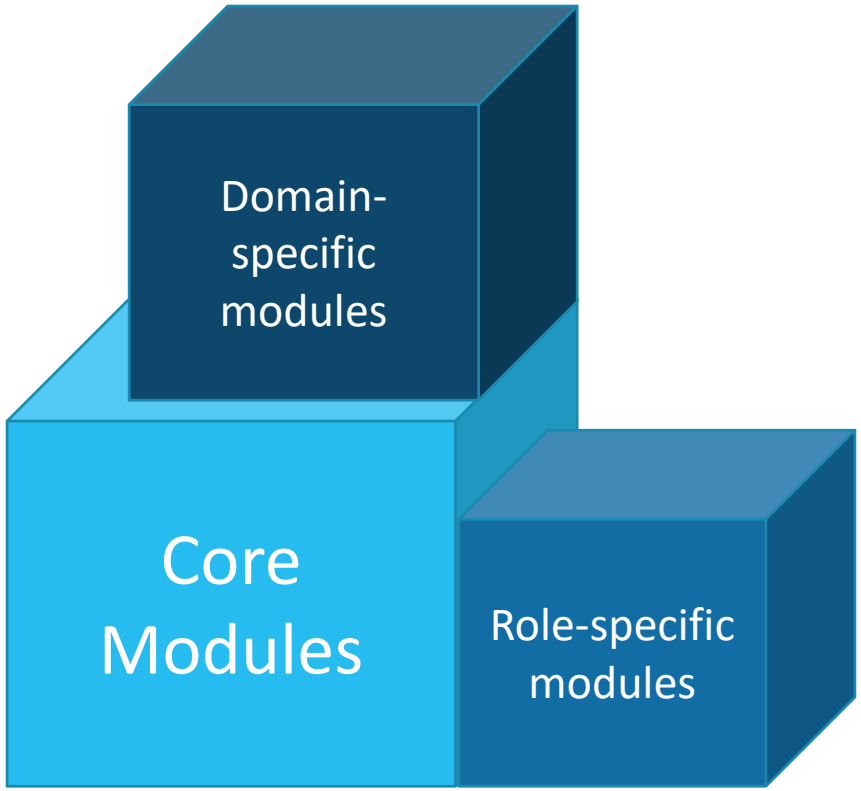


adaptation of the generic modules to the specific application domain

2-3 days

Workshops

Combination of Role- and Domain- specific modules



adaptation of the generic modules to the specific roles and application domain

2-3 days

Workshops

The FAIR Data Spaces Demonstrators as Case Studies

The FAIR Data Spaces Demonstrators

- Biodiversity (GeoEngine)
- Research data quality assurance
- Cross-platform data analytics(PHT)
- Input from
  - WP2 (“Rechtliche und ethische Rahmenbedingungen”)
    - “E2.2.1:Bericht Vertragsrechtliche Überprüfung und Compliance”, a.o.
  - WP4 Deliverables and Publications

Biodiversity

- Geo Engine:
  - supports interactive data analyses for geodata (such as vector and raster data)
  - allows data scientists to focus on the actual data analyses rather than data preparation
- Not aimed to be used with personal data, but it can exemplify concerns on the collection and processing of personal data
- Ethical concerns: the use of geolocation wrt bias and stigmatisation of populations and regions

Data Validation and Quality Assurance

- Performs automated quality control and data assurance within a commonly available or easily provided environment.
- Can be used to explain the concepts copyright, trade secret and patent
- FAIR vs FRAND principles

Cross-Platform FAIR Data Analysis

- PHT(Personal Health Train) operating on Health care data
- Employs federated learning
  - ensures privacy and data governance by keeping the cloud-based data spaces separate from hospital data silos only accessed by local clients
- Can be used to exemplify
  - the concept of personal and sensitive data, an example of privacy by design architecture
  - the issues posed by opaqueness regarding the data, e.g. bias

Publications and Events

Publications

- Papers:
  - Christoforaki, Maria, and Oya Beyan. 'AI Ethics—A Bird's Eye View'. *AI Ethics—A Bird's Eye View* 12, no. 9 (20 April 2022): 4130. https://doi.org/10.3390/app12094130.
  - Christoforaki, Maria, and Oya Deniz Beyan. 'Towards an ELSA Curriculum for Data Scientists'. *AI* 5, no. 2 (11 April 2024): 504–15. https://doi.org/10.3390/ai5020025.
- Reports
  - Christoforaki, Maria. 'ELSA Training for Data Scientists-Describing the Landscape'. FAIR-DS Project Deliverable. Cologne: UzK, 31 December 2021. https://doi.org/10.5281/zenodo.7233569.
  - Christoforaki, Maria. 'ELSA Training Curriculum for Data Scientists - Version 1.0'. FAIR-DS Project Deliverable. Cologne: UzK, 31 August 2023. https://zenodo.org/record/8318726.
- Presentations
  - Christoforaki, Maria. 'Data Scientists and ELSA:Describing the Landscape'. Presented at the 1st FAIR Data Spaces ELSA Workshop, 1 June 2022. https://doi.org/10.5281/zenodo.6637759.
  - Christoforaki, Maria. 'Towards an ELSA Curriculum for Data Scientists'. Presented at the 1st FAIR Data Spaces ELSA Workshop, 1 June 2022. https://doi.org/10.5281/zenodo.6637778.
  - Christoforaki, Maria. 'A First Approach Towards an ELSA Curriculum for Data Scientists'. Presented at the 2nd FAIR Data Spaces ELSA Workshop, 16 June 2023. https://doi.org/10.5281/zenodo.8046261.

Events

- Workshop Organization
  - 1st FAIR Data Spaces ELSA Workshop, "*Towards creating an ELSA Curriculum for Data Scientists*", Wednesday, 1 June 2022, online, https://www.nfdi.de/1-elsa-workshop/
  - 2nd FAIR Data Spaces ELSA Workshop, "*A first approach to an ELSA Curriculum for Data Scientists- The FAIR Data Spaces Project as a Use Case*", Wednesday, 14 June 2023, online, https://www.nfdi.de/2-elsa-workshop/
  - videos and slides for both Workshops are published in the FAIR Data Spaces Community in Zenodo: https://zenodo.org/communities/fair-ds
- Participation in Workshops
  - Christoforaki, Maria, "An ELSA curriculum for Data Scientists", BI-K, MeDIC Retreat, 14.9.22, Winningen
  - ELSA Training –Feedback from the Community Survey, Horizon, Europe Project Shift-Hub Open Workshop, 13.6.2023
- Talks
  - Christoforaki, Maria, "Towards an ELSA curriculum for Data Scientists-A first Approach", Data Driven Medical Research (DDMR) Seminar Series, 20.4.2023, Cologne
  - Christoforaki, Maria, "Towards an ELSA curriculum for Data Scientists", Research Data Alliance (RDA) Plenary 21, 23 – 26 October 2023, Salzburg, Austria

Thank you for your interest!

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Stay in touch:

www.nfdi.de/fair-data-spaces

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Community newsletter: https://www.nfdi.de/newsletter-abo/

FAIR Data Spaces Community in Zenodo:

https://zenodo.org/communities/fair-ds

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