FAIRICUBE –
F.A.I.R. INFORMATION CUBES

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1   Introduction and objective

The objective of deliverable D7.1 is to briefly review the analysis of the ethical dimension that were identified as part of the general project evaluation and described in the Ethics Summary Report[1] submitted together with the Proposal Evaluation Form. We will introduce the appointed members of the external Ethics Board (EB) and briefly outline the ethics assessment and implementation which will be covered in more detailed in deliverable *D6.11_OEI - Requirement No2_EB_review*.

1.1   Ethics issues and dimension

In the Ethics Summary Report (associated with document Ref. Ares(2022)750364 - 01/02/2022), the following ethics issues are identified and partially quoted:

- **Humans:** Several public outreach activities are planned as part of the *WP6 disseminate* work which for example include innovation workshops with local stakeholders to test the project's innovations. This will directly target human interaction.
- **Personal Data:** The FAIRiCUBE proposal foresees the collection, processing and transmission of the data coming from partners or external platforms. It shall be ensured that this data will adhere to GDPR requirements and the data management plan DMP will have an integrated Ethics Management Framework in which the ethical approval, data protection and management will be coordinated.
- **Non-EU Countries**: The project coordinator institution is located in Norway and several use cases will focus on the functional urban area of a selected list of cities including Oslo.
- **Artificial Intelligence:** The FAIRiCUBE proposal will use machine learning (ML) algorithms and applications. During the project multiple data sources (including data relating to climate issue, land use, biodiversity, agriculture, physical condition of the region, environment etc.) will be integrated with machine learning algorithms to streamline the process of generating appropriate decisions by governances, researchers as well as commercial actors. The use of ML applications may result in ambiguous and misleading conclusions that can generate ethical concerns. This was underlined by the FAIRiCUBE ethics self-assessment with specific examples related to the use cases.
- **Environment, health and Safety**: The use of ML and its results in the use cases might produce risks to the environment. A few examples are described in the FAIRiCUBE ethics self-assessment: "in the biodiversity-agriculture use case, misinterpretation of influence of chemicals on the crops production can affect the harvest volume and supply of agriculture products. In the climate change mitigation use case, falsely identifying data links to heat islands can degrade the environment for local citizens".

Despite the list of potential issues above, the ethics summary report states that the ethics issues identified do not represent complex and serious ethics issues, and the FAIRiCUBE consortium has demonstrated awareness regarding most of them. Of all the identified issues, the AI ethics and

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[1] FAIRiCUBE Ethics Summary Report, Ref. Ares(2022)404215 - 19/01/2022

environmental ethics aspect are most relevant for the FAIRiCUBE project and are advised to be addressed.

After completing the first project reporting period, the expert reviewers further advised the project to reduce the "importance of [AI] ethics with respect to the use of machine learning because machine learning in this project is not used to make decisions directly affecting individuals (such as medical decisions, or bank loan decisions etc.). Also, the project does not process personal data. Overall, the importance of ethics appears overstretched. For example, the statement that "No ML application will be executed without human supervision and validation" (#9 in List of Critical risks) may be relaxed without problems, for such a project"[2].

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[2] FAIRiCUBE General Project Review Consolidated Report, Ref. Ares(2024)2507986 - 05/04/2024

2 Project Ethics Board

The ethics summary report stated that the identified ethics issues do not represent complex and serious ethics issues and FAIRiCUBE consortium demonstrates awareness regarding most of them (as shown by the ethics self-assessment and section 1.2.7 of Part B). The FAIRiCUBE project activities will be undertaken in compliance with requirements of the European Commission.

Nevertheless, the ethics evaluation concluded with a recommendation to appoint an Ethics Board which advises and supports the FAIRiCUBE project work:

- **Reason for appointment:** There are multiple and intersectional ethics for example addressing the ethics issues of *Artificial Intelligence* and *Environment, Health and Safety*. There might also be the risk that the results may be misused since insufficient details are provided on the exploitation routes.
- **Expertise:** The EB should have expertise at least on AI ethics and environmental ethics; the EB must be consulted at least on the following points:
  - identification and thorough analysis of the ethics issues raised by this project in each of the use cases, with special attention to possible harm to the environment and to the human health, as well as to the measures that will be taken to ensure compliance with the ethics standards of Horizon Europe and, if applicable, the existence of appropriate health and safety procedures conforming to relevant local/national guidelines/legislation;
  - trustworthiness of the use of the Machine learning applications in each of the use cases, with specific reference to the "Assessment List on Trustworthy Artificial Intelligence" (ALTAI).

It may hereby be added that the recommendation of the Ethics Summary Report was not foreseen in the original project proposal while having significant budget implications. The efforts of the Ethics Board must be financially compensated while no budget item was foreseen to cover it. Further, the concept of AI ethics assessment and the requirement of appointing an AI ethics board is new to the EU Horizon programme. As a result, little guidance from the European Commission (EC), the EC project officer or other projects that went through the same process is available.

The AI ethics assessment and implementation process will therefore need to bridge a gap between the AI ethics experts that usually advise projects with more prominent ethics risks and the FAIRiCUBE project members who have not yet considered the relevance of an AI ethics assessment for the out-of-the-box application of standard ML algorithms. In addition, a careful balance of EB interaction and self-guided work must be considered for budget reasons.

2.1 Members of the Ethics Board

Following a detailed candidate search and contacting process, we are pleased to have nominated and got approved by the FAIRiCUBE consortium two renowned experts forming the FAIRiCUBE [AI] Ethics Board:

1. Roberto V. Zicari is an affiliated professor at the Yrkeshögskolan Arcada, Helsinki, Finland, and an adjunct professor at the Seoul National University, South Korea. Roberto V. Zicari is leading a team of international experts who defined an assessment process for Trustworthy AI, called **Z-Inspection®**. Previously he was professor of Database and Information Systems (DBIS) at the Goethe University Frankfurt, Germany, where he founded the Frankfurt Big Data Lab. He is an internationally recognized expert in the field of Databases and Big Data. His interests also expand to Ethics and AI, Innovation and Entrepreneurship. He is the editor of the ODBMS.org web portal and of the ODBMS Industry Watch Blog. He was for several years a visiting professor with the Center for Entrepreneurship and Technology within the Department of Industrial Engineering and Operations Research at UC Berkeley (USA).

2. Dr. Rob Heyman Rob Heyman is head of the Knowledge Centre Data and Society, Vrije Universiteit Brussel, Belgium, which is part of the Flemish strategic plan on AI. He is a senior researcher at imec-SMIT where he researches participative methods in innovation projects between different stakeholders (legal, civil society, end-users) so that societal, legal and ethical values are integrated during development. He also has given lectures and courses at the ULB and VUB on online marketing, research methods, privacy and challenges of the ongoing digitalisation.

2.2   Ethics assessment and implementation strategy

A common basis and general mutual interest between representatives of the FAIRiCUBE project and the EB was established in several kick off workshops; a first mapping attempt of AI ethics knowledge, issues and competences was made by a self-assessment of several use case leads and relevant FAIRiCUBE personnel using the ALTAI self-assessment tool. As feedback of involved partners including the use case (UC) leads and a joint interpretation session where the results of the ALTAI assessment list was discussed and studied, the conclusion was made that the ALTAI self-assessment was seen to be too generic and theoretical. Two example results are shown in Figure 1 indicating significant divergence. Several answers were biased by the subjective interpretation of the question and most importantly, no clear implementation strategy could be derived from it.

Results of the Assessment List

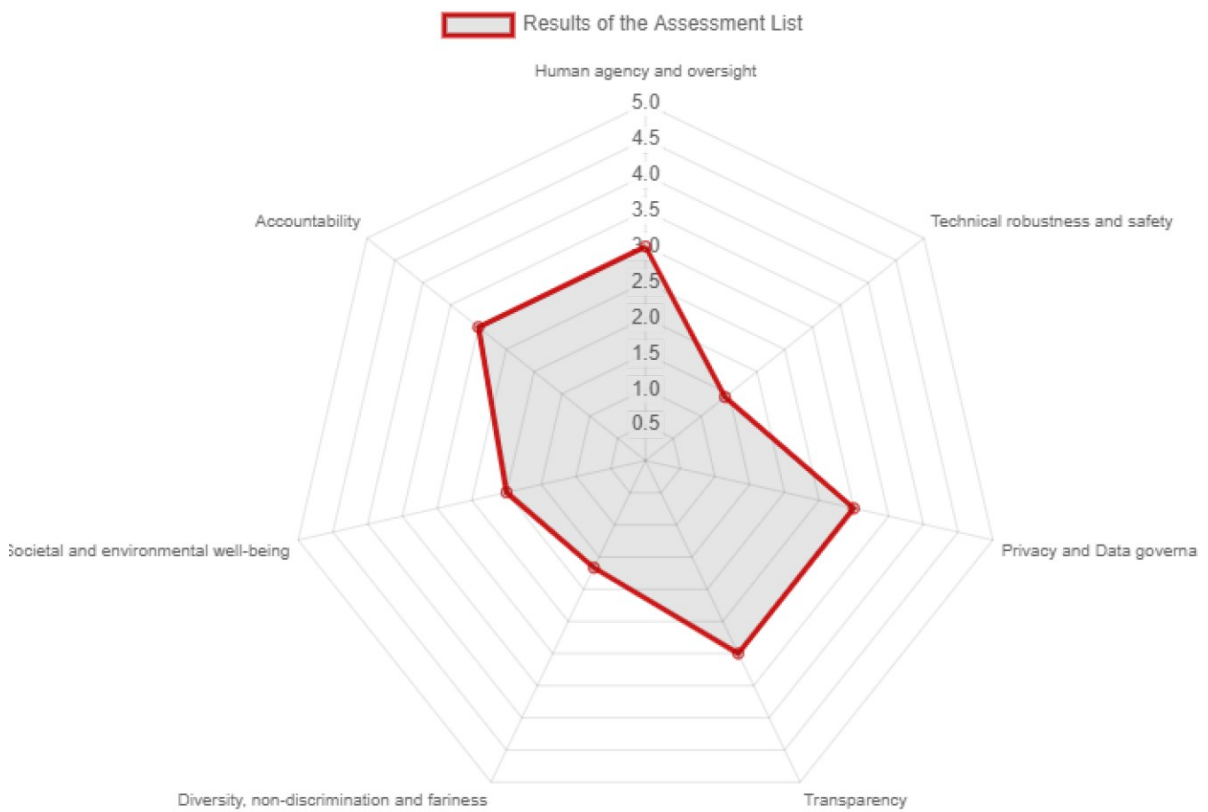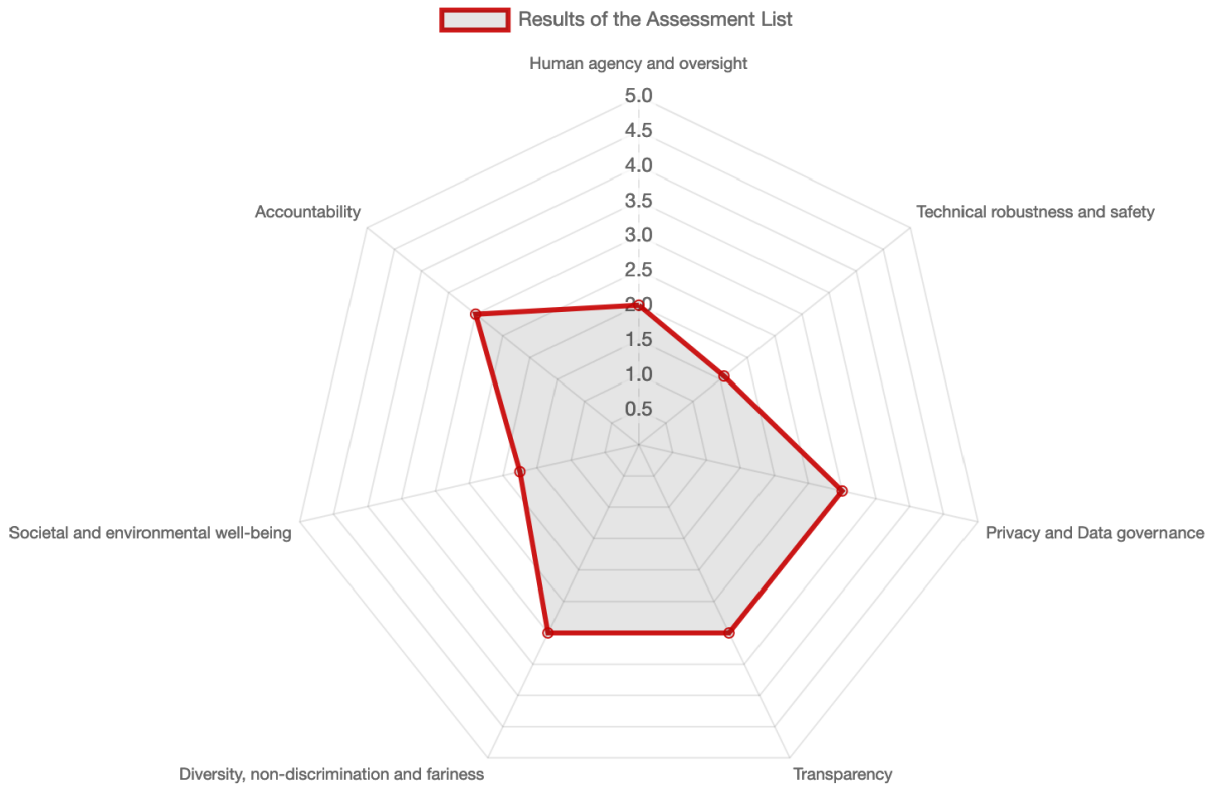

Results of the Assessment List

Figure 1 : Results of the ALTAI assessment list by partner Natural History Museum, Vienna (top) and space4environment (bottom)

The EB members therefore recommended to follow the approach of custom socio-technical scenarios[3] as introduced by the Z-Inspection®[4] process to assess trustworthy AI. The Z-Inspection® process provides a holistic and dynamic framework to evaluate the trustworthiness of specific AI systems at different stages of the AI lifecycle, including intended use, design, and development. It focuses, in particular, on the discussion and identification of ethical issues and tensions through the analysis of socio-technical scenarios and a requirement-based framework for ethical and trustworthy AI.

Socio technical scenarios are used as a base for a Trustworthy AI co-design for the project. While answering a set of 11 questions, the use cases who apply machine learning techniques provide information on the aim of AI system, actors, context, interaction. The first demonstrator walkthrough of a selected use case together with the EB developed a pilot case delivers a suggestion of implementation in UC work. All other use cases will follow the same procedure to provide feedback through the custom socio-technical scenarios question catalogue.

A detailed description of the process, the UC walkthrough results, and a generalization of the answers will be documented in the deliverable *D6.11_OEI - Requirement No2 – EB review* and contribute to the implementation described in the general validation deliverable *D2.5 Use Case Validation* and *D3.6 Validation of processing and ML applications*. It is envisioned to:

- include the EU Trustworthy AI ethical principles as results of the abstraction from the UC response to the socio technical scenarios into the UC workflow and documentation,
- identify a short list table of potential AI ethics issues and tensions that will be used for co-design,
- integrate such AI ethics table as part of the FAIRiCUBE Hub meta-data pipeline,
- allow future use cases on FAIRiCUBE to perform a short Trustworthy AI co-design with accompanied online guidance and follow up documentation fields,
- implement «warnings» at critical steps of data science work.

2.3   Ethics Check

Considering the multiple and intersectional nature of the identified ethics issues and the sensitiveness of some of them, the Ethics Review Report further recommended that an ethics check is performed by month 34. This would coincide with the realisation of the exploitation and stakeholder plan and can exploit synergy effects (Milestone 14).

The ethics check should be functional assess the ethical compliance of the project activities and outcomes to the EU Framework for Trustworthy AI, as well as the use cases' operations and results,

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[3] https://z-inspection.org/socio-technical-scenarios/
[4] Z-inspection® is a registered trademark and it is distributed under the terms and conditions of the Creative Commons (Attribution-NonCommercial-ShareAlike CC BY-NC-SA) license.

including the planned validation tasks and its first scheduled delivery *D2.5_UC_Validation_report* in month 24. Further, the check shall consider the identified risk 9 in the update Table 3.1e "Critical risks for implementation" which was transferred to the continuous reporting portal.

3   Summary

In response to the FAIRiCUBE Ethics Summary Report provided by external expert(s), feedback from the first reporting period evaluation experts, the FAIRiCUBE Ethics Board (EB) and the WP7 leads (coinciding with the WP1 lead) were tasked to develop an AI Ethics assessment and execution implementation suitable and usable for the use cases (UCs) that are executed on the FAIRiCUBE Hub, and that plan or already initiated the application of machine learning (ML) methods. Besides the general task to raise awareness of AI ethics, a concrete guidance shall be provided to assist the UCs to perform a self-assessment of potential AI ethics issues and how to address, mitigate and document them. During frequent collaboration meetings with the EB, a common understanding of the UC work in FAIRiCUBE was reached and a time-effective approach was chosen balancing the sound treatment of the AI ethics dimension with the budgeting issues as no additional funding was foreseen for this AI ethics assessment.

Based on the replies from the UCs to the list of questions following the custom socio-technical scenario analysis, a generalization will be extracted and accompanied by a short list table of potential AI ethics issues. The self-assessment, mitigation steps and documentation will be integrated into the existing validation methods in FAIRiCUBE and shall be made available as part of the holistic FAIRiCUBE meta data pipeline. As part of the FAIRiCUBE Hub service development, it is envisioned to provide a web-service solution to perform the AI ethics self-assessment and integrate the replies as part of the FAIRiCUBE Hub Knowledge Base services[5].

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[5] https://fairicube-kb.dev.epsilon-italia.it/