

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

WP6 Dissemination

D6.5 Academic courses and course work

Deliverable Lead: WUR

Deliverable due date: 31-07-2025

Version: 1.0

2025-08-18

Document Control Page

Document Control Page	
Title	Academic courses and course work
Creator	WER
Description	Overview of stakeholders, topics and training/workshop activities
Publisher	"FAIRiCUBE – F.A.I.R. information cubes" Consortium
Contributors	WER, EPS, CU, NHM
Date of delivery	31/07/25
Type	Text
Language	EN-GB
Rights	Copyright "FAIRiCUBE – F.A.I.R. information cubes"
Audience	<input checked="" type="checkbox"/> Public <input type="checkbox"/> Confidential <input type="checkbox"/> Classified
Status	<input type="checkbox"/> In Progress <input type="checkbox"/> For Review <input checked="" type="checkbox"/> For Approval <input type="checkbox"/> Approved

Revision History			
Version	Date	Modified by	Comments
0.1	2/7/25	Wies Vullings	Draft structure and full content edit
0.2	10/7/25	Kathi Schleidt	Review
0.3	11/7/25	Wies Vullings	Final review and adjustments
1.0	22/7/25	Jaume Targa & María Colina	Further review and format

Disclaimer

This document is issued within the frame and for the purpose of the FAIRiCUBE project. This project has received funding from the European Union's Horizon research and innovation programme under grant agreement No. 101059238. The opinions expressed and arguments employed herein do not necessarily reflect the official views of the European Commission.

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1 Introduction

The primary goal of WP6 was to optimise the promotion and dissemination of project outcomes. This involved increasing the project's visibility and reaching key target audiences. It also entailed the formulation of relevant and focused messages and the use of new communication channels to engage with stakeholders and gather feedback. Task 6.2 focused on training and education activities aimed at promoting the understanding and use of project results to stakeholders. Innovations developed in the project are disseminated among project partners (between different use cases) and externally by innovation-workshops. This task also developed academic course materials and supports academic courses.

In D6.4 an overview is given of the conducted dissemination activities. In this deliverable the conducted dissemination activities are linked to stakeholder groups and topics in order to show the coverage of topics and outreach to various stakeholder groups of the FAIRiCUBE project. The upcoming chapter provides a description of the relevant stakeholder groups. The third chapter provides a compilation of FAIRiCUBE topics that are relevant for dissemination through academic courses, workshops, seminars and training days. The final chapter includes two matrices which topics and stakeholders to conducted dissemination and communication activities (seminars, workshops, training days and courses).

This deliverable is updated since it was submitted in 2023, but did not undergo major changes, since the view on stakeholders and relevant dissemination activities did not change. The related deliverable (D6.4) which shows an overview of the conducted and planned events and education activities has been updated. Only the final paragraphs are updated showing the targeted audience and topics of the conducted activities.

Since the deliverables (D6.4 and D6.5) are submitted before the end of the project we refer for a full and up to date overview of the dissemination activities to the EU portal and website.

2 Relevant stakeholders

Several potential stakeholder groups have been identified for the dissemination activities such as academic courses, workshops, seminars. Some of them are too general for the purpose of these activities and need to be subdivided. The following list of potential stakeholder types includes:

- Research community
 - Machine learning/AI
 - IT
 - Geo-information science
 - Ecology
 - Environmental science
- Students
 - Machine learning AI students
 - IT students
 - Geo-Information students
 - Students of Ecology and Evolutionary Biology
 - Environmental science students
- Policymakers
 - Regional/national/EU environment/biodiversity
 - Regional/national/EU Spatial planning
- Governmental Organizations
- Industry
- NGOs
- Citizen Science Initiatives/Interested Public
- EC Institutions
- Standardization Bodies

3 Relevant topics

The FAIRiCUBE project is linking geo-information science and Earth Observation (EO), Machine Learning (ML) and Artificial Intelligence (AI) and domain topics such as climate, ecology and spatial planning. Specifically on the cutting edge of these domains we identified interdisciplinary topics that are relevant for external stakeholders. Next to these topics the requirements for the FAIRiCUBE Hub itself and the five use cases and how they are met also offers valuable topics for dissemination with external stakeholders. The table below (Table 1) shows the relevant topics. During the course of the project two extra topics were identified and added to the list (governance and standardisation).

Table 1: Topics relevant for external stakeholders




Topic	Short description
Biodiversity data cubes	
Occurrence cubes	How does occurrence data (e.g., biodiversity observations) fit in a data cube?
Genomic variation cubes	How to store, process and provide genomic data via geospatially enabled data cubes?
Data preparation and handling	
Query-Cube	This application retrieves and processes values specific to spatiotemporal coordinates from multiple gridded data layers
Grid projections and resampling	How do you synchronise different grid projections without loss of data
Preparing and publishing data	How to prepare and publish multi-dimensional data in a datacube, includes access APIs
Transforming vector data to grids	What to take into account when transforming vector data to grids without losing data
Processing and Storage Requirements	What processing and storage requirements are valid and necessary for storing multi-dimensional data in data cubes
Data Preparation and Gap Filling, Labelling	How to prepare data with missing data and use the available information of neighbouring data points to estimate missing data points with heuristic or ML techniques
Metadata	
Datacube metadata	We all know metadata at data level, but metadata at datacube level is also relevant. What are the relevant datacube metadata issues and how do you deal with that. Includes info on STAC & API
Processing Resource Metadata	In order to enable reuse of diverse analysis, processing and ML resources, tailored metadata is being provided allowing for simple discovery of existing resources.

Datascience and AI	
Applicability of AI/ML approaches	Different AI/ML approaches are suited to different usage areas, both in regard to what insights they can generate as well as regarding the robustness and explicability of the outputs
Explainable AI	How to understand how ML models come to their predictions, reduce the black box.
MLOps	What is needed to put Machine Learning models in operations
AI Cubes	Integration of ML in Rasdaman cubes
AI and ethics	How do we deal with ethics and societal issues in AI? Questions like whether are data and models biased, and how to limit energy consumption?
Resource Requirements for AI/ML approaches	How to estimate the required processing resources for AI/ML analyses?
Visualisation	
Standardisation	
Governance	
Requirements of FAIRiCUBE Hub and Use cases	
FAIRiCUBE Hub	The FAIRiCUBE hub is a crosscutting platform and framework for data ingestion, provision, analysis, processing, and dissemination, to unleash the potential of environmental, biodiversity and climate data through dedicated European data spaces.
Use case 1: Urban adaptation to climate change	This use case covers the priority “climate change” with a specific focus on the adaptation of cities to climate change.
Use case 2: Agriculture-biodiversity nexus	This use case focuses on biodiversity as one of the European Green Deal (EGD) priority actions, while considering the agricultural landscape as focus environment for the investigation of impact of activities at farm field level on the biodiversity
Use case 3: <i>Drosophila</i> landscape genomics	Within this use case, we investigate the impacts of diverse environmental aspects on genetic variation in <i>Drosophila melanogaster</i>
Use case 4: Building stocks	The purpose of this use case is to focus on the potential impacts of building stocks on the material use and greenhouse gas emissions over time
Use case 5: Phytosociological Methods	Within this use case, we investigate the validity of existing plant community data through comparison with occurrence data on individual species

4 Dissemination activities

In general, three primary dissemination activities aligned with training and education are identified for the majority of the target groups outlined in chapter 2. These activities include carrying out seminars/webinars, organising workshops either independently or in collaboration with sister projects and participating in workshops associated with conferences. However, for students we see some additional dissemination activities such as guest lectures (2 hours, presentation), provision of slides, Bac and MSc thesis subject provision and support and PhD subject provision and support. In the next table (Table 2) a symbol is connected to the dissemination types to facilitate visualisation in the matching matrices in chapter 5.

Table 2: Dissemination types and matching symbols

Type of dissemination action	Symbol
Seminars/Webinars and Workshops (standalone) or connected to conferences	
Guest lectures (2 hours, presentation) and/or Provision of slides	
Bac, MSc, PhD thesis subject provision and support	







































5 Matching target groups and conducted activities






























In the previous chapters, the relevant target groups, topics and dissemination types were listed. The first matrix (

















Table 3) shows an overview of the conducted dissemination activities linked to the target groups that were addressed. In the second matrix on overview of the conducted dissemination activities linked to the topics is shown. In D6.4 the conducted dissemination activities are listed in more detail.

Table 3: Matrix showing the conducted activities and the addressed target groups

	Researchers					Students					Policy makers		Govern- mental Org	Industry	NGOs	Citizen Science Public	EC inst	Standar- dization
	AI	IT	Eco	GI	Env	AI	IT	Eco	GI	Env	Spat.pl	Env						
Seminars																		
UC3			👤		👤								👤					
UC1/UC4			👤	👤	👤							👤	👤				👤	
UC2			👤		👤													
UC5																		
workshops																		
DrosEU Workshop City Fly			👤		👤								👤			👤		

	Researchers					Students					Policy makers		Govern- mental Org	Industry	NGOs	Citizen Science Public	EC inst	Standar- dization
	AI	IT	Eco	GI	Env	AI	IT	Eco	GI	Env	Spat.pl	Env						
ESA-NASA Intern. Workshop on AI																		
usage and research applications of databases in museums																		
Workshop on Occurrence cubes																		
GDDS requirements																		
I-adopt workshops																		
Trainingsdays																		
Geoscripting course																		
Innovation workshops																		
OGT																		
GDDS event																		

	Researchers					Students					Policy makers		Govern- mental Org	Industry	NGOs	Citizen Science Public	EC inst	Standar- dization
	AI	IT	Eco	GI	Env	AI	IT	Eco	GI	Env	Spat.pl	Env						
Guest lectures																		
Understanding the Urban Heat Island Effect																		
Widen understanding of the Challenges in Gridded Data and ML/AI																		
Understanding how environmental variation shapes genomic diversity																		
Student support																		
ACT																		
Scientific papers																		
Performance of Null Handling in Array Databases																		
Deep Learning-Enhanced Gap Filling in_Drosophila																		

	Researchers					Students					Policy makers		Govern- mental Org	Industry	NGOs	Citizen Science Public	EC inst	Standar- dization
	AI	IT	Eco	GI	Env	AI	IT	Eco	GI	Env	Spat.pl	Env						
melanogaster Genomic Data																		
AI and DataCubes: Towards a Happy Marriage (poster)																		
Unlocking the full potential of The green deal data space																		
Causal Machine learning, UC2																		

Legend for matrix

AI: Artificial Intelligence
 IT: Information Technology
 Eco: Ecology
 GI: Geo-Information
 Env: Environmental
 Spat.pl: Spatial planning



: Seminars/Webinars and Workshops (standalone) or connected to conferences



Guest lectures (2 hours, presentation) and/or Provision slides



Bac, MSc, PhD thesis subject provision and support



Paper

Table 4: Matrix showing the conducted activities and the addressed topics

																	Visuali- zation	Gover- -ance	Standar- disation
	Occurrence cubes	Genomic Variation cubes	Query Cube	Grid projections and resampling	Preparing and publishing data	Transforming vector data to grids	Processing and Storage Requirements	Data Preparation and Gap Filling, Labelling	Datacube metadata	Processing Resource Metadata	Applicability of AI/ML approaches	Explainable AI	MLOps	AI Cubes	AI and ethics	Resource Requirements for AI/ML approaches			
Seminars																			
UC3	x	x	x								x			x		x			
UC1/UC4			x								x					x	x		
UC2	x										x			x		x			
UC5		x									x			x		x			
Workshops																			
DrosEU Workshop City Fly		x	x								x			x					
ESA-ESA-NASA Workshop on AI											x	x	x						
usage and research applications		x	x				x				x			x					

																	Visuali- zation	Gover- ance	Standar- disation
	Occurrence cubes	Genomic Variation cubes	Query Cube	Grid projections and resampling	Preparing and publishing data	Transforming vector data to grids	Processing and Storage Requirements	Data Preparation and Gap Filling, Labelling	Datacube metadata	Processing Resource Metadata	Applicability of AI/ML approaches	Explainable AI	MLOps	AI Cubes	AI and ethics	Resource Requirements for AI/ML approaches			
of databases in museums																			
Dataspaces-OECM					x				x	x	x							x	x
Workshop on Occurrence cubes	x	x																	
GDDS requirements									x	x								x	x
I-adopt workshops									x	x								x	x
Trainings day																			
Geoscripting course	x				x	x		x											
Innovation workshops																			
OGT	x								x	x								x	x
GDDS event	x								x	x	x							x	x
Guest lectures																			

																	Visuali- zation	Gover- -ance	Standar- disation
	Occurrence cubes	Genomic Variation cubes	Query Cube	Grid projections and resampling	Preparing and publishing data	Transforming vector data to grids	Processing and Storage Requirements	Data Preparation and Gap Filling, Labelling	Datcube metadata	Processing Resource Metadata	Applicability of AI/ML approaches	Explainable AI	MLOps	AI Cubes	AI and ethics	Resource Requirements for AI/ML approaches			
Understandi ng the Urban Heat Island Effect																	x		
Widen understandin g of the Challenges in Gridded Data and ML/AI				x	x	x	x	x			x	x	x	x		x			
Understandi ng how environment al variation shapes genomic diversity	x	x									x			x					
MSc support																			

																	Visuali- zation	Gover- -ance	Standar- disation
	Occurrence cubes	Genomic Variation cubes	Query Cube	Grid projections and resampling	Preparing and publishing data	Transforming vector data to grids	Processing and Storage Requirements	Data Preparation and Gap Filling, Labelling	Datacube metadata	Processing Resource Metadata	Applicability of AI/ML approaches	Explainable AI	MLOps	AI Cubes	AI and ethics	Resource Requirements for AI/ML approaches			
ACT											x								x
Papers																			
Performance of Null Handling in Array Databases				x	x	x	x												
AI and Datacubes: Towards a Happy Marriage																			
On Openness in Service Stacks.									x	x								x	x
Status and Plannin g Update									x	x									

																	Visuali- zation	Gover- -ance	Standar- disation
	Occurrence cubes	Genomic Variation cubes	Query Cube	Grid projections and resampling	Preparing and publishing data	Transforming vector data to grids	Processing and Storage Requirements	Data Preparation and Gap Filling, Labelling	Datcube metadata	Processing Resource Metadata	Applicability of AI/ML approaches	Explainable AI	MLOps	AI Cubes	AI and ethics	Resource Requirements for AI/ML approaches			
on Big Data Standardization in OGC and ISO.																			
Analysis-Ready EO Data: A Standards-Centric Perspective									x	x									
Deep Learning-Enhanced Gap Filling in Drosophila melanogaster Genomic Data		x						x			x		x	x					

																	Visuali- zation	Gover- -ance	Standar- disation
	Occurrence cubes	Genomic Variation cubes	Query Cube	Grid projections and resampling	Preparing and publishing data	Transforming vector data to grids	Processing and Storage Requirements	Data Preparation and Gap Filling, Labelling	Datacube metadata	Processing Resource Metadata	Applicability of AI/ML approaches	Explainable AI	MLOps	AI Cubes	AI and ethics	Resource Requirements for AI/ML approaches			
Unlocking the full potential of The green deal data space	x								x	x	x								
Estimating Residential Building Energy Demand at City Scale: Heuristic vs. Machine Learning																			
Scalable Deep Learning for High-		x						x				x							

																	Visuali- zation	Gover- -ance	Standar- disation
	Occurrence cubes	Genomic Variation cubes	Query Cube	Grid projections and resampling	Preparing and publishing data	Transforming vector data to grids	Processing and Storage Requirements	Data Preparation and Gap Filling, Labelling	Datacube metadata	Processing Resource Metadata	Applicability of AI/ML approaches	Explainable AI	MLOps	AI Cubes	AI and ethics	Resource Requirements for AI/ML approaches			
Fidelity Imputation of Large-Scale Genomic Fragments																			
Footprints of worldwide adaptation in structured populations of <i>D. melanogaster</i> through the expanded DEST 2.0		x						x											

																	Visuali- zation	Gover- ance	Standar- disation
	Occurrence cubes	Genomic Variation cubes	Query Cube	Grid projections and resampling	Preparing and publishing data	Transforming vector data to grids	Processing and Storage Requirements	Data Preparation and Gap Filling, Labelling	Datacube metadata	Processing Resource Metadata	Applicability of AI/ML approaches	Explainable AI	MLOps	AI Cubes	AI and ethics	Resource Requirements for AI/ML approaches			
genomic resource																			
The biodiversity and ecology of urban <i>Drosophila</i> species		x						x											
How to catch a fly in the city - fast? Citizen Science on <i>Drosophila</i> ecology helps to raise		x						x											

																	Visuali- zation	Gover- -ance	Standar- disation
	Occurrence cubes	Genomic Variation cubes	Query Cube	Grid projections and resampling	Preparing and publishing data	Transforming vector data to grids	Processing and Storage Requirements	Data Preparation and Gap Filling, Labelling	Datacube metadata	Processing Resource Metadata	Applicability of AI/ML approaches	Explainable AI	MLOps	AI Cubes	AI and ethics	Resource Requirements for AI/ML approaches			
awareness for biodiversity in urban environments																			
Genome-wide signals of adaptation in <i>Drosophila</i> to natural and anthropogenic factors in rural and urban environments in Europe		x						x											





6 Concluding remarks

This deliverable provides an overview of the target groups we served with FAIRiCUBE and the topics we covered with the dissemination events that we conducted throughout the project. It shows that the all the target groups we intended to serve were served and all the topics were covered.