Erasmus Mundus Joint Master

PARIS LODRON UNIVERSITY SALZBURG

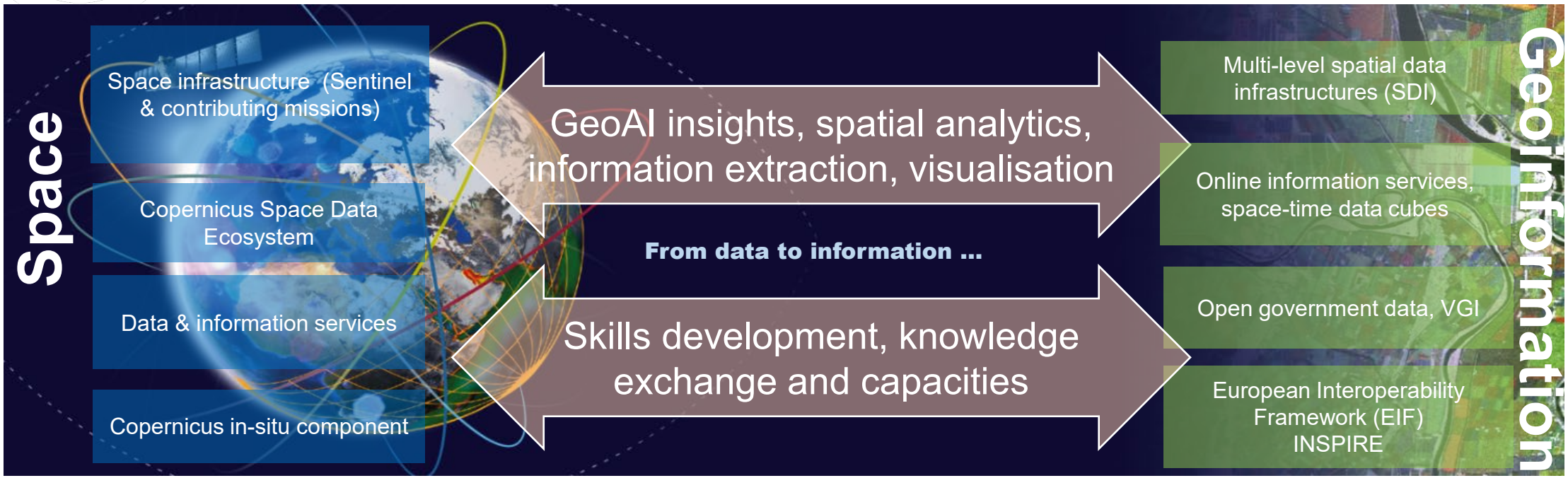
Université Bretagne Sud

COPERNICUS MASTER IN DIGITAL EARTH

Palacký University Olomouc

Co-funded by the European Union

www.master-cde.eu



Conventions, policy frameworks, global / regional commitments …

United Nations Climate Change

SUSTAINABLE DEVELOPMENT GOALS

The European Green Deal

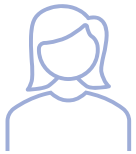
Programme & Project Management

Vít Vozenílek

Programme & Selection Committe Chair

Alena Vondrakova

Programme Board



Dana Gronychová

Coordinator of International Mobility

Jakub Koníček

Student support

Department of Geoinformatics

Geovisualisation & Geocommunication

Geovisualisation

- Systematic Geovisualisation
- Advanced Methods of Geovisualisation
- Design in Geovisualisation

Geocommunication

- Cognitive Cartography
- Web Cartography

Electives

Palacký University Olomouc

Programme & Project Management

Sébastien Lefèvre
Programme & Selection Committe Co-Chair

Charlotte Pelletier
Programme Board

Sandra Vessier
Head of International Office

Pernelle Blaise
Student support

Computer Science Department

GeoData Science & AI4EO

Fundamentals of Data Science

- Machine Learning
- Foundations of Deep Learning
- Big Data

Artificial Intelligence for Earth Observation

- Efficient Remote Sensing Image Processing
- Deep Learning for Computer Vision
- Geospatial Data Analytics Project

Programme & Project Management

Stefan Lang

Joint Programme Coordinator & Academic Lead

Barbara Schernthanner-Hofer

Programme Board

Dirk Tiede

Programme Board

Barbara Brunner-Maresch

Project Management & Student support

Department of Geoinformatics

Earth Observation & Geoinformatics

B1 - Orientation Project

B2 - Space-Time Models & Representations

B3 - Digital Earth Observation & Technologies

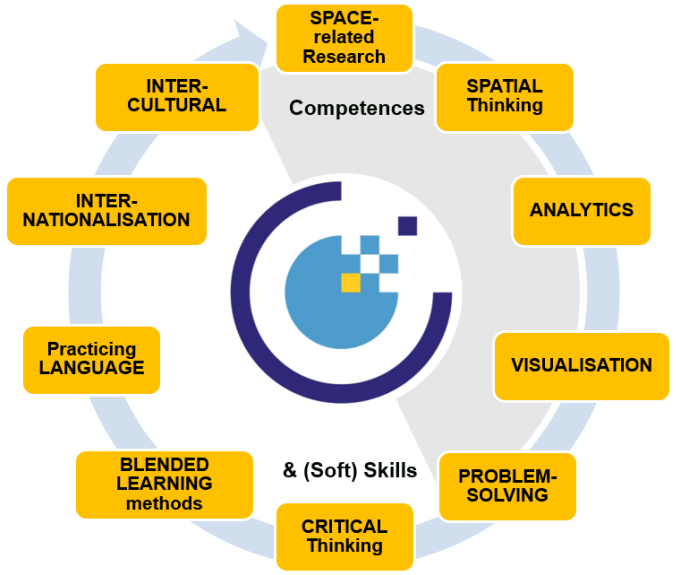
B4 - Spatial Image Analysis

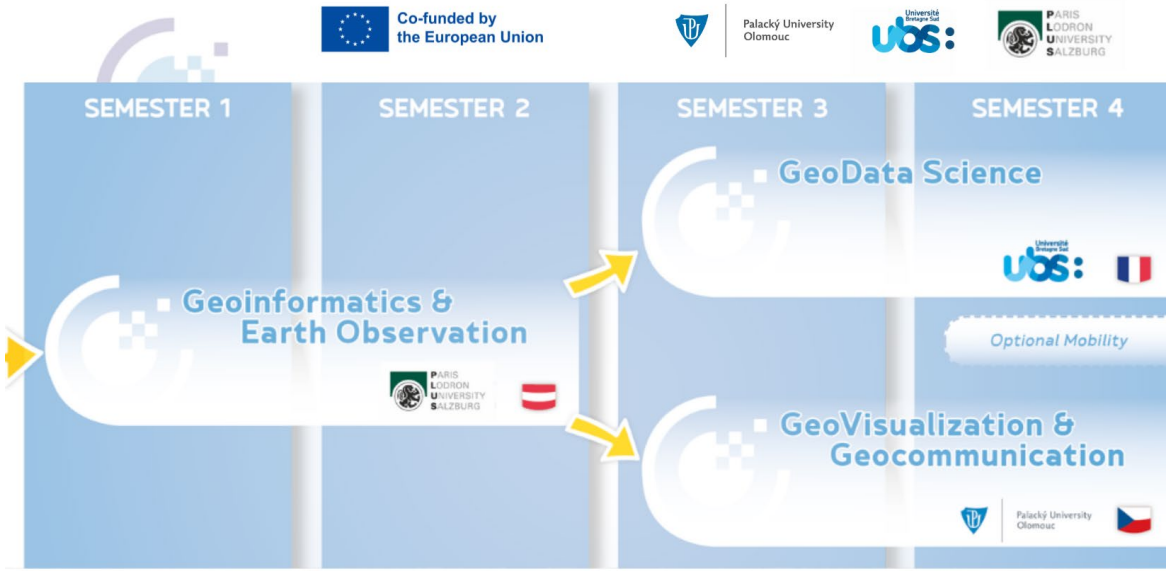
B5 - Integrated Applications

PARIS LODRON UNIVERSITY SALZBURG

Erasmus Mundus Joint Master

Key required EO*GI competences & skills of students enhance the employability of alumni worldwide, in Europe's space industry & the downstream sector.



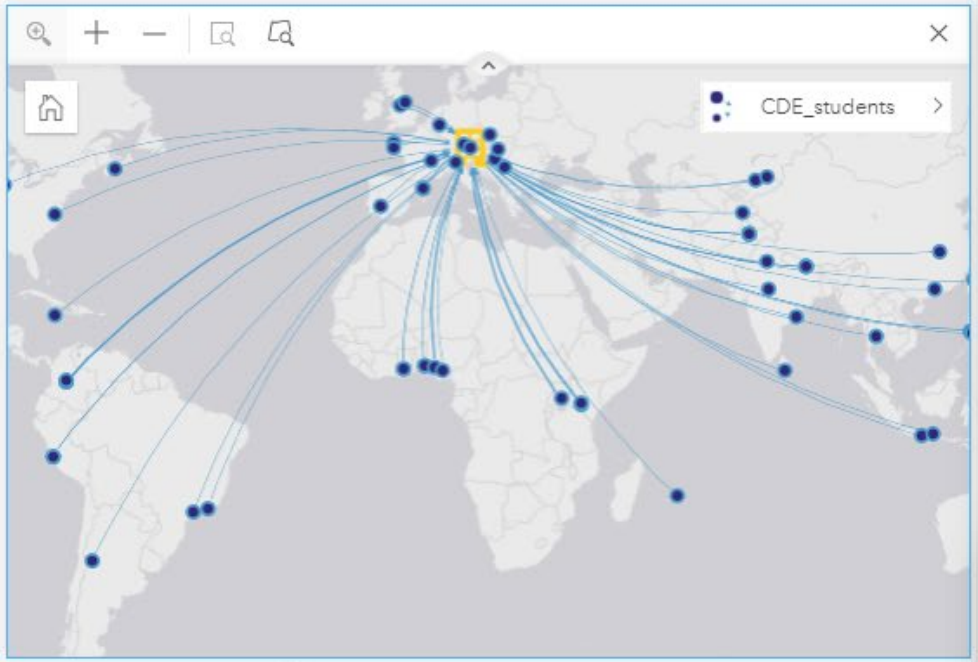


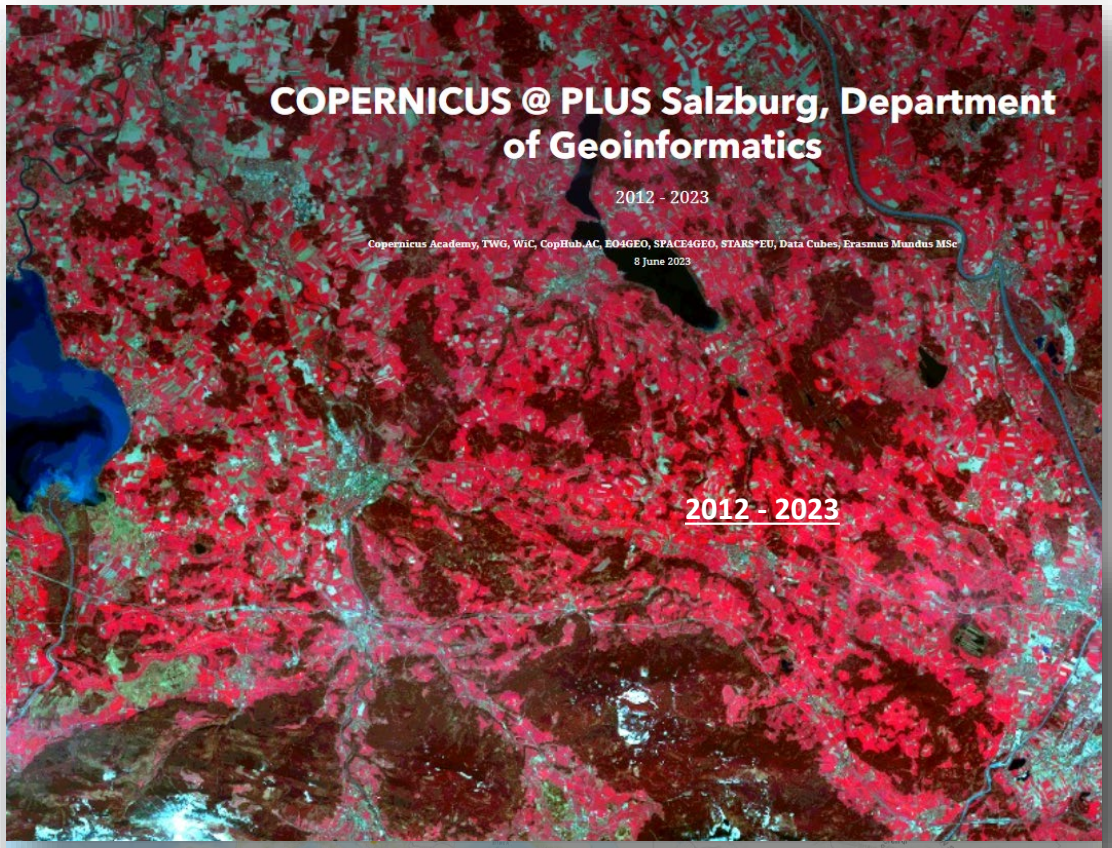
CDE Intakes

Wert suchen

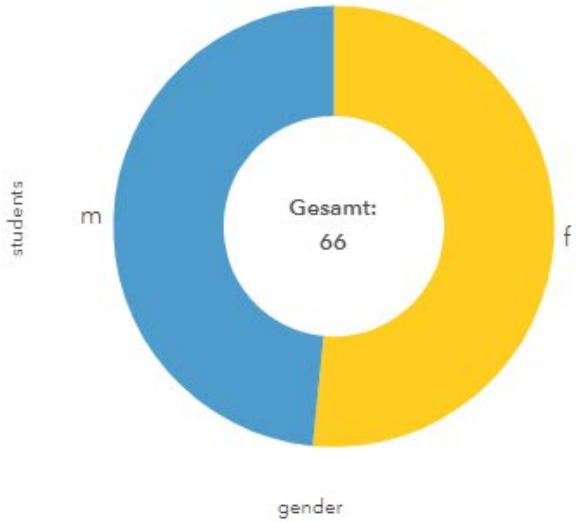
- Alle auswählen
- Intake 1
- Intake 2
- Intake 3
- Intake 4

CDE statistics

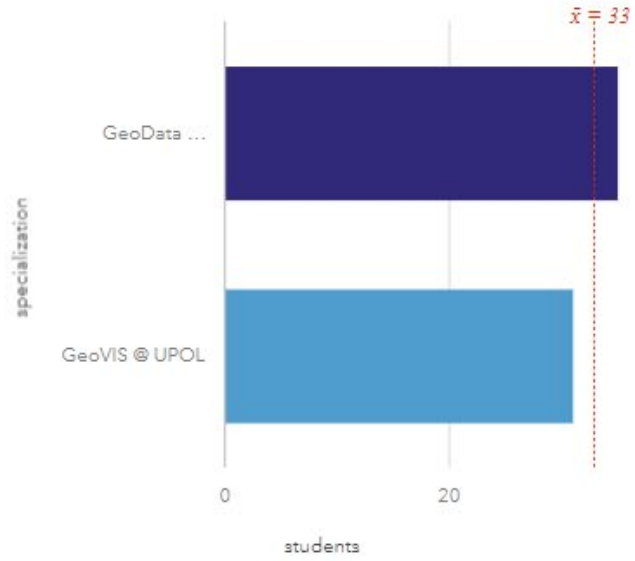




Student gender



2nd year specialization



Programme Accreditation

Accreditation under the **European Approach for Quality Assurance in Higher Education**

Agency for Quality Assurance and Accreditation Austria

The Agency for Quality Assurance and Accreditation Austria (AQ Austria) awards its quality seal

AQ Austria ACCREDITED

to the Joint Master's Programme

Copernicus Master in Digital Earth (CDE)

implemented at the following Universities:

Paris Lodron University of Salzburg (PLUS) Austria

University of South Brittany (UBS) France

Palacký University Olomouc (UPOL) Czech Republic

The Joint Master's Programme Copernicus Master in Digital Earth (CDE) complies with the "European Approach for Quality Assurance of Joint Programmes (2015)", approved by European Higher Education ministers in May 2015 in Yerevan (adopted by the Board of AQ Austria in its 36th meeting on 20th September 2016).

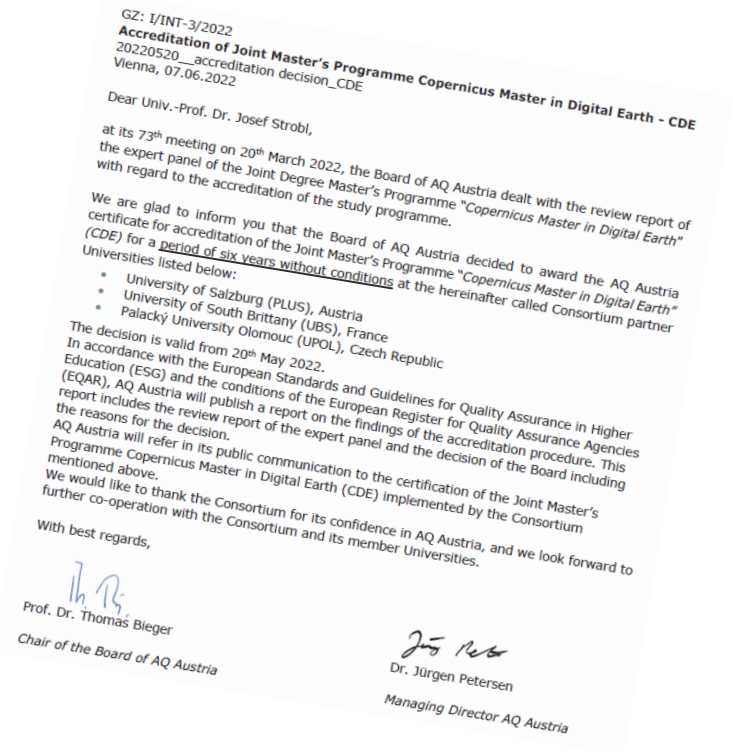
The accreditation is valid until 19th May 2028.

Vienna, 20th May 2022

Prof. Dr. Thomas Bieger
President of the Board of AQ Austria

Dr. Jürgen Petersen
Managing Director of AQ Austria

awarded quality seal 2022-2028



GZ: I/INT-3/2022
Accreditation of Joint Master's Programme Copernicus Master in Digital Earth - CDE
20220520__accreditation decision_CDE
Vienna, 07.06.2022

Dear Univ.-Prof. Dr. Josef Strobl,

at its 73th meeting on 20th March 2022, the Board of AQ Austria dealt with the review report of the expert panel of the Joint Degree Master's Programme "*Copernicus Master in Digital Earth*" with regard to the accreditation of the study programme.

We are glad to inform you that the Board of AQ Austria decided to award the AQ Austria certificate for accreditation of the Joint Master's Programme "*Copernicus Master in Digital Earth*" (*CDE*) for a period of six years without conditions at the hereinafter called Consortium partner Universities listed below:

- University of Salzburg (PLUS), Austria
- University of South Brittany (UBS), France
- Palacký University Olomouc (UPOL), Czech Republic

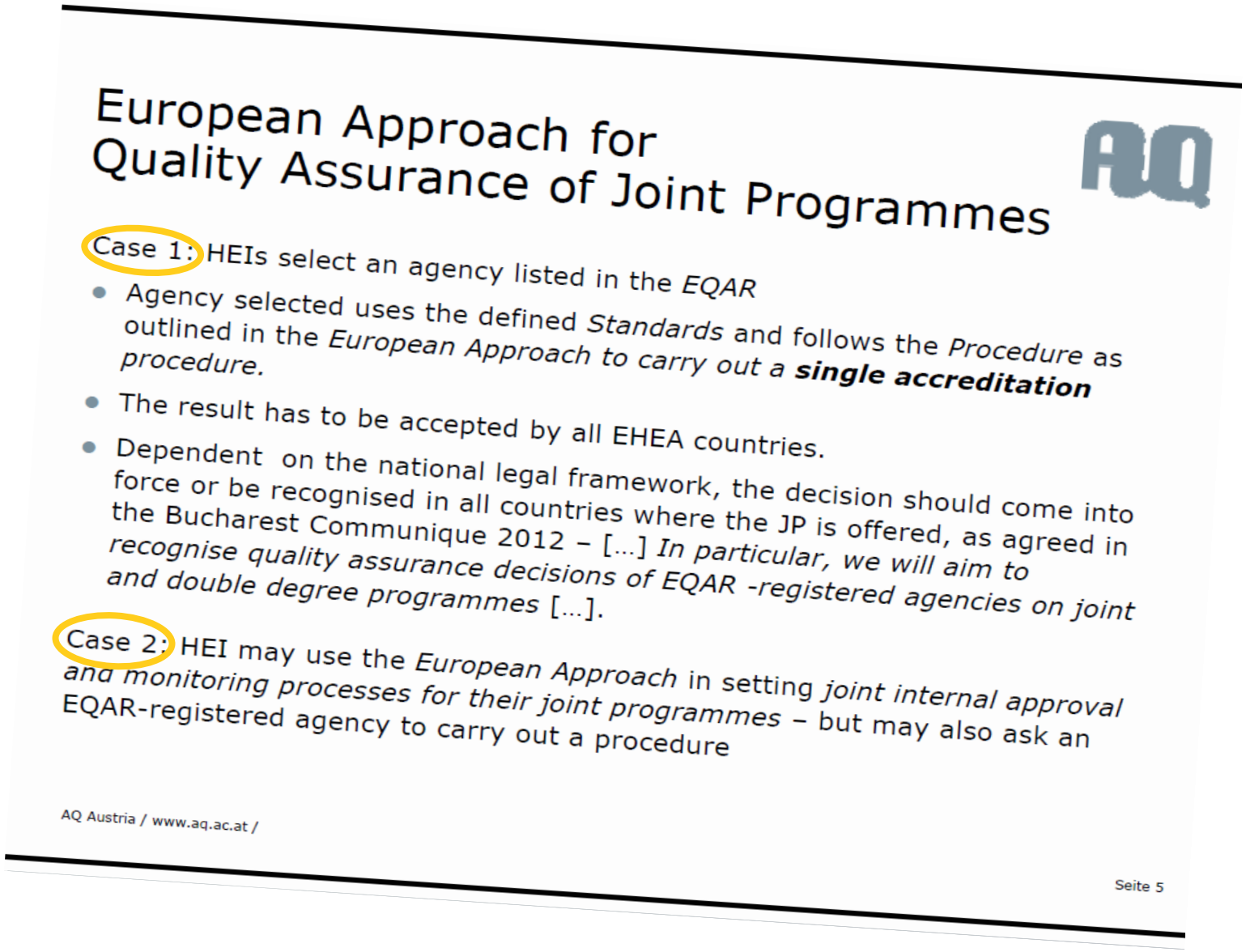
The decision is valid from 20th May 2022.
In accordance with the European Standards and Guidelines for Quality Assurance in Higher Education (ESG) and the conditions of the European Register for Quality Assurance Agencies (EQAR), AQ Austria will publish a report on the findings of the accreditation procedure. This report includes the review report of the expert panel and the decision of the Board including the reasons for the decision.
AQ Austria will refer in its public communication to the certification of the Joint Master's Programme Copernicus Master in Digital Earth (CDE) implemented by the Consortium mentioned above.
We would like to thank the Consortium for its confidence in AQ Austria, and we look forward to further co-operation with the Consortium and its member Universities.

With best regards,

Prof. Dr. Thomas Bieger
Chair of the Board of AQ Austria

Dr. Jürgen Petersen
Managing Director AQ Austria

Motivation



European Approach for Quality Assurance of Joint Programmes

Case 1: HEIs select an agency listed in the *EQAR*

- Agency selected uses the defined *Standards* and follows the *Procedure* as outlined in the *European Approach to carry out a* ***single accreditation*** *procedure.*
- The result has to be accepted by all EHEA countries.
- Dependent on the national legal framework, the decision should come into force or be recognised in all countries where the JP is offered, as agreed in the Bucharest Communique 2012 – […] *In particular, we will aim to recognise quality assurance decisions of EQAR -registered agencies on joint and double degree programmes* […].

Case 2: HEI may use the *European Approach* in setting *joint internal approval and monitoring processes for their joint programmes* – but may also ask an EQAR-registered agency to carry out a procedure

AQ Austria / www.aq.ac.at /

Seite 5

Accreditation procedure

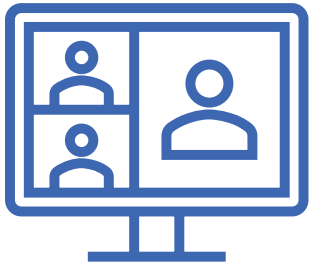
Nomination of AQ Austria & EMJM **coordinators**.

AQ Austria nomination of **expert panel**.

EMJM **self-documentation** - compliance with standards of EU Approach (part B); incl **further evidence** (docs ,reports, etc., upon request.

Pre-screening **feedback** AQ Austria.

Site visit group of experts (review panel). **Meeting** & **interviews** consortium **representatives:** management & administration, teachers, students.



Expert panel report

compliance with standards (EU Approach part B) and recommendations.

B. Standards for Quality Assurance of Joint Programmes in the EHEA

60 pages **self-documentation** - compliance with standards of EU Approach (part B); **+ annexes** & **further evidence** (docs ,reports, etc.).

1. Eligibility
- 1.1 Status
- 1.2 Joint design and delivery
- 1.3 Cooperation Agreement

2. Learning Outcomes
- 2.1 Level [ESG 1.2]
- 2.2 Disciplinary field
- 2.3 Achievement [ESG 1.2]
- 2.4 Regulated Professions

3. 3. Study Programme [ESG 1.2]
- 3.1 Curriculum
- 3.2 Credits
- 3.3 Workload

4. Admission and Recognition [ESG 1.4]
- 4.1. Admission
- 4.2. Recognition

5. Learning, Teaching and Assessment [ESG 1.3]
- 5.1 Learning and teaching
- 5.2 Assessment of students

6. Student Support [ESG 1.6]

7. Resources [ESG 1.5 & 1.6]
- 7.1 Staff
- 7.2 Facilities

8. Transparency and Documentation [ESG 1.8]

9. Quality Assurance [ESG 1.1 & part 1]

Accreditation procedure

Consortium feedback
to report.

Revised **expert panel report;**

compliance with standards (EU Approach part B) & recommendations.

Board of AQ Austria
decide on the accreditation.

Decision valid for a period of **six years**.

Publication of review panel report websites of consortium & AQ Austria.

Accreditation schedule

AQ agreement
June 2019

Self-documentation
June-Sept 2020
Oct, 2021

Expert panel
compostion
Oct-Nov 2020

Self-documentation **feedback**
Nov-Dec 2020
Jan, 2022

Final self-documentation
submission
Dec-Jan 2021

Briefing & training of expert panel
Jan-Feb 2021

Site visit
Feb/Mar 2021
Feb 8, 2022

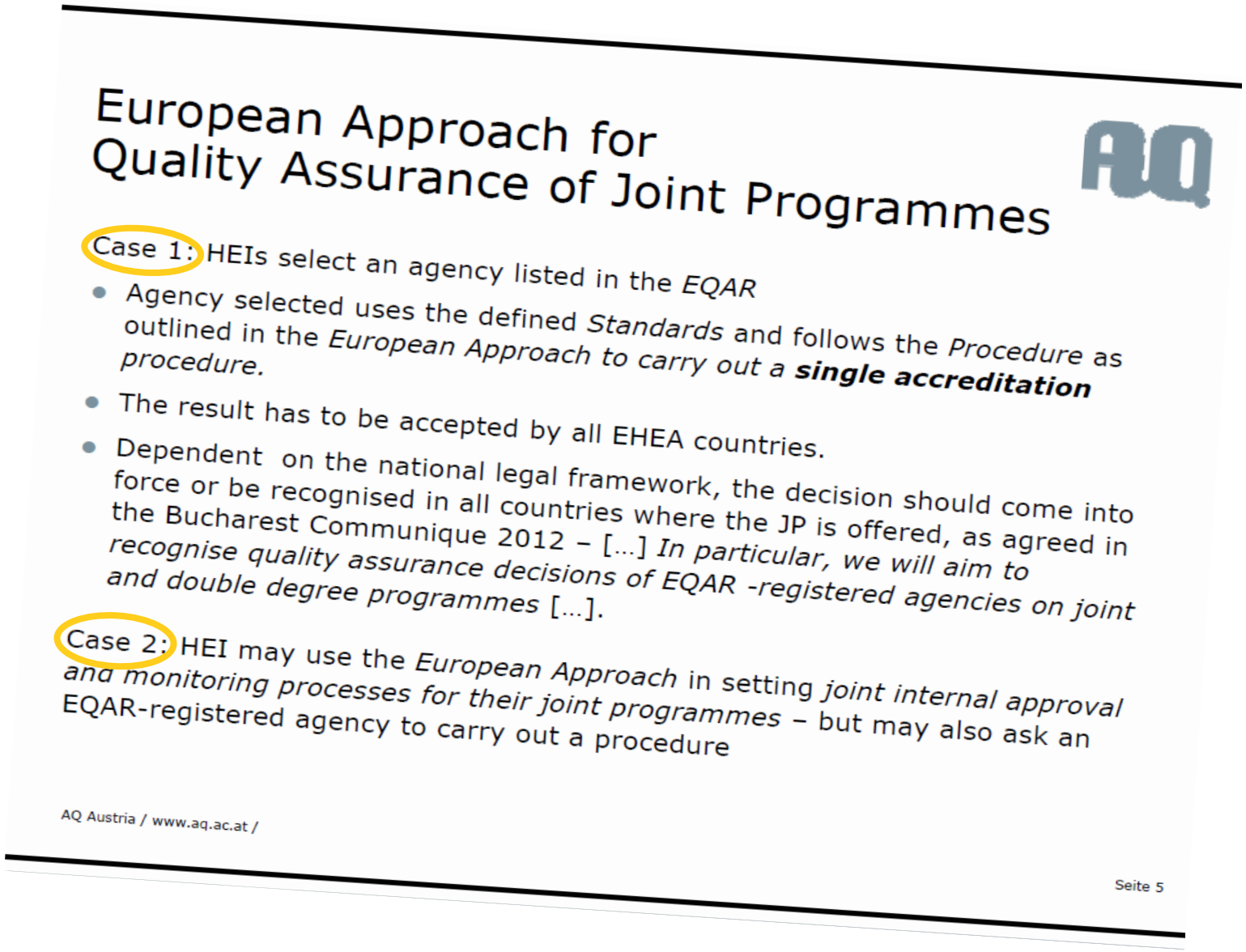
Expert panel draft report
Mar/May 2021

Second draft report
May/June- 2021

Final expert panel report
& preparation for board decision
May/June- 2021

Board decision
summer/autumn 2021
May 20, 2022

Motivation



European Approach for Quality Assurance of Joint Programmes

Case 1: HEIs select an agency listed in the *EQAR*

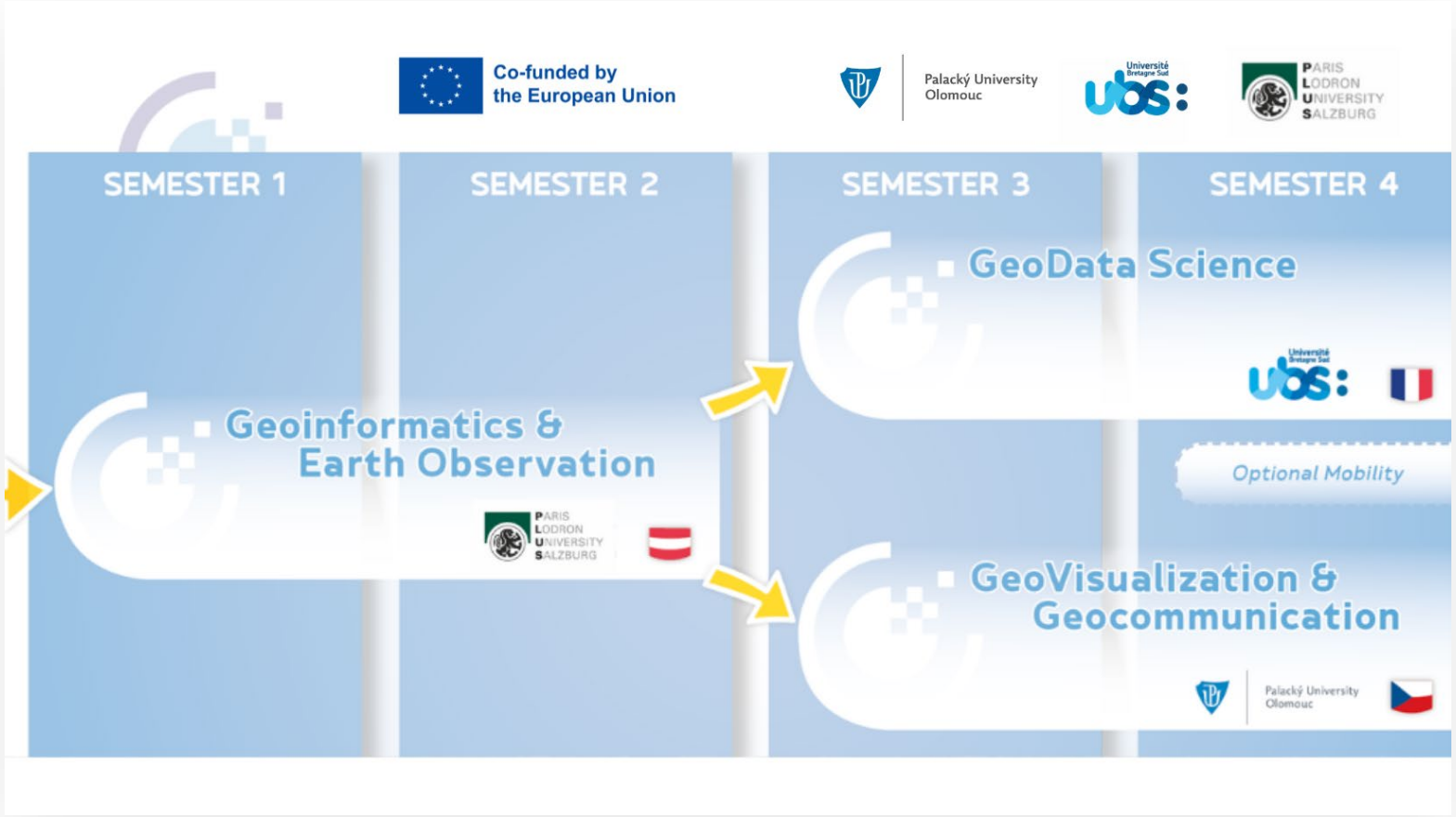
- Agency selected uses the defined *Standards* and follows the *Procedure* as outlined in the *European Approach to carry out a* ***single accreditation*** *procedure.*
- The result has to be accepted by all EHEA countries.
- Dependent on the national legal framework, the decision should come into force or be recognised in all countries where the JP is offered, as agreed in the Bucharest Communique 2012 – […] *In particular, we will aim to recognise quality assurance decisions of EQAR -registered agencies on joint and double degree programmes* […].

Case 2: HEI may use the *European Approach* in setting *joint internal approval and monitoring processes for their joint programmes* – but may also ask an EQAR-registered agency to carry out a procedure

AQ Austria / www.aq.ac.at /

Seite 5

EMJMD to EMJM: revised curriculum



PROGRAMME STRUCTURE
COPERNICUS MASTER IN DIGITAL EARTH

	ECTS
B1 – Orientation Project	6
B2 – Space-Time Models & Representations	6
B3 – Digital Earth Observation & Technologies	12
B4 – Spatial Image Analysis	6
B5 – Integrated Applications	12
SIP – Short Intensive Programmes	9 | 3
UBS: GeoData Science & AI4EO	30
UPOL: Geovisualisation & Geocommunication	30
ES - Elective Subjects	6 | 12
Master Thesis (incl Master's exam)	21
Work Placement / Internship	12 | 18
Total	**120**

Curriculum – important pillars

2018 - 2021

Survey results of EO4GEO project, EO4GEO Alliance, EO4GEO Body of Knowledge; Women in Copernicus initiative.

2022

CDE programme accreditation expert panel report. European Approach 'accreditation' 2022-2028.

With the support of the Erasmus+ Programme of the European Union

2019 - CDE – EMJMD

Accreditation of joint curriculum at PLUS.

2022

Existing need for skilled workforce, EO*GI geospatial data experts at graduate level in Europe and globally.

2019 – 2022

Student and stakeholder feedback sessions.

2023 - CDE – EMJM

Accreditation of joint curriculum at PLUS.

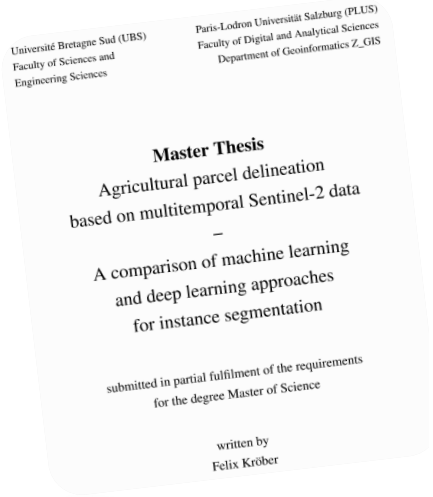
Co-funded by the European Union

2019 – 2022

Lessons learned from the Erasmus+ EMJMD project.

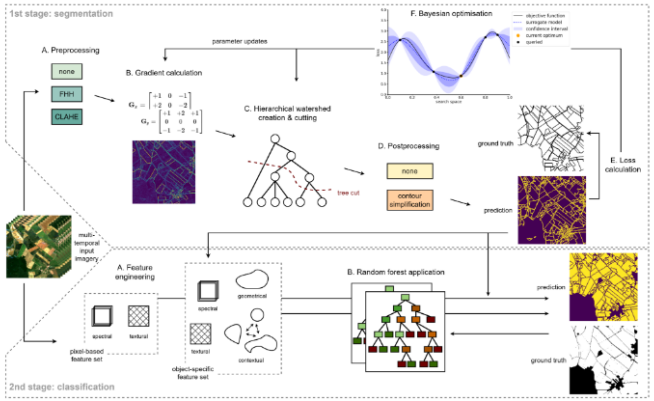
2023 - CDE - EMJM

EARSC Advisory Council member, matchmaking skills acquired with EARSC's EO market taxonomy.

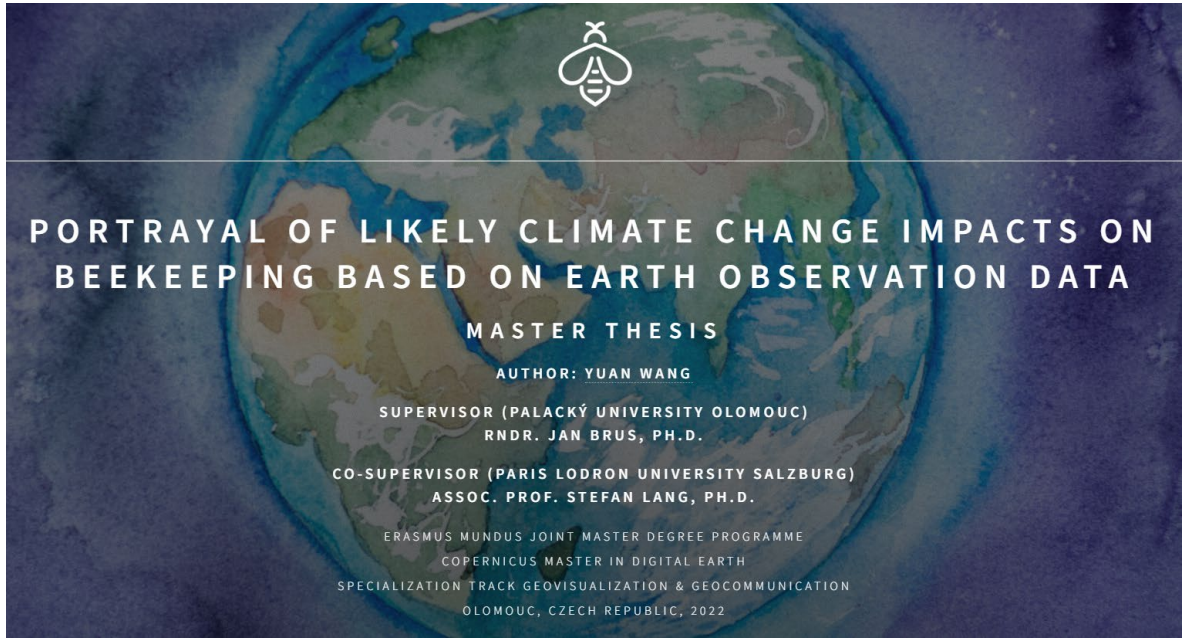


Model A: Machine learning driven OBIA

As for the machine learning based approach, this work utilises an edge-based segmentation with a watershed tree at its core. This is followed by a Random Forest (RF) classifier to distinguish between agricultural and non-agricultural land. Due to the two stage character of this approach consisting of segmentation followed by classification – both parts incorporating knowledge about scene understanding and carried out in a supervised manner – we refer to this as a machine learning driven OBIA approach.



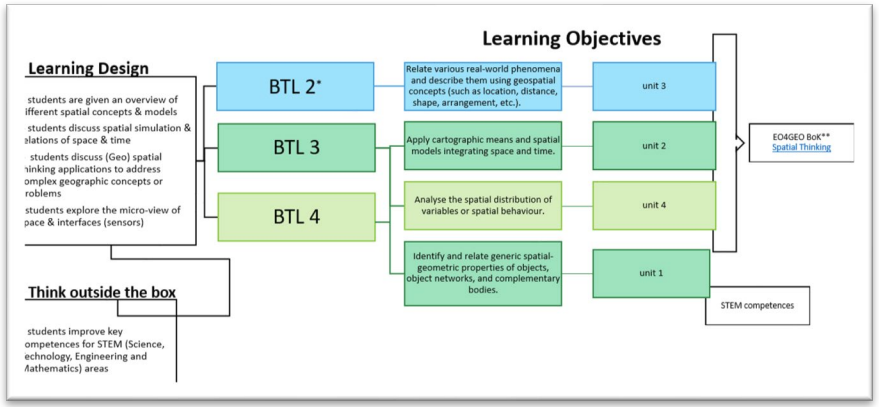
Machine-learning driven OBIA workflow

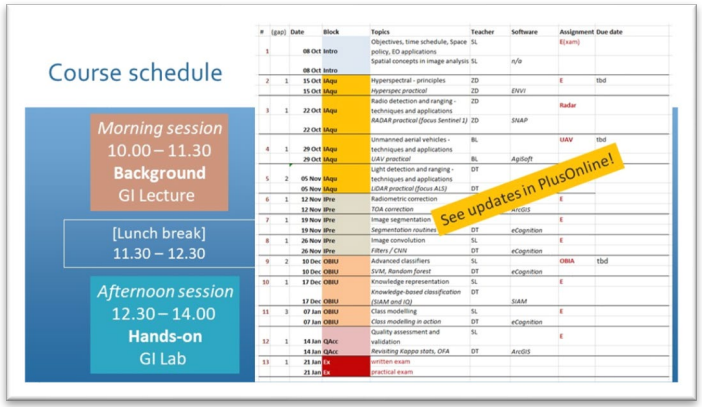


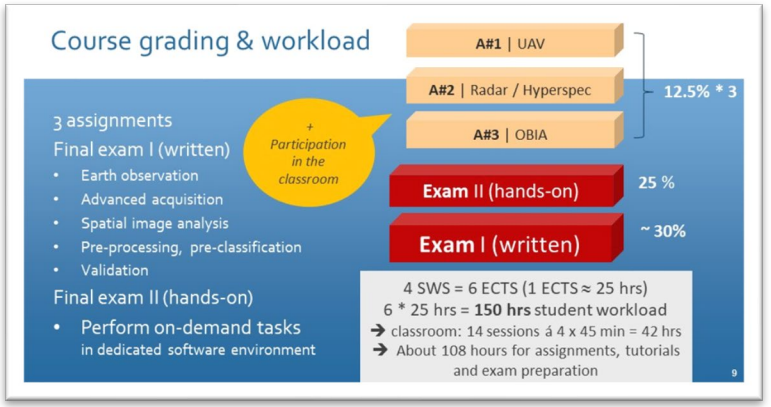
Quality Assurance

- EO4GEO EO*GI Body of Knowledge
- Standardized joint syllabus & Blooms Taxonomy
- Joint teaching guidelines
- MSc supervision guidelines for students & supervisors
- Joint programme compliance with standards of EU Approach for QA in Higher Education

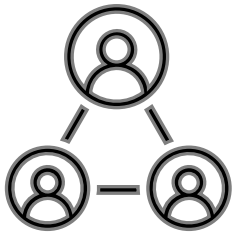
Joint teaching QA coordinator







Course level QA



- **Joint teaching quality assurance coordinator**
- **Teaching assistant**
- **Course tutor**

QUALIFICATIONS

space4geo
Empowering space data users

SKILLS

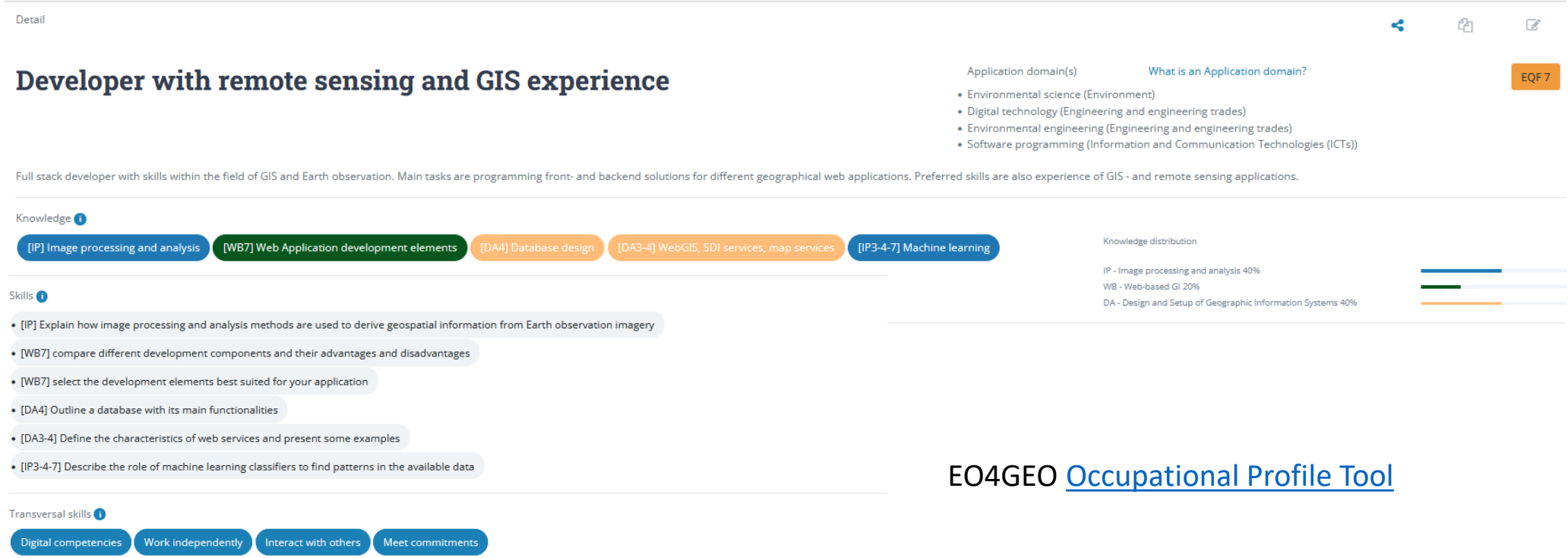
ESCO

space4geo

European Skills/Competences and Occupation (**ESCO**) classification > *https://esco.ec.europa.eu/en*

EO4GEO occupational profiles in the field of Earth Observation & Geographic Information.> *http://www.eo4geo.eu/tools/occupational-profile-tool/*

Space4geo > *https://www.space4geo.eu/*



EO4GEO Occupational Profile Tool

International Standard Classification of Education (ISCED)

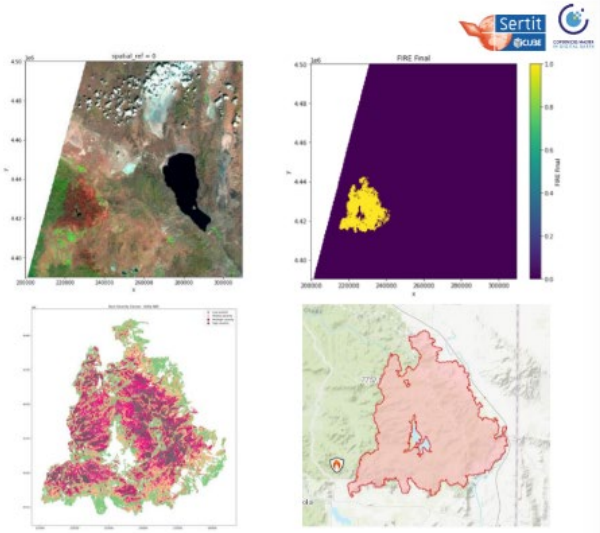
ISCED 7: Master's or equivalent level: designed to provide participants with advanced academic and/or professional knowledge, skills and competencies, leading to a second degree or equivalent qualification.

Programmes at this level may have a substantial research component but do not yet lead to the award of a doctoral qualification.

Typically, programmes at this level are theoretically-based but may include practical components and are informed by state of the art research and/or best professional practice.

They are traditionally offered by universities and other tertiary educational institutions. (see ISCED 2011 Manual, paragraph 241)

Internship experience at ICube-SERTIT



Diamond Mountains, California – United States (July – August, 2021)

RSS-Hydro Internship 2023

July to September 2023

RSS-Hydro

Overview

I secured this internship by networking with individuals on LinkedIn. The internship, officially titled Geospatial Analyst, was carried out over two months, with a full-time schedule onsite at the company's offices in Luxembourg. RSS-Hydro operates across geospatial fields for a more sustainable and resilient future. The company uses the newest remote sensing, Earth Observation, computer models and drones to achieve industry impact and inform decision-makers in meeting the Sustainable Development Goals.

Objectives

The main objectives of the internship included:

- Working with and analysing remotely sensed datasets from satellites and drones
- Operating drones, specifically the company's LiDAR drone and associated data
- Introduction to numerical modelling of hydrological processes for water risk

MASTERS ACTIVITIES

ISCED 7

EO*GI Scientists

postgraduate education

CDE graduates are confident in using key technologies pertinent to spatial information handling & upcoming trends in the field of Copernicus & Digital Earth. Answer research questions, including the development of hypotheses, definition of objectives, selection of methods, implementation of workflows, collection, analysis & interpretation of data as well as a written & oral communication & interpretation of outcomes in a decision support context.

INTERNATIONAL JOURNAL OF HUMAN–COMPUTER INTERACTION
https://doi.org/10.1080/10447318.2023.2272078

Taylor & Francis
Taylor & Francis Group

Check for updates

Design Aspects for COVID-19 Dashboards – Evidence from Eye-Tracking Evaluation

Anna Porti Suarez and Stanislav Popelka

Department of Geoinformatics, Palacký University Olomouc, Olomouc, Czechia

ABSTRACT

The outbreak of the COVID-19 pandemic caused dashboards to become widely used by the public and decision-makers. Nevertheless, dashboard interfaces have been related to business intelligence since their origins, and the search for improvements in their design is not new. This article's objective is to conduct a user evaluation of COVID-19 dashboards that contain geospatial information. This is done through a formative study to identify problematic aspects of user/dashboard interaction. This is enhanced by comparing two self-developed dashboards that, according to previous tests, have functionalities with different appearances. User evaluation is performed through mixed research that combines objective (eye-tracking) and subjective (a questionnaire and an interview) methods. The results generate recommendations for better-designed dashboard interfaces that can transfer information appropriately. The vital elements needed to achieve this are interactivity, the option to choose the metrics, and the distribution of the elements in the layout, [illegible] a role in a more user-friendly interaction between the user and the dashboard.

KEYWORDS

Dashboard; eye-tracking; geospatial information; qualitative methods; usability testing; user interface

ISPRS Annals of the Photogrammetry, Remote Sensing and Spatial Information Sciences, Volume V-2-2022
XXIV ISPRS Congress (2022 edition), 6–11 June 2022, Nice, France

CROCO: CROSS-MODAL CONTRASTIVE LEARNING FOR LOCALIZATION OF EARTH OBSERVATION DATA

Wei-Hsin Tseng[1] Hoàng-Ân Lê[1,*] Alexandre Boulch[2] Sébastien Lefèvre[1] Dirk Tiede[3]

[1] IRISA, Université Bretagne Sud, France
[2] Valeo.ai, France
[3] Department of Geoinformatics - Z_GIS, University of Salzburg, Austria

Earth Science Informatics (2022) 15:2031–2049
https://doi.org/10.1007/s12145-022-00832-5

SOFTWARE ARTICLE

Check for updates

ET2Spatial – software for georeferencing of eye movement data

Minha Noor Sultan[1] · Stanislav Popelka[1] · Josef Strobl[2]

Received: 23 February 2022 / Accepted: 13 June 2022 / Published online: 24 June 2022

Abstract

The paper focuses on the development of an open-source utility tool for the analysis of eye-tracking data recorded on interactive web maps. The tool simplifies the labor-intensive task of frame-by-frame analysis of screen recordings with overlaid eye-tracking data in the current eye-tracking systems. The tool's main functionality is to convert the screen coordinates of the participant's gaze to real-world coordinates and allow exports in commonly used spatial data formats. The paper explores the existing state-of-art in an eye-tracking analysis of dynamic cartographic products as well as the research and technology aiming at improving the analysis techniques. The developed software, called ET2Spatial, is tested in-depth in terms of performance and accuracy. The capabilities of GIS software for visualizing and analyzing recorded eye-tracking data are investigated. The tool aims to enhance the research capabilities in the field of eye-tracking in geovisualization.

Keywords Utility · Eye-tracking · Georeferencing · Interactivity · User-logging · GIS

Open Access Article

Crop Type Mapping from Optical and Radar Time Series Using Attention-Based Deep Learning

by Stella Ofori-Ampofo [1,2], Charlotte Pelletier [1,*] and Stefan Lang [2]

[1] IRISA UMR CNRS 6074, Campus de Tohannic, Université Bretagne Sud, 56000 Vannes, France
[2] Christian Doppler Laboratory for Geospatial and EO-Based Humanitarian Technologies, Department of Geoinformatics—Z_GIS, University of Salzburg, 5020 Salzburg, Austria
* Author to whom correspondence should be addressed.

Remote Sens. **2021**, *13*(22), 4668; **https://doi.org/10.3390/rs13224668**

COPERNICUS MASTER IN DIGITAL EARTH

Co-funded by the European Union

PARIS LODRON UNIVERSITY SALZBURG

Palacký University Olomouc

Université Bretagne Sud

Global Responsibility

"Geospatial technologies, including satellite Earth observation, are key enabler in addressing the grand challenges of our one world and offering possible solutions. For several decades, we have worked on R&D and innovation in the EO*GI domain, fostering sustainable development for enhancing and safeguarding the diversity and integrity of our environment and society. The current CDE programme is clearly positioned towards this global endeavour. As teachers and students, we commit ourselves to a responsible usage of tools and algorithms, which we shall actively shape for the sake of a peaceful and a sustainable future." *Stefan Lang*

International consortium

Palacký University Olomouc

PARIS LODRON UNIVERSITY SALZBURG

Université Bretagne Sud

INPE

space4geo

GISIG
Geographical Information Systems International Group

UNIVERSIDAD DE MÁLAGA

ETC UMA

UiB

EARSC
European Association of Remote Sensing Companies

terranea

tracasa global

UNU EHS

UNIVERSITÄT BONN

UNIVERSITY OF BUCHAREST
VIRTUTE ET SAPIENTIA

spatial services
WHERE **GEOINFORMATION** MEETS **TECHNOLOGY**

Sertit ICUBE

EBERHARD KARLS UNIVERSITÄT TÜBINGEN

MAKERERE UNIVERSITY

CONNECT & learn more

www.master-cde.eu

msc-cde@plus.ac.at

get in contact

comment & interact

LinkedIn

join & participate

Contact

Paris-Lodron University Salzburg
Department of Geoinformatics
Schillerstrasse 30
5020 Salzburg
Austria

47.82380499847819, 13.039431310898214

Co-funded by
the European Union

Erasmus Mundus Joint Master

Project & Programme Office
Email: msc-cde@plus.ac.at
www.master-cde.eu

Co-funded by the European Union

The European Commission support for the production of this publication does not constitute endorsement of the contents which reflects the views only of the authors, and the Commission cannot be held responsible for any use which may be made of the information contained therein.

Co-funded by
the European Union