DATA MANAGEMENT PLAN
acaSTEMy

WP1 – Management and Quality

D1.1 – Data Management Plan (DMP)

PLAN OVERVIEW

A Data Management Plan is created based on DMPonline HE Template

PROJECT	
Project number:	101104631
Project acronym:	acaSTEMy
Project name:	Trans-national STEM teacher education focusing on transversal competence and sustainability education
Creator:	Moonika Teppo
Principal Investigator:	Miia Rannikmäe
Data Manager:	Moonika Teppo
Affiliation:	University of Tartu
Funder:	European Commission
Template:	Horizon Europe Template
Project abstract:	Teachers play a key role in preparing future generations of transversally skilled people and are thus pivotal in the context of green and digital transitions. Despite this, teachers report a lack of professional development opportunities, esp. related to digital skills, mobility, and peer mentoring. The goal of acaSTEMy is to develop a systemic support structure for high-quality, research-based STEM teacher education from pre-service education to continuing professional development (CPD) that includes mobility as an essential building block. The project envisions transversally competent and motivated STEM teachers who are well equipped to prepare their students for future careers, the nature of which is difficult to foresee. Building on numerous previous activities of acaSTEMy partners, the focus of the project is to: (1) develop, pilot and promote various distance and blended learning models in combination with international mobility and mentorship; (2) improve STEM teachers' digital competences for meaningful pedagogies; (3) support the competences and pedagogies of STEM teachers for sustainable and up-to-date education by developing CPD courses to address major challenges, such as environmental sustainability, green deal, global health and immigration as well as methodological aspects, such as teaching diverse classes, combating science anxiety, and fostering gender-sensitive teaching. AcaSTEMy's bottom-up alliance brings together providers of pre- and in-service teacher education, as well as practice schools from eight (8) countries to develop and test mobility models and programmes for effective and accessible professional learning. In addition, the partnership network includes STEM teacher associations, ministries of education and Academies of Sciences to provide input for developing a policy framework for purposeful and systematic teacher mobility and to inform broader science education policies at national and European levels.
Start date:	01.06.2023
End date:	31.05.2026

DATA MANAGEMENT PLAN	
Date:	26 August 2024
Version:	DMP v1.1

1.   Data Summary

Will you re-use any existing data and what will you re-use it for? State the reasons if re-use of any existing data has been considered but discarded.

It was considered data re-use, but our preliminary search concluded that no such data could be found that would fit for acaSTEMy project.

What types and formats of data will the project generate or re-use?

Both, qualitative and quantitative types of data will be collected within the acaSTEMy project. Qualitative data will be collected through focus group interviews and qualitative data through online survey. Both types of data are collected from STEM (science, technology, engineering, and mathematics) teachers of all partner countries. Within online survey, in addition to STEM teachers' perceptions about their hard, soft, and digital skills, few background data is also asked about them (e.g., gender, experience and school level of teaching, subjects taught). This personal data is needed for different data analyses (i.e., correlation, impact, modelling, etc). Focus group interviews are conducted face-to-face and/or online and captured as audio-recordings using suitable device (e.g., QuickTime Player, via Teams/Zoom) and capturing device (laptop, mobile phone), and uploaded to The University of Tartu (UT) server. Once the recordings are transcribed into written documents (MS Word), all the recordings will be deleted whatever source they were recorded from. Data collected by each partner is stored on their own university servers, international data set is stored on UT server and a back-up copy on password protected acaSTEMy laptop hard disk.

What is the purpose of the data generation or re-use and its relation to the objectives of the project?

The purpose of the data generation is to collect information from pre- and in-service STEM teachers' perceptions about their hard, soft, and digital skills - namely STEM teaching and learning in the focus areas of Green Deal, medicine and diversity, transversal skills, and digital skills (available and suitable platforms, tools and technologies in use, and further introduction of these technologies into the educational space). Based on the literature review, curriculum analysis and survey results, partners will write 3 academic articles analysing and synthesizing results on pre- and in-service STEM teacher training in partner countries as well as local and international challenges and publish the results in high impact journals.

What is the expected size of the data that you intend to generate or re-use?

According to the acaSTEMy project, 800 respondents at minimum is the target audience. In addition, the online surveys will be complemented by focus group interviews of 5-10 persons per country. Indicative data volume for quantitative data would be 120 kB.

What is the origin/provenance of the data, either generated or re-used?

Anonymised quantitative data is collected through online survey from eight partner countries in line with ethical guidelines on survey data collection, storage and usage. Qualitative data is collected from volunteer STEM teachers through focus-group interviews. Every acaSTEMy project partner will translate the survey/interview questions into own language and fully responsible for data collection (both pilot and main data) in this country.

To whom might your data be useful ('data utility'), outside your project?

The raw data will be useful for other researchers, so that they can conduct similar studies and to compare different data. Analysed data will be useful for teachers, policy makers, and for other experts in both the public and private sector.

2. FAIR data

2.1. Making data findable, including provisions for metadata

Will data be identified by a persistent identifier?

The data will be identified by a DOI (Digital Object Identifier), which is commonly used persistent identifier.

Will rich metadata be provided to allow discovery? What metadata will be created? What disciplinary or general standards will be followed? In case metadata standards do not exist in your discipline, please outline what type of metadata will be created and how.

The project will follow the Dublin Core Standards, which is easy to use and also suitable for social science and education.

Will search keywords be provided in the metadata to optimize the possibility for discovery and then potential re-use?

Keywords of metadata will be provided to increase the findability of data, hence raising the potential for discovery and re-use. Within the acaSTEMy project, controlled vocabularies, e.g. DDI vocabularies (Thesaurus) will be used for data descriptions and metadata.

Will metadata be offered in such a way that it can be harvested and indexed?

The data will be stored in a trusted repository, which enables harvesting and indexing.

2.2. Making data accessible

Repository:

Will the data be deposited in a trusted repository?

The data will be deposited in trusted repository – DataDOI, which is managed by the University of Tartu library.

Have you explored appropriate arrangements with the identified repository where your data will be deposited?

DataDOI gathers all fields of research data and stands for encouraging open science and FAIR (Findable, Accessible, Interoperable, Reusable) principles. DataDOI is made for long-term preservation of research data. Each dataset is given a DOI (Digital Object Identifier) through DataCite Estonia Consortium. Information about uploading data to DataDOI, as well as about DataDOI policy arrangements is available on the website: https://utlib.ut.ee/en/datadoi.

Does the repository ensure that the data is assigned an identifier? Will the repository resolve the identifier to a digital object?

All datasets of DataDOI have a valid DOI, which is provided by DataCite Estonia. DOI makes it possible to share and cite your datasets.

Data:

Will all data be made openly available? If certain datasets cannot be shared (or need to be shared under restricted access conditions), explain why, clearly separating legal and contractual reasons from intentional restrictions. Note that in multi-beneficiary projects it is also possible for specific beneficiaries to keep their data closed if opening their data goes against their legitimate interests or other constraints as per the Grant Agreement.

All collected data will be in an anonymized form and openly available (as .CSV file) via DataDOI by the Creative Commons license CC-BY 4.0. In any case the project management board (representative from each partner country) decides during the project for using another repository (e.g., ZENODO), then the corresponding changes will be made to the data management plan.

If an embargo is applied to give time to publish or seek protection of the intellectual property (e.g. patents), specify why and how long this will apply, bearing in mind that research data should be made available as soon as possible.

The data will be made available with the published articles during the project lifetime or after the project as publishing high level journals takes time).

Will the data be accessible through a free and standardized access protocol?

The collected data will be open data and freely accessible to everyone, there is no standardised access protocol needed.

If there are restrictions on use, how will access be provided to the data, both during and after the end of the project?

Collected data will be accessible for other researchers without any restrictions with the publication.

How will the identity of the person accessing the data be ascertained?

Data is accessible for free. There is no need for identification (open data).

Is there a need for a data access committee (e.g. to evaluate/approve access requests to personal/sensitive data)?

There is no need for a data access committee.

Metadata:

Will metadata be made openly available and licenced under a public domain dedication CC0, as per the Grant Agreement? If not, please clarify why. Will metadata contain information to enable the user to access the data?

Metadata will be openly available and licenced by the Creative Commons license CC-BY 4.0. The data and relevant metadata are in separate files but linked.

How long will the data remain available and findable? Will metadata be guaranteed to remain available after data is no longer available?

The data will remain available and findable for re-use for minimum of 10 years. The data will be archived in DataDOI (https://datadoi.ee/?locale-attribute=en). Metadata will be guaranteed to remain available even if the data is no longer available.

Will documentation or reference about any software be needed to access or read the data be included? Will it be possible to include the relevant software (e.g. in open source code)?

The data is accessible and readable with open-source software.

2.3. Making data interoperable

What data and metadata vocabularies, standards, formats or methodologies will you follow to make your data interoperable to allow data exchange and re-use within and across disciplines? Will you follow community-endorsed interoperability best practices? Which ones?

Controlled vocabularies (Thesaurus) will be followed to make data interoperable. The data and metadata are stored and after data publication in DataDOI. Whenever possible standardised file formats will be used, such as .CSV.

In case it is unavoidable that you use uncommon or generate project specific ontologies or vocabularies, will you provide mappings to more commonly used ontologies? Will you openly publish the generated ontologies or vocabularies to allow reusing, refining or extending them?

Wherever possible, standard vocabulary (e.g. Thesauri) will be used for data set.

Will your data include qualified references[1] to other data (e.g. other data from your project, or datasets from previous research)?

There are no such previous data sets to refer to. The data collected within the acaSTEMy project will be referenced and linked.

2.4. Increase data re-use

How will you provide documentation needed to validate data analysis and facilitate data re-use (e.g. readme files with information on methodology, codebooks, data cleaning, analyses, variable definitions, units of measurement, etc.)?

README.txt files will be created and provided with relevant information about research methodology, sampling, coding, data cleaning, and variable definitions.

Will your data be made freely available in the public domain to permit the widest re-use possible? Will your data be licensed using standard reuse licenses, in line with the obligations set out in the Grant Agreement?

According to the Grant Agreement all the materials, documents and information and results produced during the acaSTEMy project will be freely available to the public (freely accessible on the Internet under open licences or open-source licences).

Will the data produced in the project be useable by third parties, in particular after the end of the project?

All the materials produced during the project will be accessible to granting authority, other EU institutions, bodies, offices or agencies, for developing, implementing and monitoring EU policies or programmes.

Will the provenance of the data be thoroughly documented using the appropriate standards?

The provenance of the data will be thoroughly documented using Data Documentation Initiative (DDI) Standards. The data will be stored in folders, which will be named according to the content of the data. Every folder and sub-folder will include a README.txt file to serve as a guide on file name and function and will be updated according to any changes made within its respective folder.

Describe all relevant data quality assurance processes.

Ensuring data quality is paramount to its reusability. For example, through data validation, missing or erroneous data addressment, and documentation of data cleaning procedures will enhance the reliability and credibility of acaSTEMy project findings.

Further to the FAIR principles, DMPs should also address research outputs other than data, and should carefully consider aspects related to the allocation of resources, data security and ethical aspects.

Other research outputs (teaching-learning materials, micro-qualifications) will be created and protected by the authors of the acaSTEMy project. Authors must be cited however these outputs will be freely available to use.

3. Other research outputs

In addition to the management of data, beneficiaries should also consider and plan for the management of other research outputs that may be generated or re-used throughout their projects. Such outputs can be either digital (e.g. software, workflows, protocols, models, etc.) or physical (e.g. new materials, antibodies, reagents, samples, etc.).

Currently, no plan has been drawn up for the management of other research outputs beside those that are allowed as the final result of the project. New digital software will not be created during the project.

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[1] *A qualified reference is a cross-reference that explains its intent. For example, X is regulator of Y is a much more qualified reference than X is associated with Y, or X see also Y. The goal therefore is to create as many meaningful links as possible between (meta)data resources to enrich the contextual knowledge about the data. (Source: https://www.go-fair.org/fair-principles/i3-metadata-include-qualified-references-metadata/)*

Beneficiaries should consider which of the questions pertaining to FAIR data above, can apply to the management of other research outputs, and should strive to provide sufficient detail on how their research outputs will be managed and shared, or made available for re-use, in line with the FAIR principles.

Questions related to the management of other research outputs will be dealt when the need arises. In such a case, this item will also be supplemented on an ongoing basis.

4. Allocation of resources

What will the costs be for making data or other research outputs FAIR in your project (e.g. direct and indirect costs related to storage, archiving, re-use, security, etc.)?

Making project data FAIR is free of cost in the University of Tartu.

How will these be covered? Note that costs related to research data/output management are eligible as part of the Horizon Europe grant (if compliant with the Grant Agreement conditions)

Costs of long-term storage are covered by archiving data in DataDOI, which is separately funded by the University of Tartu research infrastructure funding. Data management costs will be covered by the acaSTEMy project of eligible costs.

Who will be responsible for data management in your project?

Principal Investigator (PI) prof. Miia Rannikmäe is responsible for data management throughout the research project. Data Management is handled by Moonika Teppo and acaSTEMy partner researchers during the data collection and analysis, and by staff of UTARTU during preservation. The same staff will be responsible for producing standard metadata and storing and archiving the relevant datasets.

How will long term preservation be ensured? Discuss the necessary resources to accomplish this (costs and potential value, who decides and how, what data will be kept and for how long)?

No costs for long-term preservation are foreseen. The potential value of long-term preservation lies mostly in survey data which allow the analysis of long-term changes in STEM teachers perceptions.

What provisions are or will be in place for data security (including data recovery as well as secure storage/archiving and transfer of sensitive data)?

The gathered data as well as the research carried out by the acaSTEMy project researchers will follow Estonian data protection and relevant cybersecurity rules, such as all University of Tartu computers must have appropriate and up-to-date anti-viruses and anti-spyware software. The collected data sets will be edited by Project Manager, in order to remove and delete personal information. After that relevant data sets will be shared to the researchers for data analysis. Every researcher keeps the analysed data on a password-protected computer until the end of the analysis, after that the corresponding files will be deleted. The data sets will have a backup stored on an external hard drive, stored in a locked room in a looked cupboard.

Will the data be safely stored in trusted repositories for long term preservation and curation?

Yes, the University of Tartu has trusted and safe repositories for long-term preservation and curation.

5. Ethics

Are there, or could there be, any ethics or legal issues that can have an impact on data sharing? These can also be discussed in the context of the ethics review. If relevant, include references to ethics deliverables and ethics chapter in the Description of the Action (DoA).

The European Code of Conduct for Research Integrity will be followed across consortium. Project partners' will follow their own research practice, e.g. the University of Tartu is guided by the Estonian Code of Conduct for Research Integrity.

Will informed consent for data sharing and long-term preservation be included in questionnaires dealing with personal data?

An online survey informed consent for data sharing and long-term preservation is included. The GDPR will be taken into account when collecting and processing data. Participation in the focus group interviews and answering to the online survey will be entirely voluntary. They were informed that the obtained data would be used anonymously in the research.

6.   Other issues

Do you, or will you, make use of other national/funder/sectorial/departmental procedures for data management? If yes, which ones (please list and briefly describe them)?

There are no plans to use other procedures for data management.

HISTORY OF CHANGES		
VERSION	PUBLICATION DATE	CHANGE
1.0	16.12.2023	First draft version.
1.1	26.08.2024	Modified version.
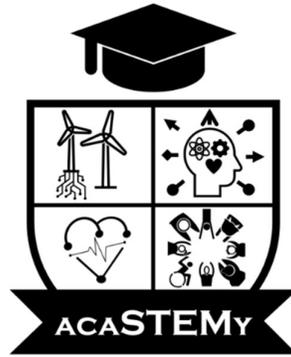
QUALITY AND RISK MANAGEMENT PLAN

acaSTEMy

WP1 – Management and Quality

D1.1 – Quality and Risk Management Plan

PLAN OVERVIEW

PROJECT	
Project number:	101104631
Project acronym:	acaSTEMy
Project name:	Trans-national STEM teacher education focusing on transversal competence and sustainability education
Start date:	01.06.2023
End date:	31.05.2026
Document Authors:	Moonika Teppo, Miia Rannikmäe
Principal Investigator:	Miia Rannikmäe
Project Manager:	Moonika Teppo
Project Coordinator:	University of Tartu (UTARTU)
Funder:	European Commission
Funding Scheme:	Horizon Europe
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Disclaimer

Document history

Date	Version	Created by	Short Description of Changes
10.12.2023	v1.0	Moonika Teppo, UTARTU	Initial version.
26.08.2024	v1.1	UTARTU and partners	Updated version (minor changes, formatting, completion).

Table of Contents

1. Introduction

This document sets the rules to ensure effective quality assurance and risk management throughout the acaSTEMy project, showing how quality aspects are taken into account in all processes and activities and how risk is foreseen and managed along the project duration. The Risk Management Plan (RMP) also defines the risk monitoring and escalation process as well as the structure of the Risk Log which is used to document and communicate the risks and their response actions.

The purpose of this document is to provide the consortium with both effective procedures and defined responsibilities to ensure a high-quality delivery of the project outputs and to face risks which could affect the project quality, timing, costs and scope. In addition, the document reports some key project management elements (e.g. the management structure, management procedures, etc.), which have been set in the project's Grant and Consortium Agreements, to provide a complete overview of the management of the project.

Quality and risk management are an integrated part of the overall project management down to Work Packages, Tasks, and project partners. All consortium partners, Work Package leaders, and the Project Coordinator are included in the risk management process to ensure integration of all stakeholders and viewpoints. Managing risks is an iterative, adaptive, and ongoing process. The table of critical risks and risk management strategy (Table 1) will be regularly reviewed and evaluated to ensure regular updates yearly and in accordance with periodic reporting.

1.1. Purpose and structure of the document

This document, "Quality and Risk Management Plan (D1.1)", is a deliverable of the Work Package 1 "Management and Quality", Task 1.2 "Initiation of monitoring of quality assurance and data management". It sets detailed rules to ensure effective quality assurance and risk management throughout the acaSTEMy project. The aim of this deliverable is to provide the consortium with simple but effective procedures to ensure a high-quality delivery of the project outputs and to face risks which could affect the project quality, timing, costs and scope. In addition, it reports the key project management elements (section 2), which have been set in the project's Grant and Consortium Agreement, to provide a complete overview of the management of the project and allow cross-references for the quality and risk management chapters (respectively section 3 and 4).

The document is structured as follows:

● Chapter 2 describes the key project management elements set out in the Grant and Consortium Agreements. These include the relevant legal framework regulating the acaSTEMy project; the management structure, roles and responsibilities; the management procedures and communication.

● Chapter 3 outlines the quality management approach, which consists of two main phases, i.e., Quality Planning and Quality Control and Monitoring. The approach is applied to all relevant aspects of the project, including, for example, the internal and external communication, the submission of official deliverables and the internal progress management.

● Chapter 4 outlines the risk management procedure, which describes how uncertainties will be identified, assessed, addressed and monitored during the project. The Risk Management Table (Table 1) - in its version updated at the time of writing this deliverable, i.e., month 15 of the project - is an integral part of this section.

2. Project management

2.1. Legal Framework

Both the Grant Agreement (signed between the European Commission, the Project Coordinator, and the other beneficiaries) and the Consortium Agreement (signed between the consortium beneficiaries) are legally binding documents. In addition, the Grant Agreement contains the following Annexes:

Annex 1 Description of the action

Annex 2 Estimated budget for the action

Annex 2a Additional information on unit costs and contributions

Annex 3 Accession forms for beneficiaries

Annex 4 Model for the financial statements

Annex 5 Specific rules

Other guidelines are not legally binding provided by the European Commission (EC) or the consortium with the aim to support project management.

2.2. Project Management Board

The project runs by the Project Management Board (PMB) that includes members from all the partners. The PMB makes strategic decisions concerning the project and the development of the consortium. It controls the realisation of the project at the strategic level, verifies the project's coherence with established aims, and keeps established frames such as range, costs and deadlines. Should any changes or deviations from the work plan occur, they must be first presented and accepted by the PMB. The PMB plays a key role in determining the strategic foci and priorities of the consortium, providing ideas, input and feedback to the individual WPs regarding the proposed foci and content of the joint events, intellectual outputs, workshops, etc. The PMB consists of 3 representatives from the coordinator UTARTU, and one representative from all other partners as follows:

• The Project Coordinator (PC), Miia Rannikmäe (UTARTU, Estonia)

• The Project Manager (PM): Moonika Teppo (UTARTU, Estonia)

• The Scientific Manager (SM): Jack Holbrook (UTARTU, Estonia)

• The representatives (project managers) of each project partner:

Anssi Salonen (UEF, Finland)
Luca Szalay (ELTE, Hungary)
Silvija Markic (LMU, Germany)
Kārlis Greitāns (UL, Latvia)
Cláudia Faria (IE-ULisboa, Portugal)
Priit Reiska (CmapA, Estonia)
Bulent Cavas (DEU, Turkey)
Josip Burušić (PILAR, Croatia)

The Grant and Financial departments of UTARTU support and help PMB with legally and financially.

The PMB focuses on the coordination of resources and mechanisms to ensure efficient progress of all technical, administrative, and financial matters and to achieve milestones and expected outcomes. The overall goal of the project management within the acaSTEMy project is therefore to

provide a focused, narrow but effective framework to support the whole Consortium in achieving the objectives of the project.

The PMB also endorses the risks management of the project and is responsible of the risks management process, assuring the monitoring and control of risks of all project activities. The project risk management plan is under the responsibility of the PMB, but all the project partners are involved in it, and in particular, the Work Packages (WP) leaders regarding the risks within the tasks of their WP.

2.3. Work Package structure and leaders

The project activities are divided and implemented within six WPs leaded by different partners (in brackets) as follows:

WP1: Management and Quality (UTARTU)
WP2: Science competencies and transversal skills capacity building (UTARTU)
WP3: Digital skills for STEM teachers (UEF)
WP4: Module and micro-credentials development (UTARTU)
WP5: Building communities of practice and job shadowing (ELTE)
WP6: Impact and Dissemination (PILAR)

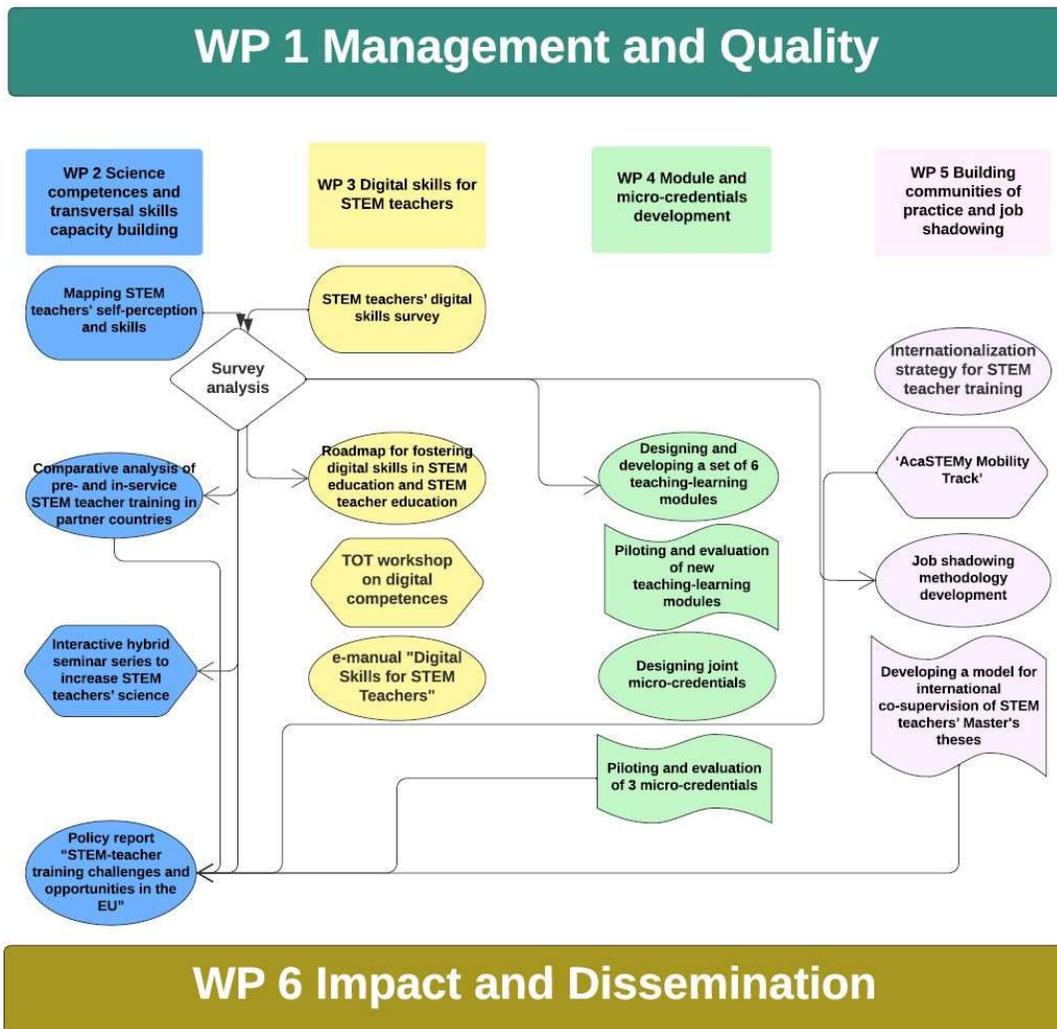Figure 1 represents the overall structure of the project's work plan including the list of WPs.

Figure 1. Overall structure of the work plan.

Each WP consists of four to five main Tasks, which in turn have sub-leaders. The WP Leaders are responsible of the implementation of the work within their own WP, so they have to bear the specific risks for the deliverables and milestones within the WP they are leading. They assure the identification and management of the risks, and they should inform the PMB. If new risks are identified, they should be reported to the PMB who will update the Risk Management Table (Table 1).

2.4. International Advisory Board

In order to align the acaSTEMy networking, research and development activities better with the tendencies in science education in Europe, as well as to ensure the high quality and sustainability of the project outcomes, a 7-member International Advisory Board (IAB) is composed, having as members key stakeholder representatives (policymakers, teachers, private sector representatives). This board will assess the project development each year. The IAB is responsible for providing advice and strategic inputs. The IAB members should follow the assessment of risks by the Consortium and the resolution actions. Reports and feedback from the board will help the MB keeping and enhancing the strategic direction of acaSTEMy. The following persons have already confirmed their willingness to serve on the IAB: Rui Marques Vieira (Portugal), Pavels Pestovs (Latvia), Kadir Demir (Turkey), Tuula Keinonen (Finland), Jüri Sasi (Estonia), Zoltán Homonnay (Hungary), Slaven Staklenac, (Croatia), Sarah Hayes or Dr. Franziska Lang (Germany).

2.5. Management procedures and communication

Voting. The PMB will take decisions in electronic format, if necessary. Whenever possible, the PMB will make decisions by consensus. If necessary, the members will vote, and opinions dissenting from the majority position will be reflected in the minutes.

Internal Communication. In order to ensure proper and effective internal communication flows, a shared folder and sub-folders by WPs in UTARTU OneDrive has been created. Every PMB member has access to the acaSTEMy folder, to create or modify the documents. Everyday communication takes place via e-mail. MB monthly meetings are held via Zoom. The agendas of the PMB meetings are prepared jointly by the PC and partners.

Reporting. The PC in cooperation with PM will submit a periodic report after 18 months and a final report at the end of the project (after 36 months), in accordance with the Grant Agreement. In order to regularly assess the progress of work and the use of resources by every project partner, the PC will ask internal reporting of the project every 6 months. The internal report includes the following:

● Overview of the progress of work, including achievements and attainment of any milestones and deliverables identified in Annex I of the Grant Agreement. This report should include the deviations, if any, between the initially planned work and actual results.

● Presentation and explanation of major deviation of the use of the financial resources at WP level for all partners.

3. Quality management

Project quality management aims to ensure that the current project will meet the expected results in the most efficient way and that deliverables will be accepted by the relevant stakeholders. It involves overseeing all activities (related both to processes and deliverables) needed to maintain a desired level of excellence. Quality Management includes creating and implementing quality planning and assurance, as well as quality control and quality improvement.

3.1. Quality Planning and Assurance

Quality planning refers to all procedures and processes expected to be followed in preparing project deliverables and carrying out project activities. Quality planning also includes the provision of guidelines for the drafting of documents and the implementation of communication actions.

3.1.1. Meetings

Throughout the project implementation, different types of meetings will be held, such as:

- Project Management Board meetings
- WP meetings, involving both the WP Leader and the Task Leaders of that WP
- Other meetings, which take place as needed (e.g. local project meetings, IAB meetings)

All project meetings will take place remotely via Zoom/Teams, except kick-off, final meeting and PMB meetings meant to take place in-person (3 managerial meetings).

Regular monthly PMB meetings will be set up to achieve high-quality results, efficient communication, experience sharing, and production of intellectual outputs. PMB meetings are scheduled for 6-month period in advance (every month on the same time) and managed by PC. The agenda of the meetings will be sent one week before and the minutes one week after the PMB meeting by PM. Participants have 5 working days at their disposal to comment on the minutes document. If no remarks are received from any party within this comment period, the minutes shall be considered as accepted and will be uploaded in the acaSTEMy shared folder in OneDrive.

WP meetings - involving both the WP Leader and Task Leaders of that WP - will take place once a quarterly or frequently if necessary. These will be scheduled by WP Leader so that the time is suitable for all tasks leaders. The Leader of the concerned WP is responsible for the organisation and running of that meeting. Moreover, he/she will circulate (at least calendar 3 days) in advance the agenda for the meeting. He/she will also be in charge of ensuring that minutes are taken of every meeting by himself/herself or by a person of his/her organisation specifically appointed for this activity. Minutes will be then circulated among participants by 3 calendar days after the meeting. Participants have 3 calendar days at their disposal to comment on the minutes document. If no remarks are received from any party within this comment period, the minutes shall be considered as accepted and will be uploaded in the acaSTEMy shared folder in OneDrive. The WP Leader of the meeting will hence inform the meeting participants via e-mail.

Other meetings will take place as needed. For example, IAB meetings will be scheduled once in a calendar year managed by PC or by a person designated by her/him. PM will take the minutes and later on circulate among IAB members. An accepted minutes will be uploaded in the acaSTEMy shared folder in OneDrive. Local meetings will be also documented and uploaded in the OneDrive.

3.1.2. Deliverables

Throughout the 36-month project implementation, a total number of 15 deliverables must be submitted to the EC. In line with the EC provisions included in the Grant Agreement, two different types of deliverables will be delivered, which are: reports (R) and websites, patents filing, press & media actions, videos, etc (DEC). The table below includes a full list of expected deliverables:

Deliverable No (continuous numbering linked to WP)	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month number)
D1.1	Quality assurance, risk management and data management plan	1	UTARTU	Report	Public	M4
D1.2	acaSTEMy Sustainability and Independence Strategy	1	UTARTU	Report	Public	M36
D2.1	Report formalising the results of data collection and analysis.	2	LMU	Report	Public	M14
D2.2	Cross-consortium policy report proposing changes to STEM teachers training and curriculum development needs.	2	UTARTU	Report	Public	M24
D2.3	Research paper predicting directions of changes in STEM teacher education and STEM education more broadly	2	UTARTU	Report	Public	M24
D2.4	Research paper presenting multi-level models describing STEM education in partner countries	2	LMU	Report	Public	M30
D2.5	Research paper: Methodologies for improving STEM education in partner countries	2	ELTE	Report	Public	M36
D3.1	Syllabus and training materials for the 'training the trainers' workshop	3	UEF	Report, DEC	Public	M17
D3.2	E-manual "Digital Skills for STEM-Teachers	3	UEF	Report, DEC	Public	M17

Deliverable No (continuous numbering linked to WP)	Deliverable Name	Work Package No	Lead Beneficiary	Type	Dissemination Level	Due Date (month number)
D4.1	Design of 4 micro-credential programmes	4	LMU	Report	Public	M18
D4.2	Syllabus and materials for 6 teaching-learning modules	4	LMU	Report	Public	M24
D5.1	Model and guidelines for effective job shadow visits	5	ELTE	Report	Public	M36
D5.2	Research paper on the co-supervision of Master theses	5	IE-ULisboa	Report	Public	M36
D5.3	Research paper on job shadowing	5	ELTE	Report	Public	M36
D6.1	Dissemination events	6	PILAR	DEC	Public	M36

To ensure consistency in the preparation of deliverables, templates will be produced and will be made available to all consortium members on the shared OneDrive folder. The general structure of the deliverables includes the following main elements: cover pages, table of contents, executive summary/introduction, core sections, conclusions, annexes (if needed). The cover pages should include the project title and acronym, grant agreement number, author(s), project coordinator, deliverable number and title, WP contributing to the deliverable, deliverable type, funder, funding scheme, dissemination type and level, date and version, table on the history of changes, EU visibility information and disclaimer.

3.1.3. Milestones

In order to effectively oversee project implementation throughout the 36-month duration, the preidentified 10 milestones included in the table below will be carefully monitored.

Milestone No (continuous numbering not linked to WP)	Milestone Name	Work Package No	Lead Beneficiary	Due Date (month number)	Means of Verification
MS1	Management Structure, Administrative/Financial Coordination and Internal Communications Established	1	UTARTU	M12	CA, Meeting Agendas and Notes, Written Annual Report
MS2	Quality assurance, risk and data management	1	UTARTU	M12	Written DMP available online, Written Risk Management Plan, Written report

Milestone No (continuous numbering not linked to WP)	Milestone Name	Work Package No	Lead Beneficiary	Due Date (month number)	Means of Verification
MS3	Independence and Sustainability Strategy of acaSTEMy created	1	UTARTU	M36	Completed report
MS4	Core research activities completed	2	UTARTU	M13	Documented research artefacts (survey data, focus group notes, transcribed interviews, etc).
MS5	Roadmap for STEM teachers capacity building in hard, soft, and digital skills and competences	2	UL	M22	Written roadmap, language: EN.
MS6	Interactive hybrid seminars held	2	UTARTU	M34	Lecture slides, written materials, presentation recordings uploaded to project website.
MS7	'Training the trainers' workshop conducted.	3	UEF	M17	D3.1 completed. Training attendance list (electronic).
MS8	"Module launch" seminars held	4	UTARTU	M29	Slides, training materials, attendance sheets.
MS9	Co-supervision piloted: first 10 MA/MSc theses defended	5	ELTE	M24	Finished MA/MSc theses, defence certificates.
MS10	acaSTEMy webpage up and running	6	PILAR	M3	Webpage.

3.1.4. Key Performance Indicators

As per the Grant Agreement, the project's success in terms of achievement of expected strategic impact will be measured against the Key Performance Indicators (KPIs) included in the table provided below.

WP	Key Performance Indicator	Target Value
WP1	Number of joint working meetings: kick-off (1), final meeting (1), management online (10), quality board (6), managerial (consortium) in-person meetings (3), stakeholders online meetings (3)	24
WP2	Number of pre- and in-service teachers conducting acaSTEMy online survey (across all partner countries)	800

WP	Key Performance Indicator	Target Value
WP2	Cross-consortium report on STEM teachers' self-perception of their hard, soft, and digital skills and competencies	1 report
WP2	Number of participants attending in consortium in-person workshop (3 days)	20
WP2	Number of research papers (articles)	3
WP2	Cross-consortium policy report proposing changes to STEM teachers training and curriculum development needs	1 report
WP2	Number of participants attending in 8 hybrid seminars "STEM step-up"	228 (in-person)
WP3	Number of persons attending "TTT / training the trainers" workshop on digital competencies for science education researchers and teacher educators	40
WP3	An e-manual "Digital Skills for STEM Teachers"	1 manual (in 9 languages)
WP4	Number of teaching-learning modules designed and developed	6
WP4	Minimum number of pre- and in-service teachers who will pilot the teaching-learning modules	200
WP4	Number of participants attending "Module launch" seminars (4 seminars by each partner, 32 seminars in total)	896 (28 participants * 32 seminars)
WP4	Number of designed micro-credential programmes	4
WP4	Number of teachers in total piloting micro-credential programmes	80
WP5	Number of consortium members and teachers attending in-person international acaSTEMy 2-days meeting	45
WP5	Total number of consortium members and teachers attending in job shadow international 5-day visits (8 participants * 2 visits per country)	80 shadows
WP5	Number of teachers attending in job shadow local 1-3-day visits (3 places * 8 countries * 10-15 teachers)	240-360 shadows
WP5	Number of jointly supervised MA/MSc theses per consortium have been led to successful thesis defence	10
WP6	Number of participants attending in hybrid dissemination events in Estonia, Germany, and Hungary	300

3.1.5. Communication

This sub-section focuses on the strategy the consortium will follow in order to ensure proper communication and alignment internally and externally. In particular, the overall strategy will leverage on a complementary range of communication instruments, including e-mails, shared folder, website, social media and dissemination.

E-mails, shared folder, website, social media, dissemination

Throughout the project implementation, e-mails will represent the key channel for everyday communication among project partners. With the aim of ensuring effectiveness, a mailing list has been created. Each member of the consortium is responsible to keep it updated, making sure that all relevant contacts are included in the list.

In order to both facilitate the internal sharing of materials/documentation and foster collaboration; the shared folder has been created by the project manager. The solution adopted is a OneDrive offered by Microsoft. The latter is accessible to all consortium partners.

In order to ensure visibility of the project and foster dissemination of the activities, acaSTEMy will leverage on a dedicated website (http://www.acastemy.eu/). All documentation and materials published on the website shall be written in English. In line with what specified above, the acaSTEMy project will be also widely disseminated on key social media platforms (e.g. X, Facebook, etc.) that will be set-up in a later stage of the project. This will allow the consortium to reach a wider audience. Posts shared by both public and private accounts shall always include cross-references to acaSTEMy and the EC through ad-hoc tags.

Any dissemination of results (in any form, including electronic) must: display the EU emblem and the following disclaimer: "This project is funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or EACEA. Neither the European Union nor the granting authority can be held responsible for them". WP6 Leader will be responsible for guaranteeing that all these aspects will be covered.

3.2. Quality Control and Monitoring

The focus of quality control and monitoring is on feedback and deviation management in the project. This entails the definition of an internal review process of deliverables and the monitoring of all communication activities, KPIs and milestones. In addition, three time-driven quality control measures are foreseen: the project periodic reporting, the project reviews and the internal reporting, which monitors both technical and financial status of the project.

Monitoring will be continuously performed by the Project Coordinator (PC) as well as project managers within partner organizations based on the tasks and deliverables assigned to each partner in the Consortium Agreement. Project activities will be checked against targets such as number of participants in project events and dates of task completion. If delays occur, UTARTU will contact persons in charge of the task in question, and if needed will inform the Management Board of the deviations as well as suggest possible ways to remedy the situation. The PC will also check on a three-monthly basis costs incurred against expected expenses in order to detect any major deviations in a timely manner and take corrective action based on the Management Board decision (for example, some activities might be re-scheduled). We will also develop procedures for collecting feedback from participants in project activities. Feedback received from participants in project activities will be used to improve project deliverables. All of this will be reflected in acaSTEMy progress reports.

3.2.1. Time management

To ensure time management, a preliminary timetable has been developed for the activities as part of this proposal. During the first two months, every partner, in cooperation with UTARTU, develop a detailed work plan for themselves, in which, in addition to the events already known, dates are added for initiating preparation for these events or outputs, the mid-term deadlines, when part of the output needs to be finalised, as well as the workload and timetable for each expert involved. This enables the experts to plan their contribution on time and avoid last-minute haste or delays. The coordinator also sends reminders to the partners well before each event and deadline, detailing among others

the purpose of each event. During each project meeting, the managers from each partner review the timeline and budget to ensure that everything is running on time and within the foreseen budgetary limits. Should there be problems with either, corrective action is taken by the PMB.

3.2.2. Financial management

UTARTU will appoint a skilled staff member for this role. Payroll and other financial activities related to the project will be carried out by accounting department staff at each of the partners while project-specific financial transactions and financial reporting will be handled by the financial manager of UTARTU. Records and financial accounts will be kept and the project budget will be monitored regularly by the PC and periodically by the PMB. The PC shall ensure all the appropriate payments are made to the other beneficiaries without unjustified delay. Whenever needed, consultation with the project officer will take place.

4. Risk management

The goal of the risk management processes is that project risks are identified, analyzed, evaluated, and treated in a structured process that monitors and tracks them, and raises risks to the right level and responsibilities in the project. The processes and structures in the project are based on best practices and frameworks such as the Open PM[2] Project Management Framework[1]. Risk Management takes a high-level place in the project management structure, and all WPs are expected to contribute. The Project Coordinator will appoint the Project Manager to the Risk Manager role, supported by the Project Management Board.

The risk management procedure describes the activities that will be performed along the whole project duration to identify, assess, monitor and address foreseen risks which may impact the project. The procedure consists of the following activities:

● **Risk identification**. The purpose of this step is to facilitate the identification and documentation of risks that can impact the project objectives. The Critical Risk Table (see Table 1) contains the risks number, risk name and short description, related WP, as well as proposed risk-mitigation measures, which will facilitate the monitor and control aspects of the project.

● **Risk assessment**. The purpose of this step is to assess the likelihood and impact of the identified risks in terms of their influence to the project objectives.

● **Risk Response Development** (response planning and implementation). The purpose of this step is to select the best risk response strategy and identify and plan the actions to control the risks. The strategy (or strategies) selected for each risk are documented in the Risk Log.

● **Risk control** (monitoring and reporting). The purpose of this step is to monitor and control the implementation of the risk response activities while continuously monitoring the project environment for new risks or changes (e.g. probability and/or impact) in the risks already identified.

4.1. Risk management roles and responsibilities

The following RACI table defines the responsibilities of those involved in risk management:

RACI	PC	PMB	PM	WP Leader	Accountant
Risk Management Plan	**A**	I	**R**	I	I
Manage Risks	**A**	I	**R**	C	I

R - responsible, A - accountable, C – consulted, I - informed

The Project Manager (PM) is responsible for identifying, assessing, managing and monitoring the risks of the project, consulting the Project Management Board (PMB) and other stakeholders, when appropriate (e.g. Project Coordinator (PC), WP Leaders). The PM is also responsible for assigning resources to the risk management process, with the approval of the PC. The planning of risk management activities is performed by the PM and documented in the Risk Management Table (Table 1). New risks and related actions, as well as changes to identified risks and actions are approved by the PC and reported to the PMB, according to the escalation procedure. WP Leaders will be informed about the risks, as well as they will consult with managing risks within their WP. The

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[1] OpenPM² - Open Project Management Methodology
https://ec.europa.eu/isa2/solutions/open-pm2_en

accountant of the consortium (under UTARTU) or financial managers of project partners is informed about financial risks when appropriate.

4.2. Risk Likelihood/Impact Matrix

This project is using the following likelihood/impact risk matrix for risk analysis and to indicate if the risks can be accepted or not accepted on a scale: low, medium or high risk.

Figure 2. Risk Likelihood/Impact matrix.

Risk level scale details:

Likelihood:

- **Low**: less than 20% chance of occurrence;
- **Medium**: between 20% to 50% chance of occurrence;
- **High**: more than 50% chance of occurrence;

Impact:

• **Low**: less than 2% of project budget affected, or/and low impact in other project baselines, or/and only one milestone affected, or/and projects stakeholders may be affected, or/and reputational impact in the organisation or unit or/and sufficient project competencies to resolve the issue (if risk occurs).

• **Medium**: 2% to 10% of project budget affected, or/and medium impact in other project baselines, or/and one or more milestones affected, or/and projects stakeholders will be to some extent affected, or/and project objectives may be affected, or/and reputational impact amongst technical staff in other organisations or units, or/and formal complaints, or/and limited project competencies to resolve the issue (if risk occurs).

• **High**: more than 10% of project budget affected, or/and high impact in other project baselines, or/and several milestones affected, or/and projects stakeholders will be affected/concerned, or/and project objectives will be affected, or/and reputational impact in several organisations or units, or/and formal and legal complaints, or/and insufficient project internal competencies to resolve the issue (if risk occurs).

4.3. Critical risks and risks response strategies

The purpose of this section is to define the available risks and risk response strategies to be used for this project. The risk response actions are documented and updated in the Table 1 throughout the project lifecycle and revisited at least monthly during PMB meetings.

The possible risk response strategies are:

• **Avoid**: risk avoidance, working the project or project plan around those conditions or activities which introduce the risk;

• **Reduce**: risk mitigation or reduction through the proactive implementation of risk reduction activities;

• **Accept**: acceptance of the risk (the impact/loss is accepted if the risk occurs). When accepting risks, there are two possible reactions:

- Acceptance of the risk and no special action required, except continue to monitor the risk (passive acceptance);
- Accept and develop contingency plans in case the risk occurs (active acceptance).

• **Transfer/Share**: transfer a risk to, or share a risk with other entities, e.g. through insurances, sub-contracting, partnering etc.

Table 1. Risk Management Table

Risk No	Description	WP No	Proposed risk-mitigation measures
R1	Delay in critical activities and research	WP2-6	The activities and results of the project are continuously monitored in project meetings. If the deadline is missed due to a force major situation, the partners will meet to discuss how the results can be achieved sustaining their high quality. The success of the project is evaluated against clearly defined and measurable parameters.
R2	Insufficient interest in consortium events by teachers (as evident from number of applications to joint seminars, job shadowing, etc.)	WP2-6	Dedicated time slot during partner/stakeholder events is planned to assure common understanding. Explanatory materials shared. The project already has a wide network of associated partners that shows the interest in the project content and activities.
R3	Insufficient interest in consortium events open to the broader scholarly community and/or the general public (as evident from number of viewers, etc.)	WP2, WP6	Effective and timely advertising of all key events. Effective cooperation with dissemination partners. Effective use of internet-based communication and dissemination channels. Cooperation with school administration to explain the opportunities the project gives to their teachers and pupils.
R4	Language barriers stop teachers from participating in project activities	WP2-6	Project materials originally in ENG are translated to local languages, events are held partly in local languages, discussions with partners in ENG, with live translation.
R5	Underestimated resource needs	WP1-6	If unexpected resource needs appear, tasks or budgets are reallocated between partners to ensure the realisation of critical parts of the project.
R6	Disagreement among partners regarding the work plan, content of specific events, or other aspects of the consortium's work.	WP1-6	All the partners met regularly online in July-August 2022, so the tasks are familiar and the general understanding is shared. Solid work plan, effective decision-making procedures, careful documentation of all decisions (minutes of meetings, etc.) will help achieve higher results. Effective communication within the consortium, effective conflict resolution and mediation by WP1, if necessary.

Risk No	Description	WP No	Proposed risk-mitigation measures
R7	Fragmentation of the consortium	WP1-6	Each partner has clearly defined roles. Each partner is involved in all the WPs, though the involvement can vary from partner to partner. Events and meetings will include the representatives from all the partners so that everybody feels valued and important.
R8	Insufficient technical knowledge	WP3-6	Ensuring leading experts have been chosen related to the consortium and each activity. Before the public hybrid events, the technologies and their proper functioning will be tested to offer quality occasions.
R9	Inability of a key staff member to perform duties as envisioned in this proposal (due to illness, travel, change of institutional affiliation, etc)	WP1-6	Sufficiently large teams involved at each partner institution – it will be possible to find a replacement. Cooperative/joint organisation of most key activities (seminars, trainings, job shadowing).
R10	Disconnectedness of the consortium	WP1-6	Careful project management, adequate number of personnel visits between partners, information sharing and dissemination.
R11	Failure in IP management	WP1-6	Ensuring all partners are aware of the IP rules for the project and principles concerning publishing project results.
R12	Currency risk	WP1-6	Changes in exchange rates may cause changes in the budget of non-euro zone partners (Turkey, Hungary). The project money will be kept in EUR on the partner accounts or a need for reallocation of the budget may be considered.
R13	Cost for mobility actions exceeds budget lines	WP1-6	Project manager and main supervisors monitor budget, results and timelines during the execution. Possible need for reallocation of budget is considered.
R14	Interest groups have conflicting perspectives and needs?	WP2-6	Due to the variety of countries in the project, the needs are different. It means that different solutions may be considered for specific situations. This way the project will only become richer in terms of outputs.
R15	Background data is not available, incomplete or otherwise difficult to obtain (survey risks)	WP2-6	Consortium partners have links to previous or current EU or national projects with related topics and, in some cases, to relevant case study areas. Experts, stakeholders, and partners are activated to ensure access to alternative data sources in case of necessity. Data access rules will be added as an article in the partnership agreement to ensure the data is treated correctly.
R16	The project has high scientific but low practical and policy impact, not leading to changes in education policy / curricula	WP1-6	The private sector and non-formal learning Associated Partners' role as offering job shadowing in the project safeguards the practical relevance of the project results. The communication and dissemination strategy concentrates on stakeholders' benefits. The

Risk No	Description	WP No	Proposed risk-mitigation measures
			dissemination activities provide tailor-made information for involved stakeholders outside the consortium. Project manager and WP leaders ensure that partners use new and already established contacts with a wide range of important groups of users at the EU, national, and regional/local levels.
R17	Disruptive events, such as the Covid-19 pandemic, prevent in-person meetings and hinder achieving the goals during the life of the project.	WP1-6	Most events and meetings, including job shadowing, can be organised online, many events are planned as hybrid events; there is excellent competence at each institution in organising online events following the lengthy period of pandemic lockdowns and restricted travel. This will mitigate risks and ensure that successful events can take place.

4.4. Risk control activities

The purpose of this section is to define the activities performed for monitoring and controlling risks, as well as their frequency. The Project Manager (PM) monitors and controls risks based on PMB meetings or on information received from other project stakeholders (e.g. PC, WP Leaders or accountant), in result of:

• Identification of new risks by the PMB or by other project stakeholders, in consequence of changes in the project environment;

• New proposed ways to deal with a risk (adding/changing actions);

• Implementation of any of the given actions or on general events or developments that will change the values for likelihood and/or impact of the identified risks;

• Other changes.

The Project Manager (PM) monitors and controls risks based on PMB meetings or on information received from PC, WP Leaders or accountant. Frequency of Revisiting the Risk Management Table updated at least once a month, after the PMB Meetings, by the Project Manager (PM).

5. Conclusion

The document has defined the quality management procedures to ensure high-quality standards in the acaSTEMy project implementation and delivery and it has provided the relevant templates for quality monitoring. In addition, it has outlined the risk management procedure to allow effective detection, monitoring and reaction to risks across the project duration. The current version of the Risk Management Table is also provided and it is constantly updated.