# DELIVERABLE

## D 2.4 Technology Sustainability Plan

31 MARCH 2026

EUROPEAN COMMISSION

Co-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 the European Education and Culture Executive Agency (EACEA). Neither the European Union nor EACEA can be held responsible for them.

| Project identification | |
|---|---|
| Project number | ERASMUS-EDU-2022-PI-ALL-INNO-EDU-ENTERP - 101109005 |
| Duration | 3 years |
| Coordinator | Suzanne Timmons |
| Coordinator organization | UCC |
| Website | https://forschung.fh-kaernten.at/change/deliverables/ |

| Document identification | |
|---|---|
| Document identification | D 4.2 Technology Sustainability Plan |
| Leader of the deliverable | CUAS |

| Deliverable info | |
|---|---|
| Description | Electronic; English; 5-10 p. approx. |
| Dissemination level | PU |
| Deliverable type | R |
| Original Due Date | 31/03/2026 (M30) |

| Change records | | | |
|---|---|---|---|
| Version | Date | Author (Organization) | Description |
| 0.0.1 | 01.03.2026 | D.Ströckl | Template, Structure |
| 0.0.2 | 10.03.2026 | D.Ströckl, E.Zografou | Content |
| 0.0.3 | 12.03.2026 | F.Carnide, E.Zoulias | Review 1 |
| 0.0.4 | 13.03.2026 | D.Ströckl, E.Zografou | Content editing, review integration |
| 0.0.5 | 20.03.2026 | Management Board | Review 2 |
| 0.0.6 | 29.03.2026 | D.Ströckl, E.Zografou | Content editing, review integration |

## TABLE OF CONTENTS

## INTRODUCTION

The **chAnGE project – Climate change and Healthy AgeinG: co-creating E-learning for resilience and adaptation** – has developed a set of **Micro-Credentials (MCs)** designed to support health and social care professionals (HSCP) and organisations (HSCO) in addressing the challenges at the intersection of climate change and healthy ageing. These learning materials have been implemented and piloted through an online learning environment based on a Moodle platform and supported by a dedicated project website.

As the project approaches its final phase, ensuring the **technical sustainability and continued accessibility of the developed outputs** becomes an important priority. This Technical Sustainability Plan outlines how the digital outputs of the project — including the MCs, learning materials, and the project website — will be maintained and made available beyond the project's lifetime, enabling their long-term reuse and adaptation in different digital learning environments.

The plan addresses the **future management of the project website**, which will be transferred to a partner organisation after the end of the project to ensure continued public access to project results and resources.

By defining these technical strategies, the plan supports the **long-term availability, transferability, and practical use of the project's digital resources**.

## DIGITAL OUTPUTS OF THE PROJECT

Within the **chAnGE** project, the main digital outputs include the developed MCs, the associated learning materials, the Moodle-based learning platform, the project website, and video-based learning materials produced as part of the courses. The learning content has been implemented in Moodle, which was chosen because it is a widely used and flexible LMS that offers strong functionality for structuring courses, managing learners, and delivering online learning. Educational videos developed for the Micro-Credentials are hosted on a dedicated project YouTube channel and embedded within the Moodle courses as part of the learning materials.

One important advantage of Moodle is its compatibility and portability, which allows courses and learning materials to be exported and reused in other LMS if needed.

In addition to **the learning platform, key project results and selected learning materials will also be made publicly accessible through the project website.** There, the materials are presented in a simplified and accessible format, serving as a guideline and reference resource for external stakeholders, organisations, and professionals interested in the topic. Promotional videos related to the project are hosted on a separate YouTube channel and embedded on the project website to support dissemination and communication activities.

In line with **Erasmus+ open access principles**, the project aims to make its results as widely available as possible. By providing open access to relevant resources and guidance materials, the project supports the further dissemination, reuse, and adaptation of its outputs by other institutions and stakeholders beyond the project partnership.

The next section highlights the capabilities of Moodle 5.1.3+[1] for creating accessible digital content and fostering innovative teaching and learning methodologies.

## MOODLE PLATFORM AND TECHNICAL INFRASTRUCTURE

Moodle is a widely used open-source LMS that supports flexible and scalable online education environments. Its modular design allows institutions to host courses, manage content, and support collaborative learning. A key advantage of Moodle is its ability to be self-hosted, giving universities control over data, system configurations, and integration with existing institutional systems, ensuring compliance with regulations such as General Data Protection Regulation (GDPR).

The Moodle instance used during the **chAnGE** project is self-hosted by the project partner **Carinthia University of Applied Sciences (CUAS)**, on a centralised server structure embedded into the university server infrastructure including security measures. The platform performs a backup every day during nighttime so that information is safely stored and can be reproduced on a daily basis.

## DIGITAL ACCESSIBILITY

During the **chAnGE** project the Moodle in Version 5.1.3+ was used as a digital platform to provide accessible content. Moodle 5.1.3+ offers a robust suite of tools and features that enhance accessibility for learners with diverse needs. These include:

- **WCAG 2.1 Compliance**: Moodle aligns with the latest Web Content Accessibility Guidelines (WCAG), ensuring that all resources are accessible to users with disabilities. Content provided on Moodle, including slides and videos, can be developed to meet at least AA-conformity levels and align with the European Accessibility Act.
- **Improved Screen Reader Support**: Navigation and user interactions in Moodle 5.1.3+ have been optimised for screen reader compatibility, providing an inclusive experience for visually impaired learners.
- **Enhanced Accessibility Checker**: Built-in tools help educators identify and resolve accessibility issues within course content, promoting inclusive design.
- **Flexible Layouts and User Customisation**: Moodle allows users to adjust font sizes, contrast settings, and colour schemes to meet individual accessibility preferences.
- **Speech-to-Text Integration**: Moodle integrates with third-party tools to enable speech-to-text functionality, supporting users with limited motor skills or auditory learning preferences.
- **Keyboard Navigation:** Moodle supports full navigation using keyboard shortcuts, making it accessible for users with motor disabilities.

However, there are always some restrictions based on the concepts, namely the following:

- **Language:** Moodle does not provide automatic translation or built-in translation tools for course content. To address this limitation within the project, the consortium created five language groups and

[1] Moodle documentation: https://moodledev.io/general/releases/5.1/5.1.3

offered the microcredentials in different project languages. As a result, instead of developing 25 courses, 84 course instances were created to deliver the same content in different languages.

- **Technical infrastructure:** even if the software and therefore the platform itself improves digital accessibility and offering more solutions, learners still need the necessary technical infrastructure (hardware, internet access).
- **Use of third-party providers:** Some content is provided by third-party providers (e.g. multimedia content or learning games) and can only be offered in the way it is made available by the provider. It is therefore important to use them with caution and not to tie any mandatory fees to their use.

## E-LEARNING POSSIBILITIES

The aim of the chAnGE project was to develop interactive, accessible, and bite-sized e-learning. Moodle 5.1.3+[2] supports a range of cutting-edge teaching and learning methodologies that are needed by teachers and learners:

- Gamification Enhancements: The latest version introduces customizable gamification options, such as interactive leaderboards, progress trackers, and achievement badges, which foster engagement and motivation.
- Challenge-Based Learning (CBL): Educators can design CBL activities that require learners to solve real-world problems collaboratively, leveraging discussion forums, wikis, and group assignments.
- Interactive Video Lessons: Moodle's updated video player supports annotations, in-video quizzes, and branching scenarios, enabling richer video-based learning experiences.
- Adaptive Learning Paths: Using Moodle's conditional activity settings, educators can create personalised learning paths tailored to learners' progress and performance.
- Enhanced Learning Analytics: Moodle 5.1.3+ includes advanced analytics dashboards that provide insights into learner behaviour, progress, and engagement, supporting data-driven decisions.

## MAINTENANCE, SUPPORT AND UPDATES

This chapter outlines the **technical support, maintenance, and update framework** for the Moodle-based learning platform used in the **chAnGE** project. During the project implementation phase, the platform is hosted and technically maintained by CUAS, ensuring stable operation, **data security, and compliance with European cybersecurity regulations and data protection laws (GDPR).**

The described maintenance structure supports the platform's operation throughout the project duration and the pilot implementation of the MCs, while also preparing for the transition to long-term hosting after project completion. The consortium plans to transfer the course content to another Moodle platform, in the **University of Lisbon in** June 2026. In case the transfer process requires additional time, Moodle course backups will be made available to the project partners. This ensures that the developed learning materials can be securely preserved and reused in other institutional LMS after the project has ended. During the transition period, the Moodle platform hosted by CUAS will remain active until the end of the project to ensure continuity of access.

[2] Moodle documentation: https://moodledev.io/general/releases/5.1/5.1.3

## DURING THE PROJECT IMPLEMENTATION

During the project implementation phase, the platform is hosted and technically maintained by CUAS, ensuring stable operation, data security, and compliance with European cybersecurity regulations and data protection laws (GDPR).

### Regular Update Schedule

The **Moodle LMS** at **CUAS** is subject to a **structured update cycle** to ensure security, system stability, and new feature integrations.

**Update Plan**

- **Daily Backups:** The platform undergoes **daily automated backups** to secure content and user data, stored on **CUAS's secure local servers** in compliance with **Article 32 GDPR (Data Security Measures)**.
- **Security Patches:** Applied **monthly** are to address vulnerabilities and prevent cyber threats.
- **Minor Version Updates:** Minor updates (bug fixes, UI enhancements) are integrated **quarterly**.
- **Major Version Upgrades:** Major upgrades (new Moodle versions) are scheduled **annually**, ensuring compatibility and new functionality.
- **Testing Phase:** All updates undergo testing in a **sandbox environment** before deployment, preventing conflicts with plugins and ensuring smooth transitions.
- **Planned Downtime (e.g. updates):** Users are notified **at least one week in advance** via email.

This schedule ensures compliance with **European cybersecurity directives (NIS Directive 2016/1148/EU)** while maintaining the **usability and efficiency** of the platform.

### Plugin Management

To enhance **teaching and learning experiences**, Moodle integrates a variety of **approved plugins** that comply with **GDPR** and **European accessibility standards (WCAG 2.1)**.

**Installed Plugins:**

- **H5P[3]:** Enables interactive, challenge-based, and game-based learning.
- **Turnitin[4]:** Plagiarism detection and academic integrity enforcement ( license-based).
- **Survey, Forum, and Polling Tools:** Supports participatory learning.
- **Media Upload & File Sharing:** Ensures structured digital content storage.
- **Gamification Elements:** Including quizzes, search games, and knowledge challenges to boost engagement.

All plugins undergo **regular review and updates** by the **CUAS Moodle technical team** to ensure security and continued compatibility.

### Legal and Compliance Aspects

All maintenance, updates, and data processing activities align with:

- **GDPR (Regulation (EU) 2016/679)** ensuring data security and student privacy.

[3] https://h5p.org/

[4] https://www.turnitin.de/

- **Directive (EU) 2019/790 on Copyright in the Digital Single Market**, governing content ownership.
- **European Accessibility Act (Directive (EU) 2019/882)** ensuring inclusive digital learning tools.
- **NIS Directive (2016/1148/EU)** mandating cybersecurity resilience for educational infrastructure.

## CONTENT PORTABILITY AND REUSE IN OTHER LMS

To ensure long-term sustainability and reuse of the developed MCs, the learning materials created within the Moodle platform will be exported and transferred to a Moodle instance hosted by the **University of Lisbon (ULisboa)**. The transfer is scheduled to take place in **June 2026**, ensuring sufficient time for verification and integration before the end of the project. During the transition period, the Moodle platform hosted by CUAS will remain active and continue to provide access to the learning content until the end of the project. This ensures continuity of learning and avoids disruption for active users. After the project ends, the Moodle instance hosted by CUAS will be decommissioned following successful transfer and verification of the materials.

The transfer process will be carried out using standard Moodle backup formats, including course structure, learning materials, and embedded resources. These backups will be securely shared with ULisboa and project partners to support implementation in their respective institutional environments, ensuring that all partners receive access to the materials for institutional reuse.

Following successful transfer and validation of the courses at ULisboa, the platform hosted there will serve as the primary environment for continued course availability for a minimum of five years after project completion, and responsibility for platform hosting, maintenance, and technical management will be assumed by the University of Lisbon. The platform will continue to follow institutional update cycles, including regular system updates, security patches, and monitoring procedures, ensuring long-term availability, system stability, and compliance with European regulations. If this transfer requires additional time, complete course backups will be provided to the partners, allowing the learning materials to be safely stored and imported into other institutional LMS. In this way, the project outputs remain accessible and reusable beyond the project's lifetime.

Where required, individual partners (e.g., UCC) may further adapt and integrate the learning materials into other systems, such as Canvas, based on local infrastructure and institutional needs. Plugin usage will be aligned with the technical infrastructure and policies of the respective hosting institutions.

## PROJECT WEBSITE SUSTAINABILITY

The project website serves as the central public access point for information about the project, its results, and selected learning materials. It provides external stakeholders with an overview of the developed MCs and acts as a reference platform for organisations interested in the project topics.

After the completion of the project, the website will be transferred to **University College Cork (UCC),** which will continue hosting and maintaining it for 5 years after the project ends. This ensures that project results, resources, and contact information remain accessible to the public and support the long-term dissemination and reuse of the project outputs. Promotional videos embedded on the website are hosted on

a dedicated project YouTube channel, which will also be maintained by UCC as part of the website's communication and dissemination infrastructure.

Due to differences between the WordPress system, used during the project, and the content management system used by UCC (TerminalFour), a direct technical migration of the website is not feasible. Therefore, the transfer of the website will be carried out in close coordination with UCC's web content team, taking into account institutional requirements, system constraints, and branding guidelines. **As direct server access between institutions is restricted due to security regulations, UCC technical staff cannot directly access the CUAS servers, and the CUAS web administration team will support the preparation and provision of the required website data.** Instead of a direct system-to-system transfer, the website content (including text, media files, and structural elements) will be secured through structured exports and backups. These materials will serve as the basis for transferring and/or reconstructing the website within the UCC content management system. The final approach (content transfer or partial/full rebuild) will be defined in collaboration with UCC to ensure an optimal and sustainable implementation.

Following the agreed approach, the technical team at UCC will implement the website within their institutional infrastructure and verify the integrity and functionality of the content. This includes validating page structures, media links, navigation elements, and ensuring that content formatting and functionality are preserved where possible. After successful import and verification, operational responsibility for hosting, maintenance, security updates, and long-term technical management of the **chAnGE** website will be assumed by UCC. CUAS will no longer maintain the live website instance after full migration. This approach ensures long-term technical sustainability by transferring operational ownership to UCC while maintaining flexibility in the technical implementation and ensuring that all project content remains accessible and reusable beyond the project duration.

## RISKS & RISK MANAGEMENT

The technical infrastructure of the **chAnGE** project relies on a Moodle-based learning environment hosted by CUAS, combined with external communication channels such as the project website and institutional networks for participant recruitment and registration. While this structure allows flexibility and accessibility for different partner institutions, it also introduces certain operational and technical risks that need to be considered.

The following section identifies potential risks related to platform operation, participant management, content sustainability, and technical infrastructure. Appropriate mitigation strategies are outlined to reduce the likelihood and impact of these risks.

## RISK MANAGEMENT

| Risk | Description | Impact/Probability | Mitigation Strategies |
|---|---|---|---|
| **1. Manual Participant Registration and Enrolment Process** | During the project, participant registration was not directly integrated into the Moodle platform. Learners had to register through the project website or partner institutions, provide GDPR consent, and were then manually enrolled in the respective Moodle courses by project staff. This process increases administrative workload and carries the risk of enrolment delays, human error, or incomplete documentation of consent. | **Mild Impact, Medium Probability** | 1. **Standardised Registration Procedures:** Establish clear internal procedures for participant registration, GDPR consent collection, and course enrolment to ensure consistency across partner institutions.<br>2. **Documentation and Data Tracking:** Maintain structured records of registered participants, consent forms, and course enrolments, to ensure transparency and compliance with GDPR requirements.<br>3. **Administrative Coordination:** Ensure coordination between the teams responsible for participant registration and platform administration to avoid delays or errors during the enrolment process.<br>4. **Platform Monitoring:** Regularly review participant lists within the Moodle platform to verify correct enrolments and ensure that learners are assigned to the appropriate language-specific courses. |
| **2. Presentation of External Content** | The inclusion of external content poses a risk in terms of accuracy, ethical considerations, and accessibility compliance. | **Low Impact, Mild Probability** | 1. **Instructor Accountability:** teachers must ensure external content is regularly reviewed for accuracy, accessibility, and ethical **considerations**.<br>2. **Content Review Standards:** Establish a standard protocol for content validation, including periodic content checks.<br>3. **Teachers Exchange:** Set up periodic faculty discussions to evaluate the validity of external content and explore alternative resources where necessary.<br>**4. Accessibility Compliance:** Ensure that external content adheres to accessibility standards; if not, provide alternatives or improvement suggestions**.** |
| **3. Platform Hosting Dependency** | The Moodle platform used during the project is hosted by CUAS. This creates a dependency on the hosting infrastructure and the availability of the server environment. In rare cases, technical issues such as server outages, cyber incidents, or network disruptions could temporarily affect access to the learning platform. | **Moderate Impact, Low Probability** | 1. **Regular System Backups:** Automated daily backups ensure that all course content and user data can be restored if technical issues occur.<br>2. **Institutional IT Security Measures:** The hosting environment follows CUAS institutional IT security standards to minimise risks related to cyberattacks or system failures.<br>3. **Monitoring and Maintenance:** The Moodle platform is monitored by the CUAS IT team to quickly identify and resolve potential technical issues. After the project, responsibility for platform monitoring and maintenance will be transferred to the University of Lisbon; individual partner responsibility will pertain to partners additionally implementing the MCs in their own LMS.<br>**4. Content Export Options:** Moodle course backups can be exported and transferred to other LMS if necessary, ensuring that the learning materials remain accessible. |

| | | | |
|---|---|---|---|
| **4. Sustainability of Learning Materials after Project Completion** | After the completion of the project, the continued use of the MCs and learning materials may depend on the priorities and technical infrastructure of the partner institutions. Without a structured sustainability approach, there is a risk that the developed materials may not be actively maintained or reused. | **Moderate Impact, Medium Probability** | 1. **Content Transfer Planning:** The consortium plans to transfer the developed courses to another Moodle instance operated by a partner institution, the University of Lisbon, in June 2026.<br>2. **Course Backup Availability:** Full Moodle course backups will be provided to project partners to ensure that selected learning materials can be imported into other institutional LMS.<br>3. **Open Access Resources:** Key project materials will remain accessible through the project website to support further dissemination and reuse.<br>**4. Institutional Reuse:** Partners are encouraged to integrate the developed MCs or selected learning materials into their own institutional teaching environments. |
| **5. LMS Migration and Compatibility Risks** | The MCs developed within the project are currently hosted on a Moodle platform. If partner institutions decide to migrate the learning materials to other LMS, technical adjustments may be necessary to ensure compatibility with different system structures, plugins, or course configurations. Without proper testing and adjustments, certain learning activities or interactive elements may not function correctly after migration. | **Moderate Impact, Medium Probability** | 1. **Use of Standard Moodle Backup Formats:** Export course materials using Moodle's standard backup formats to facilitate smoother migration to other LMS environments.<br>2. **Testing After Migration:** Conduct functional testing after transferring courses to a new platform to ensure that learning activities and resources work as intended.<br>3. **Documentation of Course Structure:** Maintain documentation of course structures, activities, and external integrations to support technical adjustments during migration processes.<br>**4. Technical Support by Hosting Institutions:** Ensure that the institution hosting the migrated courses provides the necessary technical support to address compatibility issues. |
| **6. Cybersecurity Risks** | Digital learning platforms may be exposed to cybersecurity risks such as unauthorized access attempts, phishing attacks, malware incidents, or system vulnerabilities. Although institutional IT infrastructures typically implement security and monitoring systems to reduce these risks, potential cybersecurity incidents could temporarily affect access to the learning platform or disrupt the availability of course materials, regardless of whether the MCs are hosted on Moodle or another LMS. | **Moderate Impact, Low Probability** | 1. **Institutional IT Security Policies:** Ensure that the hosting institution follows established IT security policies and standards to protect the platform infrastructure.<br>2. **Regular Software Updates:** Ensure that the LMS platform and all related plugins or integrations are regularly updated to reduce potential security vulnerabilities.<br>3. **Access Control Management:** Implement appropriate user access controls and authentication procedures to prevent unauthorized access.<br>**4. System Monitoring and Incident Response:** Maintain monitoring systems and procedures to detect and respond to potential cybersecurity incidents quickly. |

## EXTERNAL SOURCES

Some learning activities within the MC courses on the Moodle platform make use of externally hosted, self-developed educational games or other external sources and materials not hosted directly on the Moodle platform or the LMS used. These (interactive) elements are integrated into the course for learning purposes but are technically not part of the course content package hosted on the Moodle platform itself. **Thus, the institutions responsible for hosting and maintaining the MCs cannot guarantee the long-term availability, functionality, or compatibility of these externally hosted sources.** They remain external resources and are not included in the materials transferred, maintained, or guaranteed as part of the MC content delivered through Moodle.

They may be modified, relocated, or discontinued independently of the course infrastructure. The presence of these activities within the course, therefore, does not imply responsibility for their maintenance, and course providers cannot be held liable if such external resources become unavailable or change in the future. During the project, the MC lead partner is responsible to check the availability of the sources and may change them if they are no longer available. After the project, the responsibility for maintenance stops. To minimise the risk of losing access during the project, partners are encouraged to document external sources and, where possible, keep alternative materials available.

## CONCLUSION

By implementing the **outlined mitigation strategies**, the risks associated with platform hosting, external content integration, participant management, and **long-term sustainability** of the **learning materials** can be **effectively addressed**. Regular evaluations and coordination among project partners help ensure the stability and reliability of the digital learning environment during the project implementation phase.

In addition, the **portability** of the **Moodle courses** and the availability of **course backups** ensure that the developed MCs and **learning materials remain accessible** and **reusable beyond** the **project duration**.

## REFERENCES

[1]. BenchPrep (2024). Intro to LTI. Retrieved from: https://support.benchprep.com/kb/article/2103-1-intro-to-lti/

[2]. Regulation (EU) 2016/679 (General Data Protection Regulation - GDPR)

[3]. Directive (EU) 2019/790 on Copyright in the Digital Single Market

[4]. Directive 2002/58/EC (ePrivacy Directive)

[5]. European Higher Education Area (EHEA) Guidelines on Digital Education

[6]. Regulation (EU) 2018/1725 (Data Protection in EU Institutions)

[7]. NIS Directive (2016/1148/EU) on Network and Information Security

[8]. European Commission (2023). Cybersecurity in Higher Education Institutions. Retrieved from: https://digital-strategy.ec.europa.eu/en/policies/cybersecurity-higher-education

[9]. Moodle (2024). Moodle Security Guidelines. Retrieved from: https://docs.moodle.org/

[10]. Ströckl, D.E., Hoffland, M.D., and Zoulias, E., (2023). Survey Results on Online Teaching and Learning Environments in the European EMMA Project. Healthcare Transformation with Informatics and Artificial Intelligence. IOS Press Open Access. DOI: 10.3233/SHTI230523

[11]. Ströckl, D.E., Hoffland, M.D., and Stitzel, A., (2022). Building an Online Joint Program Platform Architecture for the "EMMA" Project. Forschungsforum der Österreichischen Fachhochschulen. Villach, Austria.