Deliverable 2.1

Specification of e-learning platform

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Abstract:	This activity will produce an analysis of the e-learning platform and software specifications and the hardware components required, as well as the limitations and prospects of the portal and e-learning environment that will be used. This activity will be performed by taking into consideration the results of previous tasks.

Keyword List:	Software specifications, e-learning environment

Consortium

Part. #	Partner name	Partner short name	Country
1	Eszterházy Károly Catholic University	EKCU	Hungary
2	University of Padova	UP	Italy
3	University of Cadiz	UC	Spain
4	EPLEFPA Bordeaux Gironde	EPLEFPA	France
5	Polytechnic Institute of Braganca	IPB	Portugal

1. Introduction

This report precises and highlights the main specifications of the platform, in line with the objectives of the VitEnoClimat project.

The EKERNEL e-learning framework is being developed under the guidance and cooperation of the IT Development Institute of Eszterházy Károly Catholic University. In addition to the staff of the Institute, colleagues working in other departments of the University are also involved in the development.

The Basic System of the EKERNEL framework contains the essential subsystems and basic services that are required to operate a reliable, secure, and flexible system. Its integrated, layered, and modular structure allows additional subsystems and modules to be built on it. It can be easily scaled and expanded according to the use and can operate in a distributed manner. Automatic content synchronization is also possible between geographically distant servers.

List of the major portals built on the EKERNEL software engine:

- Office of Education National Public Education Portal (nkp.hu)
- Complex Basic Program KAPU system (komplexalapprogram.hu)
- Catholic Pedagogical Institute Digital Textbook Interface (kattan.hu)
- Eszterházy Károly Catholic University portal (www.uni-eszterhazy.hu)
- Teacher Continuing Education System (tovabbkepzes.uni-eszterhazy.hu)
- Pegazus e-learning system (pegazus.uni-eszterhazy.hu)
- LELLE international knowledge sharing portal (lelle2.eu)
- Food Improviders - international knowledge transfer portal (foodimproviders.eu)

1.1 Project Overview

One of the biggest challenges of recent years and the near future is to tackle the serious problems caused by global warming. In addition to the high vulnerability of agro-ecosystems, mainly caused by rising atmospheric carbon dioxide level, climate change will inevitably have an impact on all levels of human life. Climate change issues are increasingly present in our daily lives and there is a growing societal need to raise awareness by increasing information and up-to-date knowledge about global warming. This is particularly true in those areas (natural, economic, social, traditional, and cultural) where climate change has complex impacts.

Educational materials developed by partner institutions will be adapted to e-learning format. The e-learning platform will provide a range of learning opportunities and will be available for self-training and self-monitoring, as well as short videos, webinars, and podcasts on best practices. The platform will also provide a forum for users to discuss specific topics. Using the platform will enhance users' digital competences and skills.

1.2 *Purpose and Scope of this Specification*

The overall objective of WP2 is to develop a tailored e-learning platform, adapt and integrate the raw learning contents developed in WP1 for online media and self-learning purposes and to test the platform before wider usage in the implementation during WP3. The training content and the platform developed will also be translated in the language of the consortium from English where appropriate. Now, we are not familiar with a platform that provides a suitable surface for teaching and learning, considering the specific needs identified in the project. At present, the partner institutions that are far apart but have accumulated knowledge relevant to each other, cannot share local specialties and good practices effectively. Therefore, we feel it is necessary to create a platform for a more efficient transfer of knowledge to students and between partner institutions. Higher education students will be the main beneficiaries of this new interface, as it will make their education more effective. In general, of course, the whole sector will benefit, as better trained, more open-minded professionals will be employed in wineries and vineyards. The platform will be expandable to provide the surface of the theoretical background for other practice-oriented training courses in the future.

1.4 *Disclaimer*

2. E-learning platform

In this section, the general specifications related to the e-learning platform of the project, as well as the tools proposed to be used, are described. The platform will work in three different authorities: content manager, editor and user (learner), which will be referred to each other in an agile way. The specifications are proper for each of them, otherwise will be denoted.

2.1 *Overview of EKERNEL basic functions*

Subsystems, basic modules, interfaces

Fault-tolerant distributed database layer - the databases storing system data are distributed on several servers. Servers can even be in geographically remote locations.

Virtual file system – The Virtual file system is suitable for distributed storage and management of folders and files (documents, images, videos). The distributed databases in the background can be expanded and can form a virtual storage cloud by involving several servers.

Module integration interface - It performs the integration of modules based on the Basic System and standard access to basic services.

Search Engine Indexing Service – Content recorded in any module of the system is pushed into the Search Engine through the indexing services that enables searchability.

Read-write (CRUD/View) application interface – All modules use this interface to perform secure database read-write operations.

Event logging subsystem – The system's own operation and the activities of users are recorded by the event logging subsystem. All the activities are traceable.

Standardized authentication service – The users' login to the system through a service based on the oauth2 standard. This method makes it possible to login to EKERNEL from any external system (Google, Facebook, etc.) using the oauth2 standard.

Message and email sending service – Services that support the transmission of system messages and the exchange of messages between users.

General activity evaluation subsystem - The subsystem with special algorithms that evaluates the so-called smart activities and smart activity series.

System monitoring modules – A subsystem that monitors and supervises the distributed system that contains several modules. It ensures 24-hour monitoring of the system and notifies the system operating colleagues of any disorder.

Permission system

- Manage users (role): Manage user rights based on role.
- Manage groups (system level): Manage system-level authorization groups.
- Manage institutions: Create institutions and institutional admins.
- Management of institutional groups (e.g., classes, study groups): Management of groups within the institution by the institutional administrator and teacher.
- Write-Read and View rights: Depending on user authorization, modification and viewing permissions can be assigned to the fields and tables containing data in the system.
- Elementary right search: With the help of this function, you can view all the modification and viewing permissions held by a user.

Process management (workflow)

- Manage users (role): Manage user rights based on role.
- Workflow types: Workflows with different topics and different stations can be created in the system (e.g.: Book editing process, Activity creation process, etc.).
- Workflow states: Process types are made up of these. For each state, you can specify whether the data can be edited in the given state, as well as whether it is at the beginning (starter) or at the end (closed) of the process.
- Workflow transition types: Connection of the process states, from which state to where the process can be forwarded.

- Workflow restriction matrix: Allowed and forbidden process transition combinations can be set here.
- Simple view for editors: The view created for users involved in editing. Through this, the workflow - set by the admin - can be managed easily and comprehensibly.
- Workflow flowchart: Visual display of the adjusted workflow on a graphical interface.
- My duties: List of processes delegated to the user.

Portal administration module

- Admin and support functions: The main page of the administration interface. All administrative activities can be performed on the interface.
- Active logins: A menu item available for admin users and the logged-in users can be viewed through that.
- Meta category types: Meta data can be managed separately for each content type.
- Business day setup: Holidays and non-working days can be freely set in the calendar function.

2.2 Overview of EKERNEL user functions

Login

- Multi-factor identification: This function requires a uniquely generated login code in addition to the password during the login process. Anyone can set it up in the My Profile menu, but only users with admin rights must use it.

Profile page

- View notifications: List of notifications. Viewing messages sent by other users or the system can be opened from the header by clicking on the notifications icon.
- Profile customization (notification email address, display name): Interface where the users can customize their user accounts.
- View your own roles and group memberships: Display roles and group memberships in the table at the bottom of the profile page.
- Accepting group requests: The list of requests (acceptance, rejection) is also displayed in the table at the bottom of the profile page. We also receive information about group requests in the form of a system notification.

User dashboard

- Dashboard: A customizable summary page that can also be the landing page for logged in users.
- Information tiles that can be placed on the dashboard:
    - Recently viewed content
    - View favorites
    - Recommended videos
    - Favorite videos

- Notifications tile
- Time and date tiles
- Upcoming things to do
- Content distributed by me
- Content shared with me
- Progress
- Note
- List background processes for admin users

Book display subsystem

- The system that displays educational materials (textbooks): The subsystem that stores and generates digital textbooks.
- Landing page: The main page where the user usually arrives when opening the portal.
- Normal view: The default view for textbooks, displaying a mixture of text sections and additional content.
- Textbook view: A view of textbooks that displays text sections and additional content separately.
- Presentation view: A view of the textbooks that helps to present it (in a scrollable form per section).
- Highlighting and commenting: With the help of this function, we can highlight the texts selected in the textbook in yellow or add comments to them.

Book editor

- HTML editor for books: HTML editor is a complete editorial module that covers a major part of editorial work. On this interface, you can create new books, chapters, lessons, add content to the course materials, and edit the added content. The curriculum elements move through the workflow management system between the individual roles (editor-proofreader-publisher).
- Book, activity publication (workflow): Completed books go through a publishing process, so only those books that have gone through this process are visible under this menu item
    - Under the process button, you can view more detailed logging data and send the content (book) to the next state.
    - With the Forced publication button, the entire book and all its contents can be published with one click (this requires high privileges).

Media library

- The storage of the user's own files, tasks, shares, and books.
- Create or delete a new element / folder: With its help, you can create folders or folder structures and upload any element into them.
- Cut / copy, paste (into a folder / under a content element): The file and folder management options of the content repository.
- Sharing - content shared by me/with me: There are dedicated folders for sharing in the content library. File, folder, smart activity, and smart activity series can also be shared. It is only possible

to share your own content (officially published tasks cannot be shared, because they are available in the system in another way).
- Manage favorite content: There is a dedicated folder in the content library for managing your favorite content.
- Permission system for folders and files: You can restrict the access of folders and files according to users and user groups.
- Viewing history (history): A query can be run from a separate menu item in the content library, which lists previously viewed lessons, activities, and activity series.

Search engine

- Search (in the entire file, by keyword, simple, tools): A simple (Google-like) interface where you can search for content in the system.
- Option to subsequently narrow the list of results (by type): Narrowing the list of results on the interface (all, text, video, image, etc.).
- Advanced search: Search and filter based on several criteria.
- Play all content (from the entire file): Play the content found in the search engine in an adequate player.
- Automatic search suggestions when typing: While typing a search keyword, it offers keywords from the content in the system.

Public media library

- Media store (interface): All media types can be searched in the Media store.
- The videos are linked from Vimeo's private channel, where the videos are uploaded via an API connection.
- The Media Library gives unique recommendations considering the uses.

Public activities library

- Public activity repository: A collection of smart activities, where you can search and filter them.
- All published activities that have been uploaded to the system are displayed in the Activity Library.

Activity engines

- The activity engines are evaluated by the General activity evaluation subsystem.
- Intelligent activity engine (recommendation of related content): In case of a wrong answer, specifying the location of the possible correct answer.
- Simple activity series: Different types of activities can be combined into one list. These are called activities.
- Adaptive activity series: A series of activities that gives the next question a harder or easier activity based on the solution of the person completing it.
- Progress: A report that provides statistics on the activities (results) solved.

- Activity assignment: The authorized person (e.g., Teacher) can assign activities to other persons (e.g., students).
- Assignment control, replay: It is possible to check who, when and what activity was assigned, what is the submission deadline, etc. The activities can be replayed according to the original solution steps.
- Activity engine types:
    - Sorting into sets
    - Cuckoo egg
    - Crosswords
    - Puzzle Quiz Memory game
    - Sentence completion (drag and drop)
    - Sentence completion (drop-down list)
    - Match (drag and drop)
    - Matching quiz
    - Link pairing
    - Sorting
    - Sudoku
    - A number lines
    - Number pyramid
    - Text replacement
    - Table completion (drag and drop)
    - Free text table completion
    - Drag to area
    - Blind map
    - Lightning question

CMS (WEB page editor module)

- Editing pages: The interface created for editing the menu items in the header and their contents.
- Editing articles: Creation of articles appearing under the News menu item and the interface created for editing the content of them.

Handling basic media types

- Video: Video files are uploaded to Vimeo's servers and played from there.
- Audio: Play audio files.
- Image: Display images in any format.
- Document (Word, Excel) upload and download: Various document formats (doc, docx, ppt, xls, xlsx, etc.) can be uploaded to and from the content library.
- External reference: External references can be placed in books.
- PDF file: Files with the pdf extension can be uploaded to and downloaded from the content library.
- Book element (aka section): book elements can be created in the HTML editor.
- Evaluating content (like): It is possible to evaluate various contents using the Like button.

General learning object editor functions

- Properties (keyword entry): Enter keywords for content.
- Store versions (current version, version history): Save the version of each element.
- Manual differentiation of activities: Five levels of difficulty can be set for the tasks in the task editor.

Learning path, study management

- Collections: Collect contents (books, assignments, media elements) into your own collection.
- History: List the contents most recently viewed by the user.
- Assignment of an activity sequence: Assignment of an activity set to a student or student group.
- Completing and submitting activity series: Completing the activity series and picking it back up manually or automatically.
- View progress: Queries about the success of solving the activities completed in the book.
- Teacher evaluation of a series of activities: The teacher can grade the series of activities with a text evaluation and overriding the point achieved.
- Manually adaptive activity sets: The teacher takes care of the diversity of the level of the activities selected in the activity set.

Multilingual elements

Multilingual capabilities needed to ensure that there are no linguistic limitations for online learning. Seven languages required: the native languages of the consortium partners (Hungarian, Italian, Spanish, French and Portuguese) and English.

Cooperation with the e-learning environment

There will be some requirements related to the e-learning environment, which is a web-based environment that contains the corresponding educational material. The functional and non-functional requirements of the e-learning environment are described below, under chapter 3. The e-learning environment should be usable any time on any device with cross-browser compatibility.

2.3 Hardware proposal and requirements

The e-learning platform that will be developed for VitEnoClimat is proposed to operate under the following hardware requirements, to ensure compatibility with the proposed software, good performance, capacity, availability and latency, good security features, as well as maintainability and portability:

Virtual hosting environment featuring
▪ RAM: 16 GB memory

▪ Hard drive initial capacity: 4 vCPU
▪ CPU: 256GB SSD storage place for the operating system and the database server. An additional 100 GB HDD storage space for the media items
▪ Operating system: Ubuntu 20.04 LTS

This hardware must be able to run flawlessly:

- Processor: 1GHz (min), 2GHz dual core or more recommended.
- Memory: 512MB (min), 1GB or more is recommended.
- Consider separate servers for the web "front ends" and the database.

This will ensure that all desktop clients (Windows, Linux, iOS), as well as mobile devices, with the latest browsers versions, can access the e-learning application at any time without disruption.