Erasmus + Project No 598241-EPP-1-2018-1-RS-EPPKA2-CBHE-JP

Strengthening Educational Capacities by Building Competences and Cooperation in the Field of Noise and Vibration Engineering
S E N V I B E

Report on the Requirements and Design of the ICT Platform

First Report

Activity 2.1

Date: 15/01/2019

Content:

1. Descriptions of the ICT Platform

One the main service and products planned to be achieved during the SENVIBE project is the design, establishment and use of the ICT platform (e-SENVIBE). The access to the platform will be navigated via the menu bar of the SENVIBE web-site https://senvibe.uns.ac.rs/ (see Figure 1, where 'e-SENVIBE' is encircled by a white ellipse)
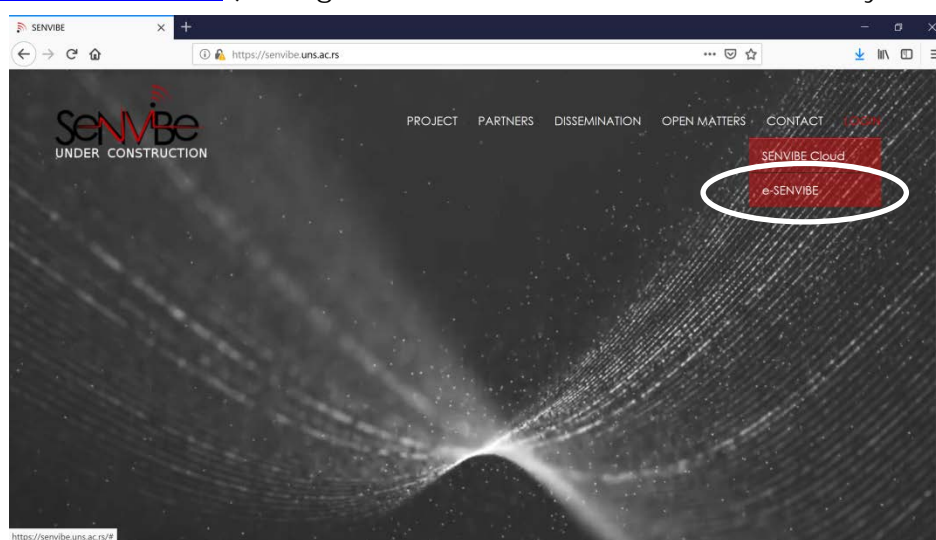

Figure 1. Access to the ICT platform (e-SENVIBE) via the SENVIBE web-site

The ICT platform will be hosted by the University of Novi Sad (UNS). It will be designed, maintained and updated by the UNS IT-team. This platform will have various types of users (accessing it from a variety of devices) and a multiple purpose.

Among the users (U) are:
U1. SENVIBE HEI partners and their students (remote access);
U2. Students of a new MSc programme on Vibro-Acoustic Engineering at the UNS (direct access);
U3. Attendees of LLL courses (remote access);
U4. Stakeholders engaged in No&Vib Hub (remote access).

Its purpose (P) is associated with the following functional aspects and the aforementioned users:
P1. Education (U1, U2, U3);
P2. Exchange of measurements data (U1);
P3. Communication (U4);

P4. Collecting contributions (U4);
P5. Dissemination (U1-U4);
P6. Exploitation (U1-U4);
P7. Sustainability (U2-U4).

These aspects are described subsequently. The main purpose of the ICT platform is educational. As such, it will be enhanced several times during the development phases, especially when the learning/teaching materials get ready, as indicated in the Workplan. It is planned that some of the measurements are provided on the ICT platform (as video forms and/or numerical measurement data), so that students from all HEIs included in the SENVIBE project can access them remotely and practice their processing and analysis by themselves. Remote access to certain material will be provided to the attendees of the SENVIBE LLL courses as well. Besides being a resource library for e-learning and b-learning, the ICT platform will be used to distribute learning materials to new MSc students, track their achievements, set assessment tasks, receive completed assessment tasks and host moderated discussions, including answering questions. Other benefit of the ICT platform will be manifested through continuity of EU partners' involvement in learning materials and knowledge transfer after the SENVIBE project is finished. This will have an impact on continuous knowledge transfer as well as on the exploitation and sustainability, especially related to the MSc students after the project completion. The ICT platform will be used for dissemination of e-learning and b-learning materials for the courses and the MSc programme developed during the SENVIBE project as well as for general dissemination about the SENVIBE project, as all the learning/teaching materials developed and distributed will have the SENVIBE logo and (when possible) the SENVIBE QR code clearly shown. A Moodle of the ICT platform should be specially developed and adapted for the sake of stakeholders involved in the No&Vib Hub and it should continue to exist after the end of the project for the sake of exploitation and sustainability. This Moodle should have channels for communication with stakeholders and for collecting their contributions (this should be precisely defined when the outcomes of WP1 and WP6 have been reached).

2. Experienced-Based Recommendations

2.1 IT Platform requirements and end-users

The main use envisaged for the IT platform is for the delivery of education material and assessment, be it for either credit bearing courses at the Serbian HEIs or for Life Long Learning courses. Hence, much of the focus and description will concentrate on the choice of software for such applications.

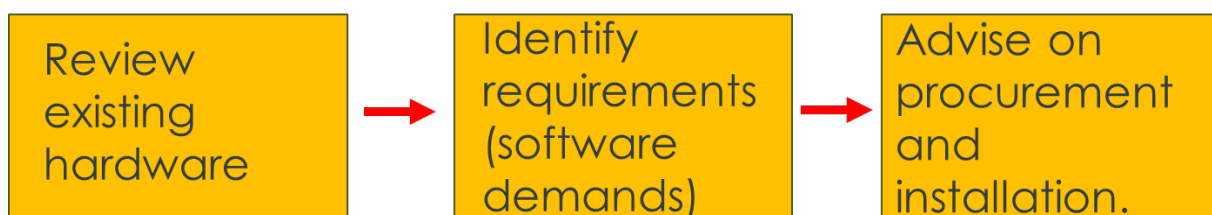The activities for this work package is illustrated in Figure 2 below.

Figure 2. An overview of the activity for work package WP2.1

Fairly earlier in the hardware considerations it was identified that one could have either a centralized system with a server hosted in one institution, and all other users connecting to it, or a system build around a set of independently configured but networked or connected systems . In either configuration, some software could be web or cloud based. Sharing licensing might lead to some cost reduction, for example, where there is a limit of the number of users possible at any one time. The issue of sustainability and compatibility would tend to support having a server based at one HEI that hosts the software to be used on this project and future noise and vibration activities, which could be managed and supported by IT staff at that one institution.

Figure 3 illustrates the expected target groups that will interface and use the IT platform, either during the period of study as a full, part-time of Life Long Learner. For the purposes of education, an overview of suitable software and the experience of Learning Management Systems at the University of Southampton is presented in sections 2.2 and 2.3 respectively.
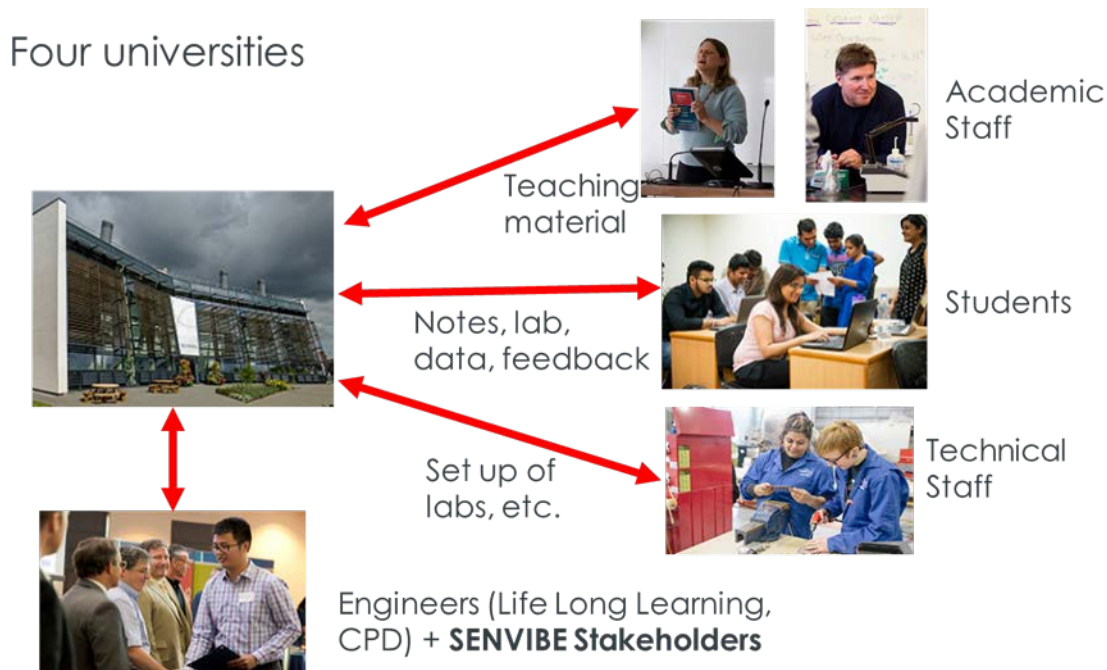
Figure 3. Identified target groups and end users of the IT platform to be established as part of the project outcomes.

2.2 An overview of Learning Management Systems (LMS) for Education purposes

A number of Learning Management Systems exists and can be divided into two different groups, namely open-sourced (or free) software or paid for commercial software. Whilst the former open source is freely available and to use, there can be limited functionality or the need for substantial support at the host university or establishment to install and manage the software and its capabilities. Paid for software obviously comes at a price, typically the costs are not publically available but are on a case by case basis and usually costed around the size of the institution and/or the number of end users and support from the commercial supplier is often part of the paid for package arrangement.

There are a few competing leading software systems, the largest number of users in terms of full time equivalent educated students using the software is held by the Blackboard Learn commercial code followed by the open sourced Moodle software (see https://www.paradisosolutions.com/blog/moodle-vs-blackboard-whos-the-

6

winner/). Partner 3, the University of Southampton, use the Blackboard Learn and Partner 1 uses the Moodle software. Many other codes exist, such as Angel, Desire2Learn, Sakai and Canvas. Partner 2 (KTH) now uses the open source code Canvas that appears to have similar functionality as the others but not so widely used and likely to have a reduced size support community for development and assistance when trying to resolve issues. Hence, for this project the obvious way ahead was to identify the preferred option of either using Moodle or Blackboard Learn for the software to be hosted and used as the IT platform system.

2.3 The use of the Blackboard Learn system at Partner 3

Computing facilities, both hardware and software, are centrally managed over the complete educational institution covering all areas of teaching, research and enterprise (consultancy). This means that all computing hardware is university owned and sourced according to procurement arrangements and likewise all software, especially for the Learning Management System, is provided across all hardware and accessible via university provided secure login information. Blackboard can be accessed both on and off site as it is a web based service, typically compatible with most web browsers although only recently has it been made more user friendly for mobile devices and phones with a Blackboard Student App. The App though is only available for students and not for instructors' use. Its functionality includes notifications, taking assignments and tests/quizzes to review performance, view course grades and attach assignment files via Google Drive, Dropbox or OneDrive. The App has IOS, Android and Windows phone device compatible versions.

From the experience of an academic, the use of Blackboard is greatly enhanced because of the functionality and integration of it into some but unfortunately not all centrally managed student information systems. The Student Records System (Banner) manages the student registration, choice of modules and the marks and this provides the registered student lists for the modules, provides contact details (emails etc., which Blackboard can use for announcements, contacting them etc., and assessment lists) and then each student's personal view will just be the applicable modules for that particular session. The taught material, e.g. lectures, assignments, etc., are hosted or uploaded onto Blackboard and can be realized in a timely manner, statistics recorded on the views as well as allowing video or other multi-media material to be provided. One particular useful feature, due to the integration of video capturing software for the lectures (Panopta), is that the lectures can be recorded and uploaded direct to

Blackboard. Some functional editing of these videos is then available for post-lecture time or remote access viewing but not for real time web streaming.

Assignments can be submitted to the system in various formats in predefined submission timescales, but typically the file formats are restricted to Word or pdf files for ease of size etc. Another software integrated into Blackboard, via a site license, is the plagiarism checking software Turnitin (see https://www.turnitin.com/). Similarity reports and original source identification can then be provided to both the assessors and ultimately the student.

Whilst not replacing the Student Record System and other places that hold module information for accreditation and quality assurance purposes, typically each Blackboard course (a course being the name given for the module) holds the module profile, a schedule of the contact time(lectures, laboratory classes and tutorials although not fully integrated with the central university timetabling system so it is a static rather than dynamic dataset which needs updating). Typically, electronic version of any lecture notes, teaching material and background reading are also uploaded in addition to the recorded video of the lectures. For interaction with the teaching staff, there can be discussion boards set up although the practicality of their usage needs investigating further for large class sizes.

2.4 The use of Moodle at Partner 1

Moodle has been trialed and used for a number of years. Its functionality is in many ways similar to Blackboard learn although its layout and graphical views are not identical. Section 3 will aim to give an independent opinion on the comparison of Blackboard lean with Moodle, given that these are the leading software candidates and there is no need to look elsewhere for other alternatives. A general comment provided by many other LMS reviewers worth reproducing is that Blackboard is designed and prioritizes better assessment tools for the teachers, i.e. quizzes gradebook assessment etc., whilst Moodle tends to focus better and more on the engagement tools for the learners.

3. Overview of the Platforms Tested

3.1 Overview of the Blackboard Learning system

Blackboard Learn is a virtual learning environment and course management system developed by Blackboard Inc. It is Web-based server software, which features course management, customizable open architecture, and scalable design that allows integration with student information systems and authentication protocols. It may be installed on local servers or hosted by Blackboard ASP Solutions. Its main purposes are to add online elements to courses traditionally delivered face-to-face and to develop completely online courses with few or no face-to-face meetings.

3.2 Overview of the Blackboard learning system features

Organizational Features

Calendar - Enter important events and deadlines and allow students to enter their own events.

Search - Search for content in the course.

Syllabus - Provide course requirements, objectives and policies.

In the IT language, this is the Learning Guide.

Gradebook – Summary of student marks for all assessments and assignments.

Tracking tool

- Summary of Activity: Provides an overview of general student activity.
- Tool Usage: Provides an overview of how often tools, such as Assessments, Assignments or Discussions, are used.
- Course Item Usage: Provides an overview of how often items, such as a quiz, an assignment or a discussion topic, are used.
- Entry Page or Tool: Provides an overview of the pages or tools most frequently used as course entry points.
- Exit Page or Tool: Provides an overview of the pages or tools most frequently used as course exit points.
- File Usage: Provides an overview of the files viewed most frequently.
- Student Tracking: Provides a detailed summary of activity information for individual students.

Communication Features

Announcements - Post important information in a central location.

Chat - Chat with other users in the course in real time or use the Whiteboard to display images.

Discussions - Post and respond to messages on specific topics. Discussions may be graded, or peer reviewed. There are three kinds of discussion:

- Threaded. Create a threaded topic for a more traditional online discussion. Users post and reply to messages. Replies that are associated with the same post are grouped together, creating message threads that can be expanded and collapsed.
- Blog. Create a collaborative blog (weblog) space by allowing participants to post a chronological series of entries on a particular topic. Participants can then add comments to any blog entry.
- Journal. Give students a place for their own writing. The journals can be kept private between the student and the Section Instructor or shared with the class. Mail - Send messages to other users within the course. Attachments may be used. Profile - View profiles for course members. Users can edit their own profile. Who's Online - Chat with other users who are logged in to Blackboard.

Student Learning Activities

Assessments - Create quizzes, self-tests and surveys.

Assignments - Create assignments for students to submit online. Students can work independently or in groups. SafeAssign or DirectSubmit may be used for plagiarism detection.

Goals - Create goals that list the qualitative and quantitative performance expected in your course. These goals may be associated with particular activities, assessments or learning modules.

Content Features

Learning Modules - Organise and present content and activities to students.

Local Content - Allow students to access large files easily from a portable medium, such as USB, instead of downloading the files from Blackboard.

Media Library - Create a glossary or image collection.

Web Links - Create links to Internet resources. Links may be annotated.

Student Tools

My Files - Allow students to store their own files.

My Grades - Allow students to check their grades.

My Progress - Allow students to track their own progress.

Notes - Allow students to take notes.

3.3. Overview of the Moodle learning system

Moodle is an open-source learning management platform designed to help schools educate their students. Moodle is based on a modular design that lets teachers and administrators build their own curriculum using plug-ins for various workflows, content and activities. Administrators have a choice of either installing their Moodle account on their servers or in the cloud. The cloud-based platform, called MoodleCloud, provides several benefits, such as accessibility anytime, scalability and a very short implementation process.

3.4. Overview of the Moodle features

General Features

- **Modern, easy to use interface** - Designed to be responsive and accessible, the Moodle interface is easy to navigate on both desktop and mobile devices.
- **Personalised Dashboard** - Display current, past and future courses, along with tasks due.
- **Collaborative tools and activities** - Work and learn together in forums, wikis, glossaries, database activities, and much more.
- **All-in-one calendar** - Moodle's calendar tool helps you keep track of your academic or company calendar, course deadlines, group meetings, and other personal events.
- **Convenient file management** - Drag and drop files from cloud storage services including MS OneDrive, Dropbox and Google Drive.
- **Simple and intuitive text editor** - Format text and conveniently add media and images with an editor that works across all web browsers and devices.
- **Notifications** - When enabled, users can receive automatic alerts on new assignments and deadlines, forum posts and also send private messages to one another.

- **Track progress** - Educators and learners can track progress and completion with an array of options for tracking individual activities or resources and at course level.
- **Useful new dashboard blocks** - Keep up to date with the Timeline block, the Starred courses block, the Recently, accessed courses block and the Recently accessed items block, all available for the dashboard.
- **Nextcloud integration** - If enabled by the administrator, Nextcloud repository may be searched for uploading files to your courses, both as copies or access controlled links.
- **Record assignment feedback -** Media and other file uploads are now permitted when grading assignments, meaning teachers can record their feedback and/or include supporting images or other files.

Administrative Features

- **Customisable site design and layout -** Easily customize a Moodle theme with your logo, colour schemes and much more - or simply design your own theme.
- **Secure authentication and mass enrolment** - Over 50 authentication and enrolment options to add and enroll users to your Moodle site and courses.
- **Multilingual capability** - Allow users to view course content and learn in their own language, or set it up for multilingual users and organizations.
- **Bulk course creation and easy backup** - Add courses in bulk, backup and restore large courses with ease.
- **Manage user roles and permissions** - Address security concerns by defining roles to specify and manage user access.
- **Supports open standards** - Readily import and export IMS-LTI, SCORM courses and more into Moodle.
- **High interoperability** - Freely integrate external applications and content or create your own plugin for custom integrations.
- **Simple plugin management -** Install and disable plugins within a single admin interface.
- **Regular security updates** - Moodle is regularly updated with the latest security patches to help ensure Moodle site is secure.
- **Detailed reporting and logs -** View and generate reports on activity and participation at course and site level.

Course Development and Management Features

- **Direct learning paths** - Design and manage courses to meet various requirements. Classes can be instructor-led, self-paced, blended or entirely online.
- **Encourage collaboration** - Built-in collaborative publishing features foster engagement and encourage content-driven collaboration.
- **Embed external resources** - Teach materials and include assignments from other sites and connect to the gradebook in Moodle.
- **Multimedia Integration** - Moodle's built-in media support enables you to easily search for and insert video and audio files in your courses.
- **Group management** - Group learners to share courses, differentiate activities and facilitate team work.
- **Marking workflow** - Conveniently assign different markers to assignments, manage grade moderation and control when marks are released to individual learners.
- **In-line marking** - Easily review and provide in-line feedback by annotating files directly within browser.
- **Peer and self assessment** - Built-in activities such as workshops and surveys encourages learners to view, grade and assess their own and other course members' work as a group.
- **Integrated Badges** - Fully compatible with Mozilla Open Badges, motivate learners and reward participation and achievement with customised Badges.
- **Outcomes and rubrics** - Select from advanced grading methods to tailor the gradebook to the course and examination criteria.
- **Competency based marking** - Set up competencies with personal learning plans across courses and activities..
- **Security and privacy** - Teacher can create classroom which only his students can attend.

4. Conclusions and Future Work

Both platforms Blackboard Learning and Moodle provide similar functionality in terms of their core features and tools they can provide, but they are totally different in terms of licensing. Blackboard Learning is business driven product, which requires licensing for core functionality and for every additional added feature. So the price of such system can go really high, depending of the needed functionality. On the other side, Moodle is community driven open source software and it totally free. Implementing additional functionality does not require any additional payments, but there is always an option for premium functionalities. Plugins and themes are created and maintained by the community and companies, so they can be easily updated to the latest security standards. Because Moodle supports NextCloud integration, SenvibeCloud can easily be integrated as the internet storage for all the users.

Therefore, we suggest that Moodle system is best suited for the SENVIBE project as an ICT learning platform. It is flexible and it can provide wide range of additional functionalities that are needed for this project.

Plans for investigations of further functionalities in our Moodle system are:

- **Virtual laboratories** - Students can do simulations on Java based programs and get results and readings they need.
- **Implementation of BigBlueButton virtual classroom server** - Teachers can create a virtual streaming classroom, share their screen with students and allow certain students to talk or share their screen during the session.
- **Virtual online programs** - Students can create simulations in Moodle and get the visual results in a Matlab like style.

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