

AgroFE – Collaborative Environment and Building Learning Knowledge Base for Agro-Forestry Trainings

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ABSTRACT

The aim of the AgroFE project is to play an important role in Agro-forestry trainings. Depending on the European countries, states or professional organizations and training actors try to reintroduce Agro forestry in the course of training and qualification in initial training and in adult education. The main objectives are to make a synthesis of needs and expectations, based on present the existing training actions and to set up a common framework; to build an innovative training system (contextualized, modularized trainings, use of ICT, professionals participation); to create a technical collaborative support for the implementation of the project with communication tools (information of partners and promotion) and for providing access to the resources and training services during and after the project (knowledge databank, interactive services). The system architecture is based on open source concept. Open source subsystems are the Search Engine (harvester), Digital Asses Management System (KDB), Content Management System for internet portal, Editorial Chain (workflow) Management, E-Learning platform. The user profiles (user groups) are Teachers, Professionals, Students, People with disabilities in professional situations, Knowledge feeders, Knowledge builders and aggregators. There are needs for handling many formats in the knowledge databank (Text in different file structures; Pictures or images; Audio and video files; Data and figures; Container format for exchange contents Pdf, html, Epub 3, etc. The Moodle system and videoconference servers (which can be used by videoconference equipment, user client software on desktop, notebook and smart-phone) is used for Collaborative working and learning environment. The Moodle (powerful, secure open source) learning and collaborative platform is used as project management and project assessments tools.

Keywords: Agro-forestry, e-Learning, training, education, knowledge databank.

1. INTRODUCTION

The agricultural system has experienced a strong abandonment of agro forestry in the 20th century, to count today only a few million ha in Europe. Following the work of scientific research, development structures and the experiments of the few professionals, in recent years, agro forestry has met a true national and European recognition. Based on the results of scientific research, development structures and those of the "farmer-researchers", experimental courses were conducted in different countries, including BE, FR, in the UK on a small scale as resources, trainers and available skills are scarce. The partners have identified training needs in the short term: These needs are on the one hand operators and future operators, adults and pupils / students, teachers and

counselors, tutors. These requirements therefore relate to levels of qualification L4 and L5 / L6 and two types of learners: Students and adults, farmers and future farmers on the one hand. In the short term, the project will address these two public through a system established by the partners: based on innovative teaching practices training, occupational situations providing access to recognized qualifications (Herdon *et al.*, 2011; Várallyai and Herdon, 2013). Fortunately the ICT tools have been developed increasingly nowadays, so there are tools and methods for e-learning and e-collaboration (Bustos *et al.*, 2007; Herdon and Lengyel, 2013; Herdon and Rózsa, 2012). 13 European partners from 6 countries participated in the project. One of the important parts of the project is to apply innovative solutions for building and using the web site (<http://www.agrofe.eu/>) and knowledge repositories for teaching and learning agroforestry. The ICT based concept and results are discussed in the next chapters.

2. THE OBJECTIVES AND DEVELOPMENT METHODS

The main objectives are to make a synthesis of needs and expectations, based on the present existing training actions and to set up a common framework; to build an innovative training system (contextualized, modularized trainings, use of ICT, professionals participation); to create a technical collaborative support for the implementation of the project with communication tools (information of partners and promotion) and for providing access to the resources and training services during and after the project (knowledge databank, interactive services). To achieve this objectives the following main activities have to be carried out:

- Exploitation of the tools and services.
- Building a collaborative working environment.
- Planning the architecture for development, teaching and training.
- Implementing the e-learning environment.
- Designing the multimedia tools to make the system accessible for learners, trainers.

That is why we will be able to build a collaborative working environment for the project partners and players who will join to this knowledge database and information service. we have to use the following methods (do the following activities):

- Using the experiences from former project and practice.
- Studying new technologies and methods.
- Evaluating them.
- Selection.

3. RESULTS

For the collaborative working in the project we plan to use existing open source and free services. One of the essential solutions was the latest version of the Moodle system. One selection criterion was based on that we have more than 7 years' experience in using this popular system which can give every function that we need for collaborative working during the project. The ICT system of the project will be based on a knowledge databank service and for mobility (field) work we will use tablets with Android, iOS, Windows platforms, using the central services and apps.

3.1 Using Moodle as virtual collaborative space

Like many other higher education institutions, we introduced the Moodle system at University of Debrecen Centre for Agricultural and Applied Economic Sciences (UD CAAES) in 2007. The faculty leaders recognize the fact that modern technologies in education should be entered, which was realized in the Moodle system (Burriel, 2007, Lengyel and Herdon, 2009). The phases of the system implementation are shown on Figure 1.

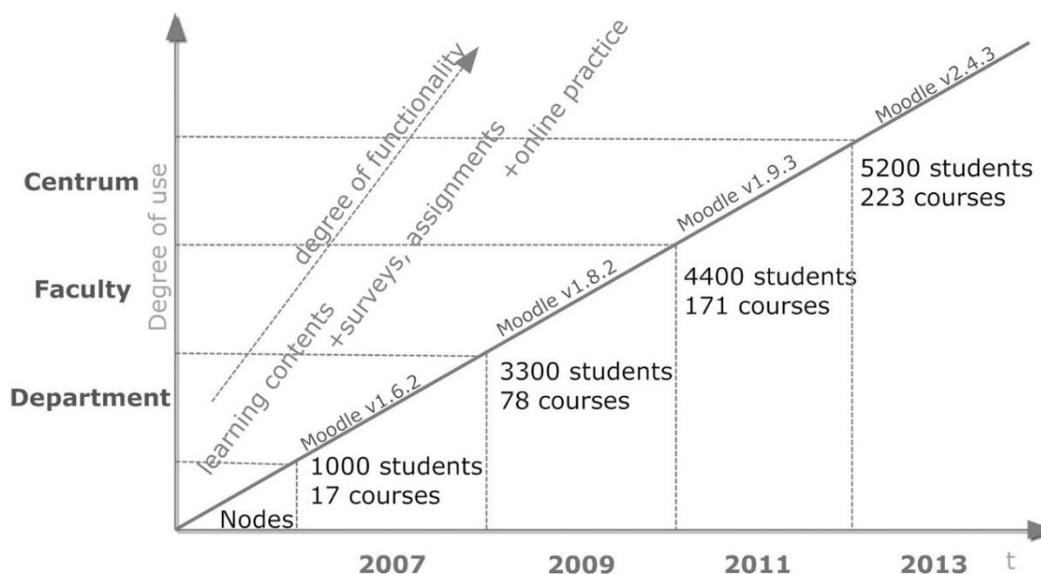


Figure 1. E-Learning System Implementation phases at the UD CAAES

Departmental use and testing began in January 2008 with the introduction of the Faculty of Business and Rural Development. Since the introduction the Moodle System has been continuously updated. The system used by a large number of courses has grown rapidly, and with it of course, the users (teachers and students) number. The Agri-Business Administration Education Program began in 2009 and number of courses and users has continued to grow. Implementation of the phases during the system upgrade has happened several times in order to make the newer features available. In the past we used the Moodle in more European project for collaborative work and adult trainings too. The preliminary experience entitled us to use this system for creating a collaborative space and e-learning in the AgroFE project (<https://moodle.agr.unideb.hu/agrofe/>)

3.2 The used videoconference system

The other function that we need to support is the virtual meeting. In Hungary there is a High speed research and education networks which enable an uncompromised quality audio and video collaboration. This system offers the following collaboration services (<http://www.niif.hu/en/>):

- Video and desktop conference (IP based videoconference). From anywhere to anywhere, with any number of participants for project and administrative meetings, consultation, distant teaching and learning.

- Videotorium: Video sharing portal for higher education, research and public collections. Share research and education recordings through Videotorium, in up to high definition (HD) quality.

The video network now features around 140 meeting room terminals spread all over the country, and a compatible desktop videoconference system is available to be used with a computer and web camera. Within the AgroFE project we use the Multipoint Control Unit which gives HD services, it is able to record and / or broadcast the meeting on the Internet. The Desktop system is also used because every partner can join in a virtual meeting room very simply and we connect this virtual room with every participant to the MCU server. This desktop system works with the Vidyo software.

3.3 The Vidyo system

The Vidyo portfolio (<http://www.vidyo.com/>) includes everything we need to deploy: the HD video collaboration to everyone in an organization, from core infrastructure to solutions that video-enable any device or application. Vidyo works the way we do. It runs on the devices we're using from smart phones to tablets, desktops to video room systems, bringing HD-quality video and content to every participant. The VidyoDesktop™ app extends high-quality video conferencing to Windows, Mac and Linux computers, allowing users on these systems to participate at office, from home, or on the road. With support encoding at resolutions up to full HD and dual-screen multipoint video. The key features are

- 2X Extreme Definition (XD) displays people and content on one or two monitors, each up to 1440p
- Multiple user-selectable layouts for continuous presence, active speaker, and shared content
- In-conference public and private text chat
- Share any app or desktop into the conference, and switch between multiple streams of shared content
- Far-end camera control of Vidyo and third-party group solutions.

The VidyoMobile™ app brings high-quality video conferencing to popular Apple and Android tablets and smartphones. Host a person-to-person or multi-party video conference from your office, home, or in transit on both wireless broadband and WiFi connections. As a full-featured endpoint in your VidyoConferencing™ solution, VidyoMobile delivers transcode-free video conferencing for natural communication at the pace of conversation, without the broken pictures associated with traditional solutions.

3.4 The system architecture

Based on our former research and development on e-learning, the concept of the AgroFE project and doing some preliminary work determined the functional modules of the system (Figure 2), which are the

- Knowledge repository
- Content Management

- Editorial Chain
- Search Engine.

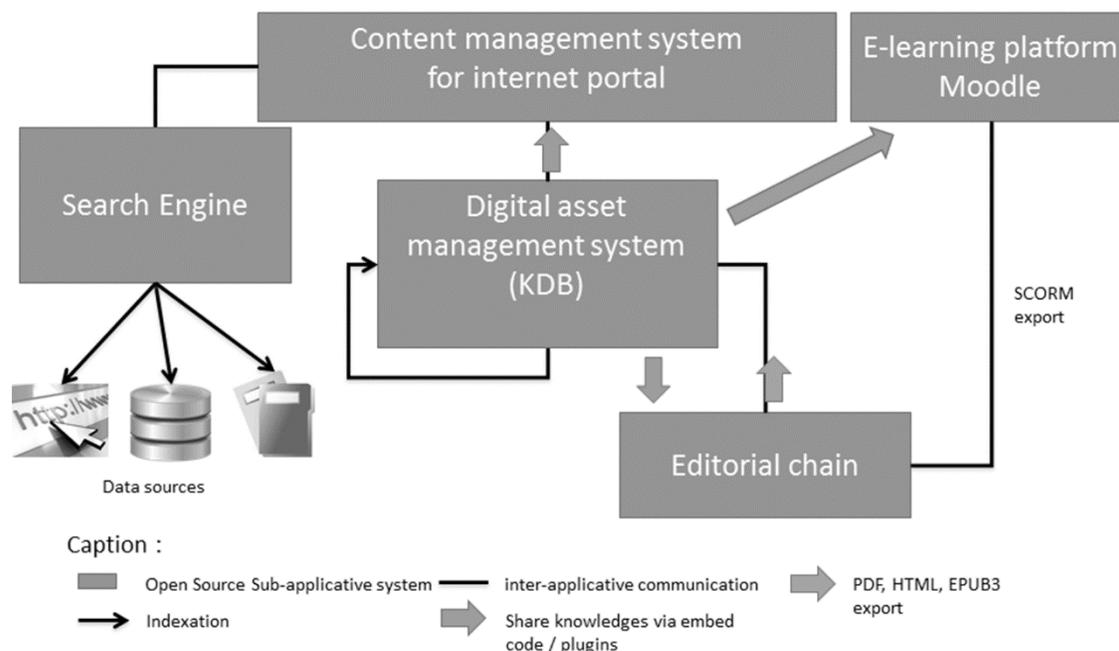


Figure 2. The architecture of the knowledge base and service system (Source: Charles Burriel)

3.4.1 Knowledge Base Systems

A knowledge base or knowledge bank is a special kind of database for knowledge management. A knowledge base is an information repository that provides a means for information to be collected, organized, shared, searched and utilized. It can be either machine-readable or intended for human use. Behind a Knowledge Data Bank, there is, at least, a back-end which is a DBMS. Some analyzed KB software are the following (<http://www.capterra.com/>):

- PHPKB Knowledge Base Software
- OPEN KM Knowledge Management
- Phraseanet.

The **PHPKB** has been designed to provide a complete knowledge management solution. It is developed in PHP with MySQL database at the backend and comes with full source code that is not encrypted and/or encoded. The **OpenKM** (<http://www.openkm.com/en/>) is a web base document management application that uses standards and Open Source technologies. OpenKM provides full document management capabilities including version control and file history, metadata, scanning, workflow, search, and more. It also allows the social activities around content to be used to connect people to other people, information to information, and people to information; helping to manage, more efficiently, the collective intelligence of the human resources of the company. The **Phraseanet** (<https://docs.phraseanet.com/3.8/en/>) is a Digital Asset

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Management system (DAM for short) targeting the professionals needs. It's created and maintained by the french company Alchemy. Phraseanet can store, manage and share a wide range of digital resources such as images, videos, audio or office documents within working groups of any size. As a 100% Web application, it runs in a modern web browser. Built upon standard components, Phraseanet settles on Linux, Mac OS X or Windows servers and is based on common software components such as MySQL, PHP or Apache. Other third-party software libraries participate to Phraseanet. Some of these are developed by Alchemy while others not.

3.4.2 Content Management Systems

We analyzed 3 more popular systems. The **Drupal** is a powerful, developer-friendly tool for building complex sites. Like most powerful tools, it requires some expertise and experience to operate. **Joomla** offers middle ground between the developer-oriented, extensive capabilities of Drupal and user-friendly but more complex site development options than Wordpress offers. **Wordpress** began as an innovative, easy-to-use blogging platform. With an ever-increasing repertoire of themes, plugins and widgets, this CMS is widely used for other website formats also.

3.4.3 Editorial chain systems

The Opale, publishing chain for the editing, management and multimedia publication of academic training documents. Opale is a publishing chain for the production of academic documents. The documents produced through different publishing media can be used in a variety of contexts:

- To back up a face to face class,
- To produce a reference paper document,
- To promote remote learning,
- To exchange content with other organizations.

To do this, the Opale publishing chain allows you to produce these document types: slideshows for video projection (Flash), printable documents (ODT for Open Office and PDF), Web (XHTML or HTML 4.01 Transitional - W3C standards), exportable to a pivot schema UNIT (XML).

3.4.4 Search Engines

A search engine is really a general class of programs, however, the term is often used to specifically describe systems. **Sphinx** server, available under GPL and used by many top websites internationally, including Craigslist, DailyMotion, and NetLog, blends together high performance, rock-solid reliability, and ease of use. Designed from the ground up with searching databases in mind, it scales to the largest of them, indexing terabytes of data and billions of documents on commodity hardware. **OpenSearchServer** is a powerful, enterprise-class, search engine program. Using its Web user interface, crawlers (Web, file, database, etc.), and REST/RESTful API, you can integrate advanced full-text search capabilities into your application. The features of the OpenSearchServer are:

- A full set of **search** functions
- Build your own **indexation** strategy
- A fully **integrated** solution

- **Parsers** extract full-text data
- The **crawlers** can index everything.

Elasticsearch is a flexible and powerful open source, distributed, real-time search and analytics engine. Architected from the ground up for use in distributed environments where reliability and scalability are must haves, Elasticsearch gives you the ability to move easily beyond simple full-text search. Through its robust set of APIs and query DSLs, plus clients for the most popular programming languages, Elasticsearch delivers on the near limitless promises of search technology.

3.4.5 Moodle Learning management system - new features

We are planning to use the Moodle system for e-learning in the project regarding to our good experience, the system references, functionality and some new feature. We just would like to highlight some new feature which will be useful in the project.

- Responsive Design, Learning on the Go
- Power up the Cloud
- Big Data
- Mobile Notifications.

Moodle are continually improving their responsive themes, this will allow Moodle to be used for learning on tablets, phones and other mobile devices. The core Moodle theme is based on Bootstrap and Webanywhere recommends all users migrate to a responsive theme to allow learners to access Moodle on the go. The Moodle Bootstrap theme is now the default for any new installation of Moodle. Given Moodle is the largest online Learning Management System globally with over 80 Million users, scalability is essential as larger companies look to deploy the solution for their workforce. Moodle now is linking with the cloud and other clustered systems to enable this. Systems administrators will find more features than ever which will enable them to scale Moodle to millions of learners if required. Moodle has incorporated better use of data and reporting. What this means is that the Learning and Development professionals will be able to pull more information out of the Moodle environment about learning experiences. This feature is using the logging framework, and, this will allow the Moodle community to build on top of the framework to enable better reports to be gathered. The Mobile Notifications is possibly the most exciting new feature to enable ‘push’ learning to users on the go.

4. CONSEQUENCES AND FUTURE WORK

The agroforestry will be important for rural areas and farms according to more aspects. Environmental, economic, agricultural production, rural living are very important issues. The project participants are involved in to developing curricula for more training levels. Up to now we have developed subjects for BSc and MSc level in “Agroforestry” which accepted by two faculty boards, the latest version of the Moodle system has been implemented for collaborative space and we carried out more virtual meetings by the new videoconference systems, which have been tested and used more times. Analyzing the open source tools we have created the architecture of the knowledge base and service system for harvesting materials, building knowledge base and

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information service, implement e-learning service in agroforestry. We are convinced that using the innovative technologies and solutions the system will serve and support to achieve the project goals. The Knowledge Data Bank and service system is developing and will be finished in the next year.

5. ACKNOWLEDGEMENTS

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