Building a European Agro-Forestry Training and Learning System Model in the AgroFE Leonardo Project - Hungarian Specialities

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Abstract. The aim of the AgroFE project is to play an important role in Agro-forestry trainings in European dimension. Depending on the European countries, states or professional organizations and training actors try to reintroduce agroforestry training and education in different levels. 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, to create a technical collaborative support for implementation of the project with ICT tools and 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 for handling many formats in the knowledge databank. Regarding to the different trends in e-learning business models we dealt with different technological solutions. We created the collaborative platform which consist of a learning management system, videoconference services, video-repositories. The prototype of knowledge databank has been developed. The paper presents the results and the planned services.

Keywords: Agroforestry, e-Learning, education, training, knowledge databank

1 Introduction

The AgroFE project is aimed at actors in agroforestry. The agricultural system has experienced a strong abandonment of agroforestry (Nair, 2005) in the 20th century, to count today only a few million ha in Europe (Price, 1995). Depending on the countries, states or professional organizations and training actors (Jamnadass et al., 2014) try to reintroduce agroforestry in the course of training and qualification in

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initial training and in adult education. 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. In the partnership countries, the need for conversion and development is between 15,000 and 20,000 farms in the next 5-7 years (Gregorio et al., 2015), which means training so many operations managers on L4, L5 and L6 level by country. 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 (Mbow et al., 2014). These requirements therefore relate to two levels of qualification L4 and L5/L6 and two types of learners: students and adults, farmers and future farmers on the one hand (mainly L4/L5) and advisors, level L5/L6. In the short term, the project will address these two public through a system established by the partners (Herdon at al., 2011; Várallyai and Herdon, 2013): based on innovative teaching practices training, occupational situations providing access to recognized qualifications (NQF, EQF, ECVET and ECTS). 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. One of the important parts of the project is to apply innovative solutions (Gamboa et al., 2010) for building and using the web site (http://www.agrofe.eu/) and knowledge repositories for teaching and learning agroforestry (Beddie and Halliday-Wynes, 2010).

The term e-learning is widely understood to refer to the use of information and communications technology (ICT) in learning and teaching. E-learning systems can be observed at both the institutional and the local level in higher education. Institutional systems include learning management systems (LMS), used primarily to manage delivery of course material to enrolled students, and the platforms that support massive online open courses (MOOCs - Porter, 2015). Local e-learning systems are observed at the level of a single course, class, lesson or learning activity. While investments at both levels can contribute to improvements in learning and teaching (Gunn, 2010), each has its own goals, methods and challenges.

2 Collaborative Work

A variety of ways that two or more organisations can work together is covered the collaborative working. The range is wide from informal networks and alliances, through joint delivery of projects to full merger. Collaborative working can last for a fixed length of time or can form a permanent arrangement. What these options have in common is that they involve some sort of exchange, for mutual advantage, that ultimately benefits end users. In recent years, interest in collaborative working has been growing, driven by the sector's drive for effectiveness and efficiency, government policy and public opinion.

CWE (Collaborative Working Environment) can be perceived as the tools, technologies, services and environments supporting individual persons in their working tasks to become more creative, innovative and productive involving the

direct or indirect interaction (collaboration) with other individuals, groups or organizations. Collaborative platforms providing sophisticated upper middleware services required for environment and person-aware distributed collaboration. It is based on system integration of Web Services, Semantic Web. They can provide the support and operations required for complex virtualised working environments. Works include development of tools for sharing resources, knowledge/resources discovery, service composition, CSCW tools (including multi-conferencing) to ensure stable, dependable collaborative applications.

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.

2.1 Moodle

Online courses are moving into the mainstream and the software commonly used to deliver online courses can be prohibitively expensive. Classes take place online through the use of software packages that have special classroom features such as discussion forums calendars, chat rooms, where participants can communicate in real time with each other, and quiz and polling capabilities. Files such as word processing documents, sound files, pictures, and videos can be uploaded to the virtual classroom for viewing by students. Thus, the "platform" is essentially a place that looks like a private website and is intended to work like an electronic classroom. The classes taught on these platforms are accessible via the Internet, and are usually private, meaning that only individuals who are registered for the class can see the password-protected website. A platform for online courses may also be called an LMS (Learning Management System) or LCMS (Learning Content Management System).

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 (Burriel, 2007, Lengyel and Herdon, 2009). 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/).

2.2 Vidyo

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 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.

2.2 Videotorium

Videotorium is a video/audio sharing portal created for the players of research and education. Videotorium provides professional presentation of video content recorded at higher-education organisations, research institutions and public collections. Videotorium has been launched in June 2010 by the maintainer of the Hungarian research and education computer network infrastructure National Information Infrastructure Development (NIIF) Institute. The portal is the successor of former "Video on Demand" repository aiming professional accommodation for the growing collection of recordings and content upload and sharing by institutions.

Videotorium is freely available for users of any NIIF member institutions, but any non-profit research and education activity can be supported. The content created by affected organisations can be infinitely various: scientific conferences, seminars, university lectures, trainings, scientific events, scientific experiments, research PR, documentary, interviews, etc.

Primarily, the portal offers its services to higher-education (students, lecturers), research and public collection community users, but the high number of public recordings offers a good opportunity for learning or self-entertainment.

3 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 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.
- Developing Agroforestry in agri-environment BSc course
- Evaluating them.
- Selection.

4 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.

4.1 e-Learning trends in Europe

Of the $4.1 trillion spent on education and training, approximately 25% is in Europe, making it the 2nd largest market to North America. In the schools market, Europe boasts 27% more teachers than the US, with 4.6 million teachers as compared to 3.6 million in the US (IBIS Capital, 2013).

The European e-Learning market is a highly fragmented market comprising up to 3,000 predominantly small entrepreneurial companies. The fragmentation represents in part the early stage nature of the industry and the market difference within Europe.

Although the relative difference in the size of markets between the US and Europe is not significant yet there is a big difference in the volume of venture deals in e-Learning. Since 2007, 60% of global venture investments in e-Learning have been in the US. Europe only accounts for 6% over the same period.

The spend on academic education and learning outweighs the spend on corporate training by about 18x. There is also a regional split between northern and southern Europe where for example in the Nordics workers are 4x more likely to be receiving training than in southern Europe.

The level of activity within e-Learning M&A in Europe is currently limited, with very few deals over $20 million. The market remains in development. The increase in venture investment is expected to fuel expansion and in due course increase strategic activity.

The evidence of increased investment in Europe in the sector and anecdotal support that companies are experience an upsurge in activity points to a market on the turn. We expect the e-Learning market to be characterised over the next 3 years by a significant increase in investment in the sector as well as a level of consolidation as companies seek scale.

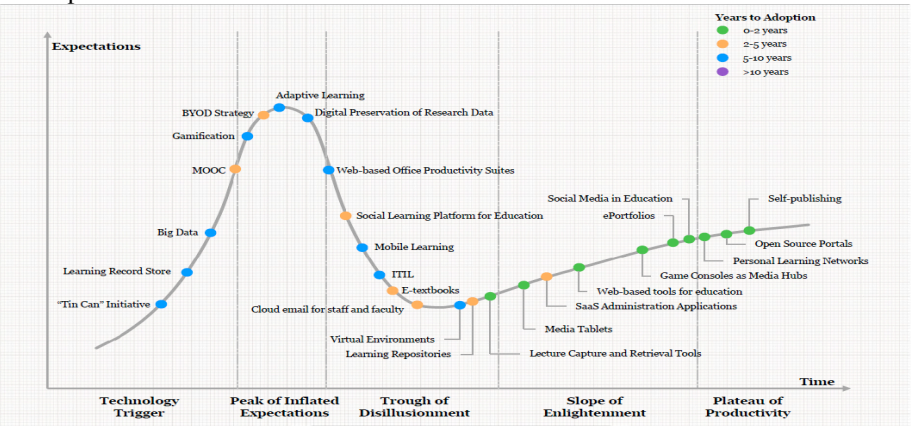

Fig. 1. A European perspective on e-Learning (IBIS Capital, 2013)

4.2 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. System administrators will find more features than ever which will enable them to scale Moodle to millions of learners if required (Ghirardini, 2011). 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 Moodle server is used as virtual collaboration space and e-learning system. The system implemented at 09/01/2014. We created the initial structure for collaborative work and starting the e-learning courses, but this year restructured it base on the English project partner's proposals. This time 136 users are registered (enrolled) in the system. From this there are 70 enrolled students.

4.3 Vidyo, Mooc and videotorium

VidyoDesktop system extends high-quality video conferencing to different platforms of computers, allowing users on these systems to participate at their office, from home. With support encoding at resolutions up to full HD and dual-screen multipoint video, VidyoDesktop delivers a first-class conferencing experience to any workspace. VidyoDesktop extends high quality conferencing and collaboration to virtual desktop and thin client environments.

A massive open online course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials such as videos, readings, and problem sets. MOOCs provide interactive user forums that help build a community for students, professors, and teaching assistants (Brahimi and Sarirete, 2015). MOOCs are a recent development in distance education which began to emerge in 2012. Early MOOCs often emphasized open access features, such as connectivism and open licensing of content, structure and learning goals, to promote the reuse and remixing of resources. Some later MOOCs use closed licenses for their course materials while maintaining free access for students. On the Fig. 2. can be seen the evolution of MOOC.

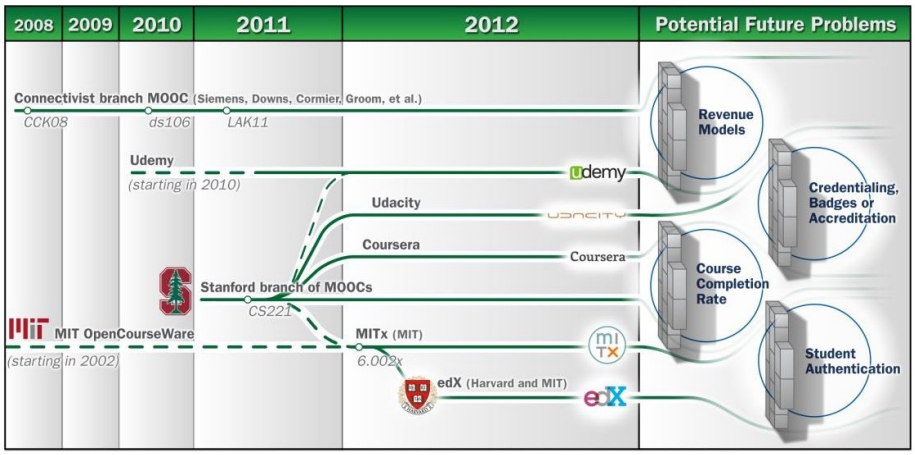

Fig. 2. Evolution of MOOC (Hill, 2012, Gaebel, 2013)

Videotorium would like to meet special requirements of higher-education, research and public collections community, which would be rather difficult to satisfy by a general video sharing portal. Major features briefly:

- Sharing of audio- and video recordings.
- Uploading and synchronize slides to the recording of your speech.
- Organisational micro sites: present all recordings of your institution through an own Videotorium site with individual URL, design and news.
- Flash based playback, compatibility with all popular browsers.
- Live streaming: broadcast your event live through Videotorium to deliver your event to thousands of users through our high capacity servers.

We are testing this system for storing and streaming videoconferences on-line lectures (on-line learning, Fig 3.).

4.4 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 (KDB), there is, at least, a back-end which is a DBMS.

The developed system architecture can be seen on the Fig. 4.

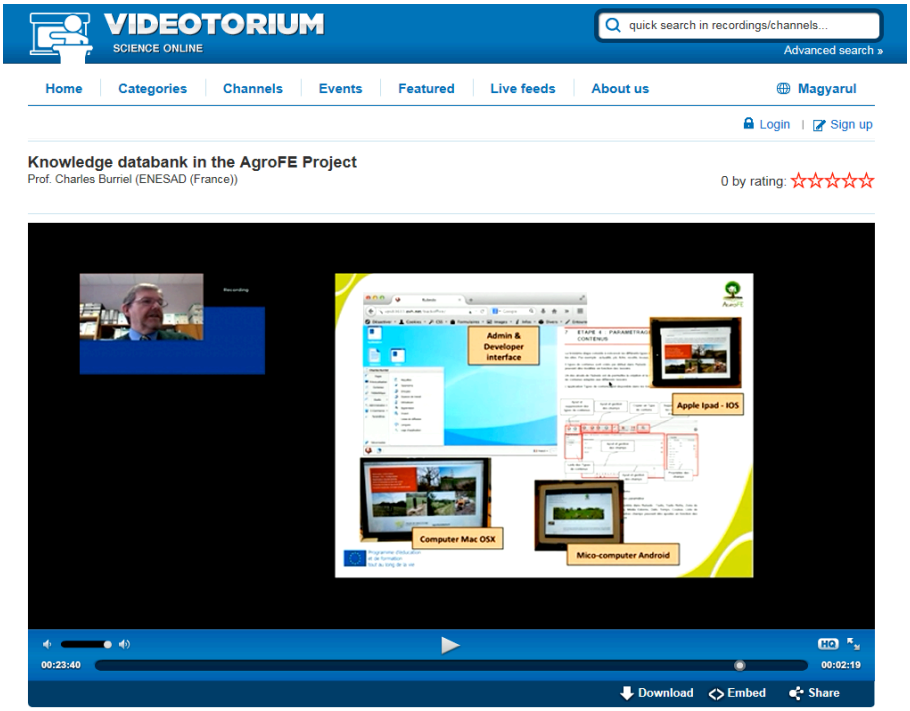

Fig. 3. Playing the lecture from the auditorium

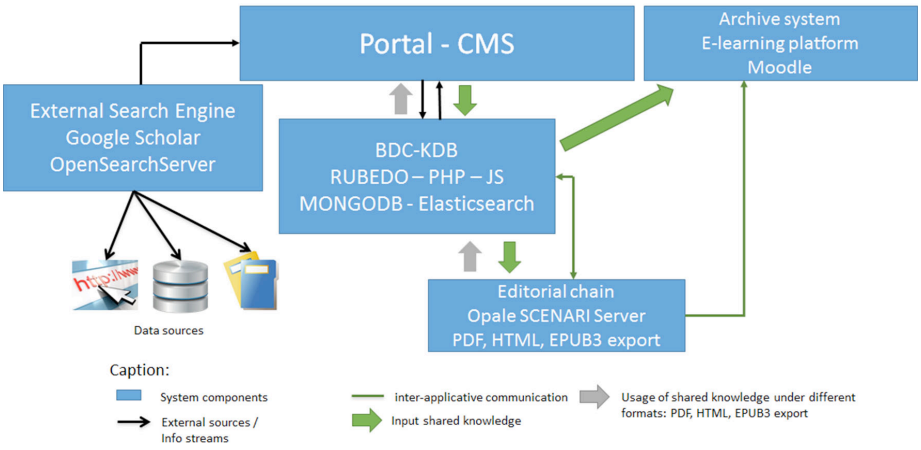

Fig. 4. Knowledge Base System architecture

In the context of the AgroFE project, the Technologies of Information and Communication, ICT, include four components, the collaborative tools (OTC-CWS), the Knowledge Data Bank (KDB-BDC), the tools for training and archiving and a portal that integrates the tools.

Under the project, these documents are identified, selected, proposed by partners and included into the KDB for the evaluation of their potential use in training, by one

or more partners. A fact sheet originally written by the proposer, the institution, who proposed it to project partners, often accompanies, completes this document.

At the end of the evaluation phase, the KDB can be extended to other contributors, for other uses, such as exchange supports between different actors of Agroforestry.

In computing, a database is gathering highly structured data, a well-defined organization, based on different types of structures: Relational, hierarchical. This is absolutely not the case in a databank in which we store structured tables of numbers as well as illustrated text or video or emails, external knowledge or those from the project, in their various forms. But it should be noted that the knowledge data bank in the prototype of the AgroFE project is based on a software, RUBEDO, developed in PHP and RUBEDO is built on different components.

4.5 Hungarian specialties in the project

4.5.1 Developing Agroforestry in Agri-Environment course

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.

The main topics are the following: National and international practice of agroforestry, Natural science of agroforestry, Watershed management of agroforestry, Flood protection of agroforestry, Mitigation of water erosion in agroforestry practice, Mitigation of wind deflation in agroforestry practice, Ecological animal husbandry and agroforestry, Grassland management and agroforestry, Ecological crop-production and agroforestry, Phytoremediation and agroforestry, Energetic wood plantation, Local governance of agroforestry, Low and justice of agroforestry, Informatics of agroforestry.

The documentation of the course was prepared for Faculty Council of University of Debrecen to accept it, which was supported unanimously. The declaration of the course was carried out in the digital educational system in order to the students could start the registry from the September 2014.

4.5.2 The Agricultural Informatics International conferences (2013 and 2014)

On the Agricultural Informatics 2013 (AI2013) Conference on 8 of November at the plenary session held a presentation by Prof. Charles Burriel. The title of his presentation was ” Proposal for a new approach of accredited credits in American University = The UIUlink platform ". The presenter spoke about the system, which are massive, open, on-line and focuses the courses. The UIU link are accredited, certified, on line at the market place and the student proposed his professor, who can

decide the accepting or refusing. The UIU link is expend the teaching to new student who cannot be on campus and expend the relationships with high level partners everywhere in the world.

There were 150 participants from 7 countries at the conference. Leading domestic and international professionals gave 11 plenary lectures on the site of the Conference (University of Debrecen, Hungary). Subsequently, professors from the University of Florida, Wageningen University, University of Bonn and Prof. Charles Burriel gave videoconference plenary lectures. In the sessions 46 lectures were given by some 100 authors and co-authors. The Conference program, presentations, photos and exhibition posters can be viewed on the conference site http://nodes.agr.unideb.hu/ai2013/ .

On the second day of the conference, 9 of November 2013 at 9 am we organized a workshop with the primary purpose of the tasks discussion in the AgroFe Leonardo Project and clarify and refine the tasks of the Hungarian partner and review of expectable proposals and opportunities in the field of Agricultural Informatics between 2014-20. On the workshop Prof. Charles Burriel was an invited speakers, who gave a presentation, which title was "Development of Knowledge Data Bank (KDB) for secondary, higher, and professional education and training, and professional usages". In the presentation we could get detailed information of the project to be achieved by KDB and the related open-source software tools (WordPress) and reported on the possible usages of the system in the AgroFe project. The presenter spoke about the concept of KDB, what is the Knowledge Data Bank and what is the architecture of the KDB. He spoke needs analysis and required components of KDB.

On the Agricultural Informatics 2014 (AI2014) on 13 of November at the plenary session, which was followed parallel sessions. The main objective of the conference is to promote the exchange of experiences among non-profit, research and business professionals, as well as the development of the international relations. The event provides a forum for agriculture involved practical and academic players, to discuss the actual questions of education, research, development and application of Information Technologies in Agriculture and Rural Development. The meeting covers a broad range of topics, as follows: Big data, Information systems, Bioinformatics, Cloud computing and services, Collaborative working environment, Decision Support Systems, Modelling and simulation, , Ecological modelling, Education/Training programs and development, E-learning, Food safety and traceability, Future Internet in the agri-food sector, Information and communication technologies for rural areas, Information systems, IT and innovation in agri-food sector, Mobile technology applications, Precision agriculture, GIS, RS, Web services, portals and Internet applications, Wireless sensor networks.

4.5.3 Field study

In the framework of transnational meeting was organised an agroforestry field study at the National Agricultural Research and Innovation Centre, Forest Research Institute (NARIC FRI).

The NARIC FRI has a 115 year-old experience in the research related to forest management and tree breeding. Six stations belong to the Institute in Sárvár,

Budapest, Mátrafüred, Püspökladány, Sopron and Szombathely. It manages three arboretums and an ecocamp. Our destination was Püspökladány, which is located 50 km from Debrecen. The basic activity of the FRI is doing research but it also has expertise, equipment, plant material produced as a result of research that can be further utilized or marketed. Water, soil and biomass analysis performed in the ecological laboratory facilitate first of all research but they also have marketable capacity in the field of soil analysis and soil consultancy. Besides breeding and genetic conservation, seedlings and cuttings are produced. FRI shares its knowledge with foresters about growing techniques, economic evaluation, and forest protection in professional meetings and exhibitions.

The field study was a half day programme there, where Csiha Imre director took a general introduction about agroforestry (Fig. 5). This follow three different practical exhibition:

- Dendrology - measuring tree height, estimation of tree mass (leadership of exhibition: Kovács Csaba and Bozsik Éva)
- Hidrology and soil science in agroforestry (leadership of exhibition: Rásó János and Riczu Péter)
- Landscape management - Ágota-puszta, Hortobágyi National Park (leadership of exhibition: Prof. Dr. Blaskó Lajos and Gálya Bernadett).

Fig. 5. Pictures about the field study in Püspökladány

5 Conclusion

The agroforestry will be important for rural areas and farms according to more aspects. Environmental, economic, agricultural production, rural living is very important issues. The project participants are involved in to developing curricula for more training levels on different (L4/L5/L6) levels. 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. All the virtual meetings have been recorded in the Videotorium system. We are convinced that using the innovative technologies and solutions the system will serve and support to achieve the project goals. Analyzing the open source tools we have created the architecture of the knowledge base and service system for harvesting materials, building knowledge base and information service, implement e-learning service in agroforestry. The Knowledge Data Bank and service system is developing and will be finished in this year. Finally is introduced the Hungarian specialties in the projects like education, subject about agroforestry, conference and workshops and field trip in Püspökladány.

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