

Collaborative working tools and applications in agriculture

Miklós Herdon, László Várallyai

University of Debrecen, Faculty of Agricultural Economics and Rural Development
e-mail: {herdon,varal}@agr.unideb.hu

Abstract

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. Recently there are more projects focusing to collaborative tools and systems. The objective of the AMI@netfood EU FP6 IST project was to support the implementation of the IST Research Priority and Framework Programme, providing a long-term vision on future trends on Scientific and Technology Research oriented to the development and application of Ambient Intelligence technologies to the agri-food domain. The e-Learning and e-Training are more and more important domain where we can use collaborative tools, collaborative working environment. For agriculture and rural areas the C@R EU FP6 IST IP project will contribute to design the European standard. C@R will design software tools to help people in rural areas to collaborate despite of the separation in space and in time.

Keywords: Collaborative working, rural areas, agriculture

1. Introduction

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[1]. 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, CSCW, utility-like computing and connectivity (grid or alike), sensor and wireless technologies (beyond 3G), advanced networks services (e.g. IPv6), knowledge and content management,

and WFMS based on peer-to-peer design principles to enable radically new collaborative environments. 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.

For agriculture and rural areas the C@R EU FP6 IST IP project will contribute to design the European standard. C@R will design software tools to help people in rural areas to collaborate despite of the separation in space and in time. To involve the rural constituency in the research tasks through a set of seven Living Labs to cope with the rural inhabitants technological expectations and demands in terms of collaboration.

2. Demand for collaborative work in agriculture

In the future, developing and successfully commercializing new agricultural products and services, including those associated with site-specific agriculture, will require organizing increasingly complex partnerships (Figure 1). In the last decade a lot of different virtual systems and applications have been developed. We can find Virtual country, Virtual libraries, Virtual conference, Virtual market, Virtual field trips, virtual meeting, Virtual farm, Virtual agriculture tours, Virtual show rooms, Virtual lab.

Partners in the complex value-added partnerships of the future, including the partners with responsibility for research and technology transfer, will have to function as one; hence the term “virtual” agriculture. Virtual agriculture will depend heavily on networked computers. The information infrastructure must play a new role, enabling frequent, easy, powerful, and inexpensive communication and coordination within and among agricultural partnerships. To serve the diverse needs and desires of individual consumers and consumer groups and compete in highly competitive agricultural markets, specialized participants in the industry of agriculture, including consumers, must communicate with each other and coordinate their activities much more than their predecessors.

The key components of virtual agriculture and virtual R&D are the partnerships, that is, the teams or task forces that conduct the R&D and implement the resulting information and technology. The question is: how to organize and manage them, and how best to exploit their collective capabilities, is emerging as another specialty, a subdiscipline of management. Because value-added opportunities are created at the primary production level, farmers will be important partners in virtual agriculture.

The success of agricultural initiatives will depend on the capability of the specialists and the degree to which their activities are coordinated, integrated, and focused. Research and development (R&D) efforts enabling and supporting complex commercial initiatives in agriculture also will be organizationally complex. They will require unusually close relationships in which public institutions, local

and regional development agencies are full partners in commercialization efforts.

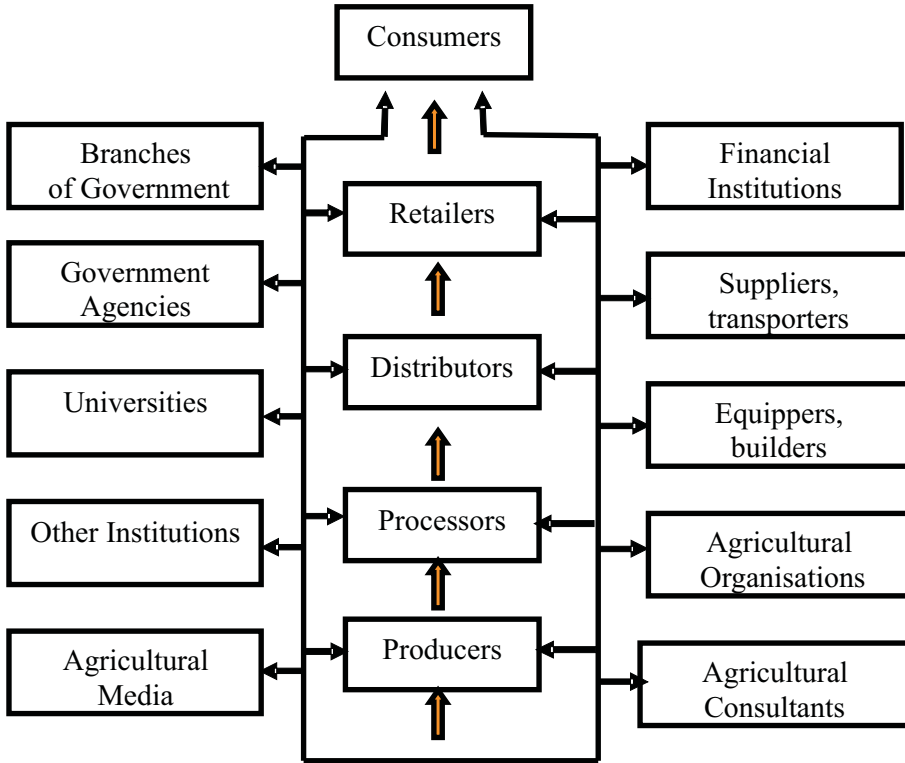


Figure 1: Information and material flow in agriculture

3. What are the features of the Collaborative Environments?

If we want to summarise, or we would like to define the Collaborative Working Environment we can say that CWE 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.

Application Sharing is an element of remote access, falling under the collaborative software umbrella, which enables two or more users to access a shared application or document from their respective computers simultaneously in real time. Generally, the shared application or document will be running on a host computer, and remote access to the shared content will be provided to other users

by the host user. A videoconference is a set of interactive telecommunication technologies, which allow two or more locations to interact via two-way video and audio transmissions simultaneously. It has also been called as visual collaboration and it is a type of groupware.

Modern collaborative working environments are utilizing:

- innovative technologies and media,
- human resources,
- ways of organising work
- and creating value chains in order to reach maximum, yet sustainable, productivity.

Enabling platforms providing sophisticated upper middleware services required for environment and person-aware distributed collaboration. It will be based on system integration of Web Services, Semantic Web, CSCW, utility-like computing and connectivity (grid or alike), sensor and wireless technologies (beyond 3G), advanced networks services (e.g. IPv6), knowledge and content management, and WfMS based on peer-to-peer design principles to enable radically new collaborative environments. It should reflect an open interoperable service oriented reference architecture built on top of lower layer middleware and offer sophisticated services such as discovery and allocation of resources(human, peers, content, knowledge, computing capacity and services); identity, security, privacy and trust; community management and sharing support; and environment awareness, including mobility.

- They will 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.
- These applications will benefit from sharing and accessibility of knowledge gain from cross-domain fertilisation and, when appropriate, leveraging on the experience on collaborative games. In particular, it is expected applications in the areas of collaborative design and engineering (fast prototyping), virtual manufacturing, maintenance, media/content production, e-Professionals, e-Scientist, and knowledge workers and information workers in remote and rural settings.

It is expected that work on enabling platforms and tools for collaboration would crystallize around Integrated Projects which will also demonstrate and validate those results on challenging application scenarios. These Integrated Projects are expected to create critical mass by covering: basic research (e.g. methods, models, languages), component-based research (e.g. new generation tools) and system integration. Projects must stimulate systemic innovation in business and industrial systems by incorporating leading-edge users with visionary application problems

and also mid-term issues and SMEs to ensure a wider take-up. Iterative testbeds and large demonstration should also be part of the IPs.

The number of research challenges to develop the enabling “upper layer” collaboration @ work middleware for distributed environments is so high that it is required a multidisciplinary research. The outcome will be enabling technologies that will support e-activities. The research challenges related to the following 9 issues will have to be tackled with [7]:

- Reference architecture for collaboration at work,
- Ontologies for collaboration at work,
- Plug&Play interoperable service oriented architecture (SOA) for collaboration at work,
- Smooth “upper layer” middleware interaction with the underlying layers,
- Interaction among peers (workers, systems, robots),
- Utility-like computing capacity and connectivity,
- Contextualization and content,
- Group-level security, privacy and trust,
- Mobility at work.

4. Motivation for developing collaborative systems

Research for agri-food and related sectors is one of several industry-focused clusters within the IST Programme. Under FP5, projects here explored innovative business models for eBusiness for the food, agriculture and fisheries sectors that aid value creation. In FP6, relevant work was undertaken in the Strategic Objective on Collaborative Working Environments. This aimed to develop next generation collaborative working environments that increase creativity and boost innovation and productivity [2, 3].

High-speed – or “broadband” – internet access is essential to the prosperity and future development of Europe’s rural regions. Broadband services are a prerequisite for eBusiness, and for the growth and jobs on which regional economies depend. Broadband allows individuals and organisations to communicate and access services regardless of their geographical location. By its very nature, broadband bridges distances and is particularly beneficial to the development and attractiveness of remote and rural areas. At the end of 2005 an estimated 13% of the EU population, or about 25% of households, had broadband access. In the EU-15 this increased to 90% of the urban population, but only around 60% of businesses and households in remote and rural areas.

A number of EU-funded research projects have addressed the technical and economic obstacles **involved in rural broadband access**, such as:

- Roadmap for ICT Solutions for Rural Areas and Maritime Regions (RURAL WINS, www.ruralwins.org),
- Analysing Broadband Access for Rural Development (A-BARD, www.a-bard.org),
- The Potential Socio-Economic Impact of Broadband Access and Use on New Form (BEACON, www.ovum.com/beacons),
- Communications from Aerial Platform Networks Delivering Broadband Communications for All (CAPANINA, www.capanina.org).

ICT brings rural communities new solutions to economic, social and environmental challenges [6, 9]. eBusiness can do much to strengthen the vitality and sustainability of agricultural and related industries. New ICT approaches, however, offer solutions that will be as applicable to the small business as to the large. Important supported projects connecting the Agri-Food Rural Value Chain are the following:

- Agri-Food Roadmap: A Vision and Work Plan to Implement Future RTD Trends for the Transformation of Agri-Food Industries into Digital Companies (AFORO, www.aforo.net),
- Food Safety and Quality Monitoring with Microsystems (GOODFOOD, www.goodfood-project.org),
- Development of Long-term Shared Vision on AMI Technologies for a Networked Agri-food Sector (AMI@NETFOOD, www.ami-netfood.com),
- A Collaborative Platform for Working and Living in Rural Areas (C@R, www.c-rural.eu)

ICT is helping to improve food quality and safety through efficient and cost-effective tracking from farm to fork [5, 8]. Food safety is vitally important and work to improve it is going on all the time. There has been a major overhaul of EU food safety laws in recent years, partly as a response to the food safety scares of the late 1990s. **Projects connecting to food quality and safety** are the following:

- Trial of the Eurovet Animal Identification and Veterinary Surveillance System (EUROVET, www.viatrace.com),
- Cold Chain Monitoring and Traceability Services (COLD-TRACE, www.cold-trace.com), Energy
- Efficient Sensor Networks (EYES, www.eyes.eu.org)

5. The AMI@Netfood project

AMI@Netfood project objective is to provide valuable contributions to **progress towards the achievement of the objectives of a European Research Area in the IST field**, with a view to its application into agrifood and rural domain [4]. AMI@Netfood, by generating consensus on a Strategic Research Agenda, contributes to prepare the ground for further RTD activities beyond FP6 by investigating future research challenges, RTD roadmaps and associated implementation models in the target domain. The key outcome achieved by AMI@Netfood project is related to first identify and reach EU consensus on medium to long term Research ICT priorities and second provide means to support the implementation of several of the identified priorities by means of a proposal for joint activities.

Project key objective has been to provide valuable contributions to **progress towards the achievement of the objectives of a European Research Area in the IST field**, with a view to its application into agrifood and rural domain. To achieve the stated objective AMI@Netfood has selected as **main tool** the design of a **Strategic Research Agenda** containing a set of societal challenges and a number of RTD areas to be further developed with a view to prepare the ground for further RTD activities beyond FP6. The key outcome achieved by AMI@Netfood project is related to **build consensus** on medium to long term Research ICT priorities and also to provide means to support the implementation of several of the identified priorities by means a set of potential joint activities. Specifically, AMI@Netfood has set up specific cooperation links with one very much related ETP in “Life Sciences” such as **Food for Life**. It has to be highlighted here the excellent welcome received from several partners responsible for different working groups under ETP Food for Life with whom possible co-operation channels have been identified for the future. In addition to close cooperation with ETPs, active cooperation with other EU funded projects has been pursued during the whole project. Once major feedback was received from AMI@Netfood constituency and sectoral stakeholders, the objective of the project has been focused to four specific RTD domains as follows.

- ICT applications for the complete traceability of products and services throughout a networked value chain.
- Collaborative environments in agri-food and rural areas.
- ICT as key enabler to support innovation and development in rural areas creating value for citizens and businesses.
- Innovative ICT applications in rural areas using broadband infrastructure

References

- [1] Collaboration@Work, The 2005 Report on new working environments and practices, Luxembourg: Office for Official Publications of the European Communities, 2005 ISBN 92-894-9283-X, (2005).
- [2] European Regional Innovation Scoreboard (2006 RIS), This report was prepared by Hugo Hollanders (MERIT – Maastricht Economic and social Research and training centre on Innovation and Technology), (2007), <http://trendchart.cordis.europa.eu/>
- [3] European Trend Chart on Innovation Annual Innovation Policy Trends and Appraisal Report Hungary, 2004-2005, European Commission, Enterprise Directorate-General, A publication from the Innovation/SMEs Programme.
- [4] Final Report for Publication FP6 - 015776, AMI@NETFOOD Development of Long-term shared vision on AMI Technologies for a Networked Agri-food sector.
- [5] HERDON, M., FÜZESI, I., Quality control and product tracing in ERP systems, Computers in Agriculture and Natural Resources, *Proceedings of the 4th World Congress*, Orlando Florida, ISBN: 1-892769-55-7, (2006), 518–521.
- [6] Information Society and Agriculture & Rural Development: Linking European Policies, European Commission, Luxembourg: Office for Official Publications of the European Communities, 15 pp, ISBN 92-79-02621-6, (2006).
- [7] Next Generation Collaborative Working Environments 2005-2010, 1st Report of the Expert Group on Collaboration@Wor, Brussels, (4th May 2004).
- [8] SZILAGYI, R., HERDON, M., Impact factors for mobile internet applications in the agri-food sectors, 4th World Congress On Computers In Agriculture, Orlando, 2006. 24-26 July, *Proceedings*, Published by American Society of Agricultural and Biological Engineers, LCCN 2006929870, ISBN 1-892769-55-7, ASABE 701P0606, 252–257.
- [9] Rural Development Programme for Scotland 2007-2013 The Strategic Plan, Crown copyright 2006 ISBN 0 7559 4968 4 Published by Scottish Executive St Andrew's House Edinburgh Produced for the Scottish Executive by Astron B45142 2/06.

Miklós Herdon, László Várallyai

University of Debrecen,

Faculty of Agricultural Economics & Rural Development

H-4028 Debrecen, Böszörményi u. 138

Hungary