Dear Reader,

ICT‐AGRI is an EU‐funded ERA‐Net running from May 2009 through August 2013. The objective of ICT‐AGRI is to contribute to coordinated European research and innovation in the important area of ICT and robotics in agriculture and related environmental issues.

The prominent tasks of ERA‐Nets are mapping of research within the domain, development of a Strategic Research Agenda, and calls for projects based on national funding (ICT‐AGRI launched its first call in 2010 and the next is planned for 2012). A further important task is networking within the research area. Inclusion of knowledge and experience from researchers and practitioners is crucial for the relevance of, e.g., a Strategic Research Agenda.

ICT‐AGRI is grateful to the EFITA/WCCA congress II‐14 July 2011 for offering a unique opportunity to approach the research and innovation community, and to present and discuss the future R&I needs on the basis of our web‐based online consultation.
European agriculture is facing conflicting future challenges: Global needs for food and bio-energy; consumer demands for food quality and security; animal welfare; reduction of the environmental footprint; diminishing rural populations; and international competition. Advancements in ICT and robotics are needed to facilitate the implementation of a green bio-production. Common solutions are required, but European research and innovation remains fragmented. The objective of ICT-AGRI is to contribute to a coordinated European research and innovation in this important area. This will be achieved by five overall goals for ICT-AGRI:

**A comprehensive publicly accessible knowledge base concerning R&D**

Mapping of existing R&D is a prominent part of this ERA-Net as of most other ERA-Nets. ICT-AGRI combines the mapping with online dissemination of the collected data. ICT-AGRI has developed a novel approach denoted the “ICT-AGRI Meta Knowledge Base”. The Meta Knowledge Base contains profiles of all major research organisations within ICT and robotics in agriculture (this is also published in a Country Report) and profiles of many individual researchers. The database is being populated with metadata on current R&D. The Meta Knowledge Base is also being developed as an online tool for interactions with and among researchers and developers.

**A widely accepted Strategic Research Agenda (SRA)**

The SRA will at the end of the project be an important reference paper for funding of R&D within ICT and robotics in agriculture. A draft SRA has been developed internally in ICT-AGRI and is now in consultations with stakeholders. An online consultation has run through April and June, and the results are presented for discussion at this workshop. A first version of the SRA will be produced within the next two or three months and made available for further discussions. The final version will be produced towards the end of ICT-AGRI.

**Three successful calls for trans-national projects**

ICT-AGRI has completed its first call for trans-national projects based on national funding by the countries in the ERA-net. The call for pre-proposals attracted 44 applications. Of these, 14 were invited to submit a full proposal, which subsequently were evaluated by an international scientific panel. Seven projects are funded with a total sum of approximately EUR 3 millions in a virtual pot (each country funds only national project partners). The next call is expected to be issued in spring 2012.

**Viable networks for funders as well as researchers and developers**

The development of networks within the research area, including the network’s viability after the end of the project, is a major strategic objective. ICT-AGRI views the Meta Knowledge Base as a major instrument for networking among funders as well as researchers and developers, and ICT-AGRI will during the project further develop the networking in the website. The viability is supported by the Meta Knowledge Base being implemented by open source software and database, which facilitates a transfer to other projects for future hosting. Two issues at this workshop are related to networks for researchers and developers: Encouragement of Public-Private Partnerships and Online information about ICT and automation in agriculture.

**Supplementary support actions for coordinated Research and Development**

True networking in the research area also involves shared activities with no or little common funding. Examples are so-called non-competitive calls, co-ordinated R&D in several countries concerning specific topics, open source software development, and open standards. ICT-AGRI will support such kinds of networking in a bottom-up approach.

**Research and Innovation**

There is a growing attention on innovation, as a reaction to a too slow transfer of knowledge from research to business. This is certainly also the case within ICT and automation in agriculture, where numerous models and applications from the research sector never or only in a small scale have been applied in practice. ICT-AGRI is therefore investigating the possibilities for submitting an innovation call. The overall objective of an innovation call could be to develop generic concepts for integrating applications from research and from small and large enterprises into the management systems used by farmers. This could, for example, be application of a Decision Support System in Farm Management Systems in at least three different countries, with the required development of ample interfaces between the two kinds of systems.

**Perspectives**

Many researchers may see ICT-AGRI, and other ERA-Nets, as another source for funding their research. A good source, as topics in ARA-Net calls usually are quite narrow compared to other funding schemes. The funding from ICT-AGRI will, however, only be a tiny contribution to the total Research & Innovation investments being required. For ICT-AGRI it is therefore crucial that its funding and activities contribute to strategic issues on a European scale. The Strategic Research Agenda is a very important issue in this respect. Another issue is a stimulation of a European (and international) R&D community for ICT and automation in agriculture, by encouraging public-private partnerships and offering online information. We offer a devoted collaboration to any organisation, project or individual, who want to work with us for these goals.
The ICT-AGRI Strategic Research Agenda (SRA) strives for new perspectives in information and communication technology (ICT) applied in agriculture. Goals of the SRA are to identify future challenges for a sustainable European agriculture; to deduce goals and solution approaches based on ICT and automation technologies; to determine and prioritize further needs for Research and Innovation (R&I); to create a vision for ICT and automation in agriculture and to develop a road map for SRA implementation.

Up to date the challenges for agriculture in Europe have been reviewed. From the current achievements in ICT and robotics for agriculture, a number of related goals, to which ICT and automation can contribute significantly, have been defined. Finally, ICT solutions having an impact on these goals have been identified. Fig. 1 shows an overview of the coherence between these challenges, goals and solutions.

In order to identify those solutions for ICT and Automation applications having the highest potential to meet the challenges facing European agriculture and to determine and prioritize the research and innovation needs from April to June 2011 an online consultation was conducted.

The consultation was designed as real time Delphi survey, so the participants could see the voting results and comments of the other participants. The description of the solutions and the solution components (Agronomy, Economics, Environment, Inter-Operation, Operation, Technology) could be modified as well as additional solutions created and commented.

Via e-mail-listings the call for participation was widespread; totally 185 participants with expertise or profound interest in ICT-AGRI from 21 mainly European coun-

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**Fig. 1**: Future challenges for a sustainable agriculture and deduced goals and solutions approaches based on ICT and automation technologies.
A comprehensive view on the RBI voting of the various solutions shows, that Agricultural Robots are seen as the solution with the highest RBI needs. This might be due to the fact, that employment of robots in agriculture is relatively new and experience with technology application is not high yet. Other solutions, having been implemented for a longer time show lower RBI needs (Fig. 3).

A comprehensive look at the components of the solutions reveals that together interdisciplinary knowhow from ICT and agricultural experts enabling the creation of new, innovative solutions.

During the next months online consultation results are analyzed in detail and incorporated in the elaboration of the SRA. Subsequently the vision for ICT and automation in agriculture and a road map for SRA implementation are to be developed. A first SRA draft is foreseen for the fourth quarter 2011.

Fig. 2: Totally 185 participants from 21 mainly European countries responded to the online consultation.

Technology and Agronomy are voted as the components with the highest RBI needs (Fig. 4). This underlines the background of the ERA-NET ICT-AGRI to bring together interdisciplinary knowhow from ICT and agricultural experts enabling the creation of new, innovative solutions.
How to encourage the Public-Private Partnership in the Era-Net ICT-AGRI?

by Dominique Didelot, Michel Berducat & Jean-Pierre Chanet (Cemagref, France)

New technologies in ICT and robotics for agriculture and environment must demonstrate their added values both in terms of economic and environment advantages.

This ambition is typically devoted to the ICT-AGRI WP5 “Establishing and maintaining a framework for long term network and collaboration”. To boost technological developments and disseminations of innovation as expected in this objective, it is proposed to set-up a “Public Private Partnership Taskforce” (PPP-Taskforce). This 3P-Tf will integrate a methodology based on the “Value Chain” analysis.

The notion of "Value Chain" is the expression of all the bricks needed to give a concrete representation of the innovation process. One common definition of Innovation is the whole process "from the idea/research to the market". This definition clearly demonstrates the important role of all the actors in order to propose new solutions on the market in adequacy with economical aspect, environmental aspect and requests of end users.

Before selecting a relevant challenge (normal first step) in function of SRA consultation, the subject about "ICT-AGRI contribution to 50% pesticides mitigation at the 2018 horizon" has retained attention. So, the chain value decomposition (step 2 - Analysis of the "Value Chain") will be performed from the expertise of partners involved in the 3P-Taskforce team: DASTI, EL-VLLO, BLE-BMLV, MIPAAF, FOAG, TNOrange, under the leadership of the Cemagref.

Each national Eranet partner will have to identify all potential actors, especially all private sectors (SME, big companies, ...) of their own countries (step 3) in close relationship with the "value chain" decomposition and Meta Knowledge Base tool.

Thus, the fourth step will focus on the analysis of the identification campaign carried out, by asking opinion of Public and Private actors through questionnaires-interviews and a workshop preparatory to the launching of a relevant network at the European level.

Roadmap of PPP-taskforce action:

- WP4: Strategic Research Agenda consultation
- WP5.1: 3P-Taskforce
  - Experimental topic: 50% pesticides mitigation at the 2018 horizon
  - 1 - concrete priorities to the “right scale”
  - 2 - Analysis of the ‘Value Chain”
  - 3 - Identification of the actors
  - Workshop
  - Analysis of the “Value Chain”
  - Identification of the actors
  - 4 - Prospective and strategic action plan
- WP2: to complete the MKB with Private sector
- WP3: to enrich with some specific topics the 2nd call?
- December 11
- 2nd challenge

June 11 October 11 December 11 April 12 November 12 May 13

Final assessment of PPP-taskforce
Today's technology should assist in meeting the main current agricultural challenges and problems. Precision farming attempts to control all actions on the farm requiring advanced sensors to measure the current state of animals, land and farm. Digital data and informatisation measures can facilitate alleviating the administrative burden imposed on farmers.

Modern communication techniques allow for an easy data transfer between (inter)national governments, regional authorities, farmers, tractors and robots. By combining all of these technologies, agriculture can take a leap forward in the agriculture management, coping with the new challenges farmers are facing, yet taking the environment into consideration.

A serious challenge however, remains the limited ICT adoption in agriculture. Therefore, extensive research on ICT and Robotics in agriculture and related environmental (ICT-AGRI) issues is conducted. New ICT and Robotics technologies are rapidly emerging and can revolutionize future farming through their major impacts that relate with productivity and profitability. Unfortunately human and financial resources remain fragmented and ICT and precision farming is only slowly becoming an integrated part of farming and farm management.

There is little tradition for networking and collaboration within ICT and robotics in agriculture. Awareness of existing knowledge is an absolute prerequisite for faster progress in research and development. The relevant knowledge within the ICT-AGRI research area is quite diffuse. It is also often time-consuming to search for knowledge and difficult to assess.

**It is ICT-AGRI’s Meta Knowledge Base’s ambition to become the central internet-based resource for researchers, developers and users within ICT and robotics in agriculture.**

The Meta-Knowledge Base attempts to stimulate coordination of research and development in this area through user-driven initiatives and activities. Therefore a structured framework for mapping and analysis of all relevant knowledge within the described research area is needed.

A profile includes address and contact information but also expertise, facilities and priorities need to be described. Edit rights can be shared with other users and contact persons can be transferred.

Postings are descriptions of research items of particular interest for ICT and robotics in agriculture. Each posting includes a title, an abstract and a text, and links to online content of any kind elsewhere. Each posting is classified using a framework based on the use of descriptive keywords.

Profiles from almost 40 different countries have been recorded. This diversity ensures a unique platform for building and maintaining international collaboration and networks.

Today, nearly 200 research postings and nearly 500 profiles have been registered in the database, hopefully boosting its use and dispersion on a global scale.
Successful start for ICT-AGRI Project “3D-Mosaic” in Potsdam

by Elke Saggau (Federal Office for Agriculture and Food (BLE) & Christiane v. Haselberg, Leibniz Institute for Agricultural Engineering (ATB) Germany

Winners at the start

From the first ICT-AGRI call in 2010 seven “winner projects” were chosen for funding. Meanwhile, the first projects are successfully “lifting off”.

So does 3D-Mosaic, the largest of the funded ICT-projects with its eleven partners from 7 partner countries. For June 13-14 the German coordinator, Prof. Manuela Zude, invited the consortium for the Kick-Off Meeting at Leibniz Institute for Agricultural Engineering in Potsdam. The Deputy-Coordinator of the ICT Agri-ERA-Net, Dr. Elke Saggau from the BLE and Dr. Christian Grugel from the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) congratulated the consortium and handed over the grant contracts to the German project partners.

ICT for more efficient use of water

Water is an increasingly scarce resource on a global scale due to climate change and rising food supply demands. To ensure crop yield and quality irrigation is a crucial measure in agriculture and horticulture. Fruit trees in orchards often differ considerably in growth and fruit load and consequently in their individual water needs. The target of 3D-Mosaic is an advanced, precise management of orchards by means of a decision support system (DSS) aimed at optimizing the efficiency of water inputs. It will apply information and communication technologies (ICT) for precision management of the economically relevant tree crops, plum and citrus. For this purpose, automated sensors, monitoring strategies, information processing and the decision support system will be developed. An evaluation of the concept takes place during two field trails in Turkey (citrus) and in Germany (plum).

Reducing the environmental footprint of fruit production

3D-Mosaic-project helps to implement the core ideas of the ERA-Net ICT-AGRI. The targeted project outcomes will have the potential to help fruit farmers cut their environmental impacts and contribute to sustainable development in food production.

General competitiveness of the European horticulture to produce more food and to maintain high food quality standards is supported while reducing the environmental footprint. The transnational research collaboration within the project allows to share multidisciplinary expertise for excellent results.

Development of new ICT applications will help create possible opportunities for a modern European agriculture while protecting the environment and promoting innovation and competitiveness.
There are 18 partners and 14 observer organisation involved in the ICT-AGRI ERA-NET covering 21 countries.

**Partners**

1. Ministry of Food, Agriculture and Fisheries, Danish Agency for Science, Technology and Innovation (DASTI), Denmark
2. Ministry of the Environment, Danish Environmental Protection Agency (DEPA), Denmark
3. Ministry of Agriculture of the Flemish Community, Institute for Agricultural and Fisheries Research (EV-ILVO), Belgium
4. Ministry of Agriculture and Forestry (MMM), Finland
5. CEMAGREF Technical Centres Development (CEMAGREF), France
6. Federal Agency for Agriculture and Food (BLE), Germany
7. Federal Ministry of Food, Agriculture and Consumer Protection (BMELV), Germany
8. Greek Research and Technology Network (GRNET), Greece
9. Ministry of Agriculture and Rural Development (MARD), Israel
10. Ministry of Agriculture, Food and Forestry Policies (MiPAAF), Italy
11. Latvian Academy of Sciences (LAS), Latvia
12. Malta Council for Science and Technology (MCST), Malta
13. Swiss Federal Office for Agriculture (FOAG), Switzerland
14. Ministry of Agriculture and Rural Affairs, General Directorate of Agricultural Research (GDAR), Turkey
15. Scientific and Technological Research Council of Turkey (TÜBITAK), Turkey
16. Netherlands Organisation for Applied Scientific Research (TNO), Netherlands
17. Agriculture and Food Development Authority (TEAGASC), Ireland
18. Region of Murcia Agency of Development (INFO Murcia), Spain

**Observers**

1. Leibniz-Institute for Agricultural Engineering Potsdam-Bornim (ATB), Germany
2. National Institute for Agricultural Research (INRA DARESE), France
3. Food and Agricultural Organization of the United Nations (FAO), Italy
4. Region of Lombardia (ROL), Italy
5. Cities on Internet Association (COIA), Poland
6. Romanian Academy of Agricultural and Forestry Sciences (ASA), Romania
7. Soil Science and Conservation Research Institute (SSCRI), Slovakia
8. Instituto Tecnologico Agrario de Castilla Y Leon (ITACYL), Spain
9. LEITAT Technological Center (LEITAT), Spain
10. Swedish Institute of Agricultural and Environmental Engineering (JTI), Sweden
11. Federal Department for Economic Affairs (DEA), Switzerland
12. Department for Environment, Food and Rural Affairs (DEFRA), United Kingdom
13. Agricultural Research Institute, (ARI) Cyprus
14. Wageningen University (WUR), The Netherlands