

## **Sustainable Precision Farming through User-Centered Design**

Agricultural Engineering innovations have a great potential to enhance sustainable development when fulfilling the needs of the growing World population. Better efficiency and accuracy in using inputs such as fertilisers and agricultural chemicals reduce the environmental impact per produced amount of food, feed, fiber and fuel. However, the innovation chain in agricultural engineering is reported to be slow. Breakthrough results of research and development are not taken into practical use widely enough.

The results from expert interviews and a global web-based questionnaire showed that the innovation chain is not as effective as it could be. The experts think that acceptability of new technologies, such as those of Precision Farming, is not as high as their technological level. The R&D process needs more knowledge of the end-users' needs and preferences. The experts agree that User-Centered Design (UCD) has the potential to speed up the process of sustainable innovations. Co-operation of agricultural engineers, industrial designers, marketers and end-users is the key for better products. If users are more involved in the design process, the products are easier to use and fit better to their use. The R&D phase is shorter because less iteration is needed to design an acceptable product. Users also adopt the usable products easier.

It is concluded that User-Centered topics should be emphasised among the European research priorities of Agricultural Engineering. The research should be more directed towards the acceptability of new technologies. The innovation process itself should be an important topic. Better usable products could bring competitive advantage to the European Union.

The results were communicated to the agricultural engineering community at the world congress CIGR-AgEng 2012 in Valencia. A special session, 'Innovation in Work Science', was arranged by the author. Furthermore, the author presented the need to use more User-Centered Design in agricultural innovation process at the 6th Workshop of the European Technology Platform MANUFUTURE under the topic 'Activating User-Centered research on sustainable agricultural innovations'. New research on the topic is being activated.