LLL strategies for new educational approaches in Smart Agriculture from an agricultural engineering perspective in Italy

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**Abstract.** Lifelong learning (LLL) is a well-known approach to further and permanent education of employees and has become very important also within the agri-forestry sector. This is especially relevant for farm machinery manufactures in order to adapt to a rapidly changing technological environment. In fact, agriculture and agricultural machinery industry, like many others, are affected by massive changes. The term Industry 4.0 is repeatedly mentioned in this context and is intended to describe the current industrial revolution. In the agricultural sector, all these processes are included in so-called Smart Agriculture, which shares with Industry 4.0 the methodological and cognitive approaches of Knowledge Management 4.0. In short, this is about the independent interaction of different technological systems into a self-organizing overall system, through an intensive and integrated applications of electronic devices, ICT, interconnected and cloud architectures and machine learning approaches (the latter mainly based on AI strategies). It is assumed that this will bring about similar structural and social changes as previous industrial revolutions. In this transformation process, the role of work and thus also of humans involved into the system will change deeply. As such processes are taking place very quickly, the qualification for any worker cannot take place in the context of generational change but requires the current workforce to continuously qualify and adapt.

Compared to industry, however, agriculture has an additional weakness in this situation. While the phase of Industry 3.0 represented for the industrial sector the advent of the IT revolution, for the agricultural sector this phase has been largely skipped for economic, financial, cultural and other reasons. Technological progress between 1970 and 2021 introduced, albeit very slowly, many mechanical and electronic innovations, which then led to the high level of automation of many solutions in Precision Farming, but failed to bring about the maturation of a solid IT culture in farm management processes. It is believed that today this gap is still the cause of many of the delays in the diffusion of Smart Agriculture practices.

In this sense, Universities can become key players in helping to overcome this gap, taking full advantage of LLL approaches and opening up to all possible decision-makers operating in Smart Agriculture and related industries.

In a joint project of the University of Natural Resources and Life Sciences (BOKU)/Austria, Free University of Bolzano/Italy, Swedish University of Agricultural Sciences/Sweden and Technical University of Munich/Germany (USAGE Project – Erasmus+), a concept on LLL in Smart Farming is currently being developed and implemented in several courses. The paper will present the main experiences from the Project with particular relevance to:

1. Results from a needs analysis/ survey among professional companies, associations and organizations active in agriculture and agricultural engineering.
2. Educational approaches developed by partners on how to teach relevant content for Smart Farming (online/ hybrid courses).
3. Topics and problems selected by partners to develop LLL modules on Smart Farming/ Smart Agriculture.
4. Educational activities to be shared among different types of experimental/ living labs, for enhancing new practical experiences.

These experiences also aim to develop new approaches to training professionals in the field of agricultural engineering.