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## OWC 2020 Paper Submission - Science Forum

*Topic 4 - Innovation in Organic farming: "thinking out of the Box"*

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### THE SOCIAL AND ECONOMIC IMPACTS OF DIGITALIZATION IN ORGANIC AGRICULTURE: THE EXAMPLE OF ROBOTS FOR WEED CONTROL IN SWITZERLAND

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**Full Paper Publication:** No

**Abstract:** The goal of this paper is to initiate a debate on the implication of introducing digital technologies into organic farming practice. With the example of a living lab on "Robotics in Swiss Organic Farming", we will present first results of our study in the framework of the on-going EU research project DESIRA. The living lab consists of a network of farmers, advisors, technology experts, innovators, and consumers to ensure that all relevant perspectives are integrated in the research. At the OWC, we will present the results of a first workshop on the assessment of needs, expectations and impacts of the technology. Further steps in the project will include creating scenarios for possible, desirable and non-desirable future developments of the technology. By presenting initial results of an on-going research project, we aim to enlarge the audience and discussion group on the introduction of digital technology in organic farming.

**Introduction:** Digital technologies are increasingly introduced in agricultural practice, including in the organic sector. While early technology, such as precision farming, was mainly developed for large-scale conventional farming, more recent developments have the potential to be suitable in organic farming. We therefore study ways on how the organic sector can deal with this technology development so that it creates benefits while staying aligned with the ethics of the sector (Scholz *et al.*, 2018). Our study is part of the EU H2020 research project DESIRA ([www.desira2020.eu](http://www.desira2020.eu)), with the objective to improve the capacity of society and of political bodies to respond to the challenges that digitalization generates in rural areas, agriculture and forestry in the next ten years. To achieve this goal, we will build a knowledge and methodological base to assess past, current and future socio-economic impacts of digitalization. With the help of living labs in all sixteen participating countries, this approach will strongly integrate the multiple actors involved in and affected by the technological development.

This paper focuses on the living lab "Robotics in Swiss Organic Farming". We will use the example of weed control in organic agriculture to assess the technology's socio-economic impact, and to develop a vision on how digital technologies need to look like for the organic sector, what particular challenges there might be in their implementation, and if and how the technologies can be aligned with organic values.

**Material and methods:** At the time of writing this paper, research is still in the planning phase. The living labs will follow an exploratory scenario development approach (Chermack, 2011). In a first step (taking place in spring 2020), the past and present problems will be addressed with stakeholders through an evaluation of the Needs, Expectations and Impacts. The impact appraisal will be based on criteria aligned with the Sustainability Development goals. In addition to the workshop, the analysis will also be based on 10 to 20 interviews, (grey) literature and other secondary sources. The distance-to-target Socio-Economic Sustainability Indicators of digitalization, selected on the basis of interaction with stakeholders in the region of the Living Lab, will be measured. Targets for the indicators will be set through a participatory multicriteria analysis based on data collected through an online survey. Our presentation at the conference will focus on the results of this initial step.

In a second step, taking place in autumn 2020, i.e. only after the OWC, two additional workshops will be conducted to explore possible scenarios for future development in terms of “what if?”. In these scenarios, internal drivers will be characterised, and the enablers, barriers, winners, losers, opponents, gender impacts and sustainability performance aspects will be addressed. The results of the living lab scenarios will feed into the development of an ethical code setting principles for researchers, innovators, and policy makers that should help in guiding decisions on further technological, legal, political and practical development.

**Results:** We expect to gather a better understanding on the state of digitalization and the socio-economic impacts of robots-related solutions for weed control in Swiss organic farming as compared to existing solutions. Robots-related solutions are still quite expensive, so economic benefits need to be scrutinized carefully. Robots can potentially reduce human labour, which is an important cost factor in organic farming. At the same time, reducing manual labour might entail social questions, as well as questions on what it means, and which skills are involved in being an organic farmer. Furthermore, the potential dependency of farmers on external companies and concerns of data ownership are relevant, and could be seen as problematic in terms of ethics by farmers, advisors, and other stakeholders involved in the living lab.

**Discussion:** By presenting initial results of an on-going research project, we aim to enlarge the audience and discussion group on the introduction of digital technology in organic farming. In accordance with the Responsible Research and Innovation approach (Owen *et al.*, 2012), we believe it is highly relevant to pro-actively lead such a discussion to shape the future of organic agriculture. We will therefore use the OWC as a wider round of experts to discuss potential implications of digital technology in organic farming, with the goal to integrate the debates in the further progress of the DESIRA project, including, among others, the development of an ethical code.

**References:** Chermack, T.J., 2011. Scenario planning in organizations: how to create, use, and assess scenarios. Berrett-Koehler Publishers

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