“Smart Farming”:
Between Traceability and Automation

Two-day workshop, September 19-20, 2019
Université de Neuchâtel

Jointly organised by

Institute of Geography
Prof. Francisco Klauser: francisco.klauser@unine.ch
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Institute of Anthropology
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UNIVERSITÉ DE NEUCHÂTEL
FONDS NATIONAL SUISSE DE LA RECHERCHE SCIENTIFIQUE
Verband Geographie Schweiz
Association Suisse de Géographie
Associazione Svizzera di Geografia

SYNOPSIS

Farming is being transformed by smart technologies. Consider autonomous tractors and weeding robots, underground infrastructures with inbuilt sensors, or drones and satellites offering image analysis from the air. Today, smart farms are just as fashionable as smart cities.

More specifically, the 'smartness' or 'Big-Data aspect' of farming is often set in relation to the connection of various tools, sites, data bases and actors in the farming sector, implying ever-increasing data gathering and widening circuits of data flow. Furthermore, smart farming is commonly associated with data processing and analytics, aiming at the automated and anticipatory management of agriculture. The farm of the future is thus presented as a software-driven system of connections, processes and flows, based on carefully orchestrated techniques of data collection, transfer and analysis.

In this picture, automation and traceability play a fundamental role. On the one hand, they are portrayed as the basic condition for making farming practices and processes more effective, manageable and secure. On the other hand, automation and traceability are also seen to raise major issues in terms of privacy, surveillance, techno-dependency, data security, economic power relations, etc.

Addressing these problematics, the two-day workshop aims to explore the driving forces behind and implications of differing smart farming initiatives, so as to generate a more detailed picture of the possibilities, limitations and problems evoked by the current digitisation of agriculture. More specifically, bringing together both researchers and practitioners alike, the workshop aims to stimulate interdisciplinary and cross-occupational discussions on, but not limited to, the following topics around smart farming:

- Automation
- Traceability and transparency
- Opportunities and risks
- Power relations and actor networks
- New practices of collaborations
- Economic dependencies
- Exemplification and policy transfer
- Surveillance and data protection

PROGRAMME

September 19th: Room RS.38

09:15 Coffee

9:45 Welcome and introduction (Francisco Klauser)

10:00 **Keynote**

Michael Carolan: *Anticipatory Politics of Automation: Robotics, Labor and the Distributive Ontologies of Digital Agriculture*

11:00 Coffee break

Session 1: Agricultural Data Transparency and Food Chains
Chair: Alistair Fraser

11:15 Andrew Donaldson: *Transparency, Traceability and Food Supply-Chain Futures*

11:45 Evelyn Markoni: *TransChain: Digitisation and Perception of Transparency in the Beef Value Chain*

12:15 Lunch (Restaurant VIO)

Session 2: Making Agriculture in the Digital Everyday
Chair: Francisco Klauser

13:45 Jérémie Forney: *"Everyday Digitalisation" in Agri-Environmental Governance: A Few Reflections from Switzerland*

14:15 Dennis Pauschinger: *"We Do Pioneering Work": The Spatial Dimensions of Exemplifying New Technologies in a Digitalised Agriculture*

14:45 Coffee break

Session 3: Swiss Smart Farming in Practice I: Data Management in Agriculture
Chair: Dennis Pauschinger

15:00 Léa Stiefel/Alain Sandoz: *A Collaboration Platform for the Distribution of Data in Swiss Agriculture*

15:30 Jürg Guggisberg: *Barto – The Swiss Smart Farming Platform*

18:00 Boat trip on lake Neuchâtel (Drinks)

19:30 Dinner (Maison des Halles)

September 20th: Room RS.38

09:15 Coffee

Session 4: Smart Farming and Algorithms
Chair: Jérémie Forney

10:00 Alistair Fraser: *"Alexa, which Futures Contract Did You Sign?": The Emerging Configurations of 'Smart Farming' Practices in the Algorithmic Age*

10:30 Géraldine Félix/Mathias Délétroz/Nastasia Jeanneret: *Use of John Deere's Smart Farming Tech by Farmers in Switzerland: Shaping New Professional Practices?*

11:00 Coffee break

Session 5: The Production of Smart Farming Practices
Chair: Michael Carolan

11:15 Moritz Dolinga: *Everyday Practices and Big Data in Agriculture*

11:45 Francisco Klauser: *Big Data and the Country Air: Sprayer Drones as Mediators of Volumetric Agriculture*

12:15 Lunch (Restaurant VIO)

Session 6: Smart Farming and Economics
Chair: Andrew Donaldson

13:45 Heidrun Moschitz: *The Social and Economic Impacts of Digitalisation in Agriculture – Possible Ways for Evaluation at the Exemplar of the Project DESIRA*

14:15 Christina Umstätter: *Changes in Livestock Farming in a Digital World*

14:45 Coffee break

Session 7: Swiss Smart Farming in Practice II: Examples from the Field
Chair: Dennis Pauschinger

15:00 Frédéric Hemmeler: *The Politics of Agricultural Drones: A Report from the Practice*

15:30 Cédric Bilat/Hatem Ghorbel: *An Autonomous Drone to Detect Fawns in Agricultural Fields*

16:00 Final discussion

PRACTICAL INFORMATION

Location of the workshop

Institute of Geography (IGG)
Faculté des Lettres et des Sciences Humaines, Université de Neuchâtel
Espace Tilo-Frey 1
2000 Neuchâtel
http://www2.unine.ch/geographie/page-2756.html

September 19th: Room RS.38
September 20th: Room RS.38

Room RS.38 is located in the main building of the Social Science and Humanities Faculty. Just go through the main door and immediately turn left. You will see two copy machines. The room is right there.

Meeting Points

Lunch: From 12:15, both days at Restaurant **VIO**, Quai Robert-Comtesse 10, 2000 Neuchâtel.

Reception September 19th: We will have drinks on a boat and take a trip on the Lake of Neuchâtel. The boat leaves at 18:00 at the Neuchâtel port: Port de Neuchâtel, Quai du Port 10, 2001 Neuchâtel. Please make sure to be on time. We will arrive back at the same address and then proceed to a restaurant for dinner.

Dinner September 19th: After the boat trip around 19.30. Restaurant **Maison des Halles**, Rue du Trésor 4, 2000 Neuchâtel.

Public transport

Train
By train (Intercity direct), the travel time to Neuchâtel is:
• 34 min. from Bern • 41 min. from Lausanne • 1h13 from Geneva Airport• 1h52 from Zurich Airport
Swiss Federal Railways – CFF: http://www.sbb.ch/en/home.html

Bus, tramway, funicular
The « TransN » serves the entire Canton of Neuchâtel. In addition to the busses and tramways, the funicular railways facilitate commuting in Neuchâtel. The "Fun'ambule" provides a direct connection between the railway station and the main University building on the Avenue du 1er Mars.

Contact and practical information

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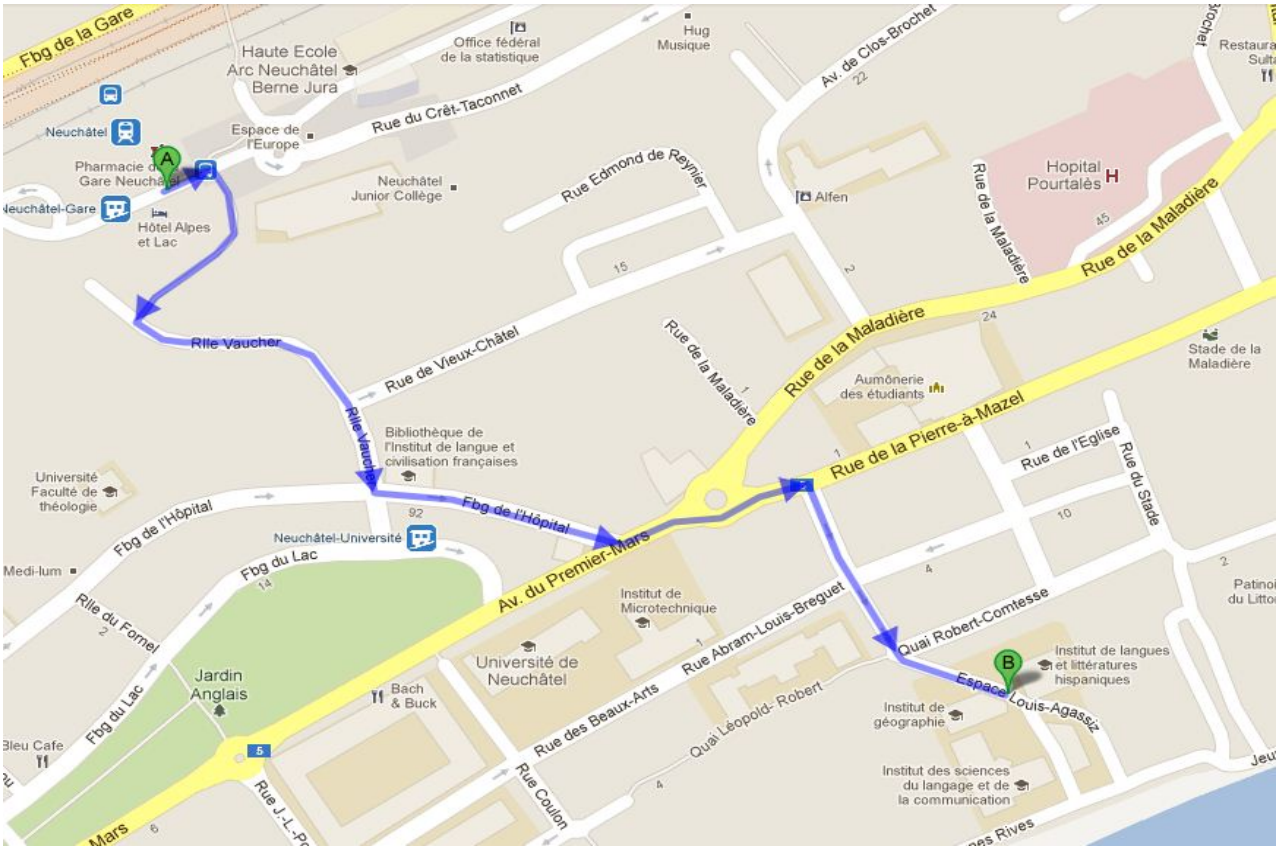
Picture of the building at Espace Tilo-Frey 1, main entry.



Itinerary map from the railway station and Hotel Alpes et Lac to the Institute of Geography, Espace Tilo-Frey 1.

ABSTRACTS

Day 1 – September 19th

Michael Carolan, Department of Sociology, Colorado State University

Anticipatory Politics of Automation: Robotics, Labor and the Distributive Ontologies of Digital Agriculture

This talk draws from interviews with three groups: (1) U.S. farmers who have adopted automated systems; (2) individuals from North American firms that engineer and manufacture these technologies and those who repair them; and (3) U.S. farm laborers (immigrant and domestic) and representatives from farm labor organizations. The argument is conceptually situated within two related literatures: (1) those interrogating the fictional expectations that underlie capitalist reproduction and (2) distributed (ontological) frameworks that recognize the coherence of any object to be an analytic effect. The framework presented questions whether concepts such as "automation" and "skill" *per se* provide sufficient analytic and conceptual clarity to critically engage these platforms. The argument aims to reposition the discussion, giving focus to what something *does* over what it *is*. This makes the debate less about discrete things (e.g., milking robots, jobs lost/gained, yield) and more about who and what these techniques/technologies connect, afford, and make un/thinkable.

Andrew Donaldson, Global Urban Research Unit and Centre for Rural Economy, Newcastle University

Transparency, Traceability and Food Supply-Chain Futures

Through an initial interest in livestock diseases and biosecurity, I became interested in the wider material-informational environments of food. This included early phases of automation and large-scale data collection in livestock production alongside genetic traceability techniques. My most recent project extended these interests into the complex space-times of full food supply chains, and considered the ways in which the information generated around foodstuffs was being managed and used by various supply chain actors to anticipate emergent problems around food supply and food integrity. Throughout, I have maintained an interest in the interactions between technical data, formal regulatory standards, different modes of 'scientific' knowledge practices, and the types of contingent 'field' expertise developed by those working in food production, processing and distribution.

Here I will use my experiences and findings to reflect on the relationships between traceability and transparency in food supply chains, along with the contested potentials that they have for reshaping spaces of food production. At the core of this is a consideration of food supply-chain mapping that highlights: the desire for, and difficulty in achieving, transparency; the powers and limits of traceability; and the un-codified expertise that turns mapped data into a meaningful understanding of risks. At a more strategic scale, actors working with food and supply-chain data at the cusp of the present, caught between a reconstructed past and an uncertain future, adopt a range of strategies to secure their positions, including: attempting total control of supply chains through rigorous data management; accommodating complexity by accepting lacunae in information and taking responsibility for risks; cultivating a carefully managed ignorance to limit their liability. Taken together, these issues help outline the already complex context of knowledge practices, regulation and discourse with which digitalisation is engaging.

Evelyn Markoni, Berner Fachhoschschule, Hochschule für Agrar-, Forst- und Lebensmittelwissenschaften (HAFL)

TransChain – Digitisation and Perception of Transparency in the Beef Value Chain

Digitisation is not only characterised by human-machine interaction but also has an impact on the perceptions of transmitted information and its credibility. This has a decisive influence on relationships between actors of different value chains, like the beef value chain, especially when it comes to questions of transparency and their perception. Smart phone apps, for example, can show a cattle's path from its birthplace to the plate. This, among other things, can significantly influence consumption patterns and present producers with several challenges. In this context, our research project "TransChain" investigates, with the help of a mixed method approach, perceptions of, demands on and perceived opportunities as well as challenges related to transparency in food value chains. In our project we focus on the beef value chain, because the industry has come under increasing pressure due to consumer expectations and political framework conditions in terms of transparency and trust. Initial results from ten qualitative expert interviews with conscious consumers show e.g. that the interviewees define transparency with the information available and the possibility to trace back products. But there were also divergent perceptions. For example, transparency is also perceived as “to know someone in person”, in contrast to the possibility of achieving traceability with the help of digital technologies. In addition, some experts fear that new technologies will make them "glassy" consumers. The experts’ perceptions of transparency in the beef value chain depend strongly on sociodemographic factors and the individual demands on transparency. These initial results represent important contemporary discourses, but also show that a more in-depth understanding is necessary. Thus, "TransChain" deals with transparency in the age of digitisation from humanities’ and social sciences’ perspectives and intends to critically discuss transparency discourses and the possible consequences of new technologies.

Jérémie Forney, Institut d’Ethnologie, Université de Neuchâtel

“Everyday Digitalisation” in Agri-Environmental Governance: A Few Reflexions from Switzerland

All over the globe, a good deal of hope is placed in digital technologies and in their potential for minimising the environmental impact of agricultural practices and food production. Collecting extensive data sets on farms and the food chain, and connecting these to tools and machinery, is thought to harbour great potential for control, monitoring, and optimisation. In short, like many other sectors of the economy, agriculture and food have entered the era of Big Data.

While technology sciences tend to confirm partly these hopeful perspectives, social sciences have still demonstrated that this new era is driven by far more than the allure of innovative technologies or intelligent machines. In this paper, I want to look beyond what I call “spotlight digitalisation” (robots, drones, and hyper-connected farms) and focus on more subtle but still significant aspects of the change happening in agriculture that are often overlooked. This “everyday digitalisation” impacts notably on the way environmental issues are addressed and governed by diverse actors of our food systems. As an example, digitalisation opens new possibilities in terms of traceability and accountability that have become crucial elements in the governance of food chains. This movement contributes significantly to the increased bureaucratisation of agriculture. The multiplication and complexification of the data collected has also led to the constitution of new large data bases, opening discussion over data control and ownership. Based on a starting research project and the literature, this paper aims to explore some of these new research avenues that an “everyday digitalisation” approach might open in the context of agri-environmental governance.

Dennis Pauschinger, Institut de Géographie, Université de Neuchâtel

"We Do Pioneering Work": The Spatial Dimensions of Exemplifying New Technologies in a Digitalised Agriculture

The digitalisation of agriculture is on the rise. From planting robots and crop management apps to disease detecting software and automated tractors, globally operating companies are presenting "smart farming" solutions as the new future of food production. Much academic and public attention, however, has been paid to how everyday urban life has become more digital, automated and structured by algorithms, often to exercise surveillance by both private and public actors. In geography, there has been much debate addressing how such new technologies and the accompanying policies have travelled globally and are implemented locally in the urban through different scales and specific spaces of learning and exemplification (e.g. McFarlane 2011; McCann & Ward 2011; Söderström 2014). There is way less literature and scientific inquiry of how these processes play out in the rural. Bringing the discussion to the sphere of a digital agriculture there is an opportunity to challenge the common understandings of how new technologies proliferate. This paper therefore draws upon empirical data from a qualitative case study with a Swiss based but internationally operating start-up that has recently obtained the first authorisation in a joint effort between a coalition of private companies and public institutions to spray pesticides on vineyards and fruit plantations with their home-made drone. The paper demonstrates in three main analytical sections 1) the actor-network, 2) the spatial dimensions, and 3) the entrepreneurial improvisation that co-produced in an assembling effort both the regulation and enablement of the sprayer drone. The example opens up the possibility of new understandings of how the exemplification and implementation of new technologies are made possible.

Léa Stiefel, Institut des Sciences Sociales, Université de Lausanne.
Alain Sandoz, Head of Project ADA-EDA

A Collaboration Platform for the Distribution of Data in Swiss Agriculture

The intervention examines the issue of data flows in production, logistics and value chains of the agri-food sector, in perspectives of timeliness, consistency and legality, based on a case study: the ADA project (Agrar-Daten-Austausch in German – Agricultural Data Exchange in English), a fully distributed system under GPL. The project evolves in the context of Swiss agriculture with competing parallel but distinct initiatives for the control and distribution of agricultural data. In this paper, we consider the architectures of the ADA system and project, and their different levels of implementation. We show how the project intends to respond "technically" to "political" issues raised by the need to share data in a network of public and private, heterogeneous, and competing actors. These issues include: *(i) data transmission is authorised by all parties concerned (owner/farmer, sender, and receiver); (ii) transmission is transparent (data recipients publish what they do with data, and as a consequence, data owners know what is done with their data and who does it); (iii) and transmission is traced (correct behaviour can always be proven, and as a consequence, misbehaviour can be spotted – if not proven); (iv) the system doesn't operate any central component (the recipients of data in the network can play the role of sender and/or receiver without distinction or retention of their "commercial" data); (v) nor does it require any adaptation of participating legacy applications.* Legacy applications can be farm managing ERPs, administrative control applications of public authorities or of label organizations, domain specific applications like livestock management, or special applications that collect and redistribute sensor data, for example. Setting up a fully automated, generic, controlled, and traced data exchange system raises a number of challenges (technical, legislative, organisational, and economic, to name but a few) that will be discussed.

Jürg Guggisberg, CEO Barto AG

Barto – The Swiss Smart Farming Platform

Many farmers are annoyed at having to supply the same data on their own production several times a year to the cantonal agricultural systems, product purchasers and labelling organisations. With its web-based documentation and operational management platform "Barto", Barto AG wants to provide agricultural companies with an instrument that simplifies data management on farms. The idea is that the relevant data – everything from planning, through documentation, to evaluation – will only be captured once, wherever possible. The various data recipients can then all be served from the same data pool.

Barto has been online since April 2018 at www.barto.ch. This version, which can be used with Agate login data, includes the components "Animal Traffic Cattle", "Swiss Balance", with GMM and PEP certification, and the electronic "grazing and free-ranging journal".

Building a comprehensive Swiss smart-farming platform is complex and expensive. For this reason, Barto AG has decided to collaborate with the German platform 365FarmNet and to use it as a base for its own system. 365FarmNet includes a view of the entire farm, including both crop production and animal husbandry. The process of adapting the platform to the Swiss market began in early 2019. Farmers should be able to operate the field calendar on the platform as quickly as possible, with the support of the corresponding mobile app. In a second step, the existing, productive Barto building blocks will be integrated into the overall solution. Barto is aiming for the central system, which stands behind the popular app Smartcow, to also be able to communicate with the Barto platform in the future. One major challenge is the exchange of data with federal and cantonal systems.

Barto deals with the data of users on a trust basis. A declaration is made as to which submitted data are necessary for the provision of a service. Barto does not share information without the user's consent. Barto charges an annual licence fee per module. The shareholders of Barto AG are Identitas AG, AGRIDEA, fenaco, the cattle-breeding organisations, SMP and Swissgenetics.

Day 2 – September 20th

Alistair Fraser, Department of Geography, Maynooth University

"Alexa, Which Futures Contract Did You Sign?": The Emerging Configurations of Ssmart Farming' Practices in the Algorithmic Age

This paper examines 'smart farming' practices in the algorithmic age. I begin with a brief overview of 'smart-farming,' which I locate relative to a broad, societal-scale shift to smart production and consumption; and contextualize relative to: (i) algorithmic governance and surveillance capitalism; (ii) climate change; and (iii) the corporate food regime. The remainder of the paper examines the emerging configurations of smart farming practices at three scales. At the micro scale, 'smart farming' requires (to-date, still rather uncoordinated) investment in physical and human infrastructure from individual agricultural producers, (supplier and buyer) firms, and public authorities. All of the various new devices, services, and opportunities associated with 'smart farming' connect with the internet of things (IoT), which is only in its infancy. At the meso scale, farmers, their industry organisations, and agricultural technology providers (ATPs) are establishing new coalitions and alliances to create the conditions for further 'smart farming' advances. Beginning to come into view here is the so-called 'internet of people' (IoP), populated by pervasive communities using 5G and Device-to-Device communications. Finally, at the macro scale, lead edge technology firms *beyond* agriculture are

mobilising artificial intelligence (AI) competency to connect IoT and IoP devices and services with life generally, thereby creating what we might refer to as the 'internet of life' (IoL) in which distinctions between cows and robots, farms and data farms, are intended to be meaningless. Per the paper's title, therefore, I take seriously the prospect of Amazon's Alexa (or some other, as-yet-unnamed, form of AI) taking control over farm decisions via new algorithmic-infused innovations that build on and dominate earlier 'smart farming' investments. In my conclusion I ask whether any actor along the food value chain – farmers, processors, retailers, or consumers – can (or should try to) prevent this possible outcome.

Géraldine Félix, **Mathias Délétroz, Nastasia Jeanneret**, Institut de Géographie, Université de Neuchâtel

Use of John Deere's Smart Farming Tech by Farmers in Switzerland: Shaping New Professional Practices?

The development of recent technologies has transformed the agricultural sector, leading to major reconsiderations of the role of farmers and involving changes in the way they see themselves and act. Farmers are increasingly confronted with new intelligent technologies, promising to simplify agricultural work, reducing working time, human and physical resources needed, and improving competitiveness.

What about Switzerland? While many actors are developing and experimenting with the latest technologies, we have chosen to study the case of agricultural management systems (AMS) developed by John Deere. They have a double advantage for our research: they are used by enough Swiss farmers and have been used for a long enough time to make our research interesting. Connected tractors are indeed a well-advanced reality for some pioneering farmers in French-speaking Switzerland: guided by satellites, accurate to within two centimetres, they drive alone once configured. These AMSs produce a quantity of data on soils, crops, harvests and the position of the tractor. This data can be synthesised into maps for crop optimisation purposes. All this stored and managed via a single platform: MyJohnDeere.

We sought to understand how farmers in French-speaking Switzerland who use AMS live and perceive the advantages and problems brought by these new technologies. We also examined the impact that the use of AMS could have on the evolution of their professional practices by questioning three different aspects: comfort and working time; economic rationality and farm management; and independence. Based on the comments of seven farmers interviewed on five different farms on the Western Swiss plateau, we document the ways in which practices are or are not modified by the use of AMS as well as the perceived benefits and risks.

Moritz Dolinga, Department Gesellschaftswissenschaften, Universität Basel

Everyday Practices and Big Data in Agriculture

While digitisation and smart farming are more often than not presented as a means to increase the competitiveness and sustainability of agriculture by political decision makers, industry and agricultural sciences, little qualitative analysis has been carried out so far to examine the social premises and logics of this ongoing digital transformation as well as its implications for everyday life and the work of those involved in production processes. Such a perspective, however, which places particular emphasis on the viewpoints, practices and considerations of those directly affected by political strategies of a "digital transformation" in their everyday lives, is of particular importance, as it helps to identify problems and challenges that are otherwise easily overlooked.

Therefore, the paper presents and discusses insights from qualitative fieldwork on Swiss farms conducted in the context of the research project “Negotiating, converting and interconnecting life in digital agriculture”, which is dedicated to the investigation of the following questions: How, why and by whom is digitisation brought to the farms? What are actors and practices? How do farmers themselves relate to the digital? How are digital technologies intermingling with agricultural practices and what effects do they produce? And: How are digital technologies embedded into several political, economic, social and environmental situations on different scales.

Francisco Klauser, Institut de Géographie, Université de Neuchâtel

Big Data and the Country Air: Sprayer Drones as Mediators of Volumetric Agriculture

The paper critically explores how agricultural drones today transform the ways in which the aerial realm is lived and perceived in the farming sector, as a contested space of risks, opportunities and power. It does so through the in-depth empirical study of the air-bound practices, expectations and imaginations that arise from the development and commercialisation of the first authorised drone system in Europe for the automated application of pesticides, sold and piloted by a Swiss-based company.
Drawing upon initial findings of a four-year research project on smart farming in Switzerland, this discussion also opens up a wider reflection on the possibility of a truly 'volumetric thinking' in contemporary assemblage theory. What difference does it make, conceptually speaking, when socio-technical systems operate in, from and through the air? What grammar are we to develop to grasp the complex relational configurations of the material and immaterial realms that co-produce and result from the present-day encounter of Big Data and the air?

Heidrun Moschitz, Department of Socio-Economic Sciences, Research Institute of Organic Agriculture (FiBL)

The Social and Economic Impacts of Digitisation in Agriculture – Possible Ways for Evaluation at the Example of the Project DESIRA

The overarching goal of DESIRA is to improve the capacity of society and of political bodies to respond to the challenges that digitisation generates in rural areas, agriculture and forestry in the next ten years. To achieve this goal, we want to build a knowledge and methodological base to assess past, current and future socio-economic impacts of digitisation. With the help of living labs in all fifteen participating countries, this approach will strongly integrate the multiple actors involved in and affected by technological development. In this presentation, I will focus on the living lab “introducing precision farming in organic agriculture in Switzerland”, and outline the planned steps to evaluate the related social and economic impacts. In particular, we will look into precision farming techniques that make intelligent, small-scale and diverse organic farming more economical. The new technologies should be open to all types of farms, regardless of their size. The intelligent modernisation of cultivation techniques should also lead to lower production costs and ultimately enable consumers to benefit from affordable organic products. My paper will present first steps in how we will integrate evaluation of social and economic impacts into technology development.

Christina Umstätter, Agroscope Tänikon

Changes in Livestock Farming in a Digital World

Digital technologies are widespread nowadays and their use is also advancing on Swiss farms, even if the implementation rates are yet rather low in Swiss Agriculture according to a survey undertaken by Agroscope in 2018. In animal husbandry, there is a strong driver to improve on-farm processes, labour efficiency and animal health and welfare. However, when developing and evaluating new systems in livestock farming it becomes apparent that new knowledge can be gained about our current husbandry systems that are hidden to the human eye. One of these promising parameters is the rhythmicity of activity in animals, which has the potential to be an indicator for animal health and welfare. This knowledge opens up new possibilities and might change the way we farm our livestock.

Joining up data and different technologies and further linking evaluating and executing functions also provides farmers with new opportunities to improve the competitiveness of their enterprise. One example is the development of a cybernetic grazing management system to support farmers who want to reduce expensive inputs, such as labour or concentrates, by replacing it with grazing. Therefore, it is envisaged to combine automated herbage mass and quality measurements with feedback from livestock as well as the option to guide livestock in order to replace conventional fences with virtual fencing.

When following the societal discussion, digitalisation is often stated as a driver for structural change. Yet, one can hypothesise that it could also support small farms or units when new approaches are taken into account. Furthermore, the work place on farms is changing. Work is shifting increasingly from physical to managerial tasks. Therefore, the focus should be even more on farm labour to optimise work processes. This is especially relevant for Swiss agriculture with its high cost-level as compared with neighbouring and competing countries.

Frédéric Hemmeler, Founder & CEO Aero41

The Politics of Agricultural Drones: A Report from the Practice

Drones in agriculture are on the rise. The flying devices are today used for a series of purposes to make farming more efficient and precise. The company Aero41 developed a drone for efficient and eco-friendly crop protection that is today used in Switzerland and beyond. The specificity of the company is that it created their own drone, adapted to the tough Swiss steep and complex parcel conditions. Aero41 obtained in 2019 the first homologation of its product as a “ground application” tool in Switzerland. The “AGv1” – name of the drone – has also obtained a first EU-certification with Austrocontrol (Austrian CAA). In this paper I will draw upon my experience as the founder and CEO of Aero41 and present three main points:

1. The history of Aero41 where I shed light on the idealisation and development of our business and drone;

2. The (long) authorisation process: I will here explain how we were able to obtain this unique authorisation, what were the challenges encountered and what solutions we proposed to solve them;

3. The future of drones in agriculture: I will try to outline where we see drones in agriculture in the not so distant future and what opportunities and risks lay ahead.

Cédric Bilat, Hatem Ghorbel, Data Analytics Group, Haute École Arc Ingénierie – HES-SO

An Autonomous Drone to Detect Fawns in Agricultural Fields

Farmers under an increasingly competitive regime are more open than ever to the use of technology, when it can increase the profitability of their farms and remain simple to use. During mowing, wild animals, especially fawns, are a major concern for farmers. Agricultural machinery can injure fawns that remain invisible and immobile in face of danger. The blood then contaminates the hay bales. There is therefore a health risk for the rest of the cattle. In addition, the protection of species is a conservation and ethical issue and comes from the expectations of both agricultural communities and the general public.

In this context we have developed a very special drone capable of automatically detecting the fawns present in a field. Like many other existing solutions, a thermal camera is used, so that the young animal becomes clearly visible thanks to a thermal signature that clears it clearly from the scenery. Nonetheless, our approach is distinguished by a very simple system of use; instead of having a human operator who usually analyses thermal images on the ground to identify an animal, an artificial intelligence (AI) embedded in the drone replaces it advantageously. The geolocation of the animal is then transmitted to the ground, in order to remove the fawn. This AI not only analyses the images in real time during the flight, it also pilots the drone directly. The farmer is thus relieved of this task. Furthermore, there is no need to draw up a flight plan, the AI automatically calculates an optimal path, minimising flight time, while avoiding obstacles, even on fields divided into several parcels.

The developed drone is fully autonomous thanks to the development of a sophisticated artificial intelligence that manages the entire mission.