



European Commission

# FARMERS OF THE FUTURE



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# FARMERS OF THE FUTURE



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# Abstract

Agriculture is one of the important sectors in the transformation of the European economy and society towards a long-term sustainable future. European farmers will face several challenges in the future, as they continue to supply food and non-food products and at the same time, contribute to this transition. The challenges are wide ranging and include: climate change, resource scarcity, infrastructural issues and changes in food demand/diet habits.

The study 'Farmers of the Future' has explored who the farmers - that will be dealing with those challenges in the medium- to long-term future - will be.

This report presents the results of that exploration. It describes the 2040 landscape of farmers and presents policy implications.



# Acknowledgements

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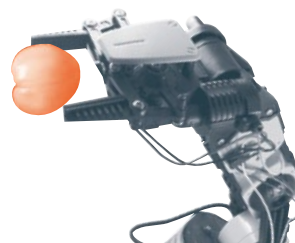
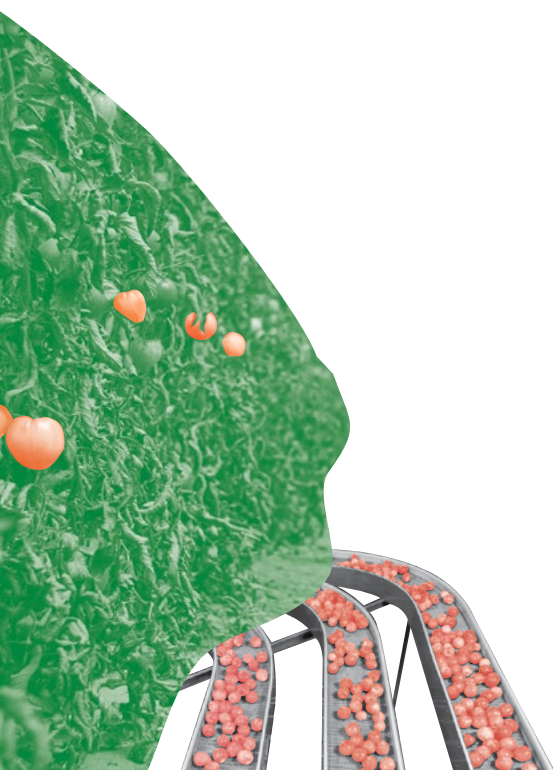
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# Foreword

Dear readers,

A foreword is like a red carpet for a show: it is the honors passageway formed by words, so that the following words are read with interest and curiosity.

And I have never written a foreword with more affection than this one; I write it from that corner of the heart, where we keep the knowledge that remains after having forgotten what we learnt and the pleasure we have remembering rewarding moments.

The *raison d'être* of this foreword is not just to introduce it –that is done by the authors later– but rather to pay due tribute to the work on the farmers of the future, as a necessary piece of the Common Agricultural Policy's future life; and of course to pay tribute to its authors, whose natural curiosity, enthusiasm and long lasting hours of work made it possible.

When we in DG AGRI were asked to draft a communication in 2017 reflecting a vision of the future Common Agricultural Policy, we started working with an enthusiastic group of young colleagues with different responsibilities, different perspectives and views. The result, of which you, dear readers, are certainly aware of, was a text that reflected a vision of a modern Common Agricultural Policy better aligned with the various EU policies. Its center of gravity was already the nowadays-top priority of sustainability, and a greater climate and environmental ambition.

Propelled by the enthusiasm put into the exercise, we asked ourselves: if this is the policy of the future, who will have to implement it on the ground? Who will be the key players of the EU next generation agriculture, the farmers of the future? How will they be? How will they face the challenges ahead and what future policy will they need? After all, policies, laws and regulations only make sense if someone gives them a life by actually applying them.

We decided then, to deepen the question. We turned to our colleagues in the Commission Joint Research Centre for support, and this is how the Farmers of the Future foresight study was launched. We wanted a people-centered, highly participatory approach, involving key players and stakeholders: more than 40 interviews with farmers and people having a say on the matter were conducted; about 20 workshops took place to gather a maximum of contributions, hear all opinions and have a rich debate.

The results are described in the pages that you will discover in this report. Allow me just to say here that the farmers of the future will be able to defy conventional established ways of working by constantly innovating, and providing better tailored solutions to problems they may face. Technology of course will be a key factor, but being innovative, specialized, diversified, independent, organic or conventional, they will have a different management philosophy.

The study also reflects, maybe above all, the diversity of situations and the rich complexity of our European Union. It provides, I am sure, an inspiring vision of the next generation of EU farmers.

I hope, dear readers, that when going through the study, you will conclude like us that tomorrow's farmers will be different from today's; however, they will remain essential and they will farm in such a way that your and all people's needs and those of nature are met in full respect of each other.

To conclude, allow me to share a strong conviction: as a strategic and modern community, the farmers of the future will face the challenges of the twenty-first century with determination and motivation, providing the public goods society is claiming. Because as Albert Einstein said "the future is not a gift; it is an achievement".



Maria De Los Angeles BENITEZ SALAS

Deputy Director-General

Directorate General for Agriculture and Rural Development

European Commission

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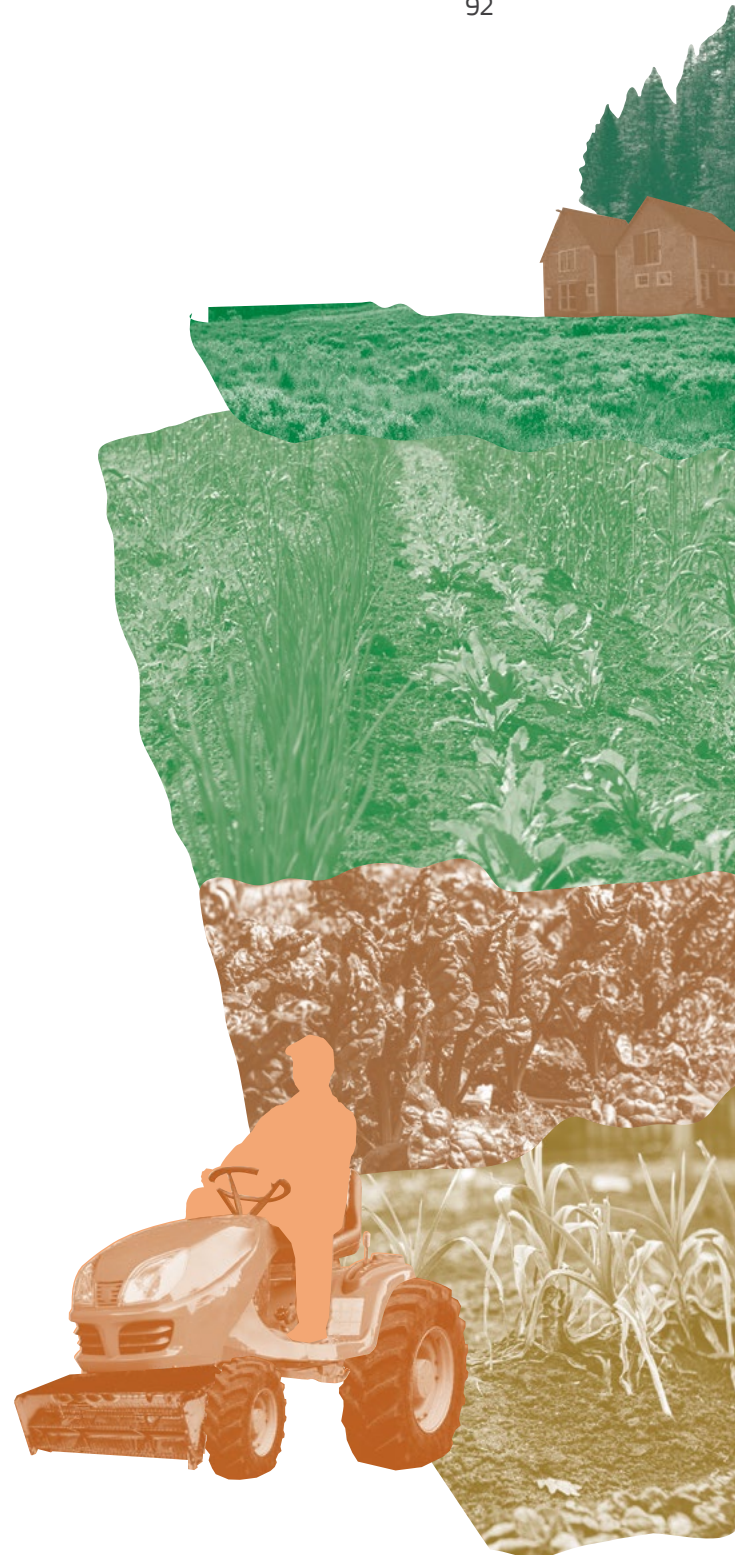
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# Executive Summary

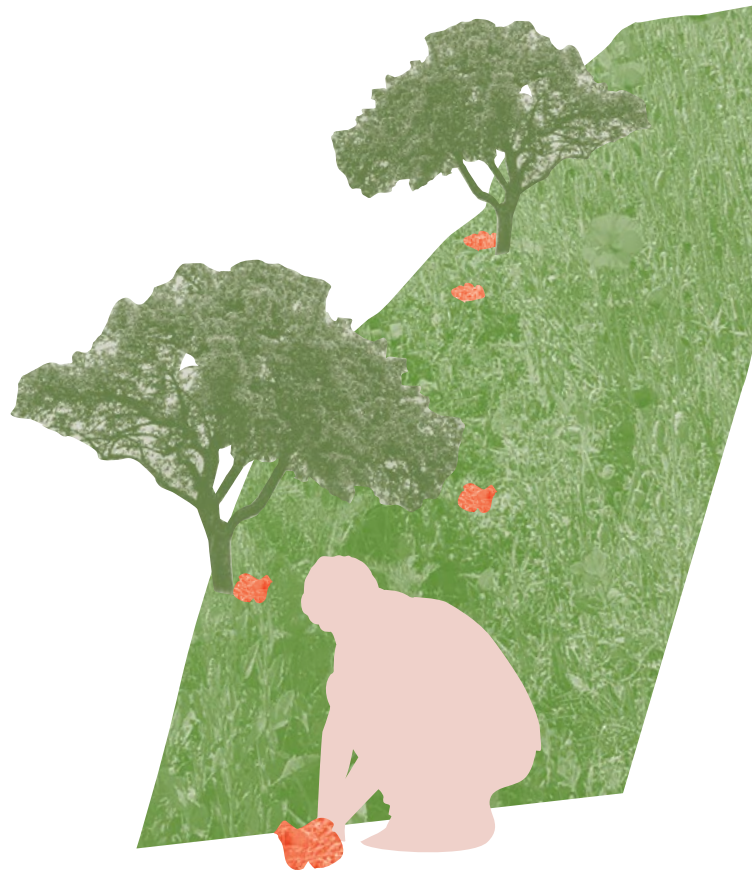
The foresight study *Farmers of the Future* sets out to explore the future professional roles of farmers as we move towards the year 2040, using a people-centred approach. The aim is to raise awareness and to open discussions about the future of farmers and farming in the EU and the policies needed to shape it. While the recently adopted 'European Green Deal', the Farm to Fork Strategy and the Biodiversity Strategy<sup>1</sup> provide the framework for the future development, the COVID-19 pandemic has been a strong reminder of how important preparedness and a resilient food system are.

The *Farmers of the Future* study applied a combination of foresight and design methodological approaches, with an emphasis on a participatory process, involving European farmers, among other stakeholders such as academia, civil society organisations and industry associations.

12 farmer profiles have been developed to reflect existing and emerging realities in European agriculture. A set of 14 megatrends that will affect farming in the two coming decades was applied to the profiles, developing farmer profiles for 2040 (see Table 1 for an overview). (Megatrends are long-term driving forces that are observable now and will most likely have significant influence on the future in the coming decades). The profiles serve to paint a picture of both the situation of the farmers themselves and their farming environments. Together, as a group of farmers, they reflect the increasing diversity of agriculture and simultaneously, how similar megatrends will affect each of them differently.

The purpose of the profiles is not to formulate distinct, rigid categories of future farmers, but to explore how various characteristics of farming and the people behind it, (i.e. the farmers), will evolve with the technological, economic, social and cultural changes to come. Accordingly, these 12 future profiles reflect an exploration of the future, they are not a forecast.

Developments across the 12 future farmer profiles include a shift to more environmentally sustainable forms of farming. Notably, in 2040 climate change, together with environmental degradation, is expected to make it



increasingly difficult to farm and thus farmers will not be able to rely only on past experiences. Agroecological practices (i.e. the application of ecological principles to agricultural production systems) are expected to become mainstream by 2040. A similar development is anticipated for alternative production methods such as cell farming, or controlled-environment agriculture, (if they have proven to be environmentally compatible and can overcome current technical obstacles). Thus, farmers and farming towards 2040 are considered to be active contributors to the sustainability transition and they are expected to live up to societal expectations and be an active part of the solution.

It is expected that consumers in 2040 will be more demanding and more conscious (i.e. more mindful and aware of the consequences of their choices). The

<sup>1</sup> COM (2019) 640 COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS The European Green Deal  
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healthiness of diets will gain more importance, in parallel with environmental and ethical considerations, but food prices will still be an important factor determining dietary choices. Short supply chains might become more frequent, as will reconsideration of business models and power balances throughout the food chain. Other consumer trends such as the ‘experience economy’ will add to the diversity of business opportunities, but might also contribute to the volatility of the business environment, as demands fluctuate.

Another important aspect shaping agriculture in the coming 20 years will be technological innovation. The digitalisation of agriculture, including precision farming and automation of processes, is expected to profoundly shape the way farmers are involved in the production process, across different approaches to farming. The availability of data and transparency of resource use and processes will also be a factor. A combination of biotechnological advances will allow substantial interventions into the production process – through introducing alternative processes, or radically transforming existing ones.

Against this background of profound changes in the environmental context of every farmer, it is expected that in 2040 there will be a more diverse ecosystem of farms responding to these challenges and opportunities. The farmer profiles that reflect the current mainstream of farming are expected to adapt and to still be around in 2040. They will be joined by profiles that are currently considered to be emerging, but by 2040 will be well established. In particular, cell farmers and controlled-environment farmers might have a profound effect on the future landscape of farming, possibly disrupting established business models.

This future diversity has the potential to contribute to the resilience of farming in the EU and thus to food security, but it also raises several questions and will have implications for future policies. Some of these are considered in this report, and briefly summarised here:

### **How to ensure coherent policies for an increasingly diverse food system?**

As general approaches to the food system become more holistic and systemic, the food system itself is becoming

increasingly fragmented (new actors, new intermediaries, new service delivery models, new niches). The future policies in the context of a more diverse food system, might need to quickly recognise and map various food sub-systems, their connections, stress points and influencing factors, to understand where and how to intervene to achieve the right results.

### **How to ensure movement in the same direction?**

As environmental sustainability and climate neutrality become one of the aims of the overall sustainability transition, the understanding of environmental sustainability and ways of achieving it will be increasingly divergent and difficult to reconcile. Future policies could be expected to support the emergence of a clear understanding of environmental sustainability, well-grounded in common values. The version of environmental sustainability needs to be balanced with socio-economic needs, and to encompass different attitudes, methodologies, technologies and frameworks under the common goal of a ‘healthy planet’ and a just transition.

### **How to build transformative resilience?**

As farming is exposed to increased risks and crisis situations, the robustness or the ability to withstand crises will not be enough – farmers will need transformative capacity to ‘bounce forward’. Future policies could target individual resilience through transformation rather than stabilisation measures and to create advisory/coaching services that combine technical and psychological support. They could also be expected to target the resilience of societies, addressing crises in more systemic ways.

### **How can farmers effectively use diverse and volatile networks?**

As more attention is paid to collective intelligence, networks and information flow, the networks themselves become more volatile, diverse and dispersed. Beyond the current role in encouraging and creating networks, future policies could support ‘networkability’ – helping to develop a culture and structures necessary to reach out and build ad-hoc networks among organisations and individuals.

### **How can farmers effectively connect to consumers?**

As food production and consumption are recognised by society as an important part of the sustainability



transition, values and worldviews, framing and narratives that are developed around respective farming approaches and farm products become more important. Future policies could consider acknowledging and recognising the various values, narratives and framings that relate to agriculture, with the aim to use them ethically, to build transparency around their subjective nature, but also to be ready to re-frame communications to facilitate discussions and to increase comprehension of policy problems.

### **What will the term ‘farmer’ mean in the future?**

As more actors become involved in food production, the traditional farmer identity might be increasingly questioned and complemented by multiple other identities, transforming the meaning of the term ‘farmer’. Future policies would therefore have to address multiple groups and individual identities related to farming and food. Furthermore, the creation of opportunities for the discussion of roles and models and their underpinning values and beliefs, as well as being open about the values underlying the assumptions behind a policy, could be considered.

### **What will be the interdependence between 2040 farmers and rural areas?**

The vitality of rural areas is essential for many of the farmer profiles to grow, as farming activities become more embedded in the broader activities of their economic and social environment. The long-term vision for rural areas that the European Commission will develop in 2021 will need to take into consideration the future diversity of farming and how to nurture it in rural areas<sup>2</sup>.

The study Farmers of the Future, bringing together different stakeholders (farmers, academia, civil society organisations, industry associations), initiated a range of discussions on:

- who farmers are in the present time;
- how they could develop in the future;
- their related hopes and fears; and
- what questions possible developments could raise.

This study could only involve a limited number of participants. With the aim of encouraging others to continue the exploration of the present and the future of farmers, the material and templates used for developing the 2040 farmer profiles will be made freely available based on a creative commons licence<sup>3</sup>.

<sup>2</sup> [https://ec.europa.eu/commission/commissioners/sites/comm-cwt2019/files/commissioner\\_mission\\_letters/mission-letter-janusz-wojciechowski\\_en.pdf](https://ec.europa.eu/commission/commissioners/sites/comm-cwt2019/files/commissioner_mission_letters/mission-letter-janusz-wojciechowski_en.pdf)

<sup>3</sup> The material and templates will be made available on the European Commission's Knowledge for Policy webpage: [https://ec.europa.eu/knowledge4policy/foresight\\_en](https://ec.europa.eu/knowledge4policy/foresight_en)

Table 1: Brief summary of 2040 farmer profiles

PROFILE NAME	2040 FARMER	FARM DESCRIPTION	VALUE PROPOSITION	ENVIRONMENTAL APPROACH
<b>ADAPTIVE THEMES AND NETWORKS</b>	Creative, curious, open, resourceful, agile, networked	Multifunctional but coherent farm run by independent business partners	A package of goods and services connected to a theme	Agroecology
<b>CORPORATE BRANCH OPERATIONS MANAGER</b>	Manager, career prospects in a large corporation	Business unit contributing to functioning of the corporation – providing ingredients for production of final products	Low-cost combined with good standards for the final product	Organic or private label certification
<b>INTENSIVE PRECISION FARMING</b>	Innovative, efficiency-driven, technophile, autonomous	Large, efficient and specialised farm holding	High technical quality, low-cost products for the global supply chains	Precision farming, climate change, resource scarcity
<b>PATRIMONIAL ON THE FENCE</b>	Conservative, traditional, surviving	Varying business models, locked-in due to past investments, reliance on subsidies/off-farm income	Various - strategy to maintain activity, survive, pass to next generation	Minimum compliance with rules, but sensitive to heritage (buildings, landscapes)
<b>CONTROLLED ENVIRONMENT SOIL-LESS HIGH-TECH</b>	Technophile entrepreneur	Vertical farming in the cities and on outskirts (soilless)	Local, circular, reliable produce, flexible to adapt to changing demands	Circular economy
<b>CELL ALTERNATIVE FOODS</b>	Biotech entrepreneur	Creating synthetic protein-based food/ingredients	Alternative to agriculture with less environmental and animal welfare issues; alternative ingredients for food processors	Circular economy, alternative to livestock production
<b>SOCIAL CARE HEALTH AND PEOPLE</b>	Service- and society-oriented, empathy, open-minded	Farms providing food and social/healthcare services	Nature and manual meaningful work as a way of care and health.	Agroecology
<b>LIFESTYLE CHANGE FOR A NEW LIFE</b>	Quality of life, self-actualisation, cross-cultural competence, flexibility	Migrants from urban areas starting (part-time) agricultural activity in 'farm as a service' context	Urban-rural translators - providing rural experience to urban and urban to rural	Agroforestry, organic
<b>REGENERATIVE A BIGGER ECOSYSTEM</b>	Strong environmental and social motivation, holistic approach to agriculture	Environmental sustainability is the guiding principle, going beyond the sustainability mainstream	Providing maximum ecosystem services	Scaled regenerative
<b>URBAN ON URBAN SOIL</b>	Entrepreneur, social responsibility	Soil based farming in urban environment, open field and greenhouses, on the ground or roof-top	Enriching/building urban ecosystems, local food, special crops, social services	Organic or permaculture
<b>SERIOUS HOBBY PASSION FOR LEISURE</b>	Persistent, focused on mastery of activity,	Small farms, the objectives focus on occupation rather than profitability	Not relying on farming income, the value is in the activity itself	Agroecology
<b>COMMUNITY PROVISIONING GROWING AND SHARING</b>	Care-giver, nurturer oriented to small, tight networks	Small farms, plots, gardens or home installations in urban or rural settings	Producing and processing food for pleasure in offering, sharing, maintaining networks	Permaculture

**MOST RELEVANT MEGATRENDS**

	Inequalities	Climate	Migration	Consumerism	Resources	Demography	Globalisation	Technology	Work	Education	Health	Urbanisation	Governance	DEVELOPMENTS TOWARDS 2040	TENSIONS
														More opportunities for diversification and creating new niches – with customers dispersed globally	Too much diversification hinders focus and coherence; consumer niches and networks will be less stable – constantly changing
														Changing nature of corporations and corporate social responsibility going towards healthy, affordable diets for all, internalising agricultural production	Strategy of business vs objectives of farm activity; motivations - personal career vs land stewardship role
														Growing ecological and economic constraints make increasing efficiencies more difficult - focus on constant adaptation of production processes; eco- and climate services, landscape optimisation required	Land use, environmental impacts, competitiveness; synthetic production affects livestock; technology providers; what would sustainability/profit tension look like in 20 years? - motivation: autonomy vs dependence
														Diverse farm businesses become locked-in and lose their ability to innovate and adapt.	Resistance to policy direction; inability to move away from business
														Moving from niche to mainstream, technological progress substantially improves resource efficiency	Competition to urban farmers, other F&V producers; dependence on city infrastructure; motivation - against 'romantic vision of agriculture'
														Overcame the technological barriers - now commercially available and accepted by consumers, more resource efficient, strong competition to livestock farming	Impact on livestock farming, relies on plant-based inputs, some still need livestock cells, energy needs and carbon footprint
														Increasing demand for services, closer integration in healthcare systems facilitates business, limited healthcare budgets imply need to target wellbeing market	Low-tech farming due to care, competition to specialised care facilities (no proper farming anymore), limited healthcare budgets
														Urban living conditions deteriorate, urban migrants expect lower-cost, convenient and good lifestyle - agriculture is part of it, easy access to participate in collective farming	'Balanced lifestyle' vs demands of agricultural work - torn between two realities, gentrification of rural areas
														Conventionalisation of environmental approaches leaves the option to support collective/more stringent standards or more radical approaches	Conventionalisation of environmental approaches - High vs low environmental standards
														As cities create more coherent food and city climate strategies, urban farming becomes more popular, but has to face increased competition	Competing with other green uses of city space, competing with vertical farming
														As paid work becomes more intellectually demanding, but less time-consuming, serious hobbies will be increasingly popular	Competition with for-profit farmers for land and resources; reliance on stable environment
														As concerns about access to healthy food increase, people create informal food sharing networks	Creating exclusionary networks, operating outside formal economy

# 1. Introduction

In 2019 the European Commission adopted the ‘European Green Deal’<sup>4</sup>, which aims to transform the European economy and society towards long-term sustainability. This includes notably, climate neutrality by 2050 and the tackling of many other environmental and social challenges, (including the loss of biodiversity and declining health), while simultaneously arguing for an inclusive and fair transformation. Primary production has a key role in achieving the objectives, and the ‘Farm to fork strategy’<sup>5</sup>, as one element of the Green Deal, aims to make EU food ‘the global standard for sustainability’. Another element of the Green Deal, the Biodiversity strategy<sup>6</sup>, emphasises the role of farming for a healthy planet.

The Common Agricultural Policy is also a key tool to achieve a sustainable transformation, and it puts farmers at the core of its actions. The 2017 Commission Communication ‘The Future of Food and Farming’<sup>7</sup> credits farmers with guaranteeing food security for over 500 million European citizens and being the first stewards of the natural environment. According to the Communication, the role of the policy is to “bring out the very best from the Union’s farm sector and rural area (...) and to support farmers in anticipating and dealing with future relevant challenges and developments.” This is echoed by the Green Deal, the Farm to Fork Strategy and the Biodiversity strategy, assigning farmers a vital role in contributing to solutions to the many challenges the EU is facing.

The COVID-19 crisis in 2020 has been a strong reminder of how important an intact environment and a resilient food system are. The speed at which living conditions changed, the acceleration of existing trends (e.g. digitalisation), as well as possible longer-term behavioural changes due to the pandemic (e.g. regarding consumption patterns), showcased the importance of preparedness and anticipation. Given

the crucial role of food production, i.e. food security, being aware of future developments and related challenges and opportunities (and implications for policies) is essential.

To date, there have been many initiatives to explore the future of agriculture, and there is a considerable amount of literature detailing the future challenges for agriculture and food production and consumption, especially regarding climate change and resource scarcity, technological change, infrastructural issues and food demand/dietary habits.<sup>8</sup> However, there has been less consideration given to the question of who the farmers will be, in the medium- and long-term future, who will be dealing with those challenges. The fact that only 5.6 % of EU farmers are under 35 years old suggests that there could be much more disruption than continuity ahead in the farming profession.

Against this background, the study ‘Farmers of the Future’ was initiated in late 2018 and carried out in close collaboration between the European Commission’s Joint Research Centre (JRC, Competence Centre on Foresight) and the department for Agriculture and Rural Development (Directorate General (DG) AGRI). This foresight study aimed to identify and explore possible future professional roles of farmers towards 2040 and to generate ‘food for thought’. Accordingly, rather than trying to predict the future, the aim is to open discussions on the future of farmers and farming in the EU, as well as respective policies to shape that future.

4 COM(2019) 640 COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE EUROPEAN COUNCIL, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS The European Green Deal

5 COM (2020) 381 COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS A Farm to Fork Strategy for a fair, healthy and environmentally-friendly food system

6 COM (2020) 380 COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONSEU Biodiversity Strategy for 2030 Bringing nature back into our lives

7 COM(2017) 713 final COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS The Future of Food and Farming

8 See Annex 1 for references





To capture today's diversity as well as emerging farming situations, 12 farmer profiles have been developed for this study. The time horizon of the year 2040 was chosen to move beyond the current budgetary and policy planning horizon.

The study applied a combination of foresight and design methodological approaches, with an emphasis on a highly participatory process, and involving in particular European farmers, among other stakeholders (i.e. alongside farmers, it involved academia, civil society organisations and industry associations).

### How this report is organised

This present report summarises the results of the study. Section 1.1 briefly explains the methodological approach and the process applied (more detailed descriptions can be found in the Annexes). This is followed by a presentation of the farmer landscape 2040, including underlying trends and fictitious examples of future farmers in Chapter 2. The discussion on emerging issues can be found in Chapter 3. Possible next steps building on this work are described in Chapter 4.

## 1.1 The Foresight and Design Approach and Process

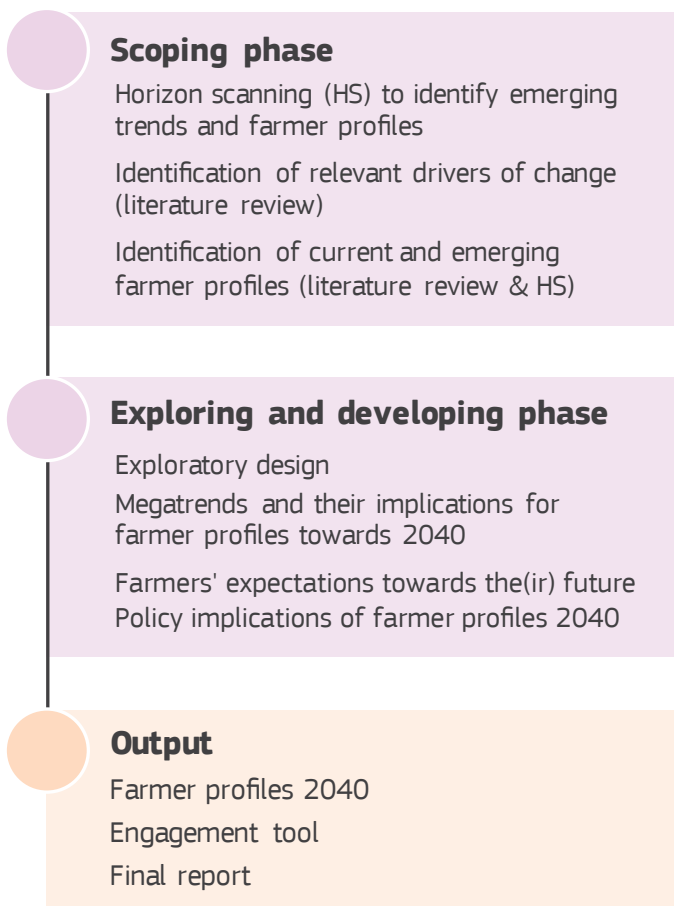
In today's fast-paced world, anticipation of possible future developments and preparedness for the unexpected are essential, in particular for pro-active policy-making. In its first Annual Strategic Foresight Report, the European Commission describes how "establishing a forward-looking culture in policymaking will be crucial for the EU to strengthen its capacity to deal with an increasingly volatile and complex world and to implement its forward-looking political agenda."<sup>9</sup> Foresight provides the tools for exploring the mid- to long-term future in a systematic, participatory and inclusive way. The resulting collective intelligence and systemic view allows for a better understanding of the possible future consequences of current trends and emerging developments. New insights are generated to inform today's decision making and thus to shape the future.

Design shares several characteristics with foresight, the most obvious being the capacity to project itself

into the future and to multiply the possible directions in which the future may go. Both disciplines implement and build on collaborative, participatory and systemic approaches. Design supports the exploratory and sense-making steps, with tangible visual inputs ensuring the quality of the experience for both the participants in the process and the final beneficiaries.<sup>10</sup> This study, exploratory in nature, applies new approaches in combining Foresight methods (megatrends, horizon scanning) with design-based approaches (prototypes, personas) to further facilitate the engagement and buy-in of diverse groups of stakeholders, to think jointly and constructively about the future.

An overview of the study process is presented in Figure 1. The different methodological steps are briefly explained.

Figure 1: Overview of the study process



9 Communication from the Commission to the European Parliament and the Council. 2020 Strategic Foresight Report Strategic Foresight – Charting The Course Towards A More Resilient Europe, COM/2020/493 Final  
 10 Science for Policy Handbook, V. Sucha, M Sienkiewicz (ed.), Elsevier, 2020

Several formats of participatory meetings, i.e. collaborative working sessions, were developed for the Farmers of the Future study. Some were exclusively Foresight or Design-led and others had a mix of both. For the scoping phase, participatory working sessions were organized mainly with Commission colleagues involved in the study, or those knowledgeable on the topic. For the second phase of the study the participatory activity focused on engaging with the people at stake, i.e. the farmers and other stakeholders (academia, civil society organisations, industry associations). Overall, about 200 participants took part in the various engagement formats (in total 21 workshops).

## 1.2 Scoping Phase

### Drivers of change and horizon scanning

An essential element in any foresight exercise is the identification of relevant 'drivers of change', i.e. factors causing change in fields pertinent to the study. Because the future of agriculture and food is of crucial interest for society, there are already many studies available that have identified and used different sets of drivers of change. Accordingly, it was decided to build on existing work and to carry out a literature review to identify drivers of change relevant for the farmers of the future. These drivers provide important background information for the exploration of possible future developments and the application of the megatrends later in the process.

The literature review encompassed scientific and grey literature from 2010 onwards. Foresight and other prospective approaches to the future of European agriculture, food production and consumption were looked into, including other aspects potentially relevant for farmers, such as technology development, the future of education and work, as well as rural areas. The identified drivers of change and their relevance for the agro-food system can be found in Annex 1.

Horizon scanning - a systematic examination of a wide range of sources to identify early signs of emerging developments - was applied in this study to contribute to the identification of emerging farmer profiles and to complement and enrich the use of drivers of change and megatrends.

### Farmer profiles

An exploration of the future needs to start in the present, and should be based on a good understanding of the current situation. As a starting point for discussions with farmers and other stakeholders on the farmers of the future, a number of farmer profiles were developed to capture the current landscape in its diversity. In a combination of workshops with European Commission colleagues, elements from horizon scanning and the literature review, relevant criteria to describe farmer profiles and the farmer profiles themselves, were developed.

As main criteria, the following were identified:

- motivation/objectives for the farming activity (capturing also notions of origin and belonging, relation to nature, and innovativeness);
- the business model (capturing also possible diversification of activities, type of production); and
- education and skills.

Applying these criteria to the current landscape of farming - while also considering current niche forms of farming (and keeping the number of profiles to a manageable limit) - 12 farmer profiles were generated. Six of these represent more established farmer profiles, i.e. well-known forms of farming. The other six profiles reflect more recent developments, i.e. current niche and emerging profiles:

Current established farmer profiles:

- Adaptive – diversified: Make best use of all potential resources of the farm to maximise profit through diversification of activities and adapting to new societal demands.
- Intensive – specialised: Maximise production of agricultural goods of best possible quality, as demanded by the supply chain in order to maximise profit.
- Patrimonial – tradition and family: Maintain the farm as a heritage from past generations to pass on to next generations, achieving adequate profit to make a living.
- Recreational – non-profit: Operate the farm business as a recreational activity (or semi-retirement) without an expectation of making a profit (and accepting some losses).

- Semi-subsistence: Maintain farming as a means of self-provision and subsistence.
- Corporate: Maximise shareholder value of the company and adapt the role of the farming activity to the overall corporate strategy.

Current emerging farmer profiles:

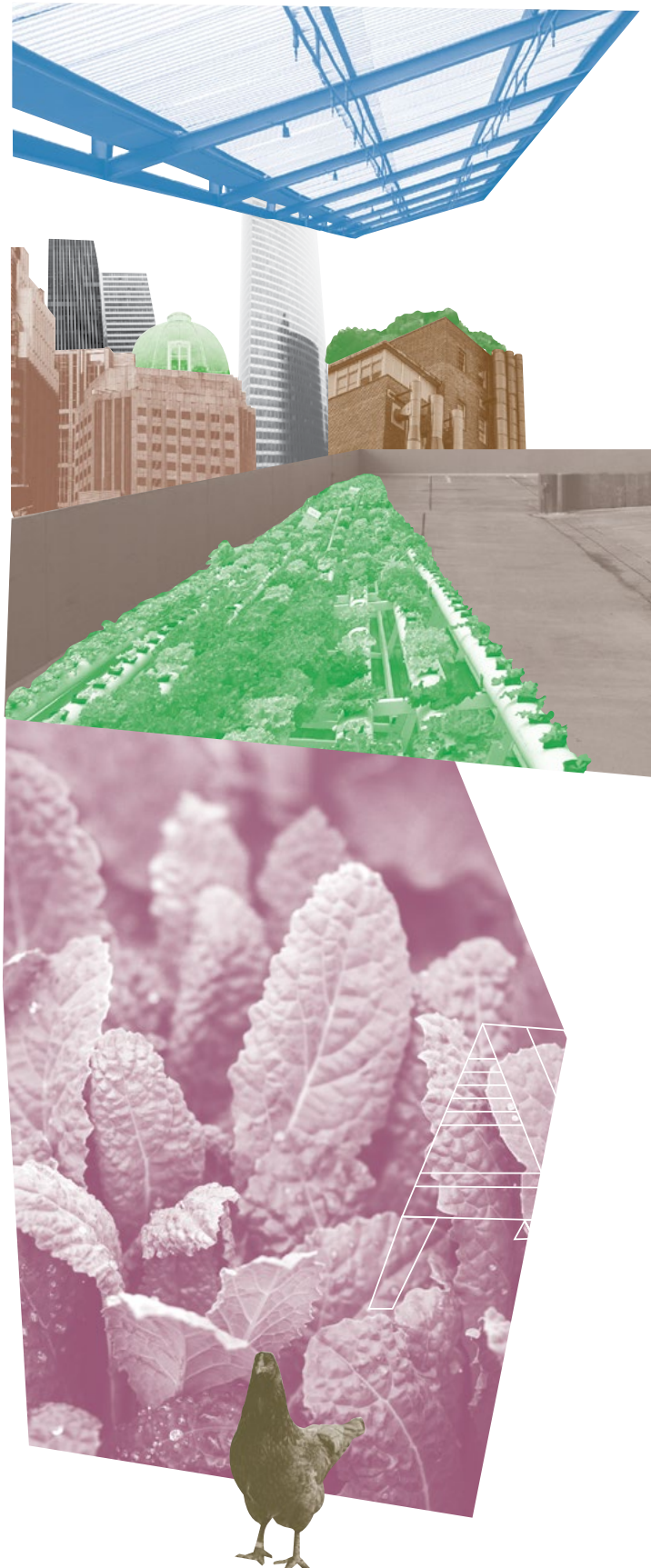
- Regenerative: Create a sustainable food system through regenerative farming activity, which enhances the state of the farm ecosystem.
- Social farming: Maintain the farm activity as a service to improve health and wellbeing of nearby communities through social and care activities.
- Lifestyle – neo-rural: Move to the countryside to improve quality of life, to take up a farming lifestyle and to contribute to the development of rural areas.
- Urban micro-farming: Embed food production in cities, where most of the human activity and demand for food is concentrated.
- Indoor - controlled environment agriculture: Develop start-ups in the agtech domain which disrupt the current agricultural model and allow the production of food in new ways (such as controlled environment agriculture).
- Biotech start-up: Develop biotechnology processes to produce food without farming activity (such as cellular agriculture).

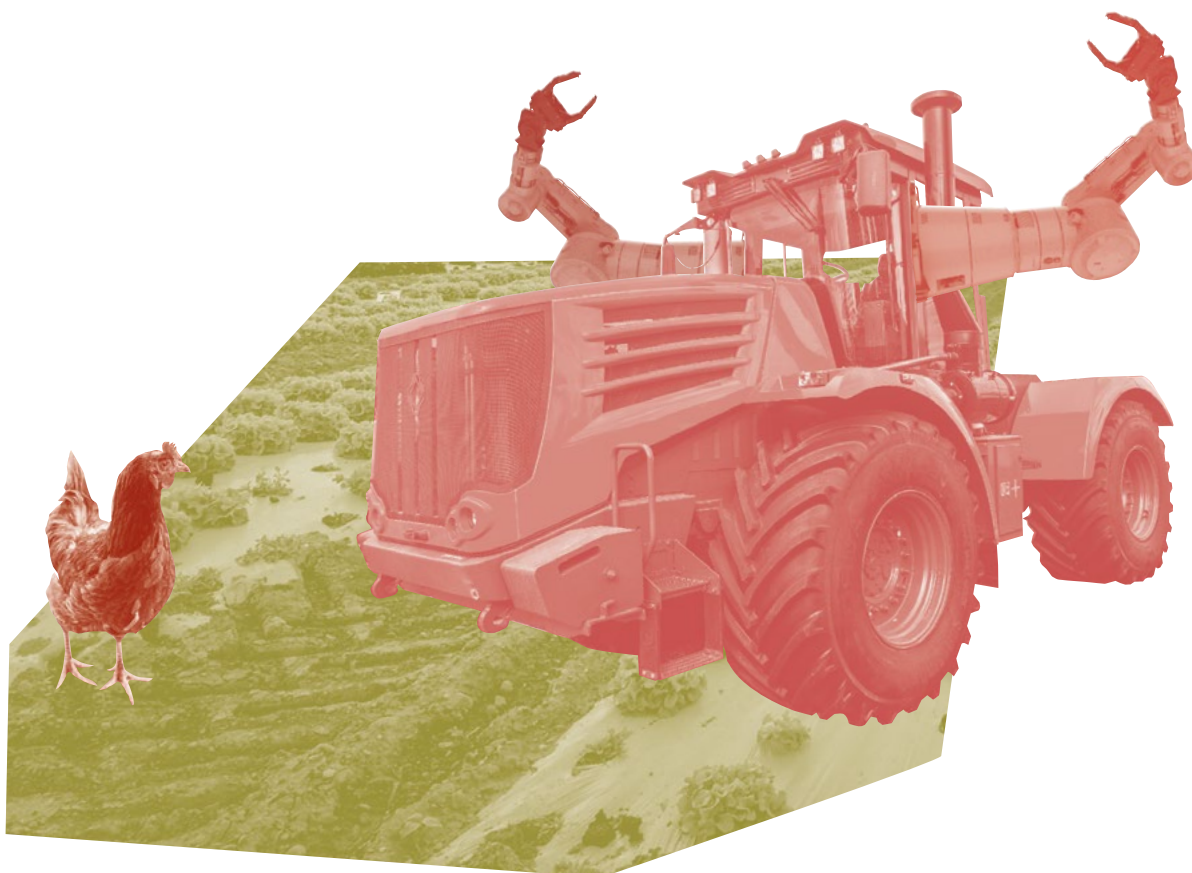
These 12 farmer profiles were created to provide a basis for structured conversations about the future. They are not meant to be empirically well-established profiles or to imply any categorisation that will be used beyond the purpose of this study. The 2020 farmer profiles are described in more detail in Annex 2.

### 1.3 Exploring and Developing Phase

#### Exploratory design - Future design objects

Design produces objects to respond to current societal challenges and to people's changing needs. Prototypes are made to refine the proposal towards a final product. The JRC uses Design to create tangible concepts of the future that enrich conversations and raise awareness of the possible directions the future may take. For this study, Design school students





created 12 prototypes, envisioning 2040 farming tools. The thought-provoking prototypes were used in conversations with farmers to foster discussions about the future (see Farmer workshops below). For more details see Annex 3.

### **Megatrends and their implications for farmers - Profile workshops**

In June 2019, an exploratory workshop took place gathering 50 invited participants. A mixed group of stakeholders involved in the topic of farming were invited (in particular farmers and other agricultural stakeholders). The objective of the workshop was to explore the development of the identified farmer profiles towards 2040. Three steps were followed:

1. selecting and enriching 2020 farmer profiles;
2. discussing the impact of megatrends; and
3. envisioning farmers in 2040.

Moving from sub-group to plenary discussions, the two-

day workshop produced rich debates, knowledge sharing and content for the next steps of the study. Six of the 12 profiles were discussed at the workshop, leaving room for subsequent workshops to explore the remaining farmer profiles. Some of the follow-up workshops were conducted in an online setting due to the COVID-19 pandemic, having adapted the methodology.

The megatrends (long-term driving forces that are already observable now and will most likely have a significant influence on the future in the coming decades) used in Step 2 of the profile workshops, were those of the Commission Megatrends Hub<sup>11</sup>. A brief description of each of the 14 megatrends as well as an indication regarding the links with the agro-food system can be found in Annex 1.

The 2040 farmer profiles were developed on the basis of the profile workshops. Each profile was complemented with two 'personas' - to showcase possible combinations of specific characteristics within the different farmer profiles. Profiles and personas are present or near future

<sup>11</sup> [https://ec.europa.eu/knowledge4policy/foresight/tool/megatrends-hub\\_en](https://ec.europa.eu/knowledge4policy/foresight/tool/megatrends-hub_en)

archetypes, that tell us something about a group of people with similar interests or functionalities. In particular personas are useful to gain empathy for a targeted group of people, to 'stand in someone's shoes' and facilitate an understanding of their perspective, or their wishes.

Furthermore, both profiles and personas function as boundary objects: in complex projects where many stakeholders are involved using their own jargon and working models, personas are useful to align different perceptions around a certain topic. Because they express specific human characteristics, needs or goals, they will often cut across several 'silos'. For example, the needs of farmers are not restricted to the policies that fall into the agricultural domain alone. The profiles and personas also include elements related to health, education and to digital developments and tools. In this way, profiles and personas function as an easily understandable common language.

Several participants of the profile workshops and selected stakeholders were interviewed for the study and their answers provided a further input to the study. About 40 interviewees answered questions relating to

- the biggest trends changing the life of farmers in the coming 20 years;
- their views on the farmers in 2040;
- future skill needs of farmers, and, more recently;
- lessons from the COVID-19 pandemic.

Interviewees were also asked for their message for today's young farmers. Elements of the interviews will be made available in video format.

### **Farmers' expectations towards the(ir) future - Farmer workshops**

The profile workshops, and more strongly, the farmer workshops, reflect the project's intention to involve farmers in the conversations, making them actors in the policy discussions. Workshops took place across Europe (in Germany, Latvia, Poland, Romania and Spain), to try to grasp the diversity of European farmers' personal and professional realities. At this step of the research, the intent

was to generate new knowledge from the personal input of the participants who were asked to share their expectations, hopes and fears about the future. The conversations were set up around different themes, combined with the future design objects to inspire reflections about the future.

### **In the shoes of 2040 farmers - Policy implications workshops**

Building on the knowledge and the material produced in the previous stages of the study, a series of workshops were developed to discuss policy implications. Small groups of experts (farmers, civil society organisations, academia, and industry associations) were invited to online exchanges that contributed to consolidate the 2040 farmer profiles and generate insights regarding possible future policy implications.

The participants co-produced insights on what the farmers of the future may need to ensure their activity in 2040. A first step invited participants to put themselves in the shoes of a 2040 farmer of their choice. Once ownership of a profile was taken, they were asked to react to a situation in 2040 that may affect - in a positive or negative way - their fictive farmer's personal and/or professional life. A list of needs for each farmer was produced to use in a second step, in which conversations were geared towards specifying the most relevant needs and possible policy approaches to meet those needs.

Relevant references can be found in Annex 5.

## 2. The EU Farmer Landscape 2040

The EU farmer landscape 2040 was developed in several workshops, using the 2020 farmer profiles as an input, and exploring the impacts of the set of 14 megatrends (see Section 1.1). Out of these discussions, and building on the review of various studies on the future of agriculture and food (see reference list in Annex 1), a narrative was developed to set the scene for the 2040 farmer profiles. It shows the possible impact of drivers of change (Table 2) and megatrends (Annex 1) on EU agriculture, and provides a context in which diverse motivations, business models and farm activities might evolve, or be created.

### 2.1 How Drivers and Megatrends Might Affect EU Agriculture

In 2040, climate change, together with environmental degradation, is expected to make it increasingly difficult to farm. Farmers will not be able to rely on past experiences due to the changing weather patterns, new emerging pests and diseases, growing water scarcity, reduced biodiversity and declining soil quality. Resilience will be more important than yield growth, in a world with more frequent natural disasters and extreme weather events.

At the same time, global demand for food is expected to grow - attracting people and investment to produce food, but under increasingly difficult conditions. The growing world population and global middle class adopting Western diets will push retailers and traders to actively source commodities, offering premiums for traceability and reliability. However, more intense global competition and more open markets will enable them to keep some sourcing at low prices. In addition, consumerism will bring ever more diverse niche trends into food consumption, leading to extended customisation and a fragmentation of markets. This will also be linked to increasing concerns about health and the environment, the experience economy (linking products to a positive experience of consumers) and servitisation (linking products to services). Furthermore, the circular economy concept will motivate a growing number of farms to engage in supply chains of various bio-based products.

For example, increasingly popular DNA testing and the

wealth of information from various health and behaviour monitoring devices will provide much more context-specific advice to people about their nutritional needs. At the same time, more information will be accessible regarding the influences that food choices will have on the local environment and economy. However, societal concerns about privacy and misuse of data (e.g. for advertising), might increase the number of people who are sceptical, or avoiding such advice.

Rural areas might become more attractive compared to crowded cities, offering interesting alternative opportunities. This is due to the mainstreaming of digital public services, new modes of transport (such as autonomous vehicles or ride sharing schemes), as well as the changing nature of work (involving new work patterns and work being increasingly flexible, knowledge-based and decentralised). Another factor supporting this trend will be the growing emphasis put on quality of life and well-being, rather than economic growth.

The combination of bioinformatics and plant genomics with sensors and machine learning will provide a much more detailed understanding of biological and chemical processes happening on the farm. The immediate effects will probably relate to increased efficiencies within current processes (use of resources, better decision-making). In the longer term, this increased understanding and sense making of all the information is likely to generate more profound interventions into the production process - through ideas about introducing alternative processes, or radically transforming existing ones.

For example, advances in biotechnologies will help to understand and intervene in farm processes at the molecular level. CRISPR technology<sup>12</sup> could result in increasing resistance, quality and productivity of crops. Research into a better understanding of the plant microbiota and ways of improving the microbiome target similar objectives.

The pressures on the environment, societal demands on farming and new opportunities and diverse new models are expected to aggravate existing conflicts (environmental, ethical, food safety, business conflicts in supply chains etc.) and create new ones (around ownership

<sup>12</sup> CRISPR stands for clustered regularly interspaced short palindromic repeats. CRISPR technology is used for genome editing.

**Table 2: Main drivers for the future of agriculture (Based on literature review, see Annex 1 for more details).**

<b>Demographic developments</b>	Size of world population, ageing EU population, generational shift of farmers and consumers, urbanisation, migration, dietary shifts
<b>Shifting values of EU society</b>	Values placed on rural areas, tradition and culture, landscapes as public goods and multi-functionality of farming, counter-urbanisation (in-migration), sustainability and ethical aspects, diversification of lifestyles and diets, work-related aspirations
<b>Inequality &amp; trust</b>	Social cohesion, consumer trust, influence on community values and activities, and implications on attitudes and lifestyle, influences food choice, consumer engagement in the food chain
<b>Digitalisation</b>	Precision agriculture (Internet of Things), automation & robots, connectivity, virtual services and servitisation
<b>Biotechnology</b>	New breeding technologies/synthetic biology, alternative protein sources, food design, bioeconomy
<b>Climate change</b>	Volatile, harsher weather conditions, changing transboundary pests and diseases
<b>Natural resources</b>	Expected increasing scarcity and competition for access (water, land, soil, minerals, fertilisers), environmental degradation such as air and water pollution, habitat loss, decline of biodiversity, soil quality
<b>Economic growth and globalisation</b>	Framework conditions for policy, public budget, trade, rise of emerging economies, developments in agricultural markets, access to land and capital, financialisation of commodity markets
<b>Structure of the agro-food sector</b>	Power distribution within the sector, structural change of farm holdings, relative importance of agriculture in rural economies & diversification, increased competition
<b>International situation</b>	Conflicts & crises, competition, access to energy and other resources, implications for standard setting, trade, sanitary measures
<b>Policies &amp; regulatory frameworks</b>	Set framework conditions for farming and food production in the EU and elsewhere, urban-rural relationship, climate, energy and environmental targets

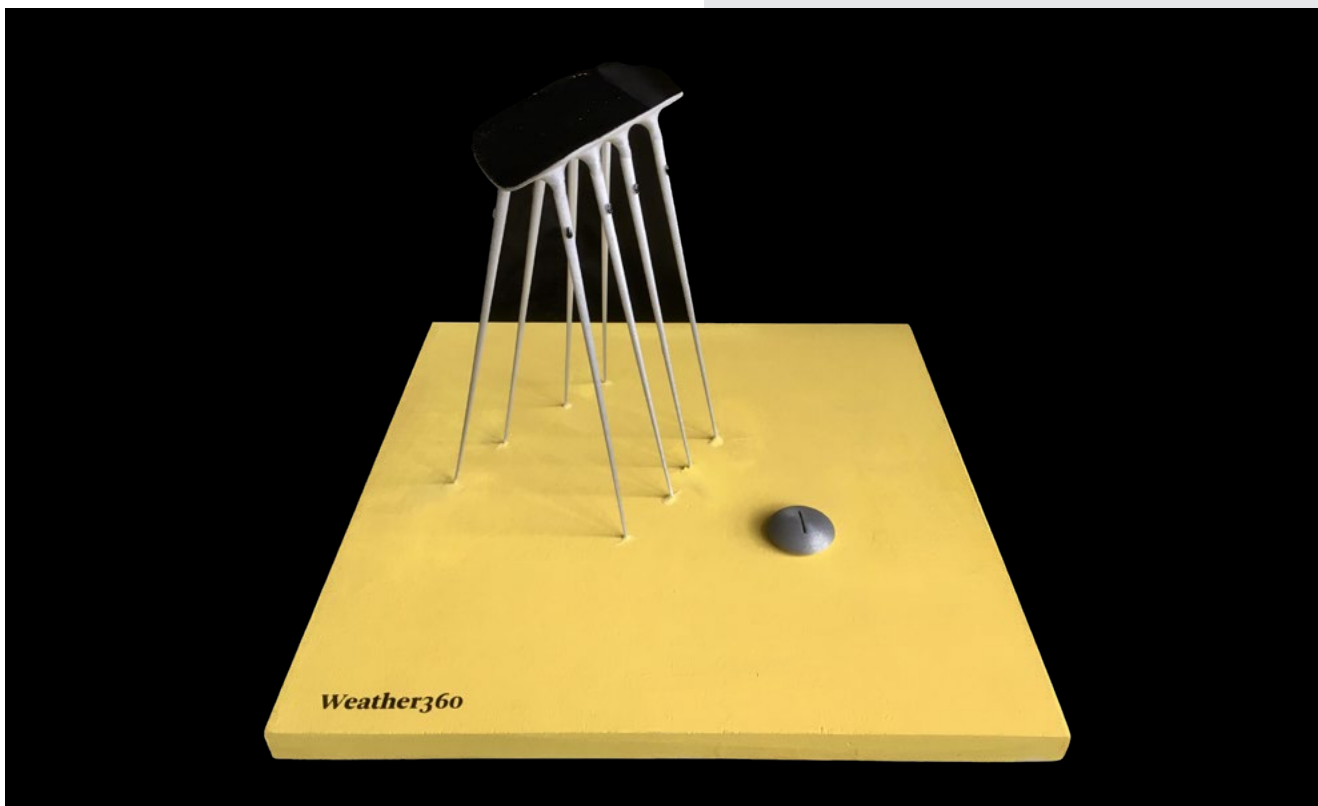
of assets, intermediation in increasingly complex networks, competition between different farming models, security aspects such as bioterrorism). At the same time governance structures could become more fragmented, with greater responsibilities at local level, but more distributed control over other aspects of agriculture.

All of this leads to the emergence of more diverse and experimental models of farming to face the environmental challenges and to address the diverse consumption models. A focus on specialisation and optimisation of production processes is increasingly untenable in a more unpredictable climatic, social and political environment. However, diversification has considerable costs in terms of time, expertise and investment.

## 2.2 What Does It Mean for Farmers

In this broad context, five themes emerged from the discussions with stakeholders in the workshops, which are important for future farmers and their motivations, business models and farming practices. They are related to the technological and economic changes in agriculture and food production; future sustainability; relation to consumers; livestock farming and societal expectations. The themes are explored in more detail below, each theme complemented by one illustrative future design object created in the exploratory design phase.

**What if... data controlled all professional and private activities?**



### Theme 1: Advanced technologies

In 2040, the nature of a farmer's work is expected to have changed. For many farmers technological and managerial skills will be essential. In addition, closer contact and more interaction with consumers will demand good communication skills. The requirements for environmentally sustainable production methods, as well as the changing climate will require more widespread knowledge, in order to be able to manage the farm.

Technologies such as precision farming, robotisation, digitalisation of supply chains (blockchain, autonomous mobility), and decision-support systems (artificial intelligence, big data) are expected to increase the efficiency of agricultural practices and business processes, thus reducing environmental impacts. However, more adaptive systems need new know-how, specific competences and a complex networks of partners for assembling the right mix of assets (land, capital, labour), production processes (advisors, service providers) and sales (consumer networks, communication and social media).

There might be an increasing number of non-traditional food producers focusing either on alternative protein

#### 'Weather 360' by Charlotte Goffette

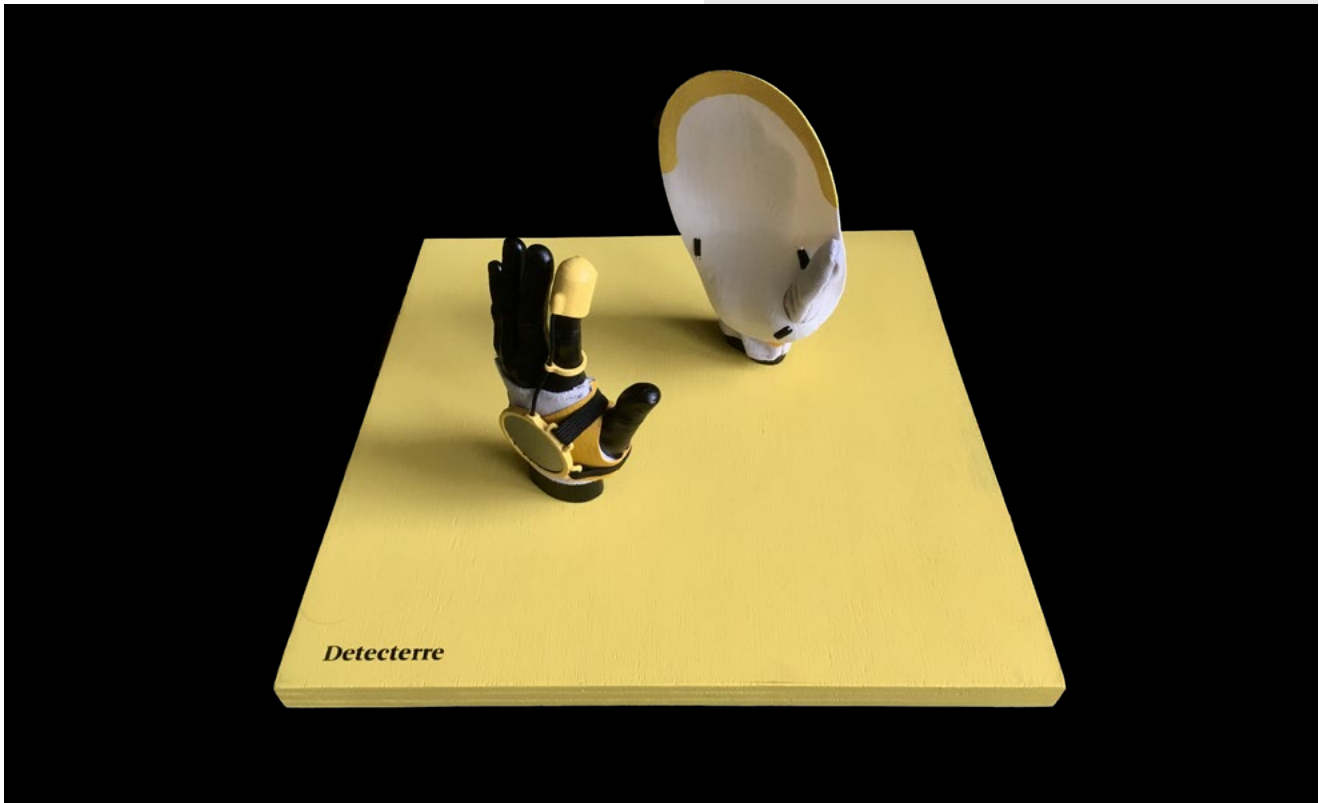
The Chinese company Agri-Jishu offers « Weather 360 », a decision support service for farmers. It collects different data: social, emotional, health, farm productivity, finance, political developments, and weather and soil conditions. The farmer does not need to make any decision about his/her daily tasks - the sensor station gives all the instructions which the farmer then needs to follow.

production or automating the production process in a controlled environment at a small or large scale. Food processing companies are likely to invest in actions to ensure less costly and more stable supply.

The food supply networks are expected to be bigger, distributed, global and diverse. The new transport possibilities (e.g. drones, automated vehicles with parcel lockers) could spark conflicts over the control of logistics, and the increasing reliance on knowledge and technology might create conflicts over intellectual property and data ownership.



What if ... technology helped to connect and understand?



## Theme 2: Environmental challenges

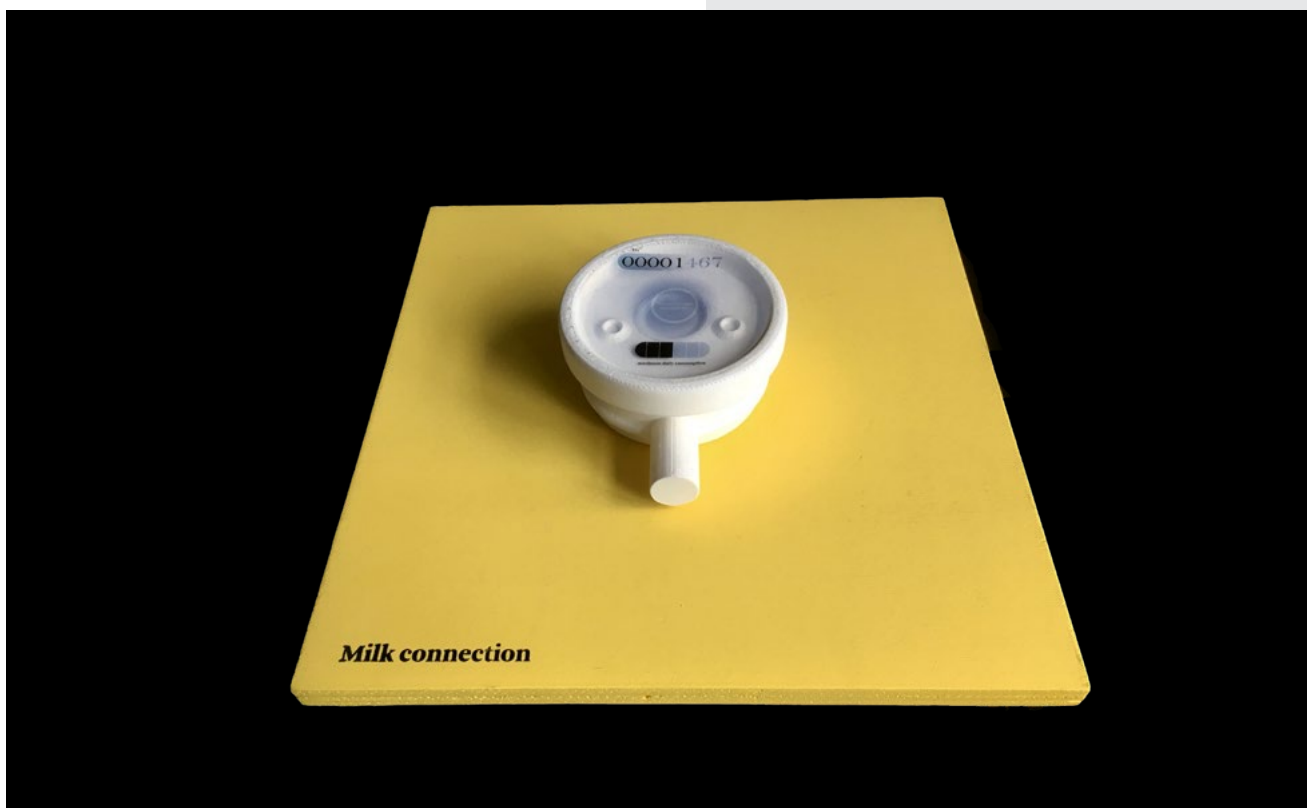
The impacts of climate change will be felt all across Europe, leading to volatile weather conditions, more frequent floods and droughts and more extremes in terms of temperatures. Accordingly, climate change adaptation and mitigation measures are expected to be mainstreamed throughout the entire food chain, further pushed by consumer awareness and demand for more information about where and how food products are produced and processed.

Environmentally conscious farming, in whatever form, will be much more common, if not mainstream. High-tech approaches such as precision farming will co-exist or be combined with other approaches such as agroecology and permaculture. Alongside temperature extremes, soil health and water supply will be major concerns. Agriculture will be a part of a circular economy in which waste, if it cannot be avoided, is considered a resource. New types of land uses such as carbon storage will be part of farmers' portfolios.

### 'Detecterre' by Alexis Guidet

Terrinov is a company that aims to reconnect farmers to the environment without rejecting the technology that has become essential to them. The first product of the company, Detecterre, represents a step towards strengthening farmers' awareness of the living elements they are handling. These are gloves that analyse the soil by electric and analogue means, to precisely determine required actions for its chemical, biological and mineral reactivation. They thereby ensure monitoring by regular analysis cycles, in-line with a more sustainable production.

**What if ... technology helped to connect and understand?**



### **Theme 3: Consumer trends and societal concerns**

Consumers might be more demanding and many might want to know more about the origins of food products and how they are produced. Farmers will see an opportunity to provide quality products to their local communities. Community-supported agriculture schemes could become more common and direct relations to consumers could be an element of many business models.

Certainly, consumers will still value convenience and comfort but they might also look for more 'food experiences'. Farmers will work with new telepresence technologies (the experience of being fully present at a live real-world location, remote from one's own physical location), including virtual reality, which could help to create an experience of short supply chains even if in reality, they become longer and more complex.

The increasing capacity for innovation in the food industry and growing interconnectedness offering more food choices and more targeted and personalised advertising, will mean that markets will be more segmented and food fads will be shorter, less widespread. Micro-trends and niches will prevail. This means that pressure will increase on farmers to adapt quickly and be very responsive to signals from other parts of the supply networks.

**'Milk connection' by Anne-Caroline Nizou et Pauline Liogier**

Now you can link your home to the nearest dairy farm, thanks to a new pipe network. In urban areas, there is a farm for each district, each feeding several homes. You can buy your kit from Milk Connection©. The kit consists of milking machines, some flexible connector pipes, a spigot, a tap and a milk meter. Many new kitchen utensils have been designed to process the milk to butter, cream, yogurt and other dairy products used in everyday life, packaging waste is reduced.

## What if ... communication with other species changed?



### Theme 4: Livestock farming

Livestock farming will continue to be under pressure. More European consumers are expected to adhere to a flexitarian, largely plant-based diet. Alternative products, being entirely plant-based or stemming from biotech production, will be a standard on supermarket shelves. Although export markets still absorb part of the EU meat production, the production volume of beef and pork meat could have decreased and EU consumers would be purchasing less, but caring more for quality and sustainability characteristics.

Research on animal cognition might further shift the understanding of animal welfare, moving from the five freedoms<sup>13</sup> to animal-centred concepts including their needs, affective states and inter-individual differences. At the same time, various technologies such as artificial intelligence and brain-computer-interfaces could help to translate animals' language to one understood by humans.

### 'Augmented animal' by Inès Le Menec

Ageekulteurs represent a new generation of farmers in 2040. They grew up with the internet and with omnipresent, new digital technologies, video games and artificial intelligence. To better understand the animal, they start to digitalize it with devices that would give the animal the capacity to use the technology to communicate with the farmer. It becomes an augmented animal, almost humanized. With the sensor transplants and other technologies, the animal becomes a cyborg. Its status changes: it is no longer a property to handle, but has more responsibilities now.

<sup>13</sup> Freedom from hunger and thirst; from discomfort; from pain, injury and disease; to express normal behaviour; from fear and distress (European Convention for the Protection of Animals kept for Farming Purposes)

What if ... farming was a civic duty not a private service?



### Theme 5: Farming in society

The supply of quality food is expected to be an issue in 2040, due to the increased food demand of a (still) growing world population and environmental conditions that make agricultural production much more difficult (both in the EU and many other parts of the world). In general, farmers will need to provide food for a growing population, in a sustainable way, while competing on a more and more volatile world market.

However, citizens might also be much more aware of the challenges food production is facing and accordingly, food could be moving away from the image of a cheap commodity good which is available in unlimited quantities. Yet, farmers in 2040 might still find themselves between a rock and a hard place, facing many demands at the same time.

All the different societal concerns regarding health, environment, ethics and wellbeing will be increasingly perceived as interconnected and translated into a common comprehensive set of demands under the heading of 'planetary health', which farmers will have to respond to.

'Farming service' by Lucas Macabéo et Valentine Maupetit

The ministry for urban farming has dedicated areas to urban farming and initiated a 6 months Urban Agricultural Service, mandatory for people over the age of 16. The labour code was reformed, which henceforth stipulated that a fifth of the working time must be spent on working in Urban Agricultural Farming Areas. The working time is compensated in-kind with various food items. The administration provides a kit including clothes and accessories to make the transition from the urban life to the farm efficient.

## 2.3 The Diversity of Future Farmers – EU Farmers in 2040

The diversity of future farmers in this study is expressed through future profiles and personas. They start from the present situation, but the main emphasis is on the future.

The profiles function as a generic tool that shows one possible future for certain groups of farmers. They explain the developments of a group, without making it too specific or getting too personal. In contrast, the personas are specific: in providing further dimensions of the profile, they show two of many possible manifestations of a profile. Accordingly, for the personas, choices were made in terms of farming type, special characteristics and even personal styles, without referring to specific geographical locations, so that they can be visualised in many different places across Europe. The personas show how a certain profile could play out. Therefore every profile has two personas attached: they create engagement, involvement and make the profiles come alive.

The 12 profiles of future farmers were created through a series of workshops considering existing and emerging realities in European agriculture and taking into account megatrends that will affect farmers in the two coming decades. The profiles try to paint a picture of both the situation of the farmers themselves, and their farming environments. Together, they reflect the increasing diversity of agriculture and how similar trends might affect them differently.

The future depicted through the 12 profiles is one of many possible futures. It should be understood as an exploration rather than a forecast. Many assumptions were made to arrive at the 2040 profiles, not least assuming that the megatrends will play out towards 2040 as currently envisaged, e.g. in terms of economic development, globalisation, and scientific and technological progress.

The purpose of the profiles was not to create a typology and formulate distinct, rigid categories of future farmers, but to explore how various characteristics of farming as well as the persons behind farming, the farmers themselves will evolve with the technological, economic, social and cultural changes to come.

Few of the actual current, or future farmers will recognise themselves 100% in any of the 12 profiles. For example, the characteristics of some recognised farming profiles (peasant, organic, family farm) can be found in several of the 12, profiles without naming them explicitly. The intention was not to focus on the profile details as such, but their characteristics - and how they could evolve and adapt taking into account all the technological, economic, social and cultural changes. Often, the evolution of these characteristics will be complementary and both large- and small-scale farmers will recognise their challenges for the future in different aspects of several profiles. Other changes are contradictory (picking one or another option) and will require farmers to make strategic choices regarding their future. In all cases the distinction via the 12 profiles makes it easier to explore various facets of possible future developments.

While agriculture will be affected by all the megatrends, there are aspects, that will be particularly responsive to specific future challenges – and the profiles showcase these specificities. The adaptive, corporate, intensive and patrimonial profiles take many of the well-established characteristics of European agriculture and project their evolution with the technological and economic changes expected to come – especially in terms of digitalisation, biotechnologies and evolution of agricultural markets, consumption patterns and economic inequalities. The controlled environment and cell-based profiles look at emerging, and potentially disruptive, technologies for food production. Social care, regenerative and urban profiles explore in more depth the social trends – urbanisation, health and wellness, community building, redefining the relation to nature. Finally, lifestyle, serious hobby and community-provisioning profiles converge around cultural trends – changing nature of work, back-to-the-land and slow food, informal knowledge, informal governance networks.

Workshop participants discussed the names of the profiles intensively, proposing many different options. The final names used in this report try to reflect the trajectory of these profiles between now and 2040. The first element of the name is more evocative of the current and more familiar agriculture of today, the second part of the name tries to reflect the main changes that it will undergo in the future.



**ADAPTIVE FARMER**



**URBAN FARMER**



**LIFESTYLE FARMER**



**CORPORATE FARMER**



**REGENERATIVE FARMER**



**PATRIMONIAL FARMER**



**SOCIAL CARE FARMER**



**CELL FARMER**

# FARMER LANDSCAPE 2040



**INTENSIVE  
FARMER**



**CONTROLLED  
ENVIRONMENT  
FARMER**



**SERIOUS HOBBY  
FARMER**



**COMMUNITY-  
PROVISIONING  
FARMER**



**ADAPTIVE  
FARMER**



# ADAPTIVE FARMER

## Themes and Networks

Adaptive farmers make best use of all the resources of the farm, to provide a diverse range of goods and services depending on demand. According to the 2013 Eurostat survey on farms structures, about 7% of EU farms pursued at least one other gainful activity<sup>14</sup>. Entrepreneurship and diversification of activities on farms is a way of broadening the income base and contributes to the dynamism of rural areas. Traditionally, the diversification included tourism, processing and sales of products and services. Increasingly, opportunities emerge related to the bioeconomy, sports, entertainment and environmental sectors too.

In 2040, there are many more opportunities for diversification with the development of the bioeconomy – including small-scale manufacturing and bio-manufacturing – and the development of door-to-door shipping. New tools (e.g. 3D food printing) also enable farmers to provide products responding to the expectations of individual customers. Adaptive farmers also benefit from the focus on the services and the knowledge sectors, with developing telepresence and immersive technologies - which do not limit such activities to cities. Easier access to knowledge makes it less demanding to experiment and enables a growing number of actors interested in agritech and biotech to collaborate, which again facilitates access to finance and further knowledge.

Diversification and adaptation usually make these farms/farmers relatively resilient. However, since 2020 the farmers' environment has become much more volatile. Consumer trends now change much faster than the time needed to bring returns on investment. Many of the activities fail, consuming considerable resources. The diversity of suppliers and customers to deal with, and material and financial flow, makes any overview difficult. More importantly, diversification of activities protects less against income risks, because these risks are increasingly correlated with a stronger interdependence of different sectors of the economy.

Those farms which diversified into too many different areas have found it very difficult to survive in increasingly complex circumstances. Other farmers moved out of agriculture for other reasons. The farmers that prevailed (and the newcomers) had to adopt a more coherent, systemic approach

to their activities. They no longer indiscriminately pursue any diversification activity, but start to consciously find 'areas of interest' or 'themes' that would guide their diversification decisions. These would vary from those related to local environment or culture (e.g. peatland, horses, and monastery life), to more abstract ones, related to certain societal values, to cater for the requirements of the 'experience economy'.

Managing the complexity requires a broad variety of skills, assets and sources of finance, so these farms will usually have a more complex structure of partnerships with many individuals managing different aspects of the farm. It will also build alliances with multiple other businesses in different domains, and be an active player in the local community.

While curiosity, openness, resourcefulness and a 'network mind-set', remain the main characteristics of farmers involved in such activity, they need to adapt them to the new realities. Curiosity and openness have to be enhanced by systems-thinking skills and creativity that are needed to build a coherent approach to all activities on the farm. Resourcefulness has to turn into complex problem-solving skills and an experimentation mind-set. As networks become more short-lived and temporary, the skill is not only to find the right networks to connect to but to create and sustain more permanent networks around the 'theme' of the activity and to make better use of it - not only passively as sources of information, but as part of the knowledge systems - collective intelligence and human cloud.

The business models of the farms are based on offering a meaningful experience around food, renewable energy and other goods and services. These increase the wellness of consumers and contribute to their perception of the meaningfulness of their lives. They cater to customers for whom 'life designing' and 'curated experiences' are particularly important. Food production remains an important part of the business, but it is complementary to entertainment and bioeconomy (biomanufacturing, bioplastics). Their approach to sustainability focuses on circularity – connecting the diverse activities for resource efficiency and minimising waste. Ecological issues related to agricultural production will be a part of it, but not the main issue.

14 [https://ec.europa.eu/eurostat/web/products-datasets/-/ef\\_ogadsexage](https://ec.europa.eu/eurostat/web/products-datasets/-/ef_ogadsexage)

# Ema

AGE 35

FAMILY LIVES ON A FARM WITH HER PARTNER AND PARENTS

EDUCATION DEGREE IN INNOVATION POLICY



Farm experience is no longer interesting for people, they want  
it to change their life – to be deep and transformational.



Ema was building a successful career in the civil service as an innovation guardian, with a specialisation in transformative organisational creativity. During the weekends and holidays, she was helping her parents on their farm where a lot was happening – processing and direct sales, agritourism, energy, ecosystem services. It required a lot of effort and expertise, but the activities were a great risk management strategy, with one activity always providing good money.

However, five years ago, a combination of over-investment with economic slowdown in the region and a bad harvest resulted in a level of debt that put them on the brink of bankruptcy. Ema got very involved in finding additional sources of finance: looking for a new business plan to convince potential backers and keeping the farm alive.

An opportunity arose when she learned that the Virtue Farms Network was expanding and looking for candidates for a 'Responsibility Farm'. Virtue Farms is a network of concept

farms focused around virtues, catering for the 'transformative economy' - where people do not only expect to experience something positive, but to transform themselves and become better people. The products, recreation facilities and various services offered, all reflect the overall theme of the farm.

Responsibility farm is built around a particular virtue - responsibility. The 'guests' pay only virtual visits to the farm to learn about and practice responsibility. For individual responsibility, guests 'adopt' a particular plant or animal for a certain period of time. They are also responsible for helping others under social responsibility. Carbon farming and environmental measures fall under climate responsibility. Through an extended reality, the guests take part in talks and movie screenings on the subject.

Ema's parents were not enthusiastic about this change, however they were happy that Ema was willing to take over the farm and that the now profitable farm could continue.

## Alexander

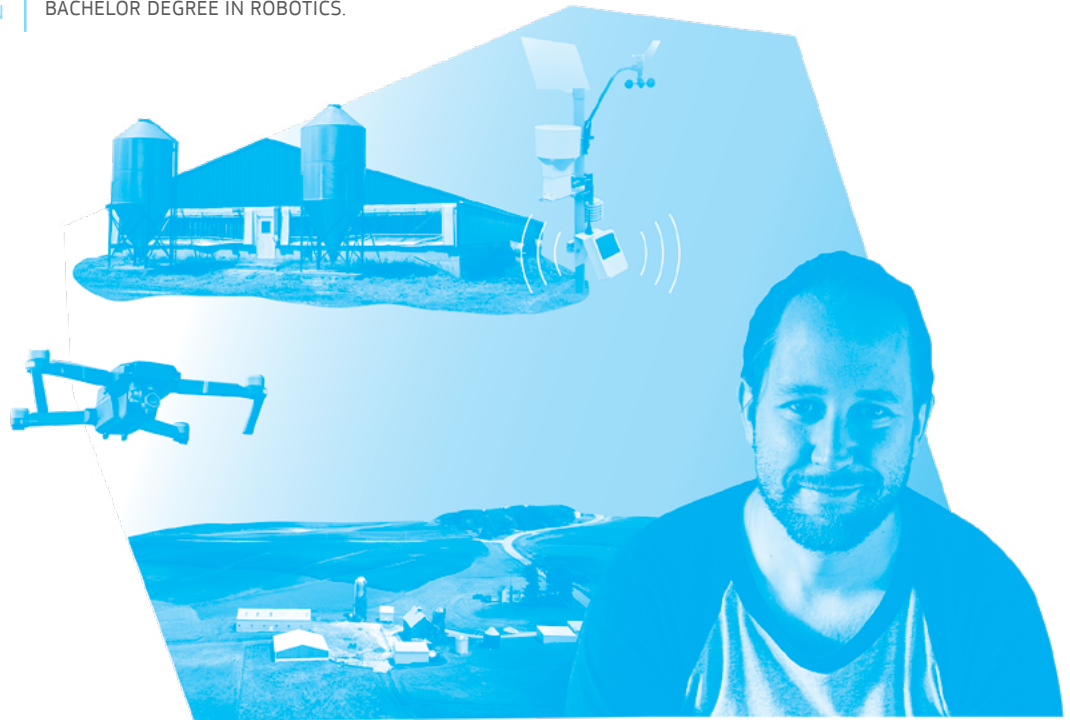
AGE 29

FAMILY

LIVES WITH HIS 5 YEAR OLD SON IN A TOWN, NEAR THE PART OF THE FARM TO WHICH HE CONTRIBUTED LAND

EDUCATION

BACHELOR DEGREE IN ROBOTICS.



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When start-ups were mostly digital, a laptop with an internet connection was enough to start a business. Now, things are much more physical and in the messy reality of agriculture, how you implement, is more important than the idea itself

Alexander had been planning to join the booming robotics sector at the end of his Masters studies, but he unexpectedly received 60 hectares of land from his parents. It was worth enough money for him to be able to buy shares and a right to work in one of the robotics companies. But, when he used the land as a case study in his entrepreneurship class, he realised that he could put it to better use.

At a networking event he met John, who introduced him to the concept of ‘shoot-up farms’ (ag start-ups) which create proof-of-concept and pilot new techniques, processes and products. John was a partner at a shoot-up farm. He was responsible for energy projects there, working with two others – Andrea (biotechnologies) and Ines (social projects). They offer their facilities to start-ups to help develop their ideas, in exchange for shares in their new companies.

John and partners were looking for new entrepreneurial partners and land to expand, and Alexander joined them. He helped to coordinate IT-related projects, attract new shoot-

ups, with the practicalities of setting-up the projects and he helped to find potential clients for successful pilots. The farm has now about 500 hectares in four locations (cross-border), which gives it enough versatility to address different projects.

Many of the projects that Alexander works on now relate to environmental and climate-change adaptation challenges, but the main goal is to have enough profitable projects in the portfolio. A big part of his day is spent maintaining and developing new networks. He works with various innovation centres, research institutions, businesses and farmers. The increasing number and volatility of these networks is one of the bigger challenges. Most of the networks are widespread and global.

Alexander enjoys the entrepreneurial and novelty aspects of his work as well as being in the centre of things. What he had to learn were the managerial skills: planning, delegating, motivating and problem-solving and running a successful team.



**CORPORATE  
FARMER**

# CORPORATE FARMER

## Branch Operations Manager

In 2040, large food corporations include agricultural production as an integrated part of their business in order to secure a minimum share of their supply needs. The provision of affordable foods meeting quality standards is contributing to healthy diets. In addition to trained agronomists, a high degree of farm automation attracts professional managers with a variety of skills looking for new opportunities and an interesting career path. They are attracted by the companies' purpose, and also by the challenges and opportunities of being a part of a large profitable organisation.

In 2020, farm managers running the operations of commercial farms - where they are neither owners nor partners - were a small, but expanding group of farmers. In the EU in 2016, about 333,000 farms did not use any family labour (ca. 3% of the total number), accounting for 27% of agricultural land<sup>15</sup>. At that time, food corporations had limited interest in including agricultural production in their portfolio, relying instead on contracts or agricultural markets for sourcing their raw materials. However, several trends made integrating some parts of agricultural production into a larger corporate structure a more logical choice, than sourcing it exclusively outside.

Towards 2040, resource scarcity, climate change and environmental risks, as well as unexpected systemic crises, made the supply chains less stable and production processes less predictable, thus making it more difficult to rely on external partners. Concerns over security of supplies were a recurring theme. Increasing reliance on retail and platform economies for sales, often selling under private labels, further eroded the competitive advantage of branding and reduced them to commodity production, limiting available marketing strategies.

At the same time, consumer demand grew for low cost and convenient, but healthy products – which became the main area of competition and consequently the focus of research and innovation. The changing nature of work allowed for more distributed, flatter organisation structures, so-called 'heterarchies', allowing to cut much of the overheads. The importance of Corporate Social Responsibility (for consumers and to attract talent) led to the refocusing of corporations'

aims towards clear societal purposes, in addition to shareholder value.

Consequently, while corporations in the farming sector in 2020 attracted mostly agricultural managers who would like to farm but had no possibility to buy their own farm, in 2040, with automation and technology-assisted decision-making easing entry requirements, and clearer and positive purposes of feeding people – these changes attract different types of professional profiles to farming.

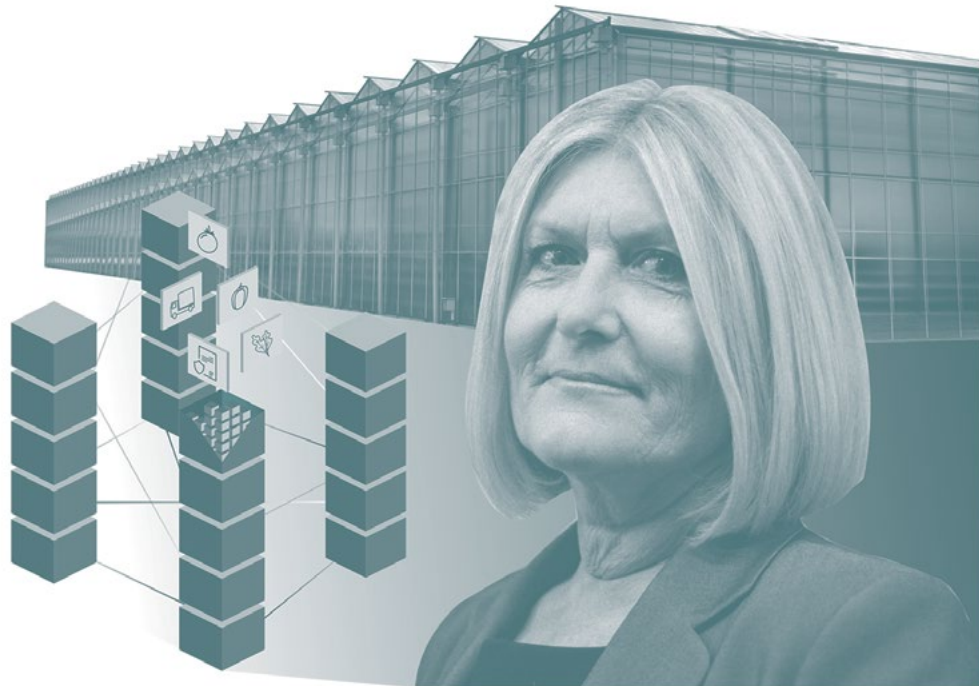
While people management and negotiation skills remain an important part of the farm manager skill-set, understanding business processes and cultural intelligence of operating in a complex organisation are increasingly valued. Agronomic skills may be encouraged, but agricultural knowledge management is provided by respective corporate teams and needs to be constantly updated. Internal procedures and coordination take precedence over autonomous decisions and the objectives and strategy of the corporation as a whole dictates the approach to the farming part of the business. Managing the agricultural production-related part of the business is an element in a larger career that spans different departments (production, processing, distribution, and sales) and the turnover of people in the farming business is rather high. The corporate farmer thus feels more connection to the values of the corporation, than to farming itself.

The business model focuses on delivering healthy and affordable products to the broader public. The farming part of the business provides low-cost ingredients of standardised quality at the right time, to create the final product. Vertical integration reduces uncertainty and transaction costs, while allowing the farming part of the business the economies of scale and the use of a company's R&D. The approach to environmental issues depends on consumer demand trends for the final product. Increasing demand for sustainable, healthy diets favours sustainability certification (such as organic or similar), as well as the scaling up of quantities. Processes that can lead to certification and labelling and that can be easily turned into procedures and automated are favoured.

<sup>15</sup> Agriculture statistics - family farming in the EU, Eurostat, [https://ec.europa.eu/eurostat/statistics-explained/index.php/Agriculture\\_statistics\\_-\\_family\\_farming\\_in\\_the\\_EU](https://ec.europa.eu/eurostat/statistics-explained/index.php/Agriculture_statistics_-_family_farming_in_the_EU)

# Ingrid

AGE 50  
 FAMILY LIVING IN A CITY, 100 KM FROM THE FARM, HUSBAND HAS A NON-FARM JOB  
 ONE SON 19 YEARS OLD  
 EDUCATION MASTER IN AGRONOMY AND DEVELOPMENT



I'm motivated every time I think about what our corporation has achieved with providing accessible and nutritious food, but it's difficult to work in constant uncertainty



Ingrid worked in a development NGO as agricultural consultant overseas, after her agricultural and development studies, and back in Europe as a manager on a family farm. Following that experience she wanted to move back to the city and accepted an offer from Boreas, a company with a mission to produce low cost, sustainable and nutritious ready-made meals. Their low product prices are a result of cut overhead costs, which they achieve by removing a central management administration and forming a type of decentralised autonomous corporation.

It is a company where all the internal processes are coded as a set of rules, and internal coordination is achieved through automated contracts and exchanges registered in a common ledger (using blockchain technology). There is no management layer needed to coordinate.

Ingrid's role is to supervise a 150 hectare company-owned production unit that provides vegetables grown in climate-controlled automated greenhouses. Alongside agricultural

production, it also has energy production and other facilities to minimise its dependence on external sources of inputs. Her unit is one of 3.000 in Europe and over 30.000 in the world, which are cooperating with 5.000 processing units and over 50.000 distributors.

Ingrid was well prepared for the challenge of managing the unit, but the adaptation to the corporate framework was difficult. The demand for products from the processing units is recorded as a contract, and fulfilled by the many production facilities optimised for cost and distance. Although she can supervise most of the activities remotely, she receives notifications 24 hours a day. She also makes it a point to visit the unit at least every second day. It is time-consuming to learn about new updates to the code and to vote on new rules.

It is lonely and tiring work, and there is little contact with other people. But with Level 98 having been reached now, only two more milestones separate her from being a 'Master Grower'.

## Manuel

AGE	37
FAMILY	LIVING IN A CITY, SOME 50 KM FROM THE FARM SINGLE
EDUCATION	MICRO-ECONOMICS



Food production is a business as any other –

you need to be ahead of the curve!



Manuel joined the company ‘Your food – your health’ six years ago, and he has already been working in three different company departments in three different locations, from sales to logistics to development. Last month he started at his latest job – running one of the farms that belongs to the company and provides part of the ingredients for the convenience food they produce. As an economist by training, he has already acquired a lot of knowledge about food, and now he is going for the ‘roots’ of the food products.

He watched the virtual reality hand-over package from his predecessor several times, internalised the production goals, and met the two farm staff. The company’s ag-support team advised him on training courses he should take and how to tackle the issues mentioned in the hand-over, in addition to the points he has already identified.

Full automation based on precision farming means that he does not have to be in the fields watching the crops grow, but for the first months he thought he should be there to find out how the situation developed in the fields, with

his own eyes. Sensors, cameras, drones and satellites etc. provide information around the clock, analysed constantly by artificial intelligence-powered systems, but Manuel still believes in direct contact, also with people. He keeps checking the latest consumer trends, a habit from his time in the sales department, and has contacted his networks to find out what crops are compatible with the trends and the geographic location of the farm, and the environmental requirements. Maybe he could initiate a new product line and boost sales further?

The farm usually runs smoothly without a manager being present every day, so he decides to rent an apartment in the nearest mid-sized town, so that he can easily commute if needed and have the chance to get to know more people. Manuel expects that he will move to another department after about 2 years and hopes that he can convince his colleagues to give him the responsibility for a large processing plant abroad.



**INTENSIVE  
FARMER**



# INTENSIVE FARMER

## Precision Farming

In 2040, the intensive 'precision' farmer is open to new developments, enjoys being independent and his/her own boss in farming the land, whether it is owned or rented. Farming is perceived as a business, and profit is the most important driver for the activities. Being innovative and conscious of environmental aspects of farming, whatever promises to work best for generating yield while minimising inputs is being tested and applied if the numbers add up. Running a usually large farm efficiently, using best available tools, techniques and processes, and producing commodity quality products to feed the region and the world is a source of pride.

20 years ago, in 2020, the intensive farmer faced less restrictions by society and thus in terms of regulations. In 2016, farms run by natural persons with over 50 ha accounted for only 5% of farms, but 55% of agricultural area and 45% of production value.<sup>16</sup> Also, 36% of the agricultural area was managed with high input intensity.<sup>17</sup> Since then, the focus on maximising yields and specialisation on a very limited number of commodity crops or animal products, catering for a globalised market, has given way to more diversification in all aspects. As climate change impacts led to more frequent and extreme weather events, and the need for a more environmentally sustainable agriculture system translated into reactions by consumers and policymakers, intensive farmers broadened their business model to maximise also environmental and climate services. Adaptation, to a more volatile international market has become much more important too.

Precision farming continues to be a technology-intensive approach to farming, with a high degree of automation, and additional skill needs have emerged. A profound understanding and knowledge of agriculture needs to be matched with technical skills, because technologies are an important tool in increasing resource efficiency, and these farmers are early and fast adopters of new technical developments. Regular interactions with advisors help to remain lucid and on top of the to the situation of the farm and possible adaptations. As consumers' awareness of agriculture and food production increased, these farmers were forced to communicate and explain their farming approach to the public, including their local and regional neighbours. The required combination of

agronomic, technical and environmental knowledge, and skills, such as entrepreneurial, financial, management, negotiation and conflict resolution skills, renders intensive farming a highly qualified profession.

Located in rather flat, open landscapes in rural areas, the intensive farmer in 2040 provides high quality commodity products for other businesses to process into food, feed and other products. As food supply value networks become more interconnected with transparency, traceability and responsiveness to changing trends, these farmers rely primarily on commodity markets but increasingly negotiate longer-term contracts with processors and/or traders. Maintaining a reliable supply of the commodity becomes the main challenge, with the focus on more agile and adaptive production practices. Sustainable intensification is the preferred approach to environmental issues. It focuses on increasing or at least maintaining productivity levels while reducing negative environmental impacts. The farmer could be co-owner of a regional biorefinery, upcycling redundant farm biomass. Large storage facilities, sometimes co-owned with other farmers or owned by the cooperative, are essential to counter fluctuating global market prices.

Production is usually certified to respond to market requirements, not only in terms of production standards but also for transparency. Precision farming with its abundance in data facilitates certification and provides the basis for automation of many processes, from sowing to harvesting and livestock care. Dependence on technology providers is a constant issue. Crop varieties and livestock breeds used are the most nutrient-efficient ones and those optimally tailored to the respective environmental conditions, but also to the overall more adverse climate. Mixing plant species (agroforestry and intercropping) is a way to diversify production while increasing sustainability. The use of latest generation biotechnology has accelerated the availability of better-adapted crop varieties. The farmland is part of a landscape that has been optimised in cooperation with other local and regional farmers and the respective authorities, to provide maximum environmental services, including for biodiversity, whilst minimising land use.

<sup>16</sup> Eurostat, Farm indicators by agricultural area, type of farm, standard output, legal form and NUTS 2 regions [ef\_m\_farmleg], [https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ef\\_m\\_farmleg&lang=en](https://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=ef_m_farmleg&lang=en)

<sup>17</sup> CAP CONTEXT INDICATORS – 2019 update, European Commission, [https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table\\_2019\\_en.pdf](https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-context-indicators-table_2019_en.pdf)

# Hal

AGE 40

FAMILY ONE DAUGHTER, 4 YEARS OLD  
CIVIL PARTNERSHIP, PARTNER HAS A NON-FARM JOB

EDUCATION STUDIED AGRICULTURE, MASTER IN SUSTAINABLE INTENSIFICATION



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Flexibility, predictive analytics and accuracy are key for growing and selling commodities in this world

Hal acquired his farm about 10 years ago. His father had successfully run a farm in southern Turkey for a long time, but climate conditions changed so much that the family decided to continue farming somewhere elsewhere. Following his agriculture studies, Hal collected the family funds and invested in a large farm in the north-eastern part of the EU, which is still relatively humid.

They started with 100 ha, and doubled that by buying additional land from farmers who gave up their business. On their 200 ha, he integrates livestock and cereal production. Aiming at a premium market, and not wanting to compete on a lowest-cost basis, Hal puts an emphasis on integrity and the traceability of origin. The beef he produces is largely fed with his own feed. Wheat and maize (mainly) complement his portfolio. However, competition is high, as many of the other large scale farms in the region also produce for export.

The heavy investment he has made in technologies, such as precision farming and automation, and his compliance with the strict rules on pesticide and fertiliser use, have paid off. New plant varieties are adapted to droughts and wet seasons, and his losses are relatively small. Nevertheless, sudden changes of weather are still difficult to handle.

It was an uphill battle in the beginning for him, because the locals did not take him for a knowledgeable farmer, and they thought he would give up farming quickly, or move closer to the city. The family considered it, because the farm could be managed remotely to a certain extent, but they decided to stay in favour of a calmer, but healthier environment. His wife works remotely anyway. In addition, there have been some incidences lately of hacked farming systems, destroyed crops, and data leaks. Hal hopes that by being physically present on the farm, he can avoid some (or all) of these potentially major disasters.

## Linda

AGE 50  
FAMILY TWO DAUGHTERS, 15 AND 18 YEARS OLD  
EDUCATION MASTER IN AGRONOMY



Making progress, finding the right new technique for the right

kind of profit, is what motivates me



20 years ago, when Linda and her husband Michael bought their farm (from a farmer who retired and moved closer to his family), she thought she would be realising her dream. The investment was substantial for the 500 ha farm, with machinery equipment in need of renewal included. Contributions from their parents, low interest loans from the bank and support by the government made it possible. They focussed on a mix of commodity crops, and quickly moved into precision farming, over time they purchased more land, as smaller farms in the regions were closing down.

Since then, with weather conditions becoming less stable, a stricter legal environmental framework, the public questioning of large scale farming, and fiercer competition on world markets, they have decided to change their portfolio. They now focus more on carbon and eco-services to maximise their share of stable income, and produce for the regional biorefinery. In addition, they produce a couple of commodity food crops, promising a relatively stable market because harvest failures are becoming more frequent world-

wide. They went for novel breeds combining resistances to a number of pests with improved photosynthesis to boost yields, and first results look promising.

Automation allowed them to move closer to the city and to commute to the farm, or to control it remotely. They also have the help of some part-time workers who continued living closer to the farm. This turned out to be the ideal combination – for the children, but also for Linda. She established closer contacts to a local university and collaborated on further improving the efficiency of carbon services and biodiversity services. In this context Linda set up a working group with other farmers and landowners and the local administration to see if the local landscape could be further optimised.

Being able to combine the farm with the amenities of city life convinced Linda's oldest daughter to reconsider farming as an option for the future. And maybe, one day, she might even move back to the farm.



**PATRIMONIAL  
FARMER**

# PATRIMONIAL FARMER

## On the Fence

As the world becomes more complex and farming requires increasing adaptation to new conditions, a large group of farmers do not have the means or motivation to change their business models and adapt their practices. Instead, they put an increasing amount of energy in keeping traditional activities, possibly with a historical farm building to maintain. Many of them have low expectations of their future in farming – they are approaching retirement or they are locked-in to the existing systems, with little access to knowledge, financing and alternative supply chains. Or they lack employment opportunities outside agriculture. They may have tried new business models but failed for many reasons, some of which are outside of their control. For all these reasons, they remain ‘on the fence’.

In the years 2004-2013, between 10 and 17% of EU farms faced a negative net income. However, for a majority (54-60%), farm net income was positive, but still below the opportunity costs.<sup>18</sup> In 2016, seven out of every ten (71.5 %) farm managers were male and a majority (57.9 %) were 55 years of age or more.<sup>19</sup>

In the 20 years between 2020 and 2040, many of those farmers quit agriculture, with the land being used by more entrepreneurial farmers or not used for farming at all. In some cases the farm was taken over by a new entrant/generation and became a viable business again. While family farming is the model, passing on the farm to the next generation can be a driver. Depending on adequate investment and training, the next farmer could be part of the ‘frontrunners’. Some, having had other work opportunities nearby, became hobby farmers. Climate change and environmental degradation increased the costs of production, limited added-value and consumer responsiveness resulted in decreased income. Yet, despite all of this, there is a group of farmers maintaining their activity, because they fail to see viable alternatives, and are attached to the land. Low costs, family labour, inherited farm equipment and land assets make them financially resilient. More importantly, they are joined by a large number of farmers who were modernising and adapting their farms, but

over time, became locked into production systems that are no longer viable. Increasing interdependence of the various parts of the supply chain and increasing investments in adaptation mean that it is difficult to continuously keep adapting, and the relatively high value of assets make it equally hard to leave the activity. As consumer trends and the global situation become more volatile, wrong strategic choices lead to more of these circumstances.

Farmers, who find themselves in this situation focus on surviving – controlling their costs and maintaining sales, possibly linked to cultural or touristic activities (if their historical buildings allow). They depend on their partner’s off-farm income to sustain the household. They avoid making decisions that could overturn the precarious stability and only implement changes to their practices when forced to. They are frustrated and disappointed with the changes that agriculture is undergoing – seeing their expertise and knowledge expiring, as their businesses stagnate. They are the ones most involved in lobbying for support policies while opposing new standards and rules being imposed on them, especially if this implies having to invest (more). Alongside cooperatives, the networks they participate in are reduced to those of farmers in similar situations, reinforcing the perception that there is no future in farming. Although access to advice would be available to them, the lack of means and motivation to engage with it, to restructure and/or restart the farm becomes the biggest obstacle.

Because this group of farmers can be relatively large, they can still provide a significant share of agricultural production. Their business models vary greatly, but they have in common the situation where the markets for their products are either shrinking, or not providing adequate income. Also, their investments make it difficult to adjust or change course, and reliance on subsidies and off-farm income will sustain their existence. Although the connection to nature is important for these farmers, they are sceptical of adapting new practices and only do so, if forced by the policies or buyers of their products. They have a key role in maintaining rural heritage, including cultivated landscapes and buildings.

<sup>18</sup> Agricultural and farm income, DG AGRI, European Commission, [https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/agricultural-farm-income\\_en.pdf](https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/agricultural-farm-income_en.pdf)

<sup>19</sup> Farmers and the agricultural labour force – statistics, Eurostat, European Commission -nm <https://ec.europa.eu/eurostat/statistics-explained/pdfscache/73320.pdf>

# Stefan

AGE 62  
 FAMILY SINGLE, NO CHILDREN  
 EDUCATION AGRICULTURAL TRAINING



Farmers are putting the food on people’s tables, but when troubles hit we’re left alone and there is not enough done to help



Stefan has been running his farm for 40 years, initially together with his parents and then alone after they retired. The farm has been in his family for many generations, with some of the buildings dating back two centuries. He learned almost everything about running the farm from his parents, but agricultural school helped him see what changes he could make to increase efficiency, improve product quality and decrease production costs.

Over the years, he maintained the traditional production – a mixed farm with cereals and dairy production. He invested significantly in precision farming and automation equipment (milking robots, automated herd management). He was a member of a large dairy cooperative (just as his great grandfather, who was one of its founders), which always bought all the milk and he sold surplus cereals to a local trader owning an elevator in the area.

However, the instability of global agricultural markets led to near bankruptcy and restructuring of the cooperative,

which had to reduce its collection of milk and prices paid, undermining the farm businesses dependent on it. The lack of an alternative buyer, high levels of debt and high personal stakes in the success of the farm meant that Stefan could neither adapt nor get out of business – instead hoping that the economic situation would change in the longer term. Alongside a changing climate and worsening soil conditions (that increased production costs), more and more stringent environmental laws called for additional investments.

Most of Stefan’s farmer friends from school and in the area experienced a similar situation. They organised themselves to put pressure on local decision-makers to give them a better long-term perspective for their activity. As Stefan has no children, there is no clear successor to the farm, which is one of his main preoccupations. He would like the farm to stay in the hands of the family, but there is no one interested in continuing the activity and he is hesitant to let go of the land.

## Elena and Tomas

AGE 45 AND 43  
FAMILY MARRIED, A SON 16 YEARS OLD, TWO DAUGHTERS 14 AND 10 YEARS OLD  
EDUCATION UNIVERSITY DEGREE IN AGRONOMY, AGRICULTURAL TRAINING



We love this place and we have no choice but to persevere,

but we're both very tired.



Owning a farm was a long-term dream for Elena and Tomas. Elena grew up on a family farm, but moved to the city for a job as a sales manager in an online marketing company. Tomas had no experience with farming and had a stable job in the civil service. For both, being in the countryside had a great attraction, and they wanted to move out of the city and run a farm, and raise their children in the countryside.

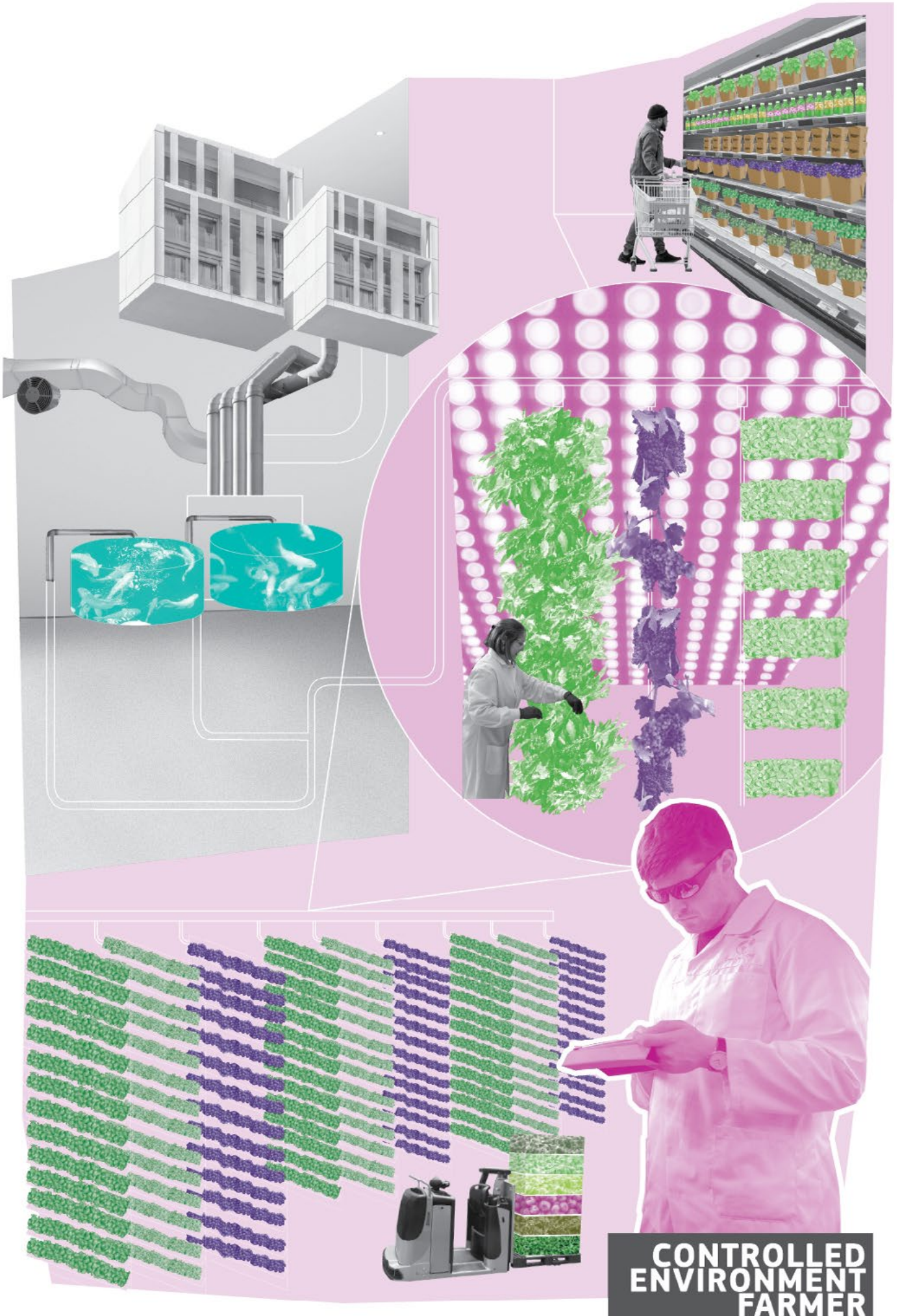
When the possibility arose to take over a reasonably well-developed farm, the retiring owner of which had no successor, they borrowed some money from their family and took out a substantial loan from a bank to buy it. In their business plan, they proposed a series of diversification measures including direct sales via an online shop, and edutainment services. In the following years, the business grew with some activities bringing in adequate income and acting as risk management, compensating for other activities that brought losses in a given year.

However, in recent years Elena and Tomas found themselves increasingly struggling with their farm business. One of the investment decisions to get into a new market did not

bring the expected profits. The education and entertainment activities also slowed down due to consumer trend changes, with more events happening in virtual reality or in more fashionable venues – wildlife parks, forests, natural protected areas - as trends for nature conservation and wildlife became more prominent.

Elena and Tomas were determined to keep the farm going despite their difficult financial situation. While further investments were out of question, they were also not able to keep the staff they employed. This resulted in an extra work burden for them, further reducing their room for manoeuvre. Any new initiative to generate income would need fresh money. Because they had to take additional loans to keep the operations going, the bank was unwilling to finance any new, promising, but potentially risky activities.

They still hope that someday they will be able to look beyond minimising the threat of bankruptcy, and be able to pass the farm on (or part of the land) to one of their children – even if they prefer to encourage their children to consider a less demanding activity for a future career at the moment.



**CONTROLLED  
ENVIRONMENT  
FARMER**



# CONTROLLED ENVIRONMENT FARMER

## Soilless High-tech

In 2040 the controlled environment 'indoor' farmer wants to contribute to food security, in particular by providing the ingredients for a healthy diet, locally sourced and circular – mainly vegetables, berries, herbs, and fish. Being independent from the increasingly volatile weather conditions, the indoor farmer can produce all year long under constant conditions, and in the vicinity of consumers. Both in urban and peri-urban settings, but also in rural areas if the demand is high enough, or if conditions are favourable and transport logistics not an issue.

In 2019, there were already some indoor vertical farms established at commercial scale, but with a limited global market (estimated to be under 4 billion EUR, and projected to grow 3.5 times before 2025). With a 21% market share, Europe was behind North America (33%) and Asia-Pacific (35%)<sup>20</sup>. In 2020, the ecological footprint in comparison to greenhouses and open field production was not yet clear, and consumer acceptance was still an issue. Customers were mainly restaurants and some supermarkets.

The controlled environment agriculture (CEA) farmer at that time was much more of a technology developer, pushing the boundaries of CEA. Communication, including to the public, was an essential element of the work to secure funding, public support and acceptance. With the maturing of the technology, better LED lightning and automation, improved circularity, CEA towards 2040 became much less labour and energy intensive and more competitive at cost level. Climate change impacts and consumer demand for fresh produce all year long provide a favourable environment for CEA to become the urban choice for selected vegetable production. Compared to 20 years ago, in 2040 CEA farming has become widespread and the capital intensity has decreased.

With an entrepreneurial mind-set and an engineering background, the CEA farmer in 2040 can be a newcomer to farming, setting up his/her own business using the (now) well-established technology, or preferring to go for a franchising approach. In either case, starting such an

enterprise from scratch is capital-intensive and needs financing. Finding suitable facilities or land to build on can be difficult in urban settings. However, the urban context makes CEA attractive to young people. Developing 'own brand', or niche products requires the development of new plants to be cultivated indoors, and for the farmer to keep an eye on scientific progress in this area and to network in the scientific community. Changing customer (and consumer) demands is another factor requiring flexibility and agility.

It is less costly than before, and larger public and private institutions embark on establishing CEA. In this setting, the farmer is rather an employee than an independent entrepreneur. The farmer might be involved in educating employees, school children, or the public on how this food is being produced. Direct sales could be added to the business plan, if the respective facility has enough capacity.

The business model focuses on providing a reliable output of fresh, customised products (also in terms of nutritional quality) to high-end clients (restaurants, retailers, pharmaceutical industry) mostly in urban areas. Production is more efficient (in terms of water, nutrients, and pesticides). They can respond quickly to changes in demand and provide personalised services. Energy efficiency is a recurring issue and integration in the local energy and heating system offers advantages - by being able to contribute to community heating with excess heat, biomass, or electricity from solar panels and windmills, while receiving heat or electricity in times of need. The environmental focus will be on the circular economy – starting with eco-design of the facilities and processes, use of renewable resources (especially energy), lean manufacturing and resource efficiency, using organic waste. Product diversification might be a way to increase competitiveness and resilience towards possible market volatility, for example to include fish, insects, flowers, medicinal plants and any newly adapted vegetable or grain, as well as some processing and direct sales (sometimes in association with cell farmers).

<sup>20</sup> Statista dossier on indoor farming, Statista, 2018, accessed 30 September 2020

# Aline

AGE 35

FAMILY MARRIED, ONE DAUGHTER 6 YEARS OLD, PARTNER HAS A NON-FARM JOB

EDUCATION ENGINEERING DEGREE



Success means grasping opportunities when they present themselves – early adopters can shape the nature of the game



Aline moved into farming 10 years ago. After having worked in an indoor farming facility for some time, she wanted to open her own business. The government had provided support for new indoor facilities to increase food security, reacting to more volatile climate conditions. An interest-free loan for the first 5 years offered her the necessary capital to establish a large-scale facility and funded additional services such as energy and heat, and support to communal waste water management. Her engineering background has been a big advantage in setting up and running such a facility.

Today, her farm is still one of the biggest in the region with 10 ha in an enlarged industry building. Apart from vegetables (tomatoes, potatoes, peas, beans, carrots, etc.), leafy salads, berries, she grows herbs and medicinal plants. Aquaponics have turned out to be a good investment too, because cultured fish have become a protein source for people. She recently added a facility for insect farming, which means she

can recycle the vegetable and fish remains in a useful way.

From the beginning, she invested heavily in relations with the local community and the city council. Initial scepticism has now vanished, because food security moved up the agenda, as well as healthy plant-based diets.

Although technology such as automation and artificial intelligence support many tasks, others remain manual – such as maintenance, handling some of the sensitive seedlings and some harvesting steps etc. 10 people are working at the facility now, but finding skilled staff remains a challenge. Technology is still key for running the business: energy generation, light management, irrigation systems, air filtering, biogas plant, harvesting machines, etc., and the digital management of it all, access to more efficient infrastructure and seamless combination of the systems still remains an issue.

# CONTROLLED ENVIRONMENT FARMER

## Lewis

AGE 32  
FAMILY SINGLE  
EDUCATION ECONOMICS AND ENGINEERING



So many possibilities in this field, I have tons of ideas waiting for execution.

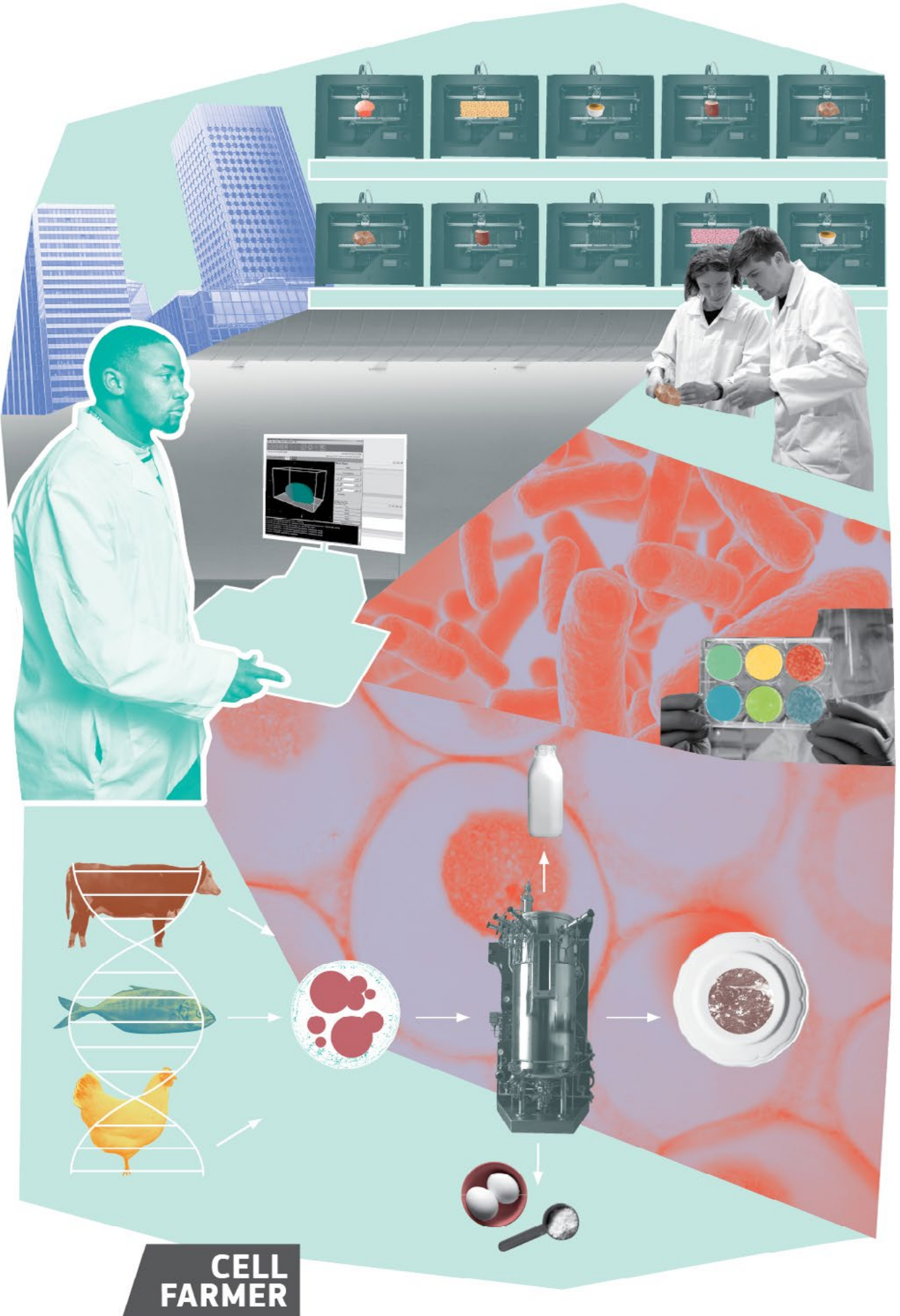


Running his own business has been Lewis' goal as a student; and with the purchase of a licence from the 'Just Harvested' indoor farming multinational five years ago, he got close to that aim. In the urban area where he lives, he installs and manages local or mobile indoor farming entities, adapted to the location and the needs of the customers. The clients include inner-city supermarket branches, schools, administrations and companies who want a secure supply of fresh, varied food for their shelves, or canteens.

In recent years, with the availability of new breeds, the variety of products that can be produced by indoor farming technology has grown substantially. Full automation enables Lewis to manage about 30 mid-sized facilities on his own. He convinced many customers who previously purchased products from another provider to switch to his because of the 24/7 service he offers, and the quality and reliability of the installations. Demand is still increasing, so he now has to increase his staff to be able to satisfy customers.

Another reason for increasing manpower is the new trend for tailored products, for example shoppers looking for new experiences can place orders for a growing list of specialities, which requires closer management of the facilities. This is part of what attracted him to indoor farming in the first place – it offers many possibilities and is flexible regarding its size and location, so the job will not become boring.

Lewis recently met a plant researcher, Lucille, and they are discussing if they should open a business with a new range of products and experiences for consumers. Lucille developed new dwarf varieties of plants that have not yet been grown indoors. They could team up with cell farmers and innovative chefs and open up a unique place for new food experiences, including allowing the influence of customers in the production process – this way every customer gets a unique meal prepared by experts. This would even beat 'Just Harvested' products!



**CELL  
FARMER**

# CELL FARMER

## Alternative Foods

In 2040, cellular agriculture is well-established. The use of cell cultures (animal-derived or micro-organisms), grown in bioreactors, allows the large-scale 'animal-free' production of food and food ingredients, for example milk proteins and meat. Cell farmers are attracted to this branch of agriculture by the combination of contributing to food security with high-tech food that respects animal welfare, and the competitiveness of the sector requiring constant innovation, pushing boundaries and taking risks.

Only 20 years ago, in 2020, cell farming was mainly in the research and development (R&D) stage, with 32 different companies working on the commercialisation of cultured meat<sup>21</sup>. The need to reduce greenhouse gas emissions, the growing scarcity of natural resources, and the increasing demand for animal proteins, were all strong drivers towards a more efficient and more sustainable production of animal products.

Equipped with an academic background and biology/biotechnology/food science knowledge, the cell farmer-researchers took up the challenge to beat the resource efficiency of conventional livestock production. Their work concentrated on further developing production processes, increasing efficiency, scaling up etc., and securing funding. Being at the forefront of a potential upheaval of the livestock sector and pushing technical and societal boundaries was part of what attracted them to this job. At the same time, the potential commercialisation of this kind of food provoked intensive scrutiny in particular from public authorities (in terms of life cycle, food safety, nutrient content and taste), as well as criticism and backlash (also regarding its sustainability), not least from the conventional livestock sector. As a result, farmers needed to learn how to communicate well early on, with the public, consumers, and with their future business partners and investors.

While entrepreneurial and management skills are indispensable for the farmer in 2040, a strong biotechnology/food technology training is essential to be able to innovate in this established field too, in order to participate in and build on research and development projects. Flexibility and agility are needed to react to shifting consumer demands and to identify related new business opportunities. Apart from

being an independent entrepreneur, the cell farmer could also be the employee of a corporate food producer, running the respective production facility, or building the business on a franchise license.

The R&D part of the business is the more labour-intensive one. Established production, processing, and packaging are fully automated and need only a few well-trained staff. Access to educated labour is not an issue, because they are located in an urban/peri-urban area. The outreach to consumers continues to be important, though acceptance of the products is not such a big issue anymore. Instead, the narrative around production needs to convey how it contributes to the special experiences that people are looking for with food, instead of environmental and animal welfare aspects alone. They are also in competition with other meat alternatives, such as plant and insect-based foods.

In 2040, the business model focuses on providing synthetic animal protein-based products to processors and retailers, without the need for animal husbandry. They target the large number of customers concerned about the ethical, biohazard and sustainability implications of intensive animal farming. Relatively easy-access to mid-scale bioreactors means that food processors can easily add cell-based products to their production processes and product portfolios. The broad variety of products provided range from food to consumer products, and include: cultured meat from different animal species to dairy proteins, fat, egg proteins etc., all of which can be tailored to meet consumer's demands and needs. The environmental focus is on product lifecycle sustainability, because this is demanded by consumers – covering sourcing of raw materials, logistics, distribution and product use. Production caters for the local and global markets, with considerable export opportunities

Livestock farms in 2040 combine extensive production of specialty products with breeding of cell donors and licensing cells to cellular farms, as a way to keep the livestock farm running. The cell farmer needs a good network of cell suppliers to be able to provide a variety of products. The fact that the EU ran a programme to preserve traditional livestock breeds in the past, now contributes to make Europe a highly reputed supplier of premium cell meat.

21 Choudhury, D., Tseng, T. W., & Swartz, E. (2020). The Business of Cultured Meat. *Trends in Biotechnology*, 38(6), 573–577. <https://doi.org/10.1016/j.tibtech.2020.02.012>

# Ellie

AGE 40

FAMILY NO CHILDREN, PARTNER WORKS IN CELL FARM

EDUCATION UNIVERSITY DEGREE IN BIOLOGY



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The new and the old –

they complement each other

In 2020, Ellie was interested in the possibilities of biotechnology, in particular in tissue engineering, i.e. the in vitro production of functioning tissues such as skin, liver, bones and heart muscle. What fascinated her most was the idea to create in-vitro edible meat, starting from a few animal cells, within the context of the role of food production in greenhouse gas emissions and climate change.

After working for some years in one of the front runner companies for developing cultured meat, and getting first-hand experience on how to overcome some of the problems related to scaling up production, and production efficiency, she decided to start her own company with her partner in 2032. Her partner was a consumer and marketing expert.

She went for the high-end part of the consumer market with local breeds of different livestock species and their specific tastes. Relations with livestock farmers have not been easy, but now she collaborates with breeders who follow an extensive farming approach with a focus on special breeds,

and who can see the business opportunity for them in cell farming.

In addition, targeting the more adventurous consumers who are looking for specific food experiences, Ellie started cultivating cells from exotic animals that are not found on the usual menus, to target the more adventurous consumers who are looking for specific food experiences.. Every product line had its story about where the cells were sourced from, how this contributed to conservation efforts and the actual revival of some species that had been almost extinct.

Another line of products she is currently developing is based on mixing cells from different species, and adding other elements for taste and appearance, to produce food that is tailored to individual consumer demands. This requires quite some R&D effort and a sophisticated organisation of production and delivery – challenges she is happy to deal with.

## Bernhard

AGE	45
FAMILY	TWO SONS 10 AND 12 YEARS OLD, MARRIED
EDUCATION	UNIVERSITY DEGREE IN BIOTECHNOLOGY



We've come a long way,  
but there is still a lot to do



In 2040, the business for Anprotech, Bernhard's biotech company of 17 years, is running well. He founded the company to produce specialty products with micro-organisms, with a couple of university friends, after finishing a biotechnology degree. He was responsible for the R&D part, and he soon got interested in the promising developments of synthetic animal protein production. The first years were pretty rough, with an uphill struggle to produce a good quality product, to meet regulatory requirements and, most importantly, to win consumers. Advances in genetic engineering/synthetic biology paved the way for the resource-efficient production of a diverse range of animal proteins for the food processing industry. Today the mainstream is relying on synthetic products.

As Anprotech developed into one of the major European players in this field, Bernhard discovered that he liked the challenge of managing an expanding company, dealing with business partners and policymakers, as well as lab work. In the early days, family and friends had stakes in the

company, and he felt a heavy responsibility to make things work. Now that the business is running well, the competitors in this price-sensitive market become a concern. Volatility of weather conditions is another factor that increasingly worries Bernhard as it affects the availability and costs of feedstock.

Alongside the large-scale production of commodity food ingredients, the company is investing in developing novel proteins and protein mixes using and adapting genetic material from a broad range of organisms (looking for characteristics better suited for processing, or for those that might help against certain food allergies and intolerances). Food safety in 2040 is also a major concern, but AI support and in-vitro safety testing has made the development process much more efficient and thus feasible for mid-sized companies such as Anprotech too.



**SOCIAL CARE FARMER**



# SOCIAL CARE FARMER

## Health and People

The social care farmer in 2040 perceives agriculture as an activity central to society, to secure food supply and health, while caring for the natural environment. Social farming is an ideal way of combining interests in agriculture and nature with contributing to people's wellbeing, for those who feel a strong social responsibility, and cherish working with people.

In 2040, social care farming is characterised by (environmentally) sustainable approaches to farming: the provision of eco-services; and the offer of interactive therapies via the care system and for self paying clients, including for example, meaningful manual labour as a therapy. These farms rely on income from both activities, and they are closely interlinked. The extensive production is largely geared towards providing for the collaborating health care institutions and self-consumption. A close collaboration with health care institutions can also lead to full integration of the farm into these entities. Competition emerges from providers of virtual services, who offer a more flexible immersive reality experience for certain types of clients.

Before 2020, a large share of social care farmers had moved into care farming as a diversification, to generate a stable additional income. The SoFar project estimated the number of social farms in the investigated countries (Belgium (Flanders), France, Italy, Ireland, Germany, Netherlands and Slovenia) at around 4,300 in 2007<sup>22</sup>. Where an appropriate policy framework was created, such as in the Netherlands, the estimated number of 'green care farms' increased by over 40% between 2009 and 2018<sup>23</sup>. Towards 2040, progress in digitalisation and automation, required care farmers to consider how to combine new technologies and machinery with a framework for interaction and manual labour for untrained people. Not being able to make full use of advanced mechanisation, social care farms are predestined for extensive, agroforestry-based forms of farming.

Good communication skills are essential for social care farmers to be able to deal with consumers, with health professionals, administration, and clients. Empathy, but also assertiveness are prerequisites to run a social care farm.

In addition to agricultural training, training in social care is indispensable. So is continued learning of new approaches and methods, and to get accredited and to provide offers that are attractive for clients. A good technical understanding facilitates the selection of technical developments in farming that are compatible with the care business.

The labour-intensive way of farming needs a limited number of workers, because clients will take over some of the work. The farmer has to manage the activity in several networks – other social care farmers, other agroecology farmers, collaborating healthcare institutions and healthcare services, and the local community. Social media communication has become an important occupation as the 'public face of the farm', ensuring transparency, generating and maintaining local support and new contacts to clients. As healthcare budgets are becoming more limited - due to increasing demand (ageing society, pandemics), less care farming services are covered by the healthcare system. Social care farms have to extend their outreach to clients that will pay for the service themselves. Continued immigration has increased the cultural diversity of clients, and thus also the need for social care farms to accommodate these.

The business model focuses on the provision of health services related to agricultural activities in close cooperation with public and private health systems and insurers. Agricultural production is an integral element of the process and is commercialised through public social and health institutions too. Social care farms in 2040 are often mixed farms, with a product mixture amenable to social care farming and labour of untrained people. Sustainably produced fruits, vegetables, flowers and dairy products processed on-farm, as well as pasture-fed livestock for meat are part of the portfolio. These farms tend to follow agroecological approaches, which focus on the ecology of agriculture but also include human and social values, culture and food traditions and responsible governance. In addition, eco-services such as carbon sequestration and biodiversity protection offer a basic income (and work for clients).

22 Di, I. F., Vadnal, K., & O'Connor, D. (2009). Supporting policies for social farming in Europe: Progressing multifunctionality in responsive rural areas. Firenze: Arsia - Agenzia Regionale per lo Sviluppo e l'Innovazione nel settore Agricolo-forestale.

23 Hassink, J., Agricola, H., Veen, E. J., Pijpker, R., de Bruin, S. R., van der Meulen, H. A. B., & Plug, L. B. (2020). The care farming sector in the Netherlands: A reflection on its developments and promising innovations. *Sustainability (Switzerland)*, 12(9) doi:10.3390/su12093811

# Hannah

AGE	38
FAMILY	TWO DAUGHTERS 3 AND 6 YEARS OLD, CHILDREN, MARRIED
EDUCATION	UNIVERSITY DEGREE IN PSYCHOLOGY



It is not always easy work, but it is very rewarding



A psychologist by background, Hannah took over the farm from her parents when they retired. Her affinity to agriculture might have come from her mother, whose family the farm belonged for four generations. Her father started the social care farm in 2015, to diversify income sources, so she may have inherited an interest in people from him.

5 years ago, Hannah negotiated with the clinic where she worked to establish a care farm as part of the clinic. She would remain an employee of the clinic, but would move back to her parents' farm and further adapt it, combining her passion for helping people to cope better with life, with her love of nature and rural life. Since then, she has focussed the farm work on a few hectares, renting out the remaining land in a long-term lease to other farmers. As the land is a valuable asset and a readily accepted security for bank credits, she does not want to sell it, although she will not farm it herself in the foreseeable future. However, as healthcare budgets are always an issue, in an ageing population and with the threat of yet another pandemic, her main income

source lacks long-term security – despite there being no shortage in patients.

Hannah has put quite some effort into setting up an ambitious certification scheme to fight fraud and unprofessionalism in the sector, which has increased in recent years. She takes care of the farm and the patients along with a cook and two part-time employees. Cooking is actually part of the treatment options. To process the food the patients have seen and helped grow gives them a great sense of achievement. Other produce is delivered to the canteens of the clinic she works for.

The next development step of the farm will be to offer residential care, an investment which might also be suitable for tourism – this will help to be prepared for a possible radical downsizing of healthcare budgets in the future.

## Max

AGE 28

FAMILY PARTNER WORKS ON FARM

EDUCATION TRAINED AS A NURSE



We all need some sort of connection –to nature,  
but also to each other



When Max first saw the old farm house he knew that this would be a good place to be – for him and for others. It was a charming house that needed some repair, with a decent amount of land for a functioning farm business, and plenty of space for the health care and well-being farm he had in mind.

He had had a hard time deciding what to choose as a profession, as he likes being in and working with nature, but he also likes people and helping them gives him great satisfaction. After training as a nurse, and spending some years of work in a clinical environment with the constant feeling of not having enough time for patients, he decided to change track. Because the treatment demand was there, a care and wellbeing farm would enable him to combine his two passions.

He made contact with the national association for care farmers to find out how to start such a business. They not only provided him with plenty of useful information and

training opportunities, but also supported him in finding a suitable farm. Max wanted to stay close to the city, i.e. close to his friends, but also close to potential clients and patients.

Max's partner Lucia also works on the farm. She is a trained psychologist who develops new activities for clients. To reach more people, they developed virtual reality applications that help people to relax remotely if they cannot come to the farm physically. These applications worked well, but still could not fully replace a stay in real nature and physical work. The use of chatbots turned out to be very helpful in giving immediate feedback and answers to clients and freed them from being present all the time.

Combining manual work by clients with modern automatized machinery (which he partly contracts) needs to be carefully planned, but it also allows the testing of new approaches. This is something that several of the clients enjoy and that makes them come back to the farm to see how 'their project' has developed.



**LIFESTYLE  
FARMER**

# LIFESTYLE FARMER

## Change for a New Life

Towards 2040, lifestyle migration to rural areas has been steadily increasing. Beyond the traditional pensioners, more people of working age decide to move to rural areas in a counter-urbanism process. They are motivated by the search for self-fulfilment and widening mental horizons, combined with a decreasing urban quality of life and improving living conditions in rural areas. By 2016, lifestyle aspects were already a common motivator to most new entrants to farming<sup>24</sup>. In the SALSA project, which examined a sample of small farms across Europe, around 20% of farmers in the clusters 'part-time self-provisioners' and 'business, diversified' were motivated to start farming for a lifestyle change<sup>25</sup>.

By 2040, cities face an increasing number of challenges in sustainability, mobility, housing, waste management, environmental degradation. Inequalities have increased social tensions and growing gentrification raised the relative costs of living in cities. Growing awareness of the importance of mental health, increased stress related to work life and population density reduces the attractiveness of urban areas. At the same time, economic activity no longer needs to be fully concentrated in cities. Also, the digitalisation of public services reduces the gaps in quality of life with regards to access to amenities.

Unlike the case of earlier migrants attracted by the idealisation of rural life, and who had to have a big dose of perseverance and ingenuity to construct their life in the new environment, the decision to move away from a city is now fairly common and popular. Rural areas (especially those relatively close to urban centres) are more cosmopolitan, diverse and offer more opportunities, while maintaining a human scale and a more relaxed and easy-going environment.

Changing to a rural lifestyle is supported by a host of public and private institutions that assist in finding accommodation and work, or setting up an activity. While many of the migrants pursue their previous activities – public service, services, arts and creative industries – many are also inclined to take up

agriculture on the land rented together with the house too, because it offers both a purposeful and meaningful activity, connection to nature and a mix of physical and intellectual skills. Multiple work activities in different areas are considered important for balanced lifestyle.

Agricultural activity is mainly viewed as part of the self-actualisation process and part of the growth mind-set – learning new skills, self-improvement and self-reflection. In order to minimise entry and exit costs, most of the activities are realised in a 'farm as a service' format (farm management, production assistance, access to markets) where the farmers choose the activities that they would like to perform themselves. They typically remain in one rural setting for several years, before moving on to other areas in search of a different experience.

The original skills of adaptation to a new environment – taking initiative, engaged citizenship and entrepreneurship – play a smaller role for future lifestyle farmers. Their skills are diverse experience, cross-cultural competency, creativity, and managing diversity. These farmers leverage the networks and knowledge of urban trends in their business models, connected with their prior experience. Sometimes this creates tensions with established farmers that rely more on traditional knowledge. They may also conflict with intensive farmers who reproach them with not being 'real farmers', while competing with cooperatives for markets and land.

Agricultural production is organised in a cooperative structure which provides the farm as a service model as well as taking care of marketing and sales. The business model focuses on linking urban and rural environments – providing urban consumers with direct connection to rural areas and amenities and introducing urban trends to the rural setting.

The main approach to sustainability for these farmers would be through agroecology and agroforestry, which combines agriculture with sustainable ways of living through designing ecological systems with care for the Earth and the people.

<sup>24</sup> EIP-AGRI Focus Group New entrants: Final report, <https://ec.europa.eu/eip/agriculture/en/publications/eip-agri-focus-group-new-entrants-final-report>

<sup>25</sup> Report on diverse small farm situations and livelihood strategies, for all regions, identifying similarities and trends, and requirements for the improvement of existing typologies, Deliverable 3.2, SALSA project [http://www.salsa.uevora.pt/wp-content/uploads/2019/10/D.3.2\\_Typologies\\_02\\_05\\_19\\_web.pdf](http://www.salsa.uevora.pt/wp-content/uploads/2019/10/D.3.2_Typologies_02_05_19_web.pdf)

# Tomas

AGE 42  
 FAMILY 3 CHILDREN: TWO SONS 12 AND 6 YEARS OLD, ONE DAUGHTER 10 YEARS OLD  
 EDUCATION MEDICAL DEGREE. INTENSIVE COURSE IN AGRICULTURE AND SUSTAINABILITY.



When city life became unbearable and my job training algorithms meaningless –  
 I started looking for a simpler life. And it's better for the kids here, as well.



Tomas had been increasingly disenchanted with the way his life and career was going. The focus on preventive medicine and advances in diagnostic technologies left him with much fewer opportunities for development as a primary care physician and most of his consultations were conducted remotely. At the same time, life in the city was increasingly unbearable. Air pollution, high temperatures, congestion and loneliness compounded the feeling that his quality of life was deteriorating. He also felt it was not a good place to raise his three kids.

He followed two of his school friends in accepting the offer of CountryLife, a real estate company, which leases residential farms to those interested in moving to the countryside. It also offers a year-long course in farming and sustainability to prepare the new farmers for their agricultural activities.

He opted for a recently renovated XIX century 5-bedroom farm with an adapted barn (where he could set up his part-time medical practice) and 5 ha of land.

The farm is situated in a high nature value area, not far from a medium sized city and in a village with a large community of people who have been renting such farms for longer periods of time. Tomas and his kids were quickly integrated in the local community, which has seen a steady growth in its population in the recent years.

Tomas has an orchard and a fish pond and grows some vegetables. The farm also comes with a few chickens, just enough to cover the needs of his family and some friends. Fruits and vegetables are distributed directly through a selling cooperative to subscribing customers with an IT network. The network is run by another rural 'convert' and its design is provided by another resident.

He considers this to be the first step in his nature life-path – he expects to move in the next 3-4 years, when the kids grow up, to rent something in a more challenging environment – fishing village, forest management – or he may just go back to another city.

## Stella

AGE 40  
 FAMILY SINGLE  
 EDUCATION VOCATIONAL CULINARY EDUCATION



People call me the minimalist farmer, but I'm neither a farmer nor minimalist

– I just want to concentrate on what is important



Following her cooking apprenticeship in a fine-dining restaurant, Stella worked for a few years as a sous-chef, before opening her own 'delivery-only' restaurant. She rented a kitchen for a few hours a day to cook food that had been pre-ordered the day before on an app (of a food delivery platform). The anxiety provoked by growing societal concerns about climate change, environmental degradation and financial fragility led her to embrace a simple and minimalist way of life – 'living with less', reducing consumption, putting a stop to accumulation and striving for zero waste.

The number of people aiming to radically change their lifestyle in such a way was growing, but they were being met with incomprehension. Frustrated by the difficulties of maintaining such a lifestyle in the city, Stella decided to move to the countryside.

She had sufficient budget to buy a small piece of land with an orchard within a short distance from the closest village. She had a 'Tiny House' set up: a 50m<sup>2</sup>, off-grid house, built with a passive design. The farm Stella created focused on

the fruits from the orchard. She followed a few trainings and exchanged with other minimalist farmers across Europe to find ways of sustainably using her orchard. After pruning the trees, replacing others and planting heritage varieties, she started to have a reasonable harvest throughout the summer and autumn.

Her production is sold to her many friends in the restaurant business either as fresh fruits using mild preservation techniques, or processed. Because her overall costs of living are very low, she does not need to generate a high revenue and the income does not go much beyond the costs of production. At harvest time, when more labour is needed, her city-based friends gladly help out and join her for picking fruits and help with the processing too, if it is needed.

Stella has few local contacts and does not feel connected to the people in the surrounding villages. Instead, friends from the city and a few other minimalist farmers in the wider region complement her simple life.



# REGENERATIVE FARMER



# REGENERATIVE FARMER

## A Bigger Ecosystem

In 2040, farmers who emphasize environmental outcomes over productivity have moved from pursuing a fringe approach to agriculture, to pushing and further improving a much more environmentally sustainable form of agriculture. They keep on pursuing the introduction of higher standards in farming - motivated by a holistic view of humans and agriculture, as part of the natural ecosystem

In the past, the increasing dissatisfaction with unsustainable food systems and the state of the environment led to a growing number of farmers turning to experimentation and the development of practices to actively improve the environment and counteract the negative effects of climate change – through agroecology and agroforestry, permaculture or keyline design and so on. In 2016, approximately 39% of the agricultural area was managed by farms with a low input intensity.<sup>26</sup> While no detailed data on agroecological practices across Europe is available, there is an increasing number of initiatives, networks and research in this field<sup>27</sup>. Over the years, growing demand for food products, (especially in the global East and South), resulted in increased pressure on resources (water and soil depletion). The world also experienced worsening effects of climate change and further environmental degradation, which made this approach to farming more popular.

Towards 2040, the awareness by consumers of environmental and climate problems prompts many actors in the food system to adopt more sustainable practices. To some extent, all agricultural models strive or are forced (through the supply chain, policies etc.) to adopt practices covered by sustainable intensification, agroecology, organic agriculture or permaculture. The conventionalisation of agroecology, mostly through standardisation and rule-setting have, however, diluted the essence of many of these practices. This has left the growing number of farmers that care about regenerative agriculture in a difficult position. On one hand, the shared objective of making the food system greener has been achieved, yet in its translation to mainstream, the complexity

and depth of the approaches have been significantly reduced. The business models based on targeting more environmentally conscious consumers, ready to pay more for food produced more sustainably, have been significantly undercut by the 'big organic' industry.

The regenerative farmers, who were pioneers experimenting with new practices, have to take on the role of guardians of the core practices. They are founding and supporting communities and/or associations of farmers that want to maintain more meaningful sustainability rules, than those of the mainstream. The social and moral obligations of ecosystem care and duty to others remain the core value. In addition to being innovators, they need leadership and community-building skills.

The business model focuses on providing food that contributes to planetary health – that of human civilisation and the natural system. It targets more conscious consumers, linking directly with them and providing a sense of common cause. Their income is supplemented by the provision of ecosystem services, which for some, depending on the environmental needs and remuneration by society, could develop into their main income source.

A new generation of farmer-activists advocate for more radical approaches to the environment and nature at the same time. Post-human ecology centres neither on human nor nature – it puts them side by side in the context of interspecies relations. Eliminating human exceptionalism raises the question of how to live together with non-human beings (animal, plant, and micro-organism). Post-humanist agriculture gives animals and plants agency and participation in co-creating the farm. Developments in animal and plant cognition create new ways of making that happen. Alongside environmental skills, these farmers need skills in biology and biotechnology, and empathy with other living beings and species. These farming models do not participate in economic exchanges and do not have a traditional monetary value proposition, as the customers or beneficiaries are all of the species present on the farm.

26 European Commission (2018) CAP CONTEXT INDICATORS 2014-2020, 33. FARMING INTENSITY [https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-indicators-doc-c33\\_2018\\_en.pdf](https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/cap-indicators-doc-c33_2018_en.pdf)

27 Wezel, A., Goette, J., Lagneau, E., Passuello, G., Reisman, E., Rodier, C., & Turpin, G. (2018). Agroecology in Europe: Research, education, collective action networks, and alternative food systems. *Sustainability (Switzerland)*, 10(4) doi:10.3390/su10041214

# Andrea

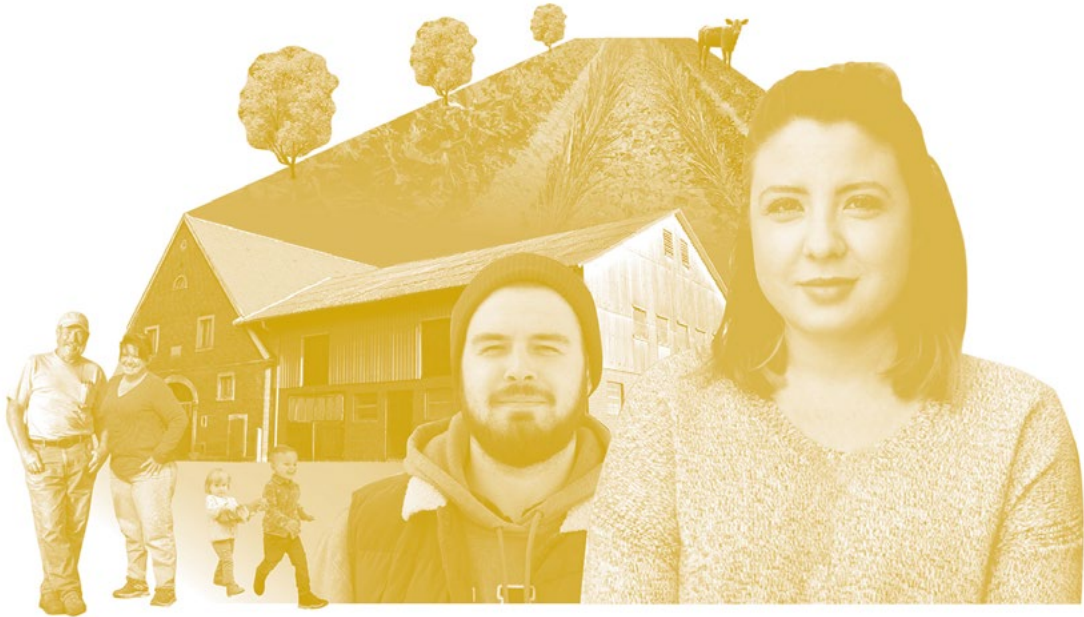
AGE 35

FAMILY

PARTNER AND A SON (8 YEARS) AND A DAUGHTER (6 YEARS); FAMILY FARM FOR MANY GENERATIONS; HER PARENTS ALSO LIVE AND WORK ON THE FARM

EDUCATION

UNIVERSITY DEGREE IN AGRICULTURE



Scaling up the water harvesting and integral waste

management is our main challenge to nurture this land



Andrea and her family farm 40 hectares of land which has belonged to the family for many generations. They apply an integrated and circular economy approach, in which they grow livestock for milk production, and do horticulture - with diverse vegetables and fruits, and they also have several honey bee colonies. Some automation has reduced their workload substantially. Moreover, they harvest their own water for human and animal consumption, as well as for irrigating their produce. This is done through a complex agroforestry system combined with interconnected ponds that capture rainwater and store it underground. All captured water (including human wastewater), goes through a filtering system that is composed of a mix of different plants, so it can be reused either for human consumption (i.e. the treated rainwater), or for irrigation purposes (i.e. the treated wastewater).

Andrea's parents take care of the farm shop, which they organise together with other local farmers, and where they sell all that is produced in the land, including ornamental plants, homemade cakes, jams and honey, cheese, bread,

and all products that can add value to the milk, fruits and vegetables produced.

Another source of income is tourism associated with educational practices. Children and their teachers from local schools, or anyone who is interested in spending some time in nature are welcome to spend a day or a weekend on retreat at the farm.

They preserve and restore ecosystem on the farm, using biological methods to control plagues to enrich the soil and to restore watersheds. It is a means to preserve the culture and past knowledge of the ancestors, who have always depended on nature to thrive. It also aims to build consciousness in community members and consumers about the importance of a healthy diet and the preservation and restoration of the planet. Farming should connect people with nature as one, instead of considering people and nature apart - it is such a vision that drives the work of Andrea's family now and for the future.

## Anders

AGE 42  
FAMILY SINGLE  
EDUCATION COGNITIVE BIOLOGIST



”

This is a place where I'm not in charge -  
we are in constant dialogue with animals and plants

As a cognitive biologist, Anders was studying the cognitive abilities of various species. The emerging field of cognitive sciences has been growing significantly in recent years, with additional data being generated and new research methods emerging. Anders' professional interests also include species relations and animal ethics.

When a funding opportunity arose with a conservation charity fund to design and set-up an interspecies farm, he took on the challenge enthusiastically. It allowed for a practical application of the various fields of research he had been involved in. The prospect to work closely with other scientists and with interested farmers motivated him.

The design of Anders' farm involved a mediation between various living beings (animals, plants, and microbes) to form a community of human actors, who believe in concepts of ecological and interspecies justice, and non-human actors. Human, animal and plant labour was combined to create a cooperative - a meaningful and flourishing workspace. The quantity and distribution of surplus production was also

examined, as well as the overall common purpose of such a farm.

In practice, the creation and management of such a farm is difficult. Anders is confronted by the challenge of encompassing different cognitive abilities, of respecting the competing interests of various species in an artificial setting and by the scepticism of many collaborators. However, intense discussions, testing, monitoring, reviewing and adapting concepts have advanced the interspecies farm step by step.

In addition, innovations in animal-computer interactions and computer-mediated human-animal interactions, as well as advanced environmental sensor networks for improving the understanding and monitoring of ecosystems, have provided support to Anders, by directing new ways forward for developing and sustaining posthuman farms.



**URBAN  
FARMER**

# URBAN FARMER

## On Urban Soil

The urban farmer in 2040 might be a newcomer to agriculture, interested in contributing to society and having acquired the necessary knowledge and skills (in specific workshops and training events). But urban farming is also an opportunity for trained farmers, who want to combine life in the city with their preferred profession. Depending on the type of farming pursued, capital investment is needed to initiate an urban farm, or to take over an established one. The commercial urban farm in 2040 is part of several city networks – such as the networks of local food producers contributing to food security and the provision of healthy diets, the green city system with green spaces for improving the city’s micro-climate and biodiversity, the organic waste recycling networks, and the networks of social initiatives and actors in the city.

In 2020, urban farmers were pathfinders, innovating agriculture in urban environments. The online atlas of urban farming created by the Urban Agriculture Europe project between 2010 and 2016 includes over 250 urban agriculture projects<sup>28</sup>. The Milan Urban Food Policy Pact of 2015 was signed by 2,010 cities, and created a favourable policy environment and led to the rapid growth of initiatives<sup>29</sup>. Urban farmers established an alternative local food provision of high value crops. They often faced unstable access to land, with short-term tenures, during an ‘in-between’ use of land, before it was used for more profitable purposes.

Towards 2040, environmental pressures (climate change and the decline of biodiversity), prompted cities across the EU to review their development plans in terms of sustainability and to increase their resilience to crises through, among others, the development and implementation of a comprehensive food system strategy. Cities became denser trying to reduce the urban sprawl and the conversion of valuable arable land to housing and industrial area. With an increased need for green spaces, urban planning now includes spaces for climate- and eco-services by default. This reality increases the amount of land available for urban farming, including space that had been formerly dedicated to cars and traffic. The land available can be used with a longer-term perspective too. New buildings are equipped to host roof top gardens by default.

Alongside entrepreneurial skills, communication skills are key for the urban farmer to be able to connect to the municipal administrations and to neighbours, as well as to a diverse range of clients. Technical affinity or social orientation determines if more high-tech, intensive urban farming is pursued, or if diversification towards social and ‘experience’ farming is preferred. Being part of an innovative city environment facilitates access to newly developed technologies and applications. Curiosity, flexibility and adaptiveness characterize urban farmers.

Urban farms in 2040 follow differing business paths. They have the close vicinity to their clients, and competition with alternative ways to produce food in cities in common, as well as a shared competition for alternative usages of the space they occupy, for e.g. non-commercial community farming initiatives. Open space, land-based, unconditioned and relatively low-tech permaculture focus on providing agricultural, open-air experiences to urban dwellers - they are prosumers who participate in the production and consumption of products and services. Farms operate through subscription services that guarantee a regular income, and most of the production goes to participants. Other activities include: education and learning (around food, herbs, and biology), and providing alternative spaces for fresh air activities etc. A fully automated roof-top garden is at the other end of the urban farming spectrum, catering for restaurants, local supermarkets/food distributors, communities and individual citizens.

Aside from diversification, differentiation is key for all types of urban farmers (high value, specialized crops, crops that cannot be grown indoors, production ‘closer to nature’). The development of ‘food hubs’ in the city space, an ecosystem combining urban farms, innovative restaurants and food researchers/developers can also be an interesting basis for generating income. Environmental and micro-climate services represent other avenues for diversification. Furthermore, urban farms are integral parts of the local bioeconomy, and are included in the recycling of organic waste flows in the city.

In terms of sustainability, these farmers focus on building sustainable urban ecosystems with water, energy, waste, pollution issues and contributing to urban biodiversity.

<sup>28</sup> <http://www.urban-agriculture-europe.org/online-atlas.html>

<sup>29</sup> <http://www.milanurbanfoodpolicypact.org/>

# Maria

AGE 35  
 FAMILY SINGLE  
 EDUCATION TRAINED ROOFTOP FARMER



Like a spider in a web- that is how I feel.

I weave the fabric of life.



Maria was one of the first generation of students to complete with a degree in rooftop farming in 2030. By then the refurbishment of older buildings with rooftop gardens and the default installation for new buildings resulted in a number of rooftop farming companies in which she could start her career.

The owner of the farm she worked at wanted to move on, and she took the opportunity to purchase the farm, after 5 years of working there. She was able to also establish a couple of other farms, because the city administration provided good support for urban farming in recent years.

Today she offers a customised mix of services – for companies the rooftop provides fresh food for the canteen, a place to socialise, as well as the possibility for some employees to care for their own small plot of soil and thus take a recreational break in the open air. For apartment buildings, she provides fresh food for inhabitants and neighbours on subscription basis. If a community or building administration

wants to add a place to socialise, or a ‘do-it-yourself’ garden, she provides the equipment. For many, these rooftops develop into small green oases in the city, above the noise of the streets. It also frees them from growing food in their own apartments.

Maria also runs fully automated ‘production only’ rooftops, with a larger share of greenhouses to cater for restaurants and retailers. Her main competitors for this business model are the indoor farms, but so far there are still enough clients who favour the use of natural light and soil.

However, the changing climate renders the conditions for rooftop farming increasingly difficult. Strong winds, sun and heat require additional construction and technical investments, which start threatening the business model. Maybe indoor farming will turn out to be the more reliable food provider and to be her future too, remotely controlled from her open-air garden.

## Peter

AGE 55

FAMILY MARRIED, PARTNER HAS A NON-FARM JOB

EDUCATION TRAINED SOCIAL WORKER



”

It is my mission to bring local communities  
and food production closer together

Peter gathered experience within a number of initiatives involving greening urban space, before starting his own business. He was a social worker by training and had worked with children in a disadvantaged community. He initiated a community gardening project on land rented by the city council. Peter found a new passion, he took training courses and learned by doing. By the time the lease for the area expired and the space was filled with an apartment block, he had made up his mind to move into farming.

Peter worked for other urban farmers until he had the possibility to establish his own farm. He started with a mix of fruits and vegetables and had no problems to find enough customers – e.g. restaurants nearby, a mid-sized retailer and many neighbours. Work became less heavy and time consuming with the availability of small-scale machinery and automation, and he could manage the farm almost on his own. His trees and areas with wild flowers fulfilled the city's requirements for environmental services.

In addition to investments into protecting his property - after several intrusions and thefts, the increasing competition from alternative urban food production, i.e. from large scale indoor do-it-yourself home-farming kits, collectively made him rethink his business model. He approached several schools and social care institutions to offer his farm as a care, training and learning environment. The easily reachable location in the city offered the possibility for flexible short stays and interactions.

Peter developed specific experience programmes for different target groups, from growing and tasting different nut varieties, to processing of products and involving customers in selecting the crops to be grown the following season. These short experiences in nature and with natural food production, attracted many city dwellers and neighbours, who wanted to take a break from work or just have a change of environment, and anchored the farm well in the local community.



**SERIOUS HOBBY FARMER**



# SERIOUS HOBBY FARMER

## Passion for Leisure

Serious hobby farmers do not consider farming to be a source of income in 2040. While farming in Europe has become more difficult due to climate change, there is still a considerable number of people intent on working with soil, plants and animals as a passion, without expecting income from the activity. Many do not have an agricultural education – they start farming only when taking over the inherited family farm, or when they purchase a farmhouse and some land to pursue their hobby. Motivation for farming stems from the need to balance a challenging work life and a need to have a meaningful alternative endeavour, and a more physical and outdoor activity. Serious hobby farmers also want to keep traditions alive. They want to contribute to improving farming by experimenting and demonstrating improvements, bringing in their non-farm professional skills if possible, and they are dedicated to an environmentally benign form of farming

Another group of leisure farmers consists of former full-time farmers, who continue running their farm after they retire, having rented out or sold off much of their land.

The motivations, commercial nature and business models for farm holders whose main gainful activity is outside agriculture differ<sup>30</sup>. In the 20 years leading to 2040, the nature of work has changed and many of the jobs in 2040 are physically passive and require stressful mental effort, constant creativity and hyperconnectivity (high level of collaboration, crowd intelligence). At the same time, increasing incidence of depression and anxiety puts more focus on work-related mental health risks. In 2040 organisations are very active in promoting actions to improve wellness and life satisfaction through serious leisure (among other) – a long-term and rewarding pursuit of meaningful activity, which requires committing considerable time and energy. A single serious hobby to balance paid work would involve physical effort, repetitive tasks and individual work. Agricultural work fulfils these

criteria and is a choice for a number of people either as a serious hobby, or as a form of pluri-activity for social and economic reasons.

The production of one's own food, and food for family and friends is part of the motivation and can be a welcome reward of the activity. Any additional efforts in terms of marketing and sales is usually not relevant for the serious hobby farmer. Instead, this will be outsourced to professionals or others, including local shops, interested in collecting and selling the produce. While the farm does not have to generate a profit, costs do have to be partially covered by the farming activity. Employment contracts also cover part of the expenses, which facilitates acquisition and running of the farm.

Farming skills, ranging from crop knowledge, and machine repair to accounting, can be acquired via special training courses for hobby farmers, and the diverse networks of farmers. Learning by doing plays an important role, and serious hobby farmers need to be prepared to experiment, to try and to fail.

The focus of serious hobby farmers is not on income, but on the processes of tending to plants and animals and the labour involved. Experimentation and uptake of new developments in farming approaches and the effort committed are the main competitive criteria in the various sub-communities of serious hobby farmers. Regarding products, extensive livestock rearing can be combined with growing specialty crops, fruits and nuts.

<sup>30</sup> Sutherland, L.-A. (2020), Finding 'Hobby' Farmers: A 'Parish Study' Methodology for Qualitative Research. *Sociologia Ruralis*, 60: 129-150. doi:10.1111/soru.12262

# Jonas

AGE 42  
 FAMILY SINGLE  
 EDUCATION DEGREE IN INFORMATICS, AI SPECIALIST



It's part of my personal development plan - I work on self-control, physical strength and connectedness through my farming hobby



Some time ago, Jonas had become too occupied with his current job, so he was looking for an activity to balance his professional work. As the company where he worked actively supported employees to develop a hobby, he skimmed through the online material they provided and did the personality test to find out his preferences and talents. Farming came out on top of the list, and he went for it.

Jonas booked several courses on a 'training farm', and then signed up for the serious hobby scheme of his company. With the help of a contractor, he found a suitable farm in the mountains, and with a cheap loan from his company, he was able to purchase it.

The first years were quite challenging and he knows all of the internet platforms and fora where people like him can ask questions and get answers now. He spends about 60% of his time on the farm, working remotely for the rest. This enables him to keep some sheep and goats on pastures, and he has arranged with neighbours to look after them when he

is not around. The mobile butcher of the region takes care of slaughtering and selling the meat.

Jonas also grows salad, fruits and nuts. This is partly for his own consumption. In good years he invites local farmers to harvest his plots for a small fee to cover costs, and he just keeps as much as he can eat and share with his friends and family.

Although he enjoys being in the mountains and on his farm, his life remains anchored in the city. He gets along well with his neighbours, and has established a good network, but he still feels like an outsider. The unorthodox new farming approaches that Jonas is testing and the adaptation of second-hand machinery he pursues – a result of discussions in diverse networks of progressive farmers and engineers – often leads to bewildered looks from local farmers, but sometimes his approaches are being taken up.

## Helene

AGE	68
FAMILY	WIDOW, NO CHILDREN
EDUCATION	MEDICAL DOCTOR, RETIRED



Working the land gave me a new purpose  
and caring for plants is just like healing people



Helene bought the farm land some years ago when she had decided to quit her job and take early retirement. With her own pension and the one from her deceased husband, she does not have to worry about a regular income, rather about how to spend her time on something meaningful.

At the time when the serious hobby initiatives were started by employers, she decided to follow her painting interests. But she visited some colleagues who had taken up farming, and found the experience quite interesting. At one point she decided to buy land close to their country house and try farming herself. Helene started with fruits and nuts, enjoying the blossoming trees in spring. In addition she now keeps a few sheep – both for company and to experiment with wool. All of this created activities that have helped her to integrate better in the local community of the village.

With the help of neighbours, she purchased the machinery she needed. Harvesting, processing and selling is largely contracted out to neighbours, but she has to take care of

the product quality and thus adhere to agreed processes. Helene exchanges with her network of friends and former colleagues on how best to tackle issues with machinery needing an update, or a lack of spare parts, as well as the experiences with new varieties and improved permaculture approaches.

She is proud that her plants and animals are healthy and productive and sometimes her yields are better than her neighbours'. But her main interest is in using the land and growing crops in harmony with nature, not in making more money. She just needs to cover her costs. Recently she visited an interspecies farm, where people try to set up a system in which all species, including humans, live and work together in harmony. Helene is fascinated by this posthumanist approach to farming, maybe this will be her next endeavour to start.



**COMMUNITY-  
PROVISIONING  
FARMER**

# COMMUNITY- PROVISIONING FARMER

## Growing and Sharing

In 2040, citizen-farmers growing a sizable amount of food for their own consumption can be found in rural and urban settings. The availability of fresh food for a healthy diet is a driving force for engaging in producing food, but strengthening a link to traditions (including the family home in the countryside) plays a large role for some of these farmers too. In contrast to this group, semi-subsistence farmers, who experience economic hardship, produce their own food out of necessity, and have limited access to markets, thus they cannot sell the produce. Against the background of deteriorating economic and social conditions, this form of farming can still be considered as a buffer.

In 2016, approximately 40% of the EU's 10.5 million farms had an economic size (in terms of standard output) below EUR 2,000 per year, representing only 1% of the EU's total agricultural economic output. Approximately 75% of these farms consumed more than half of their own production.<sup>31</sup> About 31-58% of respondents to a survey in urban and rural areas in 5 regions of Europe (in Czechia, Germany, Hungary, the Netherlands and Scotland) practice self-provisioning, (although significantly lower numbers in the Netherlands)<sup>32</sup>.

Increasing health concerns due to environmental degradation and food and diets, extreme weather events due to climate change and rising economic inequalities create a growing feeling of uncertainty and insecurity which motivates more people to use the available land or space at home for producing plants and keeping small animals, fish (in home aquaponics systems) and edible insects. The availability of new tools for home gardening and indoor food production, a thriving Do-It-Yourself maker movement and easy access to digital technologies (apps, sensors etc.) make it easier to start and develop production for self-provisioning. The trends for more flexible work patterns will allow more time for such activities, and new fora will

facilitate learning, knowledge exchange and sharing of practices, as well as food.

The community-provisioning citizen-farmer in 2040 produces more efficiently than 20 years ago. They produce a broader variety of products and are increasingly involved in wide, long-distance food networks, through family and friends, where sharing and exchange of raw and home-processed food for other products and services takes place. A growing movement of prosumers who are not striving for self-sufficiency, will have an effect on diets and attitudes towards food, which will affect other food producers. Hence, many could move towards 'community-provisioning'.

Communities centred on extended family and friends will be the sources of information, places of exchange of recipes and practices as well as recipients and providers of various products and services. The strength of informal food networks lies in their lack of institutionalisation and flexibility, with a focus on caring and empathy. In an urban context, community-provisioning farmers will produce relatively little, but will be embedded in more concentrated, larger and more diverse informal food networks. In rural settings, the capacity and variety of production will be bigger. The networks will be driven by family and friends more and be wider in area (spanning various cities and villages due to migrations) but with tighter contacts. While the farm remains relatively small or medium-sized, it would be a 'food hub' with contributions in labour and other forms of support from the network.

Although some initiatives will try to formalise their relations through 'time banks', alternative currencies and contracts, their transactional nature will be viewed with caution. Instead, a more flexible access to commercial markets will allow community-provisioning farmers to decide whether they would like to sell more of their production.

<sup>31</sup> Eurostat (2019) Agriculture, forestry and fishery statistics – 2019 edition

<sup>32</sup> Vávra, J., Megyesi, B., Duží, B., Craig, T., Klufová, R., Lapka, M., & Cudlínová, E. (2018). Food self-provisioning in Europe: An exploration of sociodemographic factors in five regions. *Rural Sociology*, 83(2), 431-461. doi:10.1111/ruso.12180

# Natalie

AGE	58
FAMILY	WIDOW, 3 ADULT CHILDREN
EDUCATION	SECONDARY SCHOOL



I expected to slowly fade into oblivion on the farm,  
instead I find myself in the centre of things

”

Natalie was the only one of her five brothers and sisters to stay on the family farm. All the others chose to move to towns and cities, to pursue their professional careers, some to other countries. The farm was small and she managed it with her husband, who also worked at the local administration. After his death, she rented out most of her land to the neighbouring farmer, keeping only a small piece of it with fruit and vegetable production, a small vineyard and some hens.

Although most of the time she lived alone, her children having left for their studies, the farm was an obvious place for family reunions and celebrations. In the summer, her sons and daughter, nieces and nephews with children would gather at the farm for the holidays, and throughout the year, and members of the extended family would come for retreats. Financially, she was able to survive by receiving some social support, some rent from the land and some support from her children.

Most of Natalie's farm activities relate to managing the garden and orchard and using the produce to make various home-made products. Initially, most of her production went to her children and occasionally to the extended family and friends. A small portion of it was also used as a local exchange currency to supply herself with other local products (meat, cheeses etc.), or in exchange of small services (house maintenance, transport).

However, lately the demand for her products has increased. Her family would give them away to business partners at special social occasions, as gifts and as tokens of gratitude to friends and acquaintances. With a push from her children Natalie's successful production took another direction. She received professional cooking, packaging and labelling equipment from them. Food production now takes up a lot more of her time than before and is about to becoming a permanent job for Natalie. Although it will bring challenges with all the stress of quality and deadlines, she knows it also brings her a lot of satisfaction.

# COMMUNITY-PROVISIONING FARMER

## Hugo

AGE 28

FAMILY SINGLE

EDUCATION DEGREE IN COMMUNICATION AND PUBLIC RELATIONS



We don't need a lot of space, if everyone just commits a little,

together we can provide a lot of food to those who need it.

”

When Hugo was completing his communication and public relations studies, he knew he wanted to work in an NGO and to use his skills for a good cause. After his studies, he joined a non-profit organisation working for the benefit of children in need – supporting children's rights, families and parenting, education and care. Poverty and inequalities were on the rise again, linked to a number of developments including climate change impacts, health care issues and the changing nature of work, with much more volatile working relationships and less and less longer-term security.

On his own initiative, Hugo engaged in work with food banks, urban gardens and other institutions to secure food for the most deprived families, in addition to public outreach and his work seeking funding. He quickly learned a lot about the potential of home food production - with small hydroponic and aquaponics systems, insect farming kits, indoor cultivation kits and so on.

With this new knowledge, he convinced his colleagues at

the NGO to start a new project. Following a call to members and supporters of the NGO, many of them installed different kinds of production kits at home. Hugo helped them to install the kits remotely, offering trainings on how to cultivate vegetables, insects, fish, herbs etc. He now also organises harvesting and processing with other volunteers. The food is then distributed via food banks or other channels to inhabitants in need, and alongside providing essential support, it also contributes to healthier diets for all involved.

While this distributed urban micro-production system serves to produce food for the statutory objectives of the NGO, part of the food is also sold through marketing channels with the aim to generate funds for maintaining the system. Local restaurants and small retailers have signed up to the scheme to support the local communities. Other cities and NGOs have already expressed interest in learning how to establish such a micro-production system in their local communities too.

# 3. Possible Emerging Issues - Policy Implications

Following an analysis of 12 farmer profiles developed through the foresight process, several horizontal developments emerge, reflecting common expectations by study participants:

The 12 farmer profiles 2040 show that farming in 2040 is expected to be much more environmentally sustainable, following a mix of farmers' motivations, societal demand, and stricter norms and rules. A major driver for this is expected to be the increasingly visible impacts of continuing climate change and environmental degradation (soil depletion, desertification, biodiversity decline, water quality degradation etc.), which will put adaptation and mitigation high on the agenda of EU society. Consumers in 2040 are expected to be more demanding regarding quality, variety and experiences related to food. However, the healthiness of diets will also gain importance, in parallel with environmental and ethical considerations. Short supply chains might gain market shares and influence the power balance throughout the food chain. However, food prices will continue to be an important factor determining dietary choices.

Against this background of profound changes in the environmental framework of every farmer, it is expected that in 2040 there will be a more diverse ecosystem of farms responding to these challenges and opportunities – benefitting from technological and social innovation of the next 20 years. Those farmer profiles that reflect the current mainstream of farming are expected to adapt and to still be around in 2040. They will be joined by the profiles that are currently considered to be emerging, but by 2040 are well established (cell farmer, controlled environment farmer, urban farmer, regenerative farmer, social care farmer, lifestyle farmer). In particular, cell farmers and controlled environment farmers might have a profound effect on the future landscape of farming, potentially disrupting established business models.

The farmer/farming landscape in 2040 could be more oriented towards the local and regional economies. While the intensive and corporate farmer profiles in 2040 are expected to continue being geared towards an EU/international market, other farmer profiles in 2040 (such as urban farmers, social care farmers, regenerative

farmers, controlled environment farmers, and community-provisioning farmers) would be predominantly focused on the local and regional communities with their products, though in an informal economy (community-provisioning farmer), social economy-oriented or market-oriented manner. The adaptive farmer, the patrimonial farmer, the cell farmer as well as the serious hobby farmer have less clear orientations, and could be part of and producing for a strong local community as well as for international markets.

The importance of the profiles in terms of overall number of farmers in 2040 will depend on many factors: the state of the food systems, functioning of agricultural markets, social and economic situation, climate change and environmental challenges, as well as policies. Overall, profiles geared more to wider markets will continue to represent a large share of agricultural land and production, but there will probably be a shrinking number of such farmers. Profiles with a more local focus could represent higher numbers of farmers in the future, but still with a relatively smaller share of agricultural land and production. They will all be producing very different goods and services – geared to specific food and non-food systems and as such it will be increasingly difficult to measure their contribution by the same criteria.

This future diversity has the potential to contribute to the resilience of farming in the EU and thus to food security. Unsurprisingly, it also raises several questions, such as:

## ***How to ensure coherent policies for an increasingly diverse food system?***

As policy approaches to the food system become more holistic and systemic, following for example the adoption of the Farm to Fork Strategy and including e.g. competition, research, education and employment policies, the food system itself becomes increasingly diverse and potentially fragmented. New actors such as Do-it-yourself farmers, new intermediaries such as self-driving mini grocery shops, drone deliveries, new service delivery models such as virtual experiences, and new niches such as food tailored to individual customers, use of new technologies, will all make the future food system much more complex to deal with. A one-size-fits-all approach will potentially not work anymore.



*The future policies in the context of an increased diversity of the food system, might need agility to quickly recognise and map various food sub-systems, their connections, stress-points and influencing factors, to understand where and how to intervene to achieve the right results.*

### **How to ensure movement in the same direction?**

As environmental sustainability and climate neutrality become the major goals of the sustainability transition, the understanding of sustainability and how to achieve it might be increasingly divergent and difficult to reconcile. The diversity of farming models expected for 2040 also imply diverging attitudes towards environmental sustainability and approaches to achieving it. The Intensive Farmer profile, together with the Regenerative Farmer profile and the Controlled Environment Farmer profile can be taken as examples of very different approaches to farming, as well as environmental sustainability, ranging from perceiving humans as part of nature to shaping nature according to human needs and separation.

*Future policies could be expected to support the emergence of a clear understanding, well-grounded in common values, of environmental sustainability balanced with socio-economic needs, encompassing different attitudes, methodologies, technologies and frameworks under the common goal of a 'healthy planet' and a just transition.*

### **How to build transformative resilience?**

Towards 2040 farming and farmers will be exposed to increasing risks and crisis situations, linked to climate change, environmental degradation, and also to events such as the recent COVID-19 pandemic - with potentially severe economic and health implications. Robustness to withstand crises might not be enough, resilience will be needed to 'bounce forward', and to not only keep the business running, but to further improve and adapt it to contribute to pre-empting future crises. Knowledge and skills as well as agility and flexibility will be essential elements of the required transformative capacity. Given the increasing diversity of farming situations, simple scaling or best practice might not be enough in the

future. Knowledge will need to be contextualised for a particular situation of a particular farmer.

*Future policies could target individual resilience through transformation rather than stabilisation measures and to create advisory/coaching services that combine technical and psychological support. They could also be expected to target the resilience of societies, addressing crises in more systemic ways.*

### **How can farmers effectively use diverse and volatile networks?**

Networks are expected to play an increasing role for farmers towards 2040. This includes local peer-to-peer networks to share information or for collective action, professional networks including farmers across regions and potentially other professions, networks of farmers and researchers, farmer-consumer networks, networks of friends and business partners etc. With growing diversity in farming, enhanced importance of information flow, changing consumer demands and customers, more diversification of activities in each farmer profile, the number of networks each farmer will have to deal with is expected to be higher compared to today. In addition, networks will be more diverse and more volatile, adapting to newly emerging needs and demands. Farmers will need to be prepared to use but also shape this changing landscape of networks according to their needs.

*Beyond the current role in encouraging and creating networks, future policies could support networkability – helping organisations and individuals to develop the culture and structures necessary to reach out and build ad-hoc networks.*



### **How can farmers effectively connect to consumers?**

Agriculture is increasingly recognised by society as an important part of the sustainability transition. The values and attitudes of consumers will continue to play a role in food choice and diets. Recognition of the work of farmers by society is an important element in shaping consumers' attitude to food and the value given of food and thus it is also part of food waste reduction. How farming activity is framed by each farmer in their conversations and contacts with consumers and the narratives that are developed around respective farming approaches and farm products will contribute to the building of trusted and stable relationships and thus will be a factor for success.

*Future policies could consider to acknowledge and recognise the various values, narratives and framings that relate to agriculture, with the aim to use them ethically, to build transparency around their subjective nature but also to be ready to re-frame them to facilitate discussions and to increase comprehension of policy problems.*

### **What will the term 'farmer' mean in the future?**

As more diverse actors are expected to be involved in food production in the future, the traditional farmer identity might be increasingly questioned and complemented by other identities, transforming the meaning of the term 'farmer'. New production methods such as cell farming or controlled environment farming, diversification of products and services such as social care farming, food experiences, recreation, carbon farming, and new farmer profiles with a limited time horizon for their engagement in farming such as lifestyle or corporate farmers, are broadening the meaning of farming and food production and add new attitudes in relation to farming. In addition, a growing degree of automation will change the work profile of farmers. Farming in the future for some might become a job that can be changed rather than a vocation for life. This profound change in how agriculture is done

and by whom will have implications for education and training, access to land and other policy fields.

*Future policies could acknowledge multiple group and individual identities related to farming and food. Furthermore, the creation of opportunities for the discussion of roles and models and their underpinning values and beliefs, as well as being open about the values underlying the assumptions behind the policy could be considered.*

### **What will be the interdependence between 2040 farmers and rural areas?**

Most of the future farmer profiles will be located in rural areas. Apart from being dependent on a 'technical' infrastructure for digitalisation, automation and logistics, many farmers in the future and their diversified activities will be even more embedded in the respective local economic and social environments than today and therefore will strongly shape these environments. At the same time, they also depend on the vitality of rural areas to be able to develop. This relates to having a large enough local customer base (e.g. regenerative, community-provision, social care, adaptive), to be able to establish a supportive network with neighbouring farmers (e.g. serious hobby, community-provisioning, lifestyle, adaptive, patrimonial, intensive, corporate...), and to have an attractive natural and social environment as well as public services (in particular lifestyle farmer). The future of farming will shape and depend on the future of rural areas. Automation of farming processes might make farming less physically demanding and less time consuming and thus more attractive also for women. At the same time, the resulting need for less labour and the possibility of at least partial remote farming might contribute to a further depopulation of certain rural areas.

*The long-term vision for rural areas that the European Commission will develop in 2021<sup>33</sup> will need to take into consideration the future diversity of farming and how to nurture it in rural areas.*

33 [https://ec.europa.eu/commission/commissioners/sites/comm-cwt2019/files/commissioner\\_mission\\_letters/mission-letter-janusz-wojciechowski\\_en.pdf](https://ec.europa.eu/commission/commissioners/sites/comm-cwt2019/files/commissioner_mission_letters/mission-letter-janusz-wojciechowski_en.pdf)

# 4. Next Steps

## Continuing the discussion

The study Farmers of the Future has brought together different stakeholders, and initiated a range of discussions on who farmers are in the present, how they could develop in the future, their related hopes and fears, and what questions these possible developments could raise (for both farmers and for policy-makers). This study could only involve a limited number of participants, workshops and discussion rounds, in part due to restrictions set by the COVID-19 pandemic. The content and material generated by the study have been developed with a view to be used to continue the joint exploration of the present and the future of farmers, now and in the future.

The material and templates used for developing the 2040 farmer profiles will be made available based on a creative commons licence, to be used and adapted to specific needs and goals<sup>34</sup>. It provides a framework for discussing individual farmer profiles, or combinations of farmer profiles to e.g. increase the understanding of specific local environments, explore the implications of different megatrends on the farmers' environments and the farmers themselves, or to discuss the future development of specific farming business models and related synergies, opportunities and challenges, also with a view to implications for other relevant actors in the food system. This might be a useful tool for local farmer associations, civil society organisations, but also different government levels. Furthermore, this tool could provide a useful framework for bringing together different stakeholders - including citizens and policymakers - for direct engagement around food policy issues.

## Using current and future profiles and personas for policy development

In future studies, personas are used specifically as a tool to make scenarios come alive<sup>35</sup>. It brings in the human perspective and facilitates engagement of the audience and an imagination of how a certain future could look, from a

persons' point of view. It also helps to convey and remember a specific development: the persona is the personification of this specific development. Various attempts have been made to use personas in policy-making to design policies with its addressees in mind<sup>36</sup>.

The farmer profiles and personas developed for this study were not meant to establish new farmer categories. However, for future policy initiatives the farmer profiles and the related information about their professional and local environment could be helpful to discuss and explore implications for farmers against the background of megatrends shaping the broader setting. For that purpose it might be useful to further enrich the profiles, for example through insights stemming from behavioural research. This could relate to the factors and cognitive frameworks that influence farmers' decisions and behaviours in the context of environmental change and practices, and the different kinds of relationships that humans have with nature<sup>37, 38</sup>.



<sup>34</sup> The material and templates will be made available on the European Commission's Knowledge for Policy webpage: [https://ec.europa.eu/knowledge4policy/foresight\\_en](https://ec.europa.eu/knowledge4policy/foresight_en)  
<sup>35</sup> Fergnani, A. (2019), "The future persona: a futures method to let your scenarios come to life", *Foresight*, Vol. 21 No. 4, pp. 445-466. <https://doi.org/10.1108/FS-10-2018-0086>

<sup>36</sup> Gonzalez De Heredia, A., Goodman-Deane, J., Waller, S., Clarkson, P. J., Justel, D., Iriarte, I., & Hernández, J. (2018). Personas for policy-making and healthcare design. Paper presented at the Proceedings of International Design Conference, DESIGN, , 6 2645-2656. doi:10.21278/idc.2018.0438

<sup>37</sup> F. Dessart et al, 2019 Behavioural factors affecting the adoption of sustainable farming practices: a policy-oriented review. *European Review of Agricultural Economics* Vol 46 (3) pp. 417-471 doi:10.1093/erae/jbz019

<sup>38</sup> R. Muradian & U Pascual (2018) A typology of elementary forms of human-nature relations: a contribution to the valuation debate. *Current Opinion in Environmental Sustainability*, 35:8-14 <https://doi.org/10.1016/j.cosust.2018.10.014>

# ANNEXES

## ANNEX 1: Drivers of Change and Megatrends

### Drivers of change

The below drivers of change were identified on the basis of a literature review (references can be found below). They are presented according to the STEEP structure (**s**ocial, **t**echnological, **e**conomic, **e**nvironmental, **p**olitical) with an indication of their relevance for the agro-food system.

#### Social drivers:

<b>Demographic developments</b>	
Size of world population	Food demand
Ageing EU population	Ageing rural population, ageing farmer population, availability of workforce
Urbanisation	Depopulation of rural areas (out-migration)
Migration	Diversity and size of rural (and urban) population, availability of workforce
Millennials coming of age	Generational shift of farmers and consumers
<b>Changing demand for food</b>	
Dietary shift in rest of the world	Possible shift towards a 'western diet' and respective demand for resources
<b>Shifting values of EU society</b>	
Values placed on rural areas, tradition and culture	Attitude towards landscapes as public goods and multi-functionality of farming, diversification of farming - leisure, tourism, and counter-urbanisation (in-migration), openness to innovation
Importance given to sustainability and ethical aspects	Diversification of lifestyles and diets, change of diets towards flexitarian, less consumption of animal proteins, vegetarian, vegan diets, animal welfare, conservation farming
Work-related aspirations	Other priorities than high income, appreciation of free time, implications for farmers and farm employment
<b>Inequality &amp; trust</b>	
Social cohesion	Influence on community values and activities, and implications on attitudes and lifestyle
Consumer trust	Influences food choice, consumer engagement in the food chain
<b>Technology drivers (progress and application):</b>	
<b>Digitalisation</b>	
Precision agriculture (Internet of Things IoT)	Affects efficiency of agriculture, implications for skill needs and farmer role (farm technician), inequality in technology access and adoption
Automation & robots	Reduced farm labour needs, less manual labour, 24/7 operations, potentially less/changed non-farm labour, changed skill needs, implications for attractiveness of rural areas (commuting - driverless cars )
Connectivity	Facilitates living in rural areas, tele-work, gig-economy activities
Virtual services	Potentially facilitates access in rural areas to e.g. education, healthcare, online platforms
<b>Biotechnology</b>	
New breeding technologies/ Synthetic biology	New varieties and products, potentially improve efficiency

Alternative protein sources	Artificial/synthetic meat, algae, insects
Food design	E.g. tailored/personalised food products, might imply diversification of agricultural product demands by food industry
Biorefinery & biofuels	Implications for rural economy, opportunity for diversification of production - bioeconomy, biomass production
<b>Other</b>	Weather modification, transport technology, conservation technology, vertical agriculture, aquaculture, renewable energy, decentralised energy production, sensor technology, smart materials, 3D/4D-printing

### Environmental drivers:

<b>Climate change</b>	Volatile, harsher weather conditions, changing transboundary pests and diseases
<b>Availability of natural resources</b>	Expected increasing scarcity and competition for access (water, land, soil, minerals, fertilisers...), environmental degradation such as air and water pollution, habitat loss, decline of biodiversity, soil quality etc. affects agriculture, necessary sustainable transition might disrupt labour markets, create new jobs with implications for farming

### Economic drivers:

<b>Economic growth</b>	EU and worldwide – sets framework conditions for policy, public budget
<b>Structure of the agro-food sector</b>	Power distribution within the sector, structural change of farm holdings, relative importance of agriculture in rural economies & diversification
<b>Globalisation</b>	Trade liberalisation, implications for supply chain complexity and agricultural trade
<b>Financial investments</b>	Access to finance, interest rates, have implications for farm investments, availability of new forms of finance (crowd-funding), stability of markets for land assets, global investments/speculation in agricultural land affect competition for and access to land
<b>Rise of emerging economies</b>	Implications for power and influence of EU worldwide, agricultural trade

### Policy drivers:

<b>Geopolitical situation/ International collaboration</b>	Conflicts & crises, competition, access to energy and other resources etc., implications for standard setting, trade, sanitary measures
<b>EU/national policies &amp; regulatory frameworks</b>	
Rural development policies	Implications for urban-rural relationship, neglect of rural areas, distance to agricultural and social infrastructure, alternative employment opportunities
CAP	Sets framework conditions for farming in the EU
Food policies	Sets framework for food production in the EU and elsewhere
Renewable energy policies	Implications for biomass growth and use for energy (in EU and elsewhere)
Other	E.g. regulatory framework for farm transfer & transmissions, unconditional basic income, nature protection policies, spatial planning, trade policies, environmental policies,

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## Megatrends

The 14 global megatrends used in this study were developed by the JRC in collaboration with experts. Below a brief description of each megatrend is provided<sup>39</sup> as well as an indication regarding the links with the agro-food relevant drivers of change presented above.

### **DIVERSIFYING INEQUALITY**

Although global inequality between countries and the absolute number of people living in extreme poverty has been declining as poorer countries catch up with richer ones, the gaps between the wealthiest and poorest segments of the population are widening. Addressing income disparities, gender inequalities, access to education, healthcare and technology, and their compounded effects will continue to represent the most important social, economic and political challenges for the foreseeable future. These challenges reflect several drivers and implications for the agro-food system, including social cohesion, consumer trust and broad EU societal values.

### **CLIMATE CHANGE AND ENVIRONMENTAL DEGRADATION**

Even if all emissions from human activities would suddenly stop, the climate would continue to change. However, continued unabated, anthropogenic pollution and greenhouse gas emissions will further increase global warming, ocean acidification, desertification and changing climate patterns. Aggravated by pollution, overexploitation of natural resources and environmental degradation, these will lead to severe, pervasive and irreversible changes for people, assets, economies and ecosystems around the world. The implications for farming and farmers include volatile and harsher weather conditions, trans-boundary pests and diseases, loss of biodiversity and ecosystems, all of which require changing production methods and products (e.g., organic farming, permaculture, integrated pest management, biorefinery and biofuels), and changing consumer demand (short food supply chains, responsible consumers).

### **INCREASING SIGNIFICANCE OF MIGRATION**

While the share of international migrants in the world population has not grown significantly over the past decades, the significance of migration as a social and political concern has intensified significantly. Even though migration tends to have a positive impact on the economic and social development, there seem to be a growing fear that current levels and structure of migration are unsustainable in many parts of the world. Concerns about migration can result in public anxiety, political disputes and increasing security measures, with effects on civil liberties and freedom of movement. In this context, the agro-food system could face increased diversity and changes in terms of size of rural and urban populations, as well as in the availability of workforce in an ageing society.

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<sup>39</sup> More information on the megatrends can be found in the JRC Megatrend Hub ([https://ec.europa.eu/knowledge4policy/foresight/tool/megatrends-hub\\_en](https://ec.europa.eu/knowledge4policy/foresight/tool/megatrends-hub_en))

**GROWING CONSUMPTION**

By 2030, the consumer class is expected to reach 5 billion people. This means 2 billion more people with increased purchasing power than today. Most of this growth will be in Asia: by 2030, China and India together will represent 66% of the global middle-class population and 59% of middle-class consumption. While the expanding middle-class could be a driver for economic development, changes in consumer behaviour and consumption patterns are expected to increase demand for food, water and energy by approximately 35%, 40% and 50% respectively by 2030. For farming the implications could entail increased global demand for animal proteins and highly processed, fast and convenient food. Also, increased diversification of lifestyles and diets could affect food demand (e.g. smart personalised food, special diets such as vegetarian, vegan, low carb, paleo, ready-to-eat food, new food services, food safety, local production, environmental or animal welfare considerations).

**AGGRAVATING RESOURCE SCARCITY**

Global demand for materials has increased ten-fold during the 20th century and is set to double again by 2030, compared to 2010. Demand for water, food, energy, land and minerals will continue to rise substantially, given the increasing purchasing power of a growing population. Bottlenecks in supply could be further aggravated by climate change, making natural resources increasingly scarce and more expensive to source. The implications for the agro-food system could include aspects such as reduced access to land, healthy soil, clean water, fertilisers, as well as air and water pollution, soil degradation, habitat loss and decline of biodiversity (including fish). A shift towards renewable resources incl. bio-based materials could be part of the answer to resource scarcities.

**INCREASING DEMOGRAPHIC IMBALANCES**

By 2030, the world's population is estimated to reach 8.5 billion, mostly getting older and more urban than today. Change will be uneven across regions, with rapid population growth in many still-developing economies, while stalled — or even shrinking — in many developed countries. For farming, this could entail an increase in global food demand. Furthermore, an ageing EU population and changing household sizes affect consumption behaviours. An ageing EU population has also implications in terms of a generational shift of farmers, as well as for the availability of farming workforce in general.

**EXPANDING INFLUENCE OF EAST AND SOUTH**

The shift of global economic power from the established advanced economies in North America, Western Europe and Japan towards the emerging economies in the East and South is set to continue. China has already overtaken the USA in 2014 becoming the largest economy in purchasing power parity (PPP) terms. If present trends continue, by 2050, the economic and political influence of the G7 (US, UK, France, Germany, Japan, Canada and Italy) will steadily shift to the E7 (China, India, Indonesia, Brazil, Russia, Mexico and Turkey). For farming, relevant related aspects are an increased globalisation, trade liberalisation and supply chain complexity, trans-boundary pests and diseases, a consolidation of the agro-food sector, more global investments/speculation in agricultural land, as well as financial investments (access to finance, interest rates, stability of markets for land assets), and related deep shifts of the economic framework conditions in the EU.



**ACCELERATING  
TECHNOLOGICAL CHANGE AND  
HYPERCONNECTIVITY**

Advancements in genetics, nanotechnology, robotics and artificial intelligence, photonics, quantum and other emerging technologies and the synergies among them are accelerating. They are changing the nature and speed of new scientific discoveries and are challenging our understanding of what is possible. Hyperconnectivity, the IoT, augmented reality and collective intelligence systems, combined with falling costs of implementation of new technologies are transforming entire systems of production, management, and governance. For farming and farmers, this would entail precision agriculture, automation & robotisation, virtual services, new forms of work, blockchain applied to farming, new breeding technologies, alternative protein sources, food design, intelligent packaging technology, bioeconomy based products and services, diverse transport technology and logistics, different conservation technology, indoor cultivation systems, 3D-printing, industry 4.0, availability of new forms of finance (crowd-funding), among others.

**CHANGING NATURE OF WORK**

By 2030, tech-savvy, hyper-connected millennials will represent 75% of the workforce. Digitalisation, new generations entering the workforce and older generations working longer are changing the forms of employment, career models, and organisational structures. Advancements in technology and automation have the potential to substitute both routine and cognitive tasks, while increasing the need for new skills and creating unprecedented opportunities. For farming, shifting work-related values (other priorities than high income, appreciation of free time), diversification of sources of income and ways of working, automation on the farm and changing roles of farmers could be important aspects of this trend.

**DIVERSIFICATION OF EDUCATION  
AND LEARNING**

New generations and hyperconnectivity are rapidly changing both educational needs and modes of delivery. Advancements in cognitive sciences, availability of information, new pedagogical approaches and an emphasis on lifelong learning are diversifying interests and the ways of learning, as well as access to education. "I don't know" becomes increasingly obsolete. The historical link between education and school-based learning could weaken in the future, with informal learning gaining more recognition. This could have both revolutionary as well as disruptive effects on the global education landscape and the intelligence of future generations. These shifts could have several implications for farmers, including potentially easier access to education and training, more information on food, farming and new technologies, increased use of social media, as well as consumer education and involvement in food production and processing (DIY).

**SHIFTING HEALTH CHALLENGES**

Advancements of science and better living standards have increased the opportunity to longer and healthier lives and reduced the incidence of infectious diseases. However, unhealthy lifestyles, growing pollution and other anthropogenic causes, combined with reactive rather than preventive medicine increasingly result in a higher burden of non-communicable diseases such as cardiovascular and chronic respiratory diseases, diabetes, cancer, depression and anxiety. Related aspects important for farming and for farmers as consumers are unhealthy diets (rich in sugar, fats, salt, high processed foods, fast and convenient food etc.), and use of antibiotics in farming. Food policies have an important role to play, and could change in reaction to this trend with implications on food demand.

**CONTINUING URBANISATION**

Over half of the world's population lives in cities. By 2030, urban population share is expected to reach 60% - some 4.9 billion people. Much of the growth in the urban population is expected to take place in Asia and Africa. Cities are increasingly functioning as autonomous entities, setting social and economic standards. Urban identity will grow in importance compared to national identity. The possible implications for the agro-food system include: out-migration of rural areas and possible lack of public services, increased recreational tourism, change of societal values placed on rural areas, as well as in valuing tradition and culture, increased urban agriculture, among others, all of which will affect the stability of markets for land assets.

**INCREASING INFLUENCE OF NEW GOVERNING SYSTEMS**

Governing systems are multiplying and diversifying. The expanding influence of non-state actors, the emergence of a global conscientiousness, the prominence of social media platforms and internationalisation of decision-making are forming new, multi-layered governing systems over traditional decision-making structures. For farming and farmers, these may entail changes in consumer engagement and trust, the shifting of power of food chain actors, changes of EU/national policies & regulatory frameworks (e.g. rural development, CAP, Renewable energy policies, regulatory framework for farm transfer & transmissions, unconditional basic income, nature protection policies, spatial planning, trade policies, environmental policies, innovation policies), among others.

**CHANGING SECURITY PARADIGM**

The nature, scope and spectrum of conflicts and security are changing. The emerging security paradigm is framed by new asymmetrical warfare, increasingly easy access to increasingly powerful weapons, violent extremism, conflicting motivations, and a relatively chaotic organisation of the parties involved. The diversification of threats and actors is generating new challenges to the defence and security communities, as well as to society as a whole. These threats may reflect in the farming system in different ways, including with new conflicts & crises, increased competition, difficulty to access energy and other resources, as well as in international collaboration. Also, with new standard setting processes, trade agreements, sanitary measures, and a shift in paradigm of security of food supply chains.

## ANNEX 2 Farmer Profiles 2020

Table 3 and 4 provide an overview on the established and emerging farmer profiles, respectively.

**Table 3: Current established farmer profiles**

	<b>ADAPTIVE - DIVERSIFIED</b>	<b>INTENSIVE - SPECIALISED</b>	<b>PATRIMONIAL</b>
<b>Objectives</b>	Make best use of all potential resources of the farm to maximise profit through diversification of activities and adapting to new societal demands.	Maximise production of the agricultural goods of best possible quality as demanded by the supply chain in order to maximise profit.	Maintain the farm as heritage from the past generations to pass it on to next generations, achieving adequate profit to make a living.
<b>KEYWORDS</b>	Diversification; adaptive.	Intensive; production-focused, specialisation.	Tradition, family, heritage
<b>Elements of business model</b>	Diversification and expansion, whole-business-oriented, portfolio entrepreneur	Intensification and expansion, production-oriented, efficiency innovation.	Financial conservatism; prudent
<b>Characteristics</b>	High level of knowledge, focuses on whole business rather than particular production; interested in most profitable use of farm resources – maximising value sustainably; interested in participating more in post-harvest stages of value chains; active in local agriculture-linked initiatives, cooperatives	Specialised, intensive; maximises yield and production; focuses on commodity qualities of product; little interest in going beyond the farm gate in supply chain, uses yield enhancing technology and equipment; active in farm unions and sector organisations, control over resources and environment; interested in pro-environment if linked to production; outsources parts of work to contractors.	Value farming lifestyle; follows practices “as it has always been done”; clear distinction between farming and nature; interested in farm aesthetics (hedges etc.); very attached to animals and crops, little investment beyond farm gate; prudent regarding innovation ; small/medium farm
<b>Elements of farming model</b>	Farms that go beyond food and fibre production – through involvement in other activities, including circular bioeconomy; knowledge and labour intensive. Integrated farming systems.	Intensive and specialised, capital intensive. Sustainable intensification approach.	Traditional, labour intensive.

	RECREATIONAL, NON-PROFIT	SEMI-SUBSISTENCE	CORPORATE
<b>Objectives</b>	Operating farm business as recreational activity (or semi-retirement) without expectation of making a profit (and accepting some losses)	Maintaining farming as means of self-provisioning and subsistence.	Maximising shareholder value of the company and adapting the role of the farming activity to overall corporate strategy.
<b>KEYWORDS</b>	Recreational, non-profit, hobby	subsistence	Corporate; business unit
<b>Elements of business model</b>	Manage costs and break even	Resource constrained, household consumption as primary objective	Maximising efficiency, minimising costs, serving other business units of the company, organisational innovation
<b>Characteristics</b>	Retired professionals/absentee farmers; traditional practices; off-farm job or other income; not interested in expanding farm business, potentially diversify, use of land for leisure activities	Often a result of loss of non-agricultural job or death of main income earner; age and lack of capacity prevent from commercialisation; in areas of weak market infrastructure.	Managers with agricultural education, no immediate prospects of owning a farm but intention, salary-based
<b>Elements of farming model</b>	Focus on crops or, for retired professionals, mixed farming systems - efficient use resources e.g. by using crops and grasslands to feed animals and fertilising their fields with manure	Low input agriculture, highly labour intensive.	Intensive and specialised; based on cost control; corporate management. Responding to supply chain demand for environmental considerations.

**Table 4: Current emerging farmer profiles**

	REGENERATIVE	SOCIAL FARMING	LIFESTYLE – NEO-RURAL
<b>Objectives</b>	Creating a sustainable food system through regenerative farming activity which enhances the state of the farm ecosystem.	Maintain farm activity as a service to improve health and increase wellbeing of nearby communities through social and care activities.	Moving to countryside to improve the quality of life, take up farming lifestyle and contribute to development of rural areas.
<b>KEYWORDS</b>	Regenerative; conservation, agroecology	Social and health sector, community, social-inclusion	Lifestyle, neo-rural, new entrant
<b>Elements of business model</b>	Creating supply networks for higher-value products, innovation: conservation-related	Creating high value services as a separate business based on farm activity; service-oriented innovation	Entrepreneurial – focused on added-value production and services, capitalising on their urban networks, consumer-oriented innovation
<b>Characteristics</b>	Considering farming activity as part of nature; protecting natural resources, willing to forgo some of the profit; strong interest in wildlife; interest in alternative food networks; participation in environmental associations	Focus on community aspects of farming; most activities geared at services provided to various social groups; ethical motivations; linked to hospitality sector	New entrants to farming from other professions and urban areas. Rather well educated/young – limited alternative activities; no agricultural education – taking up the family farm from other job;
<b>Elements of farming model</b>	Agroecology - an approach to devise agricultural production systems that harness functionalities provided by ecosystems, reduce pressure on the environment, and protect natural resources. It strives to increase agricultural output quantity and quality, manage pest populations more efficiently and effectively, and reduce reliance on inputs, 1) by increasing biological diversity in agro-ecosystems and 2) by optimising biological interactions in those agro-ecosystems	Social Farming concerns all activities that use agricultural resources to promote, or to generate, social services in rural areas. Examples of these services include rehabilitation, therapy, sheltered employment, life-long education and other activities that contribute to social inclusion. Organic, agroecology.	More likely to be involved in value-added farming activities (e.g. alternative agri-food networks, local certification schemes), capitalising on their experiences; small scale, labour intensive and requiring limited capital investment;

	<b>URBAN MICRO-FARMING</b>	<b>INDOOR - CONTROLLED ENVIRONMENT AGRICULTURE</b>	<b>BIOTECH START-UP</b>
Objectives	In a sustainable way embed food production in cities, where most of the human activity and demand for food is concentrated	Develop start-ups in agtech domain which disrupt the current agricultural model and allow producing food in new ways (such as controlled environment agriculture)	Develop biotechnology processes to produce food without farming activity (such as cellular agriculture)
KEYWORDS	Urban, microfarm, local	Agtech start-up, indoor agriculture	Biotech start-up
Elements of business model	Commercial and social activity with direct sales and services relying on high-value demand, consumer-oriented innovation	High productivity, high capital, direct sales; radical, technological innovation	Creating new high value market niches; radical, scientific innovation
Characteristics	Urban-based new-entrants, changing career path, active in the food chain beyond the farm	Entrepreneur and engineer/scientist	Entrepreneur and scientist/engineer
Elements of farming model	Urban small-scale soil based microfarms. Permaculture - consciously designed landscapes, which mimic the patterns and relationships found in nature, while yielding an abundance of food, fibre, and energy for provision of local needs.	CEA (controlled environment agriculture) optimizes indoor growing environments for crop production year round; combining the sciences of agriculture, engineering and technology to grow fresh food that is safe, nutritious and locally grown, free of chemicals. These sustainable symbiotic indoor farm systems, hydroponics (growing plants in nutrient rich water solution) and aquaponics (fish farming) can be built, scaled and sustained in most environments 365 days a year.	Cellular agriculture encompasses a set of technologies to manufacture products typically obtained from livestock farming, using culturing techniques to manufacture the individual product.

### ANNEX 3: Future Design Objects

In order to stimulate the conversations and the imagination around the topic of the Farmers of the future, the JRC turned towards Design as a means to make the future more tangible. Previous projects carried out by the JRC demonstrated the value of using physical design objects to facilitate debates on current and upcoming issues.

The JRC chose to collaborate with the School of Art and Design of Saint-Etienne, France, for its renowned research and product design program. Around 15 design students and their staff were involved in the work. The course lasted for a period of three months, from April to June 2019. Students who took part in the work were highly motivated, as the course was not mandatory.

The request from the JRC was to produce prototypes of future farming equipment in 2040. By focusing on the tools that the farmers of the future may use, the intention was

to bring focus to the individual farmer, a people-centred perspective, and to initiate the discussion on very precise and concrete issues that could eventually lead to tackling larger topics. Material on the current farmer profiles produced by the JRC was provided as an input to their research.

Strongly supported by their supervising staff, the students had in addition close contact with the JRC. Regular and direct exchanges with the students took place throughout the project which allowed to drive the development of the concepts along the lines of the evolving requirements and considerations of the overall Farmers of future study.

12 concepts were produced (see below), communicated via objects and short descriptions. The concepts were used as the starting points for discussions about possible future developments and farmers' relations and attitudes to these, aiming at generating more insights into farmers' future perspectives.



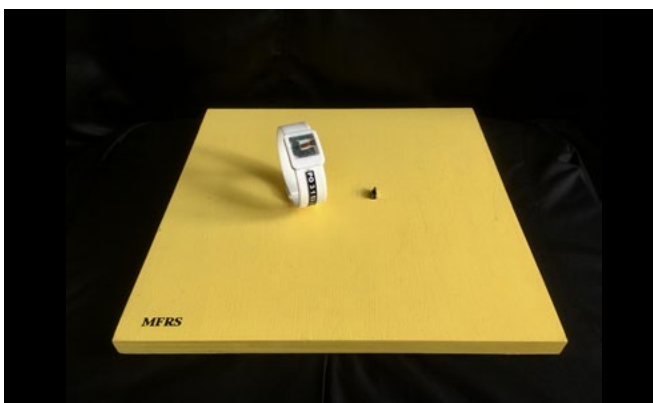
#### milk connec- tion



**Farmers come up with a new way of milk distribution**

**Milk meter from the connection kit to the network**

Pauline Liogier; Anne-Caroline Nizou



#### MFRS



**Surveillance of migrant workers in the farms**

**RFID chip and surveillance wristband**

Margot Constantin



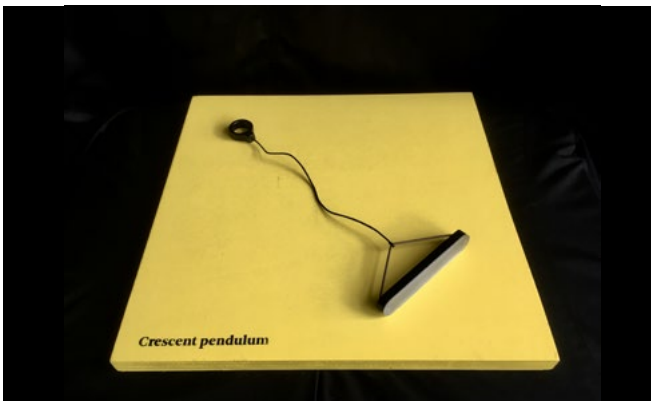
## Augmented animal



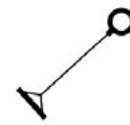
New technologies at the animal's service

Kit including several sensors connected to a pair of glasses

Inès Le Menec



## crescent pendulum



Passing on ancestral knowledge, updated with a new mysticism-aware generation of farmers

Pendulum

Charlotte Marx



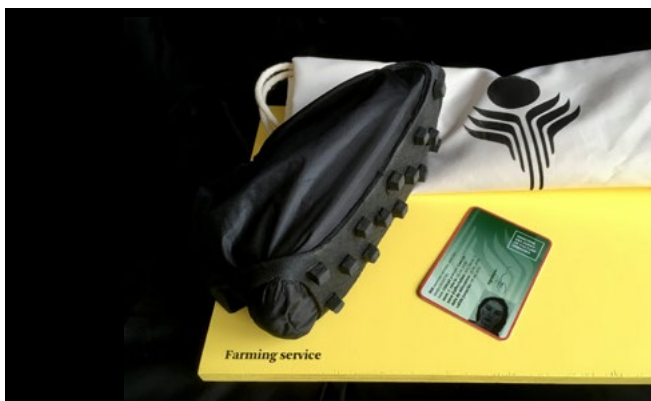
## dystopia-tech



Make the farmer's voice heard

Autonomous robot

Lucie Marchois



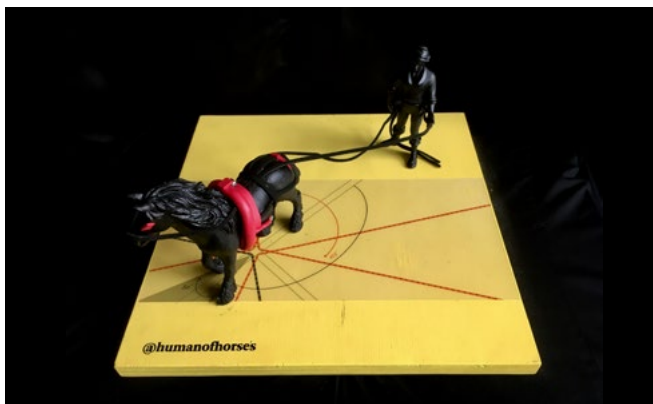
## Farming service



A new social system focused on Urban Farming Areas

Kit: jumpsuit, overshoes, raincoat, hat, bag, notification

Rosalie Blanc; Romain Joly; Lucas Macabéo; Valentine Maupetit



**@human-  
ofhorses**



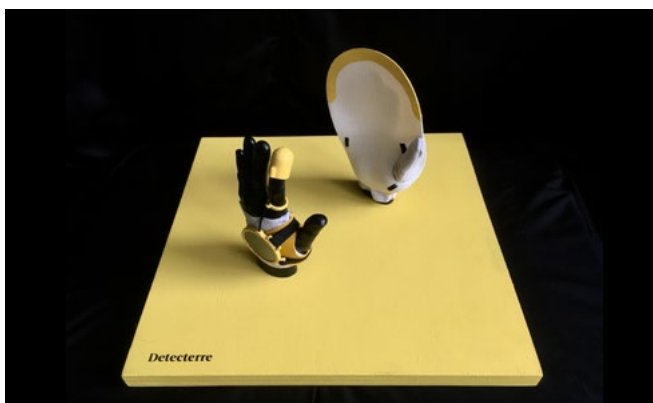
Vlogging-farming era  
Subjective action cameras  
Estelle Pom



**overseas**



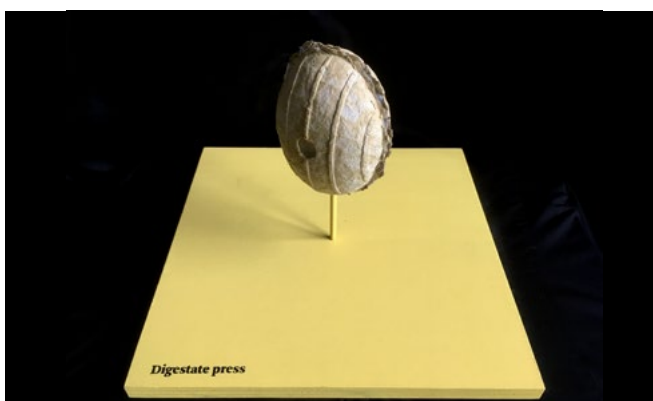
Working conditions of overseas farmers  
Game  
Alice Koté



**detecterre**



Raising awareness among farmers of living forms in  
their soil  
Pair of gloves for a microbiological analysis of the soil  
Alexis Guidet



**digestate  
press**



Farmers as energy producers and manufacturers  
Endo: birdhouse made of digestate  
Lucas Rivière





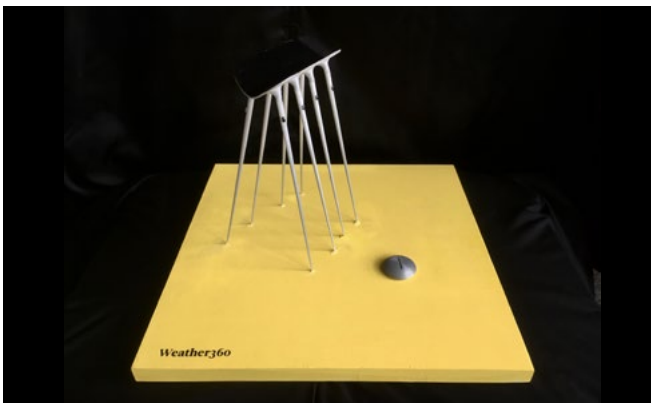
## Perma- cultor



Combining permaculture techniques and digital tools

Automated drilling machine

César Lott



## weather 360



Tech-farmers dependent on decision-making system

An antenna and a sensor station

Charlotte Goffette

## ANNEX 4: Participatory Workshops

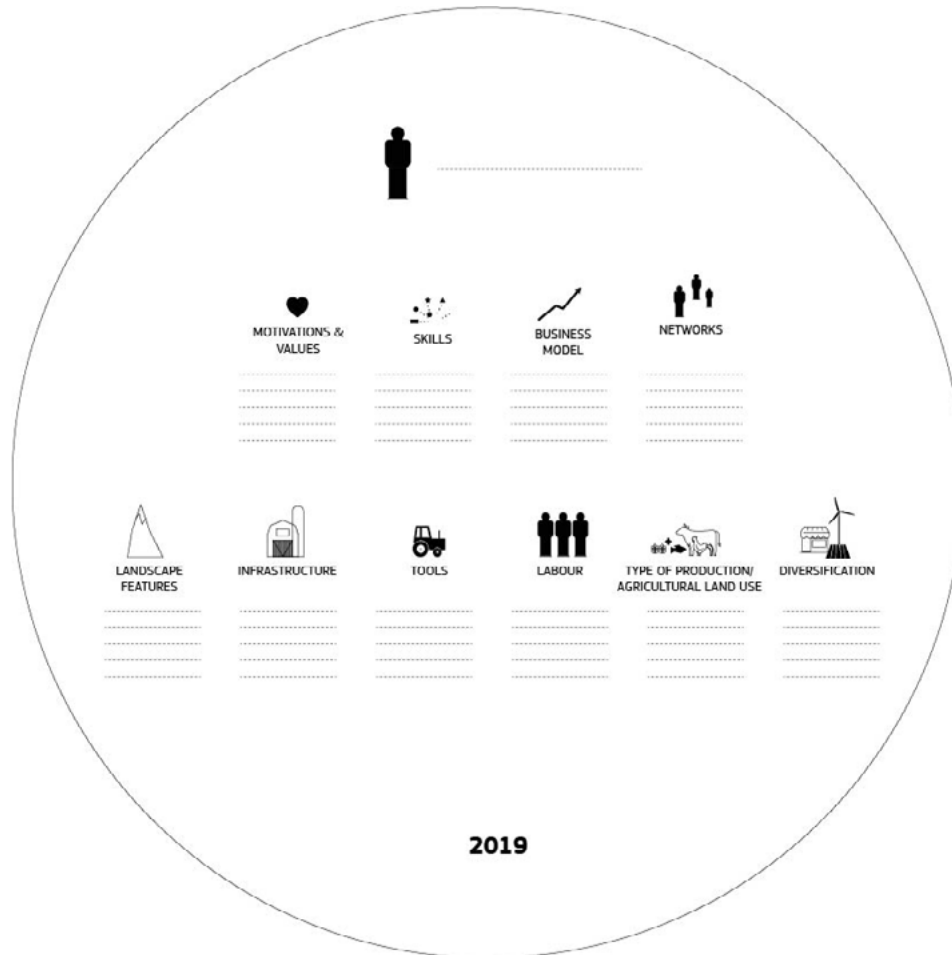


Figure 2: The centre piece of the farmer map

### Profile workshops

To define the context of specific current farmer profiles and their future developments, participatory workshops were organised with farmers and other stakeholders (from civil society organisations, academia, and industry).

In total there were seven workshops held between June 2019 and May 2020 with around 90 participants involved. The first workshop consisted of two days and covered six farmer profiles. The remaining six farmer profiles were discussed in six dedicated half-day workshops; the last two workshops had to be organised online due to the COVID-19 pandemic. All workshops included the following steps:

After setting the scene, the first task was to better describe the current farmer and his/her context in terms of e.g. motivations & values, skills, networks,

infrastructure, labour needs, while keeping the broad view on the profile, without specifying a specific product portfolio. The resulting elements were noted in a circular template, the centrepiece of a larger farmer map. The remainder of this map, a general representation of a farmer’s context (the professional environment, the local, societal and nature context), was then tailored to the specific profile on the table by further defining relevant actors, adding missing ones and deleting non-relevant ones.

The second task was to start looking into the future. The 14 megatrends, developed by the JRC and external experts, were used for this. These trends are not tailored to agriculture and the food system, but most of them have direct (e.g. climate change and environmental degradation, accelerating technological change and hyper connectivity) or more indirect (e.g. changing nature

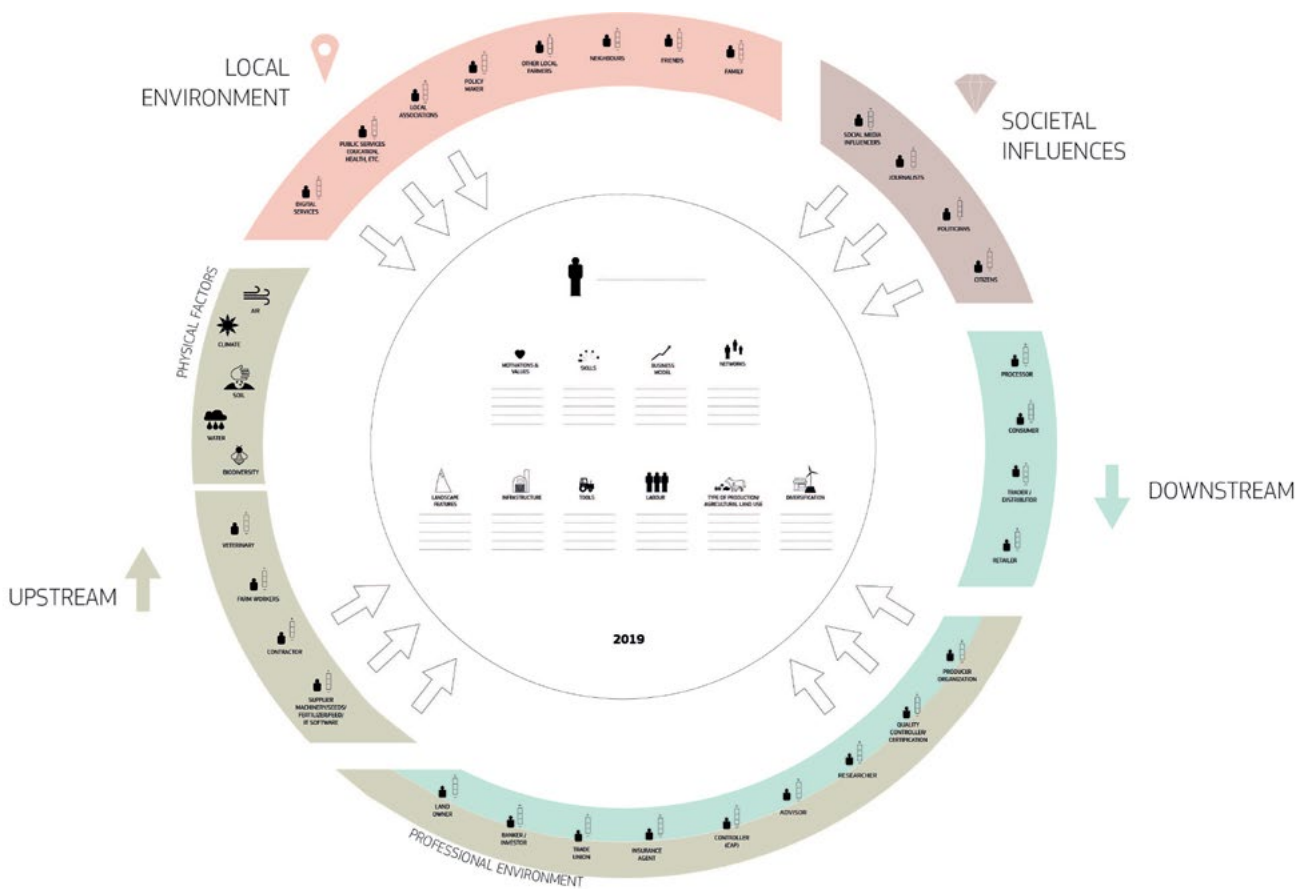


Figure 3: The farmer map

of work) implications for agriculture. The question was: ‘What influence will the megatrends have on the specific farmer profile towards 2040?’ Subgroups were formed to explore the changes the megatrends could bring to the different elements of the farmers’ environment – the upstream and downstream sectors, the local environment, and societal influences. Out of the 14 megatrends, those considered most relevant were selected and their implications for the farmers’ environment were noted on a template.

The last task was to bring the different strands together and to see how these implications could impact the profile of the farmer as it was defined in the beginning of the workshop. For this, a 2040 version of the map’s centrepiece was created. It showed possible images of the farmer in 2040, their business models, and kinds of production, type of markets that could start to evolve, based on certain assumptions and identifying uncertainties regarding the future development. The

concluding element was to choose a name for this new farmer profile.

The workshops, apart from providing input for the farmer profiles, also generated insights on broader topics. There were more general discussions, about ‘what makes a farmer a farmer’, for example, but also anecdotal stories that were shared, for example on life events that made a farmer change his perceptions and way of working. All of this was captured and used in the material presented in this report.

### Farmer workshops

To obtain a deeper insight into farmers’ perceptions of their future, the future design objects created by the design students (see Annex 3) were used in a series of half-day workshops in different EU member states. Workshops with about 15 farmers each were carried out in Spain, Poland, Germany, Romania and Latvia. Workshops planned in Greece and France had to be cancelled due to the COVID-19 pandemic.

Participants were introduced to the future with a presentation of the megatrends and their implications for farming. Starting points for the following in-depth discussions about the possible future realities were based on five themes emerging from the discussions about the farmer profiles: future livestock farming, future consumer relations, farming in the future society, the future of farm work and the ecological farming of the future. Each theme was complemented with selected design objects to foster the discussions. Participants worked in five groups, each group had to answer the following questions: ‘How would you see this development happening on your farm? What are the good/bad things it can bring?? Would you like to be a farmer in this future?’ The insights were then shared in a plenary discussion. As an ending point, the farmers were asked to write down and share their hopes and fears for the future.

### **Policy workshops – In the shoes of 2040 farmers**

The policy workshops were organised to discuss the 2040 farmer profiles in the light of insights for future policies. Developed within the online setting constraint due to the COVID-19 pandemic, four virtual workshop sessions took place (two in July 2020 and two in September 2020). Small groups (6 to 8 participants) of diverse stakeholders (farmers, academia, civil society organisations, industry associations), actively participated in the workshops. To lighten the online presence requirement, the workshop took place over two consecutive half days.

On the first day, the activities were quite reflective, geared towards individual input. Participants were acquainted to the 12 future farmer profiles. Each participant was asked to represent a farmer profile of his choice. In order to help the participants to take ownership of their farmer profile, they were asked to create small narratives describing their farmer, his activity and values. A set of “future images” taken from the latest agriculture related media were provided to stimulate the imagination. Each participant shared his/her story with the support of the five pictures he/she had selected. With a better understanding of the diversity of farmers represented in the session, participants looked at possible collaborations and competition amongst each other and with the entire 2040 future farmer landscape.

These first steps were meant to set the stage for participants to better project themselves into the future as moving forward into the workshop. In the following exercise, participants were faced with a 2040 situation, one that disturbed the stories earlier shared. The 2040 situations are generated randomly thanks to a custom-made generator of future issues. Each future situation is built on a “what if”/ expectation, i.e. an expression of a hope for the future, and followed by a contrasting “but” expressing a fear, both gathered from exchanges with farmers during previous workshops across Europe. Through the lens of his/her specific future farmer profile each participant was asked to react to the future situation. A time for reflection was given to reformulate the 2040 situation from a farmer perspective, outline the challenges and opportunities encountered and specify the underlying needs.

On Day 2, the work moved to plenary conversations and co-production of output. Based on the collection of the needs put together the day before, the facilitating team presented a consolidated list of needs. The needs were discussed in terms of relevant policy actions, supported by a guiding framework aimed at accompanying the debate and deepening the thinking towards different levels of policy interventions.

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