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Addressing the current and Future skIll needs for sustainability, digitalization and the bio-Economy in agricuLture: European skills agenDa and Strategy

D2.4 - National roadmaps (Confidential draft)	
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1 Introduction

The aim of the FIELDS project is to contribute to skill enhancement of workers in the agriculture, food industry and forestry sectors, to be able to make full use of the opportunities and comply with requirements of the ‘’Twin’’ Green and Digital transition. The FIELDS project focuses on the domains Digitalization, Sustainability, Bio-Economy and Management & Entrepreneurship. Skills include ‘’hard’’/ measurable and technology-based skills as well as ‘’soft’’ / transversal skills.[1]

One of the tasks of the FIELDS project (task 2.4 Roadmap formulation and refinement (CONFAGRI), M33-M48) is the adaptation of the EU strategy (Task 2.3) to the seven target countries with the formulation of a National Road Map (NRM).

the seven countries that have prepared the national road maps as planned are:

1. Austria - FJ-BLT and LVA, AP
2. France - AC3A and ACTIA
3. Finland - PA
4. Italy - CONFAGRI and UNITO
5. The Netherlands - AERES and WUR
6. Spain - UCLM and SCOOP
7. Ireland - ICOS

This document is a useful intermediate step for the preparation of other documents/deliverables of the FIELDS project. The objective of this document is to prepare a synthesis of the National Road Maps of the seven countries. Therefore, significant portions of the chapters of each NRM have been reported in comparative tables.

The index proposed in the guideline is the follow:

1. Introduction

1.1 Method- National working Group (NWG)

2. Context of education and policies at National level

2.1 The national education system and training needs related to the FIELDS objectives

2.1.1 Short analysis of education and training requirements specified in the national legal and regulatory framework associated with job profiles and skill needs identified;

2.1.2 Evaluation of the number of personnel within identified professional categories that will require training matching “*fields profiles*”

2.1.3 VET providers system (flexibility, resilience, organisation and governance etc.)

3. Main challenges

3.1 Priorities in the Agri-food-forestry sector

3.1.1 European reference framework and links with the national framework (e.g. different levels of operations)

[1] *The FIELDS project is consistent with main EU policies in the fields of sustainable and circular production. The European Green Deal, announced by the European Commission in December 2019, followed up on the UN Sustainable Development Goals (SDGs) and COP21 (the UN climate change conference of 2015). It commits the EU to become climate-neutral by 2050 whilst promising to help companies to become world leaders in clean products and green technologies. It aims to boost the efficient use of resources by moving to a clean, circular economy while restoring biodiversity and cutting pollution. The Green Deal encompasses a New Circular Economy Action Plan, a Sustainable Europe Investment Plan, a Biodiversity Strategy for 2030 and, a new Farm to Fork strategy on sustainable food throughout the value chain (EU-Green Deal, 2021).*

The proposed method for the synthesis is the following:
For each chapter (Level 1) there is a text summarising common elements to all countries and a table with the specific elements reported by individual countries.

2 Method- NWG

The National Working Group is the necessary tool to focus on national needs and strategies for the structuring of NRM and to select pilot project:

the NWGs were held on the following dates:

Countries	date
1. Austria	16th of May 2022
2. France	Setting up in 2023
3. Finland	20th of June 2022 and 25th of August 2022
4. Italy	13th July 2022
5. The Netherlands	7th September 2022
6. Spain	21st September 2022
7. Ireland	21st September 2022

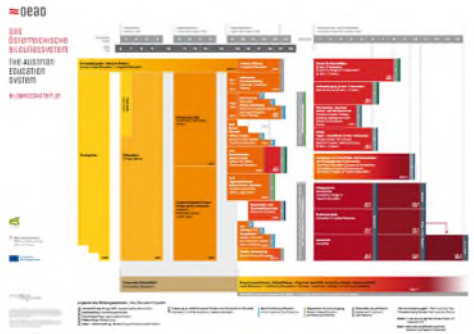
and were composed of the following stakeholders

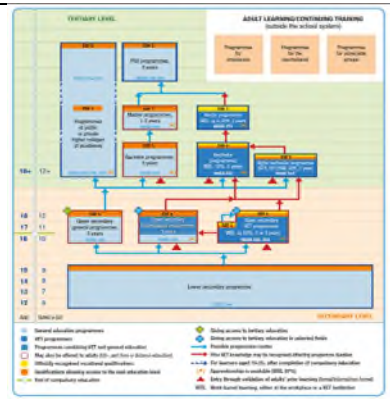
Countries	stakeholders
1. Austria	The chamber of agriculture for Austria (LKÖ) The University of Natural Resources and Life Sciences Vienna (BOKU) Food Cluster of Lower Austria (Ecoplus Lebensmittelcluster NÖ) Food Industry Federation Austria (Fachverband der Lebensmittelindustrie) The Austrian FIELDS partners LVA, AP, FJ-BLT.
2. France	Setting up in 2023
3. Finland	- Savonia University of Applied Sciences (Savonia UAS), Häme University of Applied Sciences (HAMK) - ProAgria Southern Finland - AgriHubi - Knowledge Network for Farm Enterprises, Natural Resources Institute Finland - Mtech Digital Solutions - The Central Union of Agricultural Producers and Forest Owners (MTK), Chairman for the Skills Foresight Group - Farmer, ProAgria Oulu - The Federation of Education in Jokilaaksot – Vocational Education Centre JEDU - Association of ProAgria Centres (facilitator and secretary)
4. Italy	Confagricoltura Fondo paritetico interprofessionale nazionale per la formazione continua in Agricoltura Istituto Nazionale per l'Analisi delle Politiche Pubbliche Fondazione METES ITS Fattoria solidale del Circeo; OSAF Università di Torino; INFOR ELEA; GAL Terra è Vita
5. The Netherlands	WUR / Groenpact WUR Hoogendoorn Growth Management CIV CIV - Groen Groenpact WUR / TKI
6. Spain	UCLM-DIQ UCLM-CREA Farmer (JCRMO) Farmer (Garlic Association) CA C-LM Technician (CIFP AN) IESALB FENACORE ITAP
7. Ireland	South Tipperary Farm Relief Boherbue Agricultural Co-op Irish Federation fo Group Water Schemes Mid Tipperary Co-op Livestock Mart Kerry Co-operative Dairy and Castleisland Livestock Mart IFAC Commercial Mushroom Producers Clare Marts Tipperary Dairy Co-op Sicín Poultry Co-op

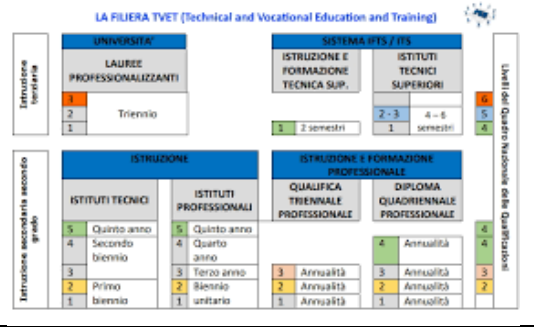
Pilot training selected

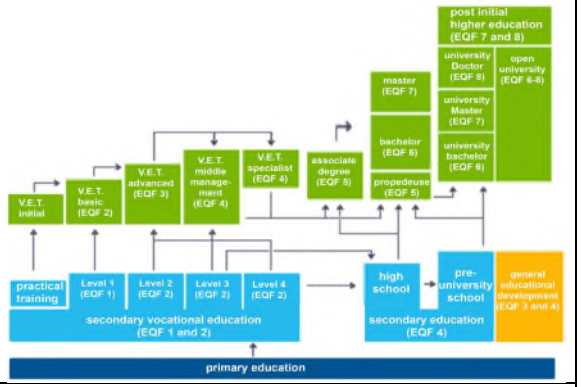
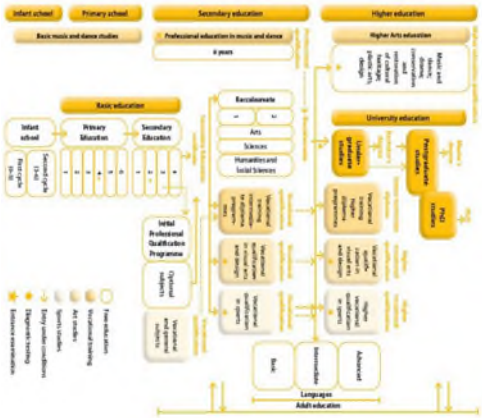
Countries	profile
1. Austria	Operator for digitalization in agriculture, food industry and forestry (EQF level 4)
2. France	Technician for Food Industry digitalisation (EQF level 5)
3. Finland	Technician for agricultural Digitalisation (EQF level 5) Operator for Digitalisation in agriculture, food industry and forestry (EQF level 4)
4. Italy	Technician for Food Industry digitalisation (EQF level 5)
5. The Netherlands	Operator for Sustainability in the Agriculture, Forestry and Agri Food Industry Operator for digitalisation in the Agriculture, Forestry and Agri Food Industry Operator for Bioeconomy in the Agriculture, Forestry and Agri Food Industry Associated Soft skills and business skills (All EQF level 4)
6. Spain	The Technician for sustainable agriculture (EQF level 5)
7. Ireland	The Operator for Bioeconomy in agriculture, food industry and forestry (EQF level 4)

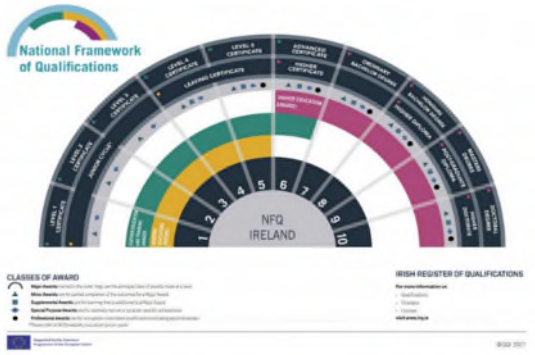
3 Context of education and policies at National level

Countries	Summary of context of education and policies	Pathway
1. Austria	There are two established guidance and counselling systems in Austria working in cooperation with each other: guidance and counselling provided by education and training institutions, and guidance services provided by the employment administration and other institutions in the field of careers guidance. The active role of the social partners (Chamber of Commerce, Chamber of Labour) in the provision of career guidance is a prominent feature of the Austrian guidance system. The key educational policy goals in this area are set out in the national Lifelong Guidance (LLG) Strategy, which establishes a general framework for the further development of educational counselling and careers guidance as an integral component of the Austrian National Strategy for Lifelong Learning. Lifelong guidance has a central role and is one of the five key strategic guidelines in the strategy and an element in at least seven of the ten lifelong learning-action lines within the strategy (https://erwachsenenbildung.at/addon/english_overview.php). Progress is monitored every year by the national lifelong guidance forum, consisting of representatives of two Ministries (the Education, Science and Research Ministry and the Labour, Social Affairs, Health and Consumer Protection Ministry), the public employment service, adult education institutions and networks, research institutions, university colleges for teacher training and Euroguidance Austria.	

2. France	In France, education is compulsory from to 16 years of age; a training obligation has been set up for youth aged 16 to 18 by the Law for a school of trust in 2019. At secondary levels, three distinct pathways are offered: general, technological and vocational education. Initial education and training at EQF level 3 and higher covers two different paths: (a) school-based path in a high school, in which the lessons are taught by 'teachers'. (b) in apprenticeship (accessible to young people up to the age of 29), alternating between an apprentices training centre (CFA, Centre de formation d'apprentis), in which the lessons are taught by 'trainers', and a company where they are 'apprentices mentors'. At the end of lower secondary education EQF level 3 (classe de troisième), 27.2% of pupils move towards vocational training with school status and one in twenty of school status students choose to enter apprenticeship training directly. All professional diplomas and vocational qualifications are accessible via both channels.	

3. Finland	The statement of the Skills Foresight Group on Natural Resources, Food and the Environment of 15 May 2019 summarizes that Finland has traditionally had a good level of expertise in the use of renewable resources, the circular economy, food quality, nutrition, food security and the state of the environment. However, this good situation has been deteriorating for years due to general cuts in teaching and research resources. This is due in particular to the fact that, for economic reasons, education providers have reduced the number of students in small fields of study. These include natural resources, food production and the environment. These sectors also have higher than average organizing costs. The attractiveness of some of these sectors has declined, which partly explains the gaps in the knowledge system. The problem is reflected in the level of access to education and training: Between 2014 and 2018, the number of priority applicants for vocational training in the natural resources sector has decreased by 37% and the number of applicants for the food sector by 44%. There has also been a slight decrease in the number of applicants to higher education. (Source: Statement of the Foresight Group on Natural Resources, Food and Environment, 15.5.2019: ASIAKIRJAPOHJA OPH). The same statement summarizes the labour needs of the sectors; labour demand in agriculture and food manufacturing will remain at 2015 levels until 2035. In forestry, an increase in labour demand is foreseen until 2035.	NA
4. Italy	The Italian education and training system is structured on the basis of the principles of subsidiarity and autonomy of educational institutions. The state has exclusive legislative power with regard to the general rules and the determination of the essential levels of services provided throughout the national territory, while the regions have concurrent legislative competence in the field of education and exclusivity in the field of vocational training. Compulsory education has a total duration of 10 years, from 6 to 16 years of age and is taught within state schools or private schools.	

5. The Netherlands	The Dutch green sector has an international renowned green knowledge system that contributes to the adaptability of the Dutch green sector. The public-private collaboration between education, research, green businesses and policy is unique and strongly supported by the public-private organisation Groenpact since 2016 (see 1.1). Moreover, strong connections have been established between the different levels of the knowledge column. 2.1 The national green education system in the Netherlands Below a scheme is given of the Dutch green education system. The green squares represent the levels where students study agricultural or related green subjects, from VET to University level. In vocational secondary education (blue squares) students can choose for a green focus, next to the common subjects taught in secondary education. Secondary education in the Netherlands is differentiated in several levels, which determines in which level the student enters the professional education (EQF 4 to EQF 6). The arrows show which 'route' a student can follow through the system. When a student has graduated in a certain level (s)he has the right to enter the next level of education	
6. Spain	According to the Spanish Ministry of Education and Vocational Training, the Spanish education and training system offers the following types of education: early childhood education, primary education, compulsory secondary education (ESO), Spanish Baccalaureate, vocational training (VT), language education, artistic education, sports education, adult education and university education. Primary education, compulsory secondary education and basic vocational training constitute basic education. Secondary education is divided into compulsory secondary education and post-compulsory secondary education. Post-compulsory secondary education is made up of Spanish Baccalaureate, intermediate vocational training, professional artistic education in music and dance and intermediate plastic arts and design, and intermediate sports education. University education, higher artistic education, advanced vocational training, higher professional education in plastic arts and design, and higher sports education constitute higher education. Language education, artistic education and sports education are considered specialised education. Organic Law 2/2006 on Education (LOE) as amended by Organic Law 3/2020 (LOMLOE) are currently the basic standards regulating the education system and defining its structure. In 2021, the structure of the Spanish education system corresponds to this organisational chart.	

7. Ireland	The Irish education system is made up of primary school, post-primary school and third-level education. Children must get a certain minimum education from the age of 6 to the age of 16 or until they have completed 3 years of post-primary education. Many people continue on after post-primary to further education and third-level education. After post-primary school many students move on to further education or third level (see third-level education below). The National Framework of Qualifications (NFQ) has 10 levels of education and allows learners to compare the different standards and levels of education available across the education system. The Education and Training Boards (ETBs) run a range of adult and further education and training programmes nationwide including Post-Leaving Certificate (PLC) courses. PLCs offer technical and practical education as well as a route to higher and third-level education. Other programmes offered through ETBs include the Vocational Training Opportunities Scheme (second-chance education for adults); Youth reach for early school-leavers; other literacy and basic education; and self-funded evening adult programmes. Apprenticeships provide on-the-job training and off-the job education. Apprenticeships are offered in traditional craft trades such as plumbing and electrical engineering but also new apprenticeships such as ICT, finance, software development and hospitality. Applicants must be at least 16 years of age and may need a minimum grade in Junior Certificate or equivalent exam	

4 Main challenges

Countries	Summary
1. Austria	Austria's agriculture and forestry are facing numerous challenges: • Preparation of the national CAP strategic plan for the period 2023 to 2027 with consideration of the EU requirements (Green Deal, Farm to Fork and Biodiversity Strategy) • Convey the requirements and conditions of the CAP 2023 to 2027 and implement them together with farmers trough educational and advisory activities. • Implementation of measures for climate protection and adaptation to climate change • Development of optimised processes for better energy efficiency • Reduction of the use of pesticides, fertilizers and antibiotics • Measures to improve animal welfare • Improving the position of agricultural and forestry enterprises in the value chain • Measures to ensure short supply chains • Increasing the value of regional foods • Improving competitiveness • Improving food quality • Promotion of digitalisation in agriculture and forestry • Development of additional offers for digital further education and extension (webinars, Farminars, Online extension) with the corresponding prerequisites (technical equipment and training of extension staff and farmers) risk management of crisis prevention (e.g. power failure in electronically controlled stables, Covid-19) • Reducing emissions and thus the greenhouse effect
2. France	The modernization of agriculture is engaged and leads to an erosion of the number of farms. At the time of the 2010 agricultural census, there were 516,000 farms in France (Metropolitan France and the French overseas departments), compared to 665,000 in 2000. Today, this long-term demographic trend is continuing and is not likely to stop soon. Indeed, the last agricultural census in 2012 revealed that in some French regions, among farmers over 50 years of age (and who would therefore cease their activity in ten years at most), only 40% of them knew the young farmer, who would take over their farm.
3. Finland	In Finland, farmers and farms differ significantly, particularly in terms of production type, size, life cycle stage, strategy and economic situation. As a long country in the north-south dimension, the climate is also very different, especially in Lapland and on the southern coast. The number of farms has decreased significantly in recent years, while their average size has increased. The increase in average size is accompanied by an increase in the number of workers employed on farms. Employment is expensive in Finland and as farm size increases, there is a stronger tendency towards automation and using new technology, for example, more than a third of milk is now milked by milking robots.

	Farm profitability has been a major problem, especially in recent years. Even before Russia's invasion of Ukraine, dairy production was already suffering from the sanctions imposed on Russia, which led to a sudden end to significant exports of dairy products to Russia. Agricultural support and subsidy systems appear to be becoming more complex. In Finland, the media and social media are blaming agriculture for climate change, making new demands for animal welfare, etc. Farmers are experiencing increased stress and pressure from public opinion. More attention needs to be paid to farmers' well-being and well-being in the future. The role of the farmer is generally becoming more entrepreneurial. Farm development is becoming more and more like the development of any other business, with its strategies, visions, missions, budgets and action plans. This change has been rapid and farmers need more knowledge about business management. There are new expectations for advisory work. The farmers of the future are more educated and need more specialized advice. The role of the adviser is becoming more and more similar to that of a business coach. They work as consultants, using new methods in an interactive way. Their work will need to be supported by greater use of digitalization and artificial intelligence, as well as support functions to save working time and control costs. (Source: Jaana Kiljunen/ Association of ProAgria Centers) Operator for Digitalisation in agriculture, food industry and forestry (LEVEL 4)
4. Italy	The statistical evidence allows us to identify the challenges that the national training system is required to face, highlighting the "main ones" on which attention should be paid: • low levels of qualification • insufficient mastery of digital skills • low attractiveness of VET • vertical and horizontal mismatch • complexity of governance In addition, there is a difficult job insertion of young people and reintegration of adults, a low participation in democratic life, a weak recognition of the value of education, training and more generally of individual growth, finally a scarce exploitation of the training proposal available.
5. The Netherlands	Implications (challenge) for education/training The policy directions and the trends above imply some focal points of attention in education and training: – Circularity of production throughout the food chain (as one of the main objectives of current Dutch agricultural policy) – Environmental pollution, with a focus on animal farming and manure management – Animal welfare – Biodiversity maintenance – New sources of protein production – Digitalization of farms and smart food industries – Multifunctional farming and short food supply chains In the last decades education/training institutes have followed and supported these trends by setting up new courses in these areas on all EQF levels
6. Spain	In relation with the priority level assigned in the previous section and as a conclusion of the meeting of the focal Iberic group and of the development of the different activities of the FIELDS project including the report “Trends in Spanish Agriculture, Agri-Food Industry, Forestry and Bio-economy” (deliverable 1.8) it was detected two main weaknesses that should be covered in Spain and that were related with the sustainability in agriculture and in the agri-food

	industry. In the two next subsections the mains points to be covered in a training program are summarized. There are many challenges that the European training system must face, among which low attractiveness of VET in many countries stands out. In addition, insufficient mastery of digital skills is also worth to be highlighted. These facts coexist with an environment in which there is a difficult job insertion of young people and reintegration of unemployed adults and a weak recognition of the value of education and training. In the search of a solution to these important problems, actions should be taken on: • the accessibility of educational services through coordination between the learning phase and the working phase; • training contexts by integrating the classic proposal delivered face-to-face with satisfactory distance learning methods; • the flexibility and personalization of training courses. It also highlighted the non-homogeneous presence in the territory of the offer of guidance services and the timeliness in the provision of information on needs (LMI and Skills intelligence).
7. Ireland	The focus group considering the development of the different activities of the FIELDS project including the report "Trends in Irish Agriculture, Agri-Food Industry, Forestry and Bio-economy" (deliverable 1.8) identified two key areas in need of development in Ireland. These were sustainability and the bioeconomy. In the following subsections the main points to be covered in a training program are set out. Emerging business trends in Ireland are aligned to the future skills needs identified in the skills analysis conducted. The core business operational model is business-to-business and the strategic focus for businesses is on sustainability, innovation, and increasing competitiveness. Essential strategic business skills include, providing leadership, change management and good governance. The most common analytical tools to support business strategy are SWOT Analysis, Strategic/Balanced Score Card and PESTLE Analysis. However, some in industry feel that there is no 'specific body' to train manual workers, we find that people who are trained and are managers as opposed to labourers they tend to be well trained already. There is a gap for 'training the trainer' i.e. how to manage people and for many of us we are employers for the first time in our 50s and this brings challenges. farming support (government) bodies have a role here and while Teagasc has done a lot, there is more to do. Because of the labour crisis in the sector (farming) the Co-op has a role to play in training and creating a 'database' of potential part time workers. Companies like FRS and other 'bodies' are available but there is a substantial cost associated. For farmers who require part time help this cost can be prohibitive. There is a gap in digital skills. Some have sourced help off farm through Agri Advisers, Agri Audit specialist, Grass measuring specialists etc. The young trainee farmer is very computer literate and could give the course. There may be a role in training around visual recording so if you are showing someone how to do a 'job' that is repetitive it would make sense to record and play back until they are familiar rather than having to do the job again and again. A lot of farms are incorporating and as such have more paperwork than an SME with tax returns, wages. Generally, this work is outsourced due to time and lack of skill set. There is a function through the farming organisations again around wages, working time act and putting appropriate contracts in place – this employer training is lacking and often ends up firefighting using the accountant or another specialist /if an issue arises. A 'go to skilled educator' for the sector should be set up through Teagasc or Co-ops that everyone could tap into - ranging in from simple things like logging on to Agri-food or Pasture Base, through to managing wages packages (simple / basic).

5 The Action Plan

Countries	Summary
1. Austria	Here, the operational aspects of the implementation of the pilot course planned for Austria identified as the one with the highest priority during the project meetings and during the NWG is the OPERATOR FOR DIGITALIZATION IN AGRICULTURE, FOOD INDUSTRY AND FORESTRY (EQF Level 4) are described. The selected module will consist of 360 hours of course divided into 150 hours of frontal classroom with specialized teachers, 150 hours of oriented self-learning and 60 hours of lessons on soft skills for the completion of training gaps and missing soft skills. This chapter defines the activities that will be carried out, the content of pilot course, the number of trainees, the costs of pilot course with also clearly indicated the problems and risks associated with the implementation of the activities.
2. France	This action plan describes the measures, course content, number of trainees and cost estimation of the pilot training and an assessment of possible challenges and risks related to the implementation of the FIELDS training to be piloted in France. As the training pilot in France is targeted at farmers following training through advising channels, one of the goals of the pilot is to enable them to choose the training components that serve their respective skills development needs. The purpose of the pilot is to test the suitability of the training for the selected target group and to obtain feedback for further development of the training. To this end, this Action Plan will identify specific training modules that are particularly useful for testing and for which participants will be directed to participate.
3. Finland	This action plan describes the measures, course content, number of trainees and cost estimation of the pilot training and an assessment of possible challenges and risks related to the implementation of the FIELDS training to be piloted in Finland. As the training pilot in Finland is targeted at agricultural advisors already employed, one of the goals of the pilot is to enable them to choose the training components that serve their respective skills development needs. The purpose of the pilot is to test the suitability of the training for the selected target group and to obtain feedback for further development of the training. To this end, this Action Plan identifies specific training modules that are particularly useful for testing and for which participants will be directed o participate.
4. Italy	The action plan defines the pilot course for both the technical content and the soft skills part. Overall, the pilot course “Technician for Food Industry digitalisation” will last 360 hours and at the end it will be possible to certify both the technical and soft skills acquired during the course. The cost of the training course was also identified
5. The Netherlands	The action plan is about the testing of major modules and pilots in the Netherlands. When the modules, which are prepared by Fields partners, are finalised a selection will be made of relevant modules for the Netherlands, other relevant parties will be included to make the selection (e.g. CIV). Dutch trainers will be selected to join the ToT organised by the Fields project. Pilots will be carried out in (Aeres) VET institutions. Monitor the process and evaluate the training. Adjust the content and didactics where necessary, Aeres is responsible here. In the end Aeres will make the materials available to colleague VET institutions in the Netherlands, a.o. through a platform for training material for professional education (Groen Kennisnet).
6. Spain	This section reports the operational aspects of the implementation of the pilot courses planned for Spain identified as the one with the highest priority during the project meetings and during the NWG: Technician for Sustainable Agriculture. The selected modules will consist of 360 hours of course divided into 150 hours of frontal classroom with specialized teachers, 150 hours of oriented self-learning and 60 hours of lessons on soft skills for the completion of training gaps and missing soft skills.

7. Ireland	This section reports the operational aspects of the implementation of the pilot courses planned for Ireland identified as the one with the highest priority during the project meetings and during the NWG: The Operator for Bioeconomy in agriculture, food industry and forestry. The selected modules will consist of 360 hours of course divided into 150 hours of frontal classroom with specialized teachers, 150 hours of oriented self-learning and 60 hours of lessons on soft skills for the completion of training gaps and missing soft skills. This chapter defines the activities that will be carried out, the content of pilot course, the number of trainees, the costs of pilot course with also clearly indicated the problems and risks associated with the implementation of the activities.

6 The Ambition

Countries	Summary
1. Austria	Life-long learning is becoming increasingly important in the face of rapid change. Initial training continues to provide the necessary basis in the life of the working population, but permanent higher qualifications and ongoing education are absolutely essential in our knowledge and service society in terms of being able to adequately meet the rapid change in social structure, economy and technology in the sense of lifelong learning. (Reference: i2connect) The key partners to be included in an Agrifood or Forestry Pact for Skills are the following stakeholder groups: VET providers (VET schools, VET providers, HEI, other educational providers), policy makers (ministries, regional and local authorities, regulatory bodies, Educational Agencies), decision makers (farmers, coops, foresters, food industries,…), Advocacy (representative bodies e.g. Farmers and AgriCoops Confederations, Food Industry Federations, Trade Unions, Professional Associations/Registers, Chambers of Commerce/Agriculture, Universities, VET and Training Agencies, Student Associations, Advisors…). On National level, a pact for skills shall be structured as following: (1) decision makers, (2) funding, (3) incentive structure for participants and (4) affected parties/interest groups.
2. France	To be completed in early 2023
3. Finland	All FIELDS occupational profiles contain skills identified as essential for the future in Finland. The pilot training will help to estimate the suitability of FIELDS trainings for Finland. If the pilot trainings are successful, it makes sense to extend the trainings to farmers and students. The national working group can act as a catalyst for this dissemination work. According to a survey by the Technology Industry (2021), three out of four companies consider the ability and motivation to continuous learning as the most important generic skill to increase their importance. Of the generic skills customer orientation and leadership are highlighted. Digitalization is seen in the top skills in all job advertisements in all main sectors. Low-carbon and circular economy skills will also become more important in the coming years. For a quarter of companies, they are already of paramount importance for business. (Source: JOTPA: National Competence Capacities - Forecast results and snapshot for 2022, p.27/76) In agriculture and food manufacturing, enabling continuous learning is a key area for development. Funding and support schemes should be developed to ensure that skills development is always more profitable than unemployment. Continuous learning is also linked to the observation of the experts of the Skills Foresight Forum that training content in the food chain should be available from early childhood to lifelong learning. (Source: JOTPA: National Skills Capacities - Forecast results and snapshot for 2022) In Finland, AgriHubi and the national AKIS system aim to promote partnerships in the agriculture, forestry and food sectors. In addition to the FIELDS project, a direct partner in the current Pact of Skills from Finland is the the Central Union of Agricultural Producers and Forest Owners (MTK) whose Director of Training Susanna Kumpulainen is a member of the national working group for this roadmap.
4. Italy	The "Skills Pact" represents an opportunity to retrain the current workforce and make the agri-food ecosystem more attractive to young people, while providing a lifelong learning perspective for both employers and employees. To achieve this goal, the FIELDS partnership has defined a common strategy to design and implement a sectoral requalification and requalification framework, maximizing the competitiveness of all the actors involved, improving the preservation of the workplace and the attractiveness of the work of the agri-food ecosystem under the Skills Pact

5. The Netherlands	The ambition below is split up in two levels. Groenpact is a partnership of several organizations in the green sector with the goal to develop a sustainable future for the green knowledge and education system. The ambition of Groenpact is leading for the national green education system. Next to that we have included an ambition on the level of the Fields project which will contribute to the Groenpact ambition. Groenpact The main ambition as formulated by Groenpact remains contributing to solutions for strengthening the sustainable competitiveness of the green sector in line with the large societal tasks (see 3.2). This contribution lies mainly in attracting and training sufficient talent, the innovation of education and the transfer of knowledge into practice. The aim is to fit in with the labour market of the future and the big social issues in the fields of food and green. Thereby, the main effect of Groenpact lies in strengthening of cohesion and boosting cooperation between sector, education, research and policy. (Groenpact, 2021) Erasmus+ Fields project The Fields project stands for: Addressing the current and Future skill needs for sustainability, digitalization, and the bio-Economy in agriculture. European skills agenda and Strategy. The concrete ambition for FIELDS in the Netherlands is that the FIELDS project contributes to the development of an EQF level 4 curriculum on sustainability and digitalization addressing the future skill needs for both the Sustainable pathway as well for the High-tech pathway. Students. As the sector is in swift transition to more sustainable policies and practices, there is a need for content material for VET students. The goal is that modules are developed and prepared, benchmarked with the relevant organisations, such as Groenpact and SBB, and made available to VET in the green sector. The form of the modules should be such that they can easily be incorporated into existing curricula.
6. Spain	Skill mismatch is pervasive in Spain, we have a high number of people without qualifications adequate to the needs of today's economy. On the other hand, we have many people who are overqualified in relation to the work they do. We need to strengthen the group of professionals with intermediate qualifications. This is the feature that differentiates us from other developed European economies, whose main asset is this intermediate group of professionally qualified people. Bringing the demand and supply of skills into a better balance requires more responsive educational institutions and training providers, more effective market policy work, better use of skills assessment and anticipation information, as well as greater efforts by the industry private to collaborate with these institutions. A new generation of skills and a lifelong learning ecosystem driven by central government and social partners need to be jointly developed to ensure a just and inclusive environment. A transition towards a future of work that contributes to sustainable development in its economic, social and environmental dimensions. Such an ecosystem should be part of an integrated approach to creating decent jobs for all, strengthening the supply-side pillar of functioning labour markets to complement the demand-side pillar and matching interventions. The system should be accessible to all, with a specific focus on women, people in precarious working conditions and all disadvantaged and vulnerable groups. The "Skills Pact" represents an opportunity to retrain the current workforce and make the agriculture and agri-food ecosystem more attractive to young people, while providing a lifelong learning perspective for both employers and employees.
7. Ireland	Emerging business trends in Ireland are aligned to the future skills needs identified in the skills analysis conducted. The core business operational model is business-to-business and the strategic focus for businesses is on sustainability, innovation, and increasing competitiveness. Essential strategic business skills include, providing leadership, change management and good governance. The most common analytical tools to support business strategy are SWOT Analysis, Strategic/Balanced Score Card and PESTLE Analysis. Training and educational systems in Ireland appear to be appropriate in formal settings, to develop the skills required across all seven skills categories. Informal education and training appear to more dispersed and there is a level of uncertainty around the accessibility of informal training.

	When considering the relevance of recognition of training and education and the attainment of qualifications, organisations valued the idea of achievement of qualifications, more so than individuals. Equally, on the skills front, whilst individuals valued having the skills to perform the task, this appeared to be significantly more critical at organisational level. A new generation of skills and a lifelong learning ecosystem driven by central government and social partners need to be jointly developed to ensure a just and inclusive environment. A transition towards a future of work that contributes to sustainable development in its economic, social and environmental dimensions. Such an ecosystem should be part of an integrated approach to creating decent jobs for all, strengthening the supply-side pillar of functioning labour markets to complement the demand-side pillar and matching interventions. The system should be accessible to all, with a specific focus on women, people in precarious working conditions and all disadvantaged and vulnerable groups. The "Skills Pact" represents an opportunity to retrain the current workforce and make the agriculture and agri-food ecosystem more attractive to young people, while providing a lifelong learning perspective for both employers and employees. To achieve this goal, the FIELDS partnership has defined a common strategy to design and implement a sectoral requalification and requalification framework, maximizing the competitiveness of all the actors involved, improving the preservation of the workplace and the attractiveness of the work of the agriculture and agri-food ecosystem under the Skills Pact. The partnership has developed a first example of a pilot project to test the way towards this ambition. The aim is to reach all stakeholders in the agriculture and agri-food ecosystem: from farmers, agri-food cooperatives, food processors and relevant associations, to education and training organizations.

7 The proposal and commitment

Countries	Summary
1. Austria	A clear Governance structure is important for the vital success of the integration of the FIELDS curricula in Austria. Therefore, a detailed governance system will be implemented according to the uprising governance structure elaborated in the frame of the European Pact for Skills. This European governance system will then be adapted on national level, to assure the success.
2. France	To be completed
3. Finland	To be completed
4. Italy	A crucial challenge for the agri-food ecosystem is to increase its attractiveness and master its ability to motivate people, especially young people, to be part of this ecosystem, especially in rural areas, where SMEs are the cornerstone of the economy.
5. The Netherlands	Groenpact formulated the following foci: • Strengthening network platforms between policy organisations, sector organisations and target group organisations. • Strengthening basic infrastructure, a.o. aiming at strengthening the cooperation between regional business and green vocational education in regional meeting points; exploring a cross-sectoral approach; INcreasing knowledge circulation, including professionalisation of teachers; Increasing the impact by continuous extension of the research programs to support the social issues and strengthening the effect on teachers and students and a lifelong development; expansion of the network of public-private partnerships for practice-oriented research; Strengthening society-based education.
6. Spain	Spain needs to strengthen the pool of professionals with intermediate qualifications. The new Vocational Training Law of 2022 aims to strengthen sustainability in all economic sectors. This will contribute to employment and economic and social development, helping to generate new socio-economic and professional opportunities.
7. Ireland	actions should be taken on: • the accessibility of educational services through coordination between the learning and working phases; • training contexts by integrating the classic proposal delivered face-to-face with appropriate distance learning methods; • the flexibility and personalization of training courses. The inconsistent availability of guidance services and the timeliness in the provision of information on needs should also be addresed From the point of view of the agri-food sector, the training system needs to be tailored. This tailoring should focus on sustainability of production processes, adaptation to climate change, managerial and financial capacity, diversification and multifunctionality and reinforcement of digital skills.

8 Evaluation

Countries	Summary
1. Austria	For the assessment of a pact for skill partnership, the following factors shall be used: • the stakeholders actively involved • a regularly obtained feedback from addressed partners • the training programs and trainees involved • useful quality criteria depending on target definition.
2. France	To be completed
3. Finland	This roadmap describes a broad vision for meeting the Finnish skills needs, especially in the agricultural sector, through existing trainings which ideally are complemented by FIELDS trainings. It also describes an action plan for the FIELDS training pilot in Finland, which is a first step towards the wider use of FIELDS trainings in Finland. Therefore, it is essential to carry out the assessment at three levels; pilot training, filling the essential training gap and partnership development.
4. Italy	It is clear that it is urgent to address the skills needs of the agri-food ecosystem in order to successfully achieve and benefit from green and digital transitions. The improvement of skills and the retraining of workers along the food chain will strengthen the resilience of this vital ecosystem. A crucial challenge for the agri-food ecosystem is to increase its attractiveness and master its ability to motivate people, especially young people, to be part of this ecosystem, especially in rural areas, where SMEs are the cornerstone of the economy. and industrial fabric. Ensuring broadband internet access, high-quality availability, digital skills education and training can play a vital role in key rural areas and the entire ecosystem towards a successful digital transition. Europe cannot overcome the global challenges facing the ecosystem without guaranteeing the acquisition of new skills, especially in the agricultural sector where the aging of farmers is a problem. Adequate support at European and national level is also essential for the ecosystem as a whole to address the current skills gap, strengthen its resilience and achieve the Green deal goals.
5. The Netherlands	Groenpact is working on a ‘’Green monitor’’ for education and labor-market research (www.groenpact.nl/groene-monitor). The Green monitor uses three main sources: • The labour market research of Colland (collaboration between funding schemes and regulations in the green sector, supported by social partners) (https://www.collandarbeidsmarkt.nl/rapporten/) • Research of ROA (Research Centre for Education and the Labour Market). One of the working fields of ROA is on skills supply and demand on the labour market, with three main themes (https://roa.nl/research/research-themes): - Labour market information, and occupational and recruitment choices - Lifelong learning and employability - Older workers and retirement

	• SBB, (SBB connects (training) companies to students, provides internship, apprenticeship and labor market information and in general connects vocational education and training with businesses). SBB performs tasks for the Dutch ministry of Education, Culture and Science, including the VET qualification structure and Work-based learning. The SBB performs research for multiple sectors on multiple labor market related subjects, applying multiple methods such as surveys, expert interviews, validation sessions, data from CBS and other public institutions, policy reports, research reports and articles. Next to the research of these organizations there are many other sources, such as reports, online data, etc. that are used to give insight in the green sector. The Green Monitor is in progress.
6. Spain	Based on monitoring, evaluation is the systematic collection and analysis of data necessary to make decisions, a useful and necessary process to improve the activities of a training plan. An evaluation is an assessment, as systematic and objective as possible, of an on-going or completed project, program or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, developmental efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors
7. Ireland	Based on monitoring, evaluation is the systematic collection and analysis of data necessary to make decisions, a useful and necessary process to improve the activities of a training plan. An evaluation is an assessment, as systematic and objective as possible, of an on-going or completed project, program or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, developmental efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors.

Countries	Key performance indicator
1. Austria	As Key Performance Indicators to measure the performance of a training module, (1) the number of students, companies and participants may be measured, and (2) the achievement of learning goals and student evaluation of training modules may be used.
2. France	To be completed
3. Finland	Assessment of the partnership: • Stakeholders actively involved (who provide quality upskilling opportunities, in education/training; who play a role in sectoral drivers of change • Coverage of countries and regions, (sub-)sectors • Visibility and awareness • Public opinion, consumer opinion • Definition and maintenance of a strategic agenda • Honest and clear communication to different target groups • Best practice dissemination • Willingness of partners to share information/knowledge • Impact on training programs and interest for the training programs (number of interested participants) • Employees actively interested in participating in Life-Long Learning • Yearly growth rate of new courses • Raised level of final degrees of food employees • Link with our scenarios, see whether profiles support desirable outcomes Assessment of training modules and courses: • Number of students, companies in the course • Number or % of participants from underrepresented groups • Achievement of learning goals (e.g. increased level of knowledge - tests before and after taking the module by trainees) • Student evaluation/satisfaction of training content and method • Numbers of certificates achieved • Flexibility of programs (hours, ECTS, online/face-to-face, ...) • Renewal of programs (new elements added year to year) • Resources per module (human resources, financial, technology...) • Weight of virtual, augmented and connected reality in the training modules, % of audio-visual learning vs class learning • Use of educational material and acquired skills in the workplace • Learning outcomes in practice (logbooks, blogs, ...) • Employment status of trainees after graduation, incl. job promotions • Placement rate for unemployed learners • Trainees and employer job impact evaluation (better execution of tasks, increased salary, new employment,…) • Rate of young people/workers recruited in agri-food sector • Employer satisfaction

4. Italy	The Key Performance Indicators (KPIs) identified by the Project, for the evaluation of the skills partnership and for the evaluation of the modules and training courses, are shown in Tables 1 and 2. ***Table 1: Assessment of the partnership:*** ● Stakeholders actively involved (who provide quality upskilling opportunities, in education/training; who play a role in sectoral drivers of change ● Coverage of countries and regions, (sub-)sectors ● Visibility and awareness ● Public opinion, consumer opinion ● Definition and maintenance of a strategic agenda ● Honest and clear communication to different target groups ● Best practice dissemination ● Willingness of partners to share information/knowledge ● Impact on training programs and interest for the training programs (number of interested participants) ● Employees actively interested in participating in Life-Long Learning ● Yearly growth rate of new courses ● Raised level of final degrees of food employees ● Link with our scenarios, see whether profiles support desirable outcomes ***Table 2: Assessment of training modules and courses:*** ● Number of students, companies in the course ● Number or % of participants from underrepresented groups ● Achievement of learning goals (e.g. increased level of knowledge - tests before and after taking the module by trainees) ● Student evaluation/satisfaction of training content and method ● Numbers of certificates achieved ● Flexibility of programs (hours, ECTS, online/face-to-face, ...) ● Renewal of programs (new elements added year to year) ● Resources per module (human resources, financial, technology...)

	● Weight of virtual, augmented and connected reality in the training modules, % of audio visual learning vs class learning ● Use of educational material and acquired skills in the workplace ● Learning outcomes in practice (logbooks, blogs, ...) ● Employment status of trainees after graduation, incl. job promotions ● Placement rate for unemployed learners ● Trainees and employer job impact evaluation (better execution of tasks, increased salary, new employment,….) ● Rate of young people/workers recruited in agri-food sector ● Employer satisfaction
5. The Netherlands	KPIs to be assessed on regular times. Table 3: Assessment of the partnership: - Stakeholders actively involved (who provide quality upskilling opportunities, in ● education/training; who play a role in sectoral drivers of change - Coverage of countries and regions, (sub-)sectors - Visibility and awareness - Public opinion, consumer opinion - Definition and maintenance of a strategic agenda - Honest and clear communication to different target groups - Best practice dissemination - Willingness of partners to share information/knowledge - Impact on training programs and interest for the training programs (number of ● interested participants) - Employees actively interested in participating in Life-Long Learning - Yearly growth rate of new courses - Raised level of final degrees of food employees - Link with our scenarios, see whether profiles support desirable outcomes ● Table 4: Assessment of training modules and courses: ● Number of students, companies in the course ● Number or % of participants from underrepresented groups ● Achievement of learning goals (e.g. increased level of knowledge - tests before and ● after taking the module by trainees)

	• Student evaluation/satisfaction of training content and method • Number of certificates achieved • Flexibility of programs (hours, ECTS, online/face-to-face, ...) • Renewal of programs (new elements added year to year) • Resources per module (human resources, financial, technology...) • Weight of virtual, augmented and connected reality in the training modules, % of • audio visual learning vs class learning • Use of educational material and acquired skills in the workplace • Learning outcomes in practice (logbooks, blogs, ...) • Employment status of trainees after graduation, incl. job promotions • Placement rate for unemployed learners • Trainees and employer job impact evaluation (better execution of tasks, increased • salary, new employment,….) • Rate of young people/workers recruited in agri-food sector • Employer satisfaction
6. Spain	The Key Performance Indicators (KPIs) identified by the Project, for the evaluation of the skills partnership and for the evaluation of the modules and training courses, are shown in Tables 1 and 2. Table 1: Assessment of the partnership: • Stakeholders actively involved (who provide quality upskilling opportunities, in education/training; who play a role in sectoral drivers of change • Coverage of countries and regions, (sub-)sectors • Visibility and awareness • Public opinion, consumer opinion • Definition and maintenance of a strategic agenda • Honest and clear communication to different target groups • Best practice dissemination • Willingness of partners to share information/knowledge • Impact on training programs and interest for the training programs (number of interested participants) • Employees actively interested in participating in Life-Long Learning • Yearly growth rate of new courses • Raised level of final degrees of food employees • Link with our scenarios, see whether profiles support desirable outcomes Table 2: Assessment of training modules and courses:

	• Number of students, companies in the course • Number or % of participants from underrepresented groups • Achievement of learning goals (e.g. increased level of knowledge - tests before and after taking the module by trainees) • Student evaluation/satisfaction of training content and method • Numbers of certificates achieved • Flexibility of programs (hours, ECTS, online/face-to-face, ...) • Renewal of programs (new elements added year to year) • Resources per module (human resources, financial, technology...) • Weight of virtual, augmented and connected reality in the training modules, % of audio-visual learning vs class learning • Use of educational material and acquired skills in the workplace • Learning outcomes in practice (logbooks, blogs, ...) • Employment status of trainees after graduation, incl. job promotions • Placement rate for unemployed learners • Trainees and employer job impact evaluation (better execution of tasks, increased salary, new employment, ...) • Rate of young people/workers recruited in agri-food sector • Employer satisfaction
7. Ireland	The Key Performance Indicators (KPIs) identified by the Project, for the evaluation of the skills partnership and for the evaluation of the modules and training courses, are shown in Tables 1 and 2. Table 1: Assessment of the partnership: • Stakeholders actively involved (who provide quality upskilling opportunities, in education/training; who play a role in sectoral drivers of change • Coverage of countries and regions, (sub-)sectors • Visibility and awareness • Public opinion, consumer opinion • Definition and maintenance of a strategic agenda • Honest and clear communication to different target groups • Best practice dissemination • Willingness of partners to share information/knowledge • Impact on training programs and interest for the training programs (number of interested participants) • Employees actively interested in participating in Life-Long Learning • Yearly growth rate of new courses • Raised level of final degrees of food employees • Link with our scenarios, see whether profiles support desirable outcomes Table 2: Assessment of training modules and courses: • Number of students, companies in the course • Number or % of participants from underrepresented groups • Achievement of learning goals (e.g. increased level of knowledge - tests before and after taking the module by trainees) • Student evaluation/satisfaction of training content and method • Numbers of certificates achieved

	• Flexibility of programs (hours, ECTS, online/face-to-face, ...) • Renewal of programs (new elements added year to year) • Resources per module (human resources, financial, technology...) • Weight of virtual, augmented and connected reality in the training modules, % of audio-visual learning vs class learning • Use of educational material and acquired skills in the workplace • Learning outcomes in practice (logbooks, blogs, ...) • Employment status of trainees after graduation, incl. job promotions • Placement rate for unemployed learners • Trainees and employer job impact evaluation (better execution of tasks, increased salary, new employment, ...) • Rate of young people/workers recruited in agri-food sector • Employer satisfaction KPIs are needed for ongoing assessment of the skill partnerships (Pact for Skills) and for assessment of training modules/courses. KPIs can be used for monitoring progress and outcomes and to take decisions on the way to go forward. A system of KPIs should be limited in complexity and be transparent and user friendly.

9 Annexes: The National Road Map

9.1 Annex I: Austria

1. Introduction

1.1 Method- NWG

The objective of the national roadmap is to formulate actions for the development of an agri-food-forestry skill strategy on the National level. To that end, data had to be collected by means of a questionnaire (prepared by Confagricoltura) and a Working-Group Meeting and Interviews with Stakeholders were performed.
Stakeholders that were involved:

- The chamber of agriculture for Austria (LKÖ)
- The University of Natural Resources and Life Sciences Vienna (BOKU)
- Food Cluster of Lower Austria (Ecoplus Lebensmittelcluster NÖ)
- Food Industry Federation Austria (Fachverband der Lebensmittelindustrie)
- The Austrian FIELDS partners LVA, AP, FJ-BLT.

2. Context of education and policies at National level

2.1 The national education system and training needs related to the FIELDS objectives

Figure 1 shows a graphical overview about the Austrian Education System (reference: https://www.bildungssystem.at/)

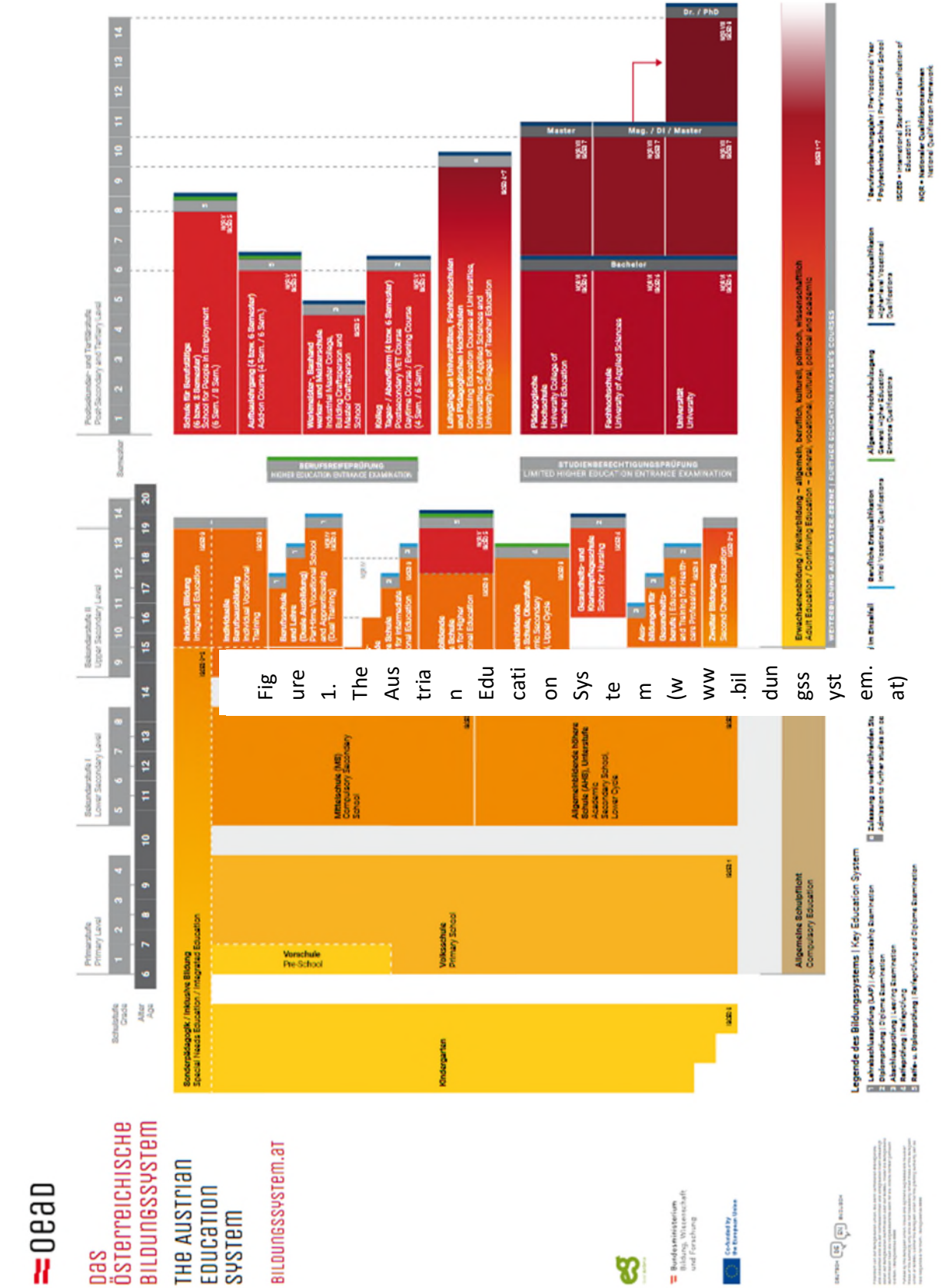


Figure 1. The Austrian Education System (www.bildungssystem.at)

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The Austrian guidance system – an Overview:

There are two established guidance and counselling systems in Austria working in cooperation with each other: guidance and counselling provided by education and training institutions, and guidance services provided by the employment administration and other institutions in the field of careers guidance. The active role of the social partners (Chamber of Commerce, Chamber of Labour) in the provision of career guidance is a prominent feature of the Austrian guidance system.

The key educational policy goals in this area are set out in the national Lifelong Guidance (LLG) Strategy, which establishes a general framework for the further development of educational counselling and careers guidance as an integral component of the Austrian National Strategy for Lifelong Learning. Lifelong guidance has a central role and is one of the five key strategic guidelines in the strategy and an element in at least seven of the ten lifelong learning-action lines within the strategy (https://erwachsenenbildung.at/addon/english_overview.php). Progress is monitored every year by the national lifelong guidance forum, consisting of representatives of two Ministries (the Education, Science and Research Ministry and the Labour, Social Affairs, Health and Consumer Protection Ministry), the public employment service, adult education institutions and networks, research institutions, university colleges for teacher training and Euroguidance Austria. The following five key priorities of the national LLG Strategy are:

- The implementation of basic competences in all curricula so that learners can make education and career decisions autonomously.
- A focus on process orientation and monitoring to enable high-quality decision-making processes.
- The professionalisation of counsellors and trainers.
- Quality assurance and evaluation of offers, processes and structures.
- The extension of access by creating offers for new target groups.

The Austrian Agricultural Knowledge and Innovation System (AKIS) is based on comprehensive vocational training, adult education, an extensive and high-quality range of advisory services and an agricultural research landscape – and stands for the cooperation between research, education and counselling. AKIS is considered as an ecosystem for exchange, networking, cooperation and communication between all the relevant players, to manage future challenges in agriculture and forestry and on the interface with adjacent areas.

2.1.1 Short analysis of education and training requirements specified in the national legal and regulatory framework associated with job profiles and skill needs identified

In the frame of the CAP strategic plan Austria 2023-2027 and based on a SWOT analysis of the AKIS ecosystem, the following potential improvements have been defined:

1. The weak connection between agricultural and forest businesses and advisors to university and non-university research facilities – this implies potential for improvement in all channels of knowledge transfer from research to the applied agricultural sector.

2. Research as such is not considered to be the main driver for new knowledge and innovation – but to be the impulse. Innovation is frequently driven by the requirements of professional practice.

3. To facilitate the knowledge transfer from professional agricultural practice to research, a better incorporation of agricultural and forestry specific research questions/-topics in the national RTI-politics would be relevant, as well as the strategic construction of structured exchange concepts

4. Another potential improvement lies in an intended intelligent cross-linking/linkage towards players who carry the knowledge relevant for innovation, e.g. civil society, research facilities, technology providers or funding institutions on national and international level.

5. Currently, the organised, regular, and mutual exchange between research, consultation, continuing education and agricultural practice in relation to departmental research (Ressortforschung) from the BMLRT is well developed. However, this is not the case regarding the exchange with university and non-university research entities beyond the departmental research - new exchange concepts have to be developed.

6. There is a lack of practicable preparation of current results and scientific data from research and experimental projects for consultation, continuing education and farmers.

7. University and non-university research do hardly play a part in continuous education and consultation of farmers.

8. “The cogwheels of knowledge transfer” – research – development – education – consultation – do not mesh sufficiently together, and provide too little opportunities for dialogue and knowledge transfer.

9. The introduction/deposition of practicable questions/issues for farmers or advisors directly into scientific entities is difficult.

10. The implementation of research and experimental projects and the dissemination of the results could be improved for all participants by a stronger involvement of consultation offices, schools and agricultural companies from the start. Likewise, in some disciplines there is no collaboration between universities, f consultation offices, apprenticeship and professional training entities, educational facilities and schools regarding the elaboration of consultation materials and training documents. Therefore, coordinated resources and possible synergistic effects are unexploited.

11. Furthermore, there is a lack of practicable, comprehensible preparation of research results and scientific works of universities and technical colleges (bachelor, master, PhDs) as well as from federal and research institutes. Therefore current knowledge is often not transfered to practice.

12. Missing resources, high complexity, interdisciplinary requirements for consultation contents and their transfer as well as traditional, inflexible structures at currently recognized consultation agencies cause the lack of specialized consultants and specialized offers in some areas. Important topics such as energy efficiency, climate protection and climate change adaptation and renewable energies can only be covered partly. Likewise, the general exchange on Austria's federal states level between consultants is expandable (although a federal state consortium does exist).

13. A platform or service centre that forces systematically the dialog (bottom-up and top-down) between players of politics, research, education and practice is lacking.

2.1.2 Evaluation of the number of personnel within identified professional categories that will require training matching "*fields profiles*"

According to the Agricultural Structure Survey 2016 (Statistics Austria 2018) 81% of Austria (83 858 km2) used for agricultural and forestry purposes are managed by 162 018 agricultural and forestry enterprises. These consist of 57 531 full-time farms, 89 782 part-time farms and 14 705 other farms (partnerships, legal entities). Small and medium sized enterprises predominate in Austria, 162 018 were counted in 2016 (i2connect 2021). Numbers for Food industry are as following: 4794 companies, of which 98% are SMEs and 48543 employees (Austria 2021).

2.1.3 VET providers system (flexibility, resilience, organization and governance etc.)

In Austria, vocational educational training may start in lower secondary level.

Secondary agricultural and forestry schools (HBLFA): 11 secondary agricultural and forestry schools (HBLFA) counted a total of 3 873 pupils in the 2019/20 school year. Training at the secondary agricultural and

forestry schools lasts 5 years (15-19), the advanced courses (after completion of a technical school) last three years. Both forms of training conclude with the "Reife- und Diplomprüfung", general qualification for university entrance (Green Report2020 – i2connect).

Agricultural and forestry colleges (LFS): 77 agricultural and forestry vocational and technical schools with 12159 pupils. The qualification at an agricultural and forestry VET college leads to the qualification of a skilled worker. Other ways to obtain a skilled workers qualification include evening school or the so-called "Farmers' School". Graduates of technical colleges can also take part in a postgraduate course at a higher agricultural and forestry college. The LFS are provincial schools.

Vocational training in agriculture and forestry is organized by apprenticeship and technical training centres:

Agricultural and forestry apprenticeship and technical training centres (LFA): The LFAs are responsible for vocational training in agriculture and forestry in Austria.

Tertiary education system:

- College for Agricultural and Environmental Pedagogy (HAUP)
- University of Natural Resources and Applied Life Sciences (BOKU)

Counselling services

Agriculture and forestry consultancy is offered by the chambers of agriculture (Austrian chamber of agriculture as an umbrella organisation on federal level, 9 provincial chambers and 70 regional district chambers) and by Bio Austria (association of Austrian agricultures, consisting of one federal organisation and 8 provincial organisations), or organic farming associations. The agricultural chambers do have a legal consulting contract, as they are a public law entity (Körperschaft öffentlichen Rechts). All full and part time working population in agriculture are members of the chamber by law.

Further Vocational Training for farmers and foresters

The manifold consulting services is complemented by a broad, comprehensive and nationwide training offering. Currently, there are 26 education providers, recognized by the federal ministry. As a prerequisite, these education providers must dispose of the "Ö-Cert", which is a quality certificate for adult education, so that they can obtain financial resources of the European Agricultural Fund for Rural Development.

3. Main challenges

3.1 Priorities in the Agri-food-forestry sector

Austria's agriculture and forestry are facing numerous challenges:

- Preparation of the national CAP strategic plan for the period 2023 to 2027 with consideration of the EU requirements (Green Deal, Farm to Fork and Biodiversity Strategy)
- Convey the requirements and conditions of the CAP 2023 to 2027 and implement them together with farmers through educational and advisory activities.
- Implementation of measures for climate protection and adaptation to climate change
- Development of optimised processes for better energy efficiency
- Reduction of the use of pesticides, fertilizers and antibiotics
- Measures to improve animal welfare
- Improving the position of agricultural and forestry enterprises in the value chain
- Measures to ensure short supply chains
- Increasing the value of regional foods
- Improving competitiveness
- Improving food quality
- Promotion of digitalisation in agriculture and forestry
- Development of additional offers for digital further education and extension (webinars, Farminars, Online extension) with the corresponding prerequisites (technical equipment and training of extension staff and farmers) risk management of crisis prevention (e.g. power failure in electronically controlled stables, Covid-19)
- Reducing emissions and thus the greenhouse effect

(Source: i2Connect2021 report).

3.1.1 European reference framework and links with the national framework (e.g. different levels of operations)

The Austrian Education System (schools, universities) is enshrined via the following laws in legislation: Allgemeine Schulordnung (1774), Reichsvolksschulgesetz (1869), regulativ für die Organisation des Volksbildungswesens in Deutschösterreich (1919), Schulorganisationsgesetz (1962/1986/1998), Studienberechtigungsgesetz (1985/1991), Arbeitsmarktservicegesetz (1994), Bundesgesetz über die Fachhochschulstudienlehrgänge (1993/1998), Bundesgesetz über die Berufsreifeprüfung (1997/1998/2008) und Verordnung über den Ersatz von Prüfungsgebieten der Berufsreifeprüfung (2000/2005/2010), Universitätsgesetz (2002), Verordnung: Bestimmung des Bundesinstitutes für Erwachsenenbildung St.

Wolfgang als Organisationeinheit (2003), Bundesgesetz über die Universität für Weiterbildung Krems (DUK-Gesetz 2004), Hochschulgesetz (2005), Bundesgesetz über den Erwerb des Pflichtschulabschlusses durch Jugendliche und Erwachsene (2012). (https://erwachsenenbildung.at/themen/eb_in_oesterreich/gesetze/weitere_gesetze.php)

Austria has an explicit federal law referring to adult education. Education policy and organisational structure of adult education are the reason that teaching and studying of adults is based on a series of different legislative fundamentals (Bundesgesetz (BGBl. Nr. 171/1973) for the promotion of adult education and training, other laws: Rechtsgrundlagen für die Erwachsenenbildung während der COVID-19 Krise, and under www.erwachsenenbildung.at).

3.1.2 Sectoral upskilling and reskilling framework

The federal law (Bundesgesetz (BGBl. Nr. 171/1973) for the promotion of adult education and training: 1973 the republic of Austria proclaimed for the first time to give financial support for adult education and drafted the federal law concerning the promotion of Education and Training. Apart from promotion of associations and institutions, this law also defines the financial support for governmental institutions. The law was adapted in 1990 and 2003.

The **Austrian LifeLong Learning Strategy** is based on the following EU-fundamental documents: A memorandum for lifelong learning (2000), Making a European Area for LifeLong Learning a Reality (2001), Key Competences for LifeLong Learning: European reference framework (2007), the recommendation on the establishment on the European Qualifications Framework for LifeLong Learning (2008), a strategy for smart, sustainable and inclusive growth (2010), Council Conclusions: A New European Strategy for Jobs and Growth (2010).

In the creation of the Austrian LLL-Strategy 2020, among other sources, suggestions of stakeholders, authorities and state institutions were included. Among the 10 lines of actions described in the Austrian LLL-Strategy, the following 2 are the most relevant here:

- Line 8: Continuing education to assure employability and competitiveness
- Line 10: Procedure for recognition of informal acquired skills and competences in all education sectors (comprehensive validation approach)

3.1.3 Major training modules (for coherent groups of skills) soft skills should be part of any job profile training program

For Austria, the following Training modules are the most important ones:

- Digitalization – needed in application, training for each new device/software – here practice is most important. Apprenticeship training: important features, need to master application.
- Sustainability – knowledge about value chains (understanding the value chain – what are the others doing – stronger cooperation, organisation and team building – knowing, where value can be created
- Traceability
- Soft skills: Communication

4. The Action Plan

Here, the operational aspects of the implementation of the pilot course planned for Austria identified as the one with the highest priority during the project meetings and during the NWG is the OPERATOR FOR DIGITALIZATION IN AGRICULTURE, FOOD INDUSTRY AND FORESTRY (EQF Level 4) are described. The selected module will consist of 360 hours of course divided into 150 hours of frontal classroom with specialized teachers, 150 hours of oriented self-learning and 60 hours of lessons on soft skills for the completion of training gaps and missing soft skills.

This chapter defines the activities that will be carried out, the content of the pilot course, the number of trainees, the costs of the pilot course which also clearly indicates the problems and risks associated with the implementation of the activities.

4.1 A clear statement of activity

Here the contents of the pilot course for both the technical content and the soft skills part are listed. Overall, the pilot course “Operator for Digitalisation in agriculture, food industry and forestry” will last 360 hours and at the end it will be possible to certify both the technical and soft skills acquired during the course

Lesson	Learning Outcomes	Hours
What is Digitalisation	Understand comprehensively from different perspectives what is meant by digitalisation	
	Ability to describe what is meant by digital innovation	
	Ability to describe what is the difference between smart farm and precision farm concept	
Technologies by Agricultural Farming Sub-sectors	Understanding the availability of digital technologies in different production sectors	
Digitalisation & the Impact of Technology	Ability to summarize how digital technology has evolved in time and can name the future digitalisation trends ("Technological breakthroughs from the early days of farming to 2030 and beyond")	
Basic remote sensing, GPS, and GIS knowledge	The tools involved in geographical mapping and positioning, such as GPS (global positioning systems), GIS (geographical information systems), and RS (remote sensing).	
	Ability to use modern technologies and equipment with high precision positioning systems, geo-mapping and/or automated steering systems for agricultural activities.	
Farm Management Information Systems	Ability to describe the concept of FMIS	
	Management information systems and databases to plan, manage and operate agricultural enterprise and production	
	Ability to describe case examples of different kinds of FMIS in different size farms and production lines in agriculture	
	The learner will be able to perform hardware and software configuration to most typical machines and robots and FMIS in Smart Farming	
	ability to run Farm Management Information Systems and understand outputs (FarmB...)	
	Precision animal health system	
Industry 4.0 circular manufacturing	Innovative circular manufacturing technologies enhanced with novel production mechanisms and digitalization aspects promoting energy efficient and low material consumption production processes, resulting in reduced greenhouse gas emissions and air pollutants.	
Forestry and agrifood production chain	Forestry supply chain principles and knowledge	
	Agrifood production supply chain management	
Introduction to digitalisation tools and machinery	Ability to find and use of mobile phones apps	
	Ability to name the various technologies available linked to farming activities and understands what can be achieved from using them	
	Software and online application use	
Control the environment for storage	Technician/Operator is able to maintain or ensure the maintenance of cleaning equipment, heating or air conditioning of storage facilities, sensors and the temperature of premises.	
	Ability to estimate the benefits and challenges relating to programming DIY vs Outsourcing / Contractors	
Greenhouse control for irrigation and protected environment conditions	able to compare devices and sensors, schedule irrigation, to set up temperatures, extra-time and CO2 fertilisation	
Use of robots/drones	Use semi-autonomous or autonomous machines, which automatically carry out complex actions while being guided by digital or electronic software, such as driverless cars, drones and other machines. Drones legislation	
Operate digital hardware	Understand Canbus/ Isobus principles to connect tractor and equipment	

	Operate Canbus/Isobus connect tractor and equipment	
Connect and troubleshoot equipment	Ability to follow manufacturer guidelines on how assemble smart farming equipment	
	Ability to perform electronic diagnosis, troubleshooting.	
Precision farming, weather forecast knowledge and tools	Gather data from satellites, radars, remote sensors, and weather stations in order to obtain information about weather conditions and phenomena.	
transfering data from application - data exchange	Entering information into a data storage and data retrieval system via processes such as scanning, manual keying or electronic data transfer in order to process large amounts of data. (Data handling and analysis, data exchange)	
basic statistics	Collecting data and statistics to test and evaluate in order to generate assertions and pattern predictions, with the aim of discovering useful information in a decision-making process. (Data handling and analysis, data exchange)	
Ability to implement traceability systems in respect of different agriculture resource	Traceability, guality signs and labels	
	Livestock farming traceability	
Practical training with job-specific machinery/equipment and their maintenance	Operate motorised agricultural equipment including tractors, balers, sprayers, ploughs, mowers, combines, earthmoving equipment, trucks, and irrigation equipment. Skills needed	
Logistics, warehousing, transportation	Opportunities and Challenges of Food Logistics 4.0	
Food processing technical skills	Fundamentals of Food Processing	
	Food manufacturing in the circular economy	
	HACCP principles, physical and chemical analysis principles	
Food processing automation	Application of sensors and control processing, Being able to manage the elements of an IoT ecosystem, assembling hardware and configuring software (sensors programming, signal processing, real-time and local analytics, manage databases, cloud analytics)	
Food packaging	The packaging role in the digitalisation of agri-food production	

4.2 Time period

New Profiles	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	hours
Operator for Digitalisation in agriculture, food industry and forestry							**360**

classroom activity							150
Self-learning							150
Soft skill							60

4.3 Quantity of inputs/outputs and unit costs

Budget - Austrian partners

Item	hours	days	€/day	Total cost
Teacher/Trainer/Researcher	180*	22,5	320,00 €	7.200,00 €

Materials & software				2.000,00 €
others				1.000,00 €
Total costs				**10.200,00 €**

*The budget was calculated with 180h for Teachers/Trainers/Researchers, of which 150h are considered to be teaching hours, and 30h are preparation, follow-up and assessment time.

4.4 Source of funding

The funds necessary for the realization of the pilot course are defined within the project budget. While the costs for the realization of the entire set of necessary courses may be drawn from the various national and regional funds connected with training activities such as ESF, ERDF and EAGGF programs as well as national funds and in particular inter-professional ones.

At national level it will be possible to launch a complete training campaign based on the 10 selected professional profiles and on the basis of the identified priorities and the respective financial budget can be drawn from different sources.

A massive investment in skills is needed. In addition to money from enterprise and governments, the EU is prioritising investing in people and their skills in our budget. The Recovery Plan for Europe proposed by the Commission in May 2020 will also focus on skills related activities.

EU investment in skills Programme Investment (in billions of euros)*

- European Social Fund Plus (ESF+) 61.5
- Erasmus 16.2
- InvestEU 4.9
- European Globalisation Adjustment Fund 1.1
- European Solidarity Corps 0.8
- Digital Europe 0.5

*Resources from the Recovery and Resilience Facility specifically for skills investment cannot yet be estimated

4.5 Entity responsible for implementation

The entity responsible for the implementation of the pilot course in Austria is defined in the detailed project description according to the Work plan and is represented by Agrar Plus (AP). The responsibility of AP will be to make teachers and facilities available for the "Operator for Digitalization in agriculture, food industry and forestry" course as well as to supervise its development and evaluate its effects. The content providers (for Austria: LVA) will provide support on technical issues related to the content during the activities of WP4.

4.6 Output indicators

From the list of ESF-Indicators (European Social Fund – Indicators, Reference), the following are the most appropriate ones in this project:

- Inactive participants, seeking for a job after their participation
- Participants that have a workplace after their participation, including self-employed workers
- Participants, who manage to get a job within six months after their participation, including self-employed workers
- Participants whose working situation has improved within six months after their participation
- Disadvantaged participants, who manage to get a job within six months after their participation, including self-employed workers

5. The ambition

5.1 National Focus on skill needs and Occupational profiles

In Austria, the quality of already existing available training is very high. The existing offer largely covers the skills and knowledge of the FIELDS occupational profiles. One of the shortcomings however is the target group outreach, i.e. the target employees possibly are not informed about the large offer. A possible integration of this large offer in the FIELDS curricula is considered – however, the creation of strong adequate channels of communication, where we can promote our offer and make it visible for target groups lies within our prime focus.

5.2 Life-long learning perspective to both employers and employees

Life-long learning is becoming increasingly important in the face of rapid change. Initial training continues to provide the necessary basis in the life of the working population, but permanent higher qualifications and ongoing education are absolutely essential in our knowledge and service society in terms of being able to adequately meet the rapid change in social structure, economy and technology in the sense of lifelong learning. (Reference: i2connect)

5.3 Partnership building contributing to agri & food and forestry pacts for skills.

The key partners to be included in an Agrifood or Forestry Pact for Skills are the following stakeholder groups: VET providers (VET schools, VET providers, HEI, other educational providers), policy makers (ministries, regional and local authorities, regulatory bodies, Educational Agencies), decision makers (farmers, coops, foresters, food industries,…), Advocacy (representative bodies e.g. Farmers and AgriCoops Confederations, Food Industry Federations, Trade Unions, Professional Associations/Registers, Chambers of Commerce/Agriculture, Universities, VET and Training Agencies, Student Associations, Advisors…). On National level, a pact for skills shall be structured as following: (1) decision makers, (2) funding, (3) incentive structure for participants and (4) affected parties/interest groups.

6 The proposal and commitment

6.1 The governance and national p&c

A clear Governance structure is important for the vital success of the integration of the FIELDS curricula in Austria. Therefore, a detailed governance system will be implemented according to the uprising governance structure elaborated in the frame of the European Pact for Skills. This European governance system will then be adapted on a national level, to assure the success.

7 Evaluation

7.1 Assessment approach

For the assessment of a pact for skill partnership, the following factors shall be used:

- the stakeholders actively involved
- a regularly obtained feedback from addressed partners
- the training programs and trainees involved
- useful quality criteria depending on target definition.

7.2 Key performance indicators

As Key Performance Indicators to measure the performance of a training module, (1) the number of students, companies and participants may be measured, and (2) the achievement of learning goals and student evaluation of training modules may be used.

ANNEX 2 – Questionnaire on key topics

Fields task 2.4 National roadmaps

Questionnaire/topic list for National experts to feed National Roadmaps in the 7 target countries (preliminary deliverable 2.4, Month 33 – 11/22)

The aim of the FIELDS project is to contribute to skill enhancement of workers in the agriculture, food industry and forestry sectors, to be able to make full use of the opportunities and comply with requirements of the ‘’Twin’’ Green and Digital transition. The FIELDS project focuses on the domains Digitalization, Sustainability, Bio-Economy and Management & Entrepreneurship. Skills include ‘’hard’’/ measurable and technology based skills as well as soft / social and experience based skills.

The National Roadmaps are a national declination of the European Strategy and therefore should follow the same structure and aim, taking into consideration the following elements:

- Identification and prioritization of job profiles and skill needs specific to the country (as defined in FIELDS tasks 2.1 and 2.2)
- The definition of major training modules (a coherent group of skills in a job profile; the focus in this questionnaire is on essential skills and essential knowledge).
- Key conditions under which these training modules are to be developed, as discussed in WP1 of the FIELDS project, but also aspects such as social fairness, VET flexibility and resilience, VET organization and governance etc.
- Definition of a pathway to agrifood and forestry pacts for skills/partnership, identifying main elements of governance and monitoring.
- The assessment of both the training modules and the programs of the partnership.

This questionnaire aims to capture multiple stakeholder national views on Life-long learning and specific training needs and opportunities. The questionnaire covers a number of topics; for every topic we keep job profiles as selected in WP2.2 and the European Strategy drafted in Wp2.3 as starting point.

Questionnaire

Please insert your answers, in different color letter type, below the related question *(Even if you are not an expert on the topic, your opinion/insight will be valued!!)*

Country needs

1. How do you rate the quality of training available to employees in your country? To what extent does the training currently available meet the needs of employers?

The quality of the training offered is very high. The existing offer largely covers the skills and knowledge in the FIELDS occupational profiles. It is questionable if the target employees know about this large offer – knowing that it would be easier to know how we can promote our offer and make it visible for the target group(s).

2. Which actors are more responsible for addressing these needs and gaps?

Universities, universities of applied sciences, HTLs, organizations that offer further training (LFI, WIFI, BFI) and advisory services.

3. Is there evidence on the current status of digital skills and literacy among farmers and SMEs?

Wide range - depending on interest or depending on area of responsibility: user level; certain digital competence available.

Certain barriers (new technologies, new programs), depending on personal interest more openness, more or less/ networking with people with computer know-how (acquaintances)

Cost-benefit consideration/effort, but general idea: it shall bring benefits (work facilitation)

4. What is the availability of agri-food-related education programs? Are such programs evaluated in terms of their adequacy for todays and future jobs in the agri-food sector?

Offer available, needs improvement, evaluation indirectly via graduate associations. Professional education providers have evaluation/feedback forms (part of QM systems).

5. How do you evaluate the system for validating the skills acquired through the training of employees?

Needs improvement.

Training modules

6. What specific training modules (coherent groups of skills) or Occupational Profile as a whole do you recognize as most relevant and needed in the Agri-food sector in your country?

From the 2020 focus group: sustainability, knowledge about value chains (understanding the value chain (what are the others doing), stronger cooperation, organization and team building, also: digitalization, specialization.

7. What are key management and soft skills fitting with the profiles needed? (please use the skill list from the ‘’Basic Module for each occupational profile’’ as defined in WP2.1)

From the 2020 Focus Group: Communication

8. For which training modules (coherent groups of skills) is practice most important? How to connect to working practice? What role do you see for apprenticeships?

Digitization (training for each new device/software) - needed in application, what are the roles of apprenticeship training: important features, need to master application.

Target groups

9. Can you identify specific target groups (e.g. age, education level, cultural background, ...) for these training modules? For which target groups the identified training modules are essential for job retention (i.e. through upskilling)? Can you give examples?

Digitalization: age-appropriate further training

Sustainability; Sustainability, Knowledge on Value Chains and Communication: all.

Seminar Series: Professionals, LLL (Life Long Learning)

10. For which training modules gender issues play a role (access to training and/or jobs because of cultural values, ...). And with respect to underprivileged groups you are aware of?

Do not play a role.

11. Do social and demographic change (aging of workers, labor mobility, increasing number of migrant laborers) impact on the training modules distinguished? How to take these effects into account?

Not really, interest of the trainees has an influence, adaptation to the different levels of training.

Resources

12. How to deal with lack of time or funding of potential trainees? (if possible please give examples for training modules as identified).

Lack of time: The solution could be different seminars that are recorded, which the trainee then listens according to his/her availability. Subsidized further training offers, support/cost absorption from Employer; training being part of the working time, this would increase participation rate.

13. Can you think of specific resources supporting inspiring learning environments for the trainees?

Bringing the common point of the learning might develop on a fruitful networking tissue.

14. How to improve attractiveness of the jobs (profiles)? Can you give examples?

Adequate payment, appreciation of the sector (importance/awareness of food/supply security in Austria).

Online training

15. What are typical training modules that are suited for online training?

Basically all - format needs to be agreed (tutorials), certain modules need practice.

16. Because of COVID a move to more online education may be expected. Do you recognize this in your sector? Are there short term consequences for the training modules identified?

Noticeable everywhere, a lot of experience gained in the last 2 years with webinars, farminars. Improvement of hardware equipment.

17. What are main challenges in the digital education infrastructure in your country with respect to these job profiles and training modules?

High-performance internet (even in the most remote rural areas); also challenges from training staff has to be considered: ressources, increased time requirement, staff shortage, need for skills for professional preparation/recordings.

Skill ecosystem resilience, harmonization and monitoring

18. Skill (and training) needs are developing fast. Which of the training modules in the job profiles is most dynamic in your opinion? How can training modules be made dynamic? Which should have priority for a dynamic set-up?

Digitization in any case.

19. Which training modules are most suited for life-long learning? Which target groups (SMEs, farmers, age, gender, …?)

All, but specially hard-skills which will be developed and mastered through practice in their professional life.

20. Are you aware of monitoring practices to monitor the skills ecosystem and to identify dynamic skill/training needs at a national level?

Exchange with target groups, active collection of feedback, working groups (e.g. pig farmers, poultry farmers), exchange with peer group.

21. What are main challenges you are aware of, to exchange and harmonize training modules and best practices in your country for these job profiles (different education systems, different training needs, national regulations ...?)

Regional conditions/specialities, differences in farm sizes/structures (have different needs) (differences in basic education in Europe)

Partnership

22. What are key partners to be included in an Agrifood or Forestry Pact for Skills? Please look whether the below mentioned group of stakeholders is complete, whether you can add important stakeholders or whether stakeholders mentioned should be left out.
    - Considering groups of stakeholders (adapted from D1.3 page 4)
        - VET providers (VET schools, VET providers, HEI, other educational providers)
        - Policy makers (ministries, regional and local authorities, regulatory bodies, Educational Agencies,….)
        - Decision makers (farmers, coops, foresters, food industries,…..)
        - Advocacy (representative bodies e.g., Farmers and AgriCoops Confederations, Food Industry Federations, Trade Unions, Professional Associations/Registers, Chambers of Commerce/Agriculture, Universities, VET and Training Agencies, Student Associatons, Advisors….)
    - European level partners, such as: Copa-Cogeca, FDE, ISEKI, CEPI, EfVET, LLLP, Cedefop, EIP-agri, ETPs, European federation of food science and technology (EFFoST), Safe and sustainable food system partnership (SSFS), Professional organizations, ...?
23. How should EU and/or National governance of a public-private pact for skills be structured:
    - decision makers (Question 22.)
    - funding
    - incentive structure for participants

    - Affected parties/interest groups

Assessment of the partnership and of training modules (please select and/or define indicators that you think are most important)

24. How to assess a pact for skill partnership? For example:
- Stakeholders actively involved
- Obtain regular feedback from addressed partners.
- training programs and trainees involved
- Meaningful quality criteria

25. Which are key indicators KPIs to measure performance of a training module? For example:
- Number of students, companies, participants; x
- Achievement of learning goals and student evaluation of training modules x

9.2 Annex II: France

Introduction

The aim of the FIELDS project is to contribute to skill enhancement of workers in the agriculture, food industry and forestry sectors, to be able to make full use of the opportunities and comply with requirements of the ‘’Twin’’ Green and Digital transition. The FIELDS project focuses on the domains Digitalization, Sustainability, Bio-Economy and Management & Entrepreneurship. Skills include ‘’hard’’/ measurable and technology based skills as well as soft / social and experience based skills.

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- Key conditions under which these training modules are to be developed, as discussed in WP1 of the FIELDS project, but also aspects such as social fairness, VET flexibility and resilience, VET organization and governance etc.
- Definition of a pathway to agri-food and forestry pacts for skills/partnership, identifying main elements of governance and monitoring.
- The assessment of both the training modules and the programs of the partnership.

Method – NWG

The roadmap will be prepared by AC3A – Association of the Chambers of Agriculture of the Atlantic Area. AC3A will be setting up in 2023 a national working group and a survey for the development of skills in the agriculture, forestry and bioeconomy sectors in France.

Composition and actions of the working group: **To be completed**

Context of education and policies at National level

The national education system and training needs related to the FIELDS objective

The content for this first draft is based on CEDEFOP's publications analyzing the context in France[2].

It will be updated in 2023 according to data collected through the working group.

In France, education is compulsory from 3 to 16 years of age; a training obligation has been set up for youth aged 16 to 18 by the Law for a school of trust in 2019. At secondary levels, three distinct pathways are offered: general, technological and vocational education (see figure 1).

Initial education and training at EQF level 3 and higher covers two different paths:

(a) school-based path in a high school, in which the lessons are taught by 'teachers'.

(b) in apprenticeship (accessible to young people up to the age of 29), alternating between an apprentices training centre (CFA, *Centre de formation d'apprentis*), in which the lessons are taught by 'trainers', and a company where they are 'apprentices mentors'. At the end of lower secondary education EQF level 3 (*classe de troisième*), 27.2% of pupils move towards vocational training with school status and one in twenty of school status students choose to enter apprenticeship training directly. All professional diplomas and vocational qualifications are accessible via both channels.

[2] https://www.cedefop.europa.eu/en/country-reports?search=&year=&country=325&sort_order=DESC&items_per_page=24

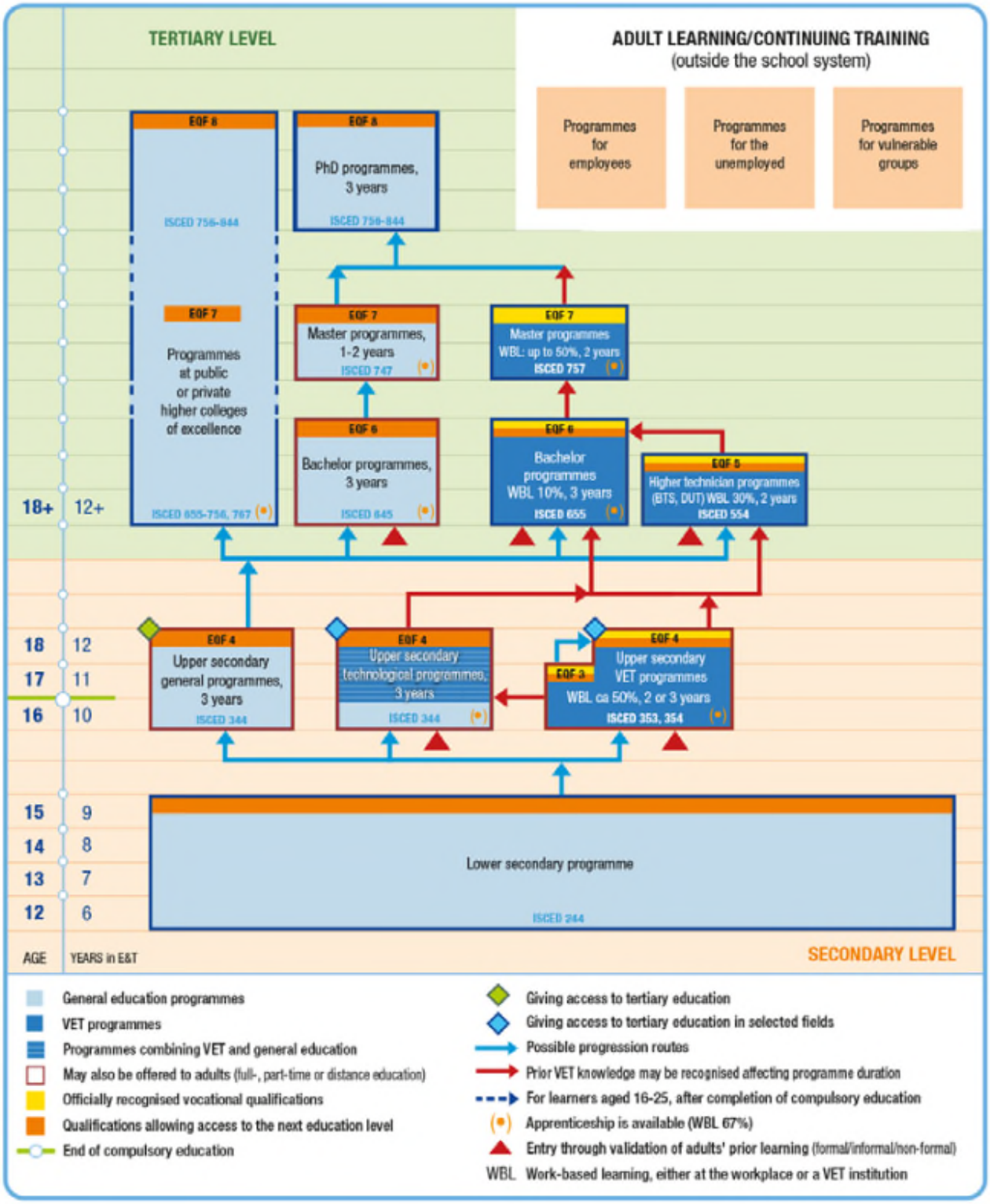


Figure 1 : pathways in French Educational system

Main Challenges

French agriculture is in a restructuring phase: the number of farms is decreasing and agricultural activity is concentrated in increasingly large farms. As in most European countries, this process has been underway for a long time, since the middle of the 19th century in France. But the real turning point came at the beginning of the 1960s when a modern agricultural policy was put in place, first within a national framework and then within a European framework. From this date on, the modernization of agriculture is engaged and leads to an erosion of the number of farms. At the time of the 2010 agricultural census, there were 516,000 farms in France (Metropolitan France and the French overseas departments), compared to 665,000 in 2000. Today, this long-term demographic trend is continuing and is not likely to stop soon. Indeed, the last agricultural census in 2012 revealed that in some French regions, among farmers over 50 years of age (and who would therefore cease their activity in ten years at most), only 40% of them knew the young farmer, who would take over their farm.

Source: Chambers of Agriculture

Priorities in the Agri-food-forestry sector

France follows the general EU long-run employment trend of decline in agri-food. In 2000, agri-food accounted for just under 11 per cent of all employment in the EU-27 but this had fallen to around 6.5 per cent by 2019. This is largely the result of the fall in employment in agriculture given that employment in food, beverages, and tobacco manufacture has remained more or less stable over time.

An initial assessment of the agri-food sector's skill needs demonstrates that much of it is at a level which has traditionally been served by VET through, for example, programmes such as apprenticeships. In other words, much of it is at EQF levels ranging from 3 to 5. Employment in skilled agricultural work has fallen substantially, as a share of overall employment, over a relatively short period of time, indicating that skill needs are changing relatively rapidly. To assess the drivers of skill change in the agri-food and how these are shaping current and future skill demand, an assessment of skill needs is needed.

To Be Completed

Summary of the main training modules

Based on the skills needs and estimation of exciting trainings described above, the FIELDS training modules can be prioritized as follows:

Main training modules	Priority
FORESTRY	
1.The Technician for sustainability, digitalization and bioeconomy in Forestry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability and bioeconomy requirements and to implement digital technologies in all aspects related to the production and management of a forestry related business. These tasks usually include (in a forestry related business): - Monitoring and improving the efficient and sustainable use of resources (including energy) and their circularity - Implementing and monitoring sustainable processing technologies and the transformation of primary products - Implementing and monitoring of the application of bio-economy principles to all production processes, including sustainable packaging, waste management and valorisation - Implementing and improving digitization- and digital techniques, methodologies and procedures, including the use of drones and robots for sustainable forestry - Managing operations, including sustainable product development, raw materials purchasing, identification of new marketing chains etc., with particular attention to the sustainability of processes and products and the principles of circular economy	**TBC**
BIOECONOMY	
2.The Technician for Agriculture in Bioeconomy (LEVEL 5) manages and controls the production processes by identifying and coordinating procedures useful for saving resources and developing the company according to the reference territorial context. Tasks performed usually include: - manage the operational organization, the implementation of continuous improvement procedures - monitoring and evaluation of the results using digital methodologies and technologies - oversight of executive activities carried out by others - technical training in the use of methodologies, tools and information specialized in the bioeconomy - management of production addressing areas such as investments, marketing chains, etc. - design and Implementation of sustainability processes and products.	**TBC**
3.The Technician for Food industry bioeconomy (LEVEL 5) performs technical tasks to support the development of the company from a bioeconomy perspective in aspects related to production, management and business. Tasks performed usually include: monitoring the efficient and sustainable use of resources (including energy), implementation and monitoring bio-economy principles applied to food processing, sustainable packaging, waste management and valorization, implementation and monitoring of continuous improvement procedures, identification of new marketing chains, administrative tasks and supervision of activities carried out by others.	**TBC**
4. The Operator for Bioeconomy in agriculture, food industry and forestry (LEVEL 4) operates at executive level in the field of agricultural -, forestry -, or agri-food production, focusing at implementation of bio- and circular economy principles. The operator applies relevant methodologies, tools and information to collaborate in the production, management and business activities of companies active in bio-economy and	**TBC**

/or circular economy. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures to run and improve a production system based on the circular economy principles. - Carrying out fundamental operations for sustainable (e.g. circular) use of resources and transformation of primary products, within the production processes of agricultural, forestry, or agri-food sectors. - Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	
SUSTAINABILITY	
5.The Technician for sustainable agriculture (LEVEL 5) performs technical tasks related to production, resources preservation and company development according to sustainability requirements and the local context. Tasks performed usually include: - the supervision and control of production processes - the implementation of continuous improvement procedures - monitoring and evaluation - identifying and coordinating procedures useful for resource preservation and developing the company according to the local context - Operational organization - the implementation of regulations of continuous improvement procedures - the monitoring and evaluation of the results using digital methodologies and technologies. the supervision of activities carried out by others - management of production addressing areas such as investments, marketing chains, etc. - Design and Implementation of good agricultural practices, sustainability processes and products.	**TBC**
6.The Technician for Sustainable Food industry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability requirements in the production, management and business activities of a food company. These tasks usually include: purchase of sustainable raw materials, monitoring the efficient use or resources, implementation and monitoring of sustainable processing technologies, sustainable product development and packaging, waste management, implementation and monitoring of continuous improvement procedures, sustainable marketing chains, administrative tasks and supervision of activities carried out by others.	**TBC**
7. The Operator for Sustainability in agriculture, food industry and forestry (LEVEL 4) intervenes at the execution level. The operator applies basic methodologies, tools and information to collaborate in the sustainable production, management and business activities of the company. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures resulting in protection of the environment and biodiversity within the agricultural, forestry and food industry production processes. - Application of practices and procedures to ensure sustainability (e.g. sustainable use of resources, reduced emissions, human rights) in the agricultural, forestry and food industry sectors. - Taking responsibility in the production processes and management systems to ensure the sustainability of the production operations, in the agricultural, forestry and food industry sectors. Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	**TBC**

DIGITALISATION	
8.The Technician for agricultural Digitalisation (LEVEL 5) performs technical tasks related to the programming, management and supervision of industrial machines, plants and automatic systems, integrating and connecting them according to the new needs of the Smart Farm. Tasks performed usually include: - programming, robotics and advanced industrial automation - Push connectivity (IOT; IIOT) - assembly, hardware and software configurations - testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems. - selection and management of production systems and the definition of maintenance policies for production systems and after-sales - integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	**TBC**
9.The Technician for Food Industry digitalisation (LEVEL 5) performs technical tasks to support the implementation of digital technologies according to the needs of the new Smart Factory; dealing mainly with programming, management and supervision of industrial machines, plants and automatic systems, their integration and connection. Tasks performed usually include: - sensor programming, robotics, and advanced industrial automation - -pushed connectivity (IOT, IIOT) - assembly, hardware and software configuration, testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems - selection and management of production systems and the definition of maintenance policies for production systems and after-sales - integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	**TBC**
10.**The Operator for Digitalisation in agriculture, food industry and forestry (LEVEL 4)** operates at executive level in the field of sustainable agricultural, forestry, or agri-food production, focusing at maintaining digitized processes or digitalisation of sustainable production processes. The operator applies relevant methodologies, software and hardware tools and information to collabour ate in the production, management and business activities of agricultural, forestry or agri-food companies. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures to run and improve digitized production processes within the field of sustainable production in agriculture, food industry and forestry sectors - Using drones and robots in different activities of the agriculture -, forestry -, and food industry. - Analysing and handling data. - Providing support in the different phases of the agriculture, forestry and agri-food production processes, using digitized machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	**TBC**

The Action Plan

This action plan describes the measures, course content, number of trainees and cost estimation of the pilot training and an assessment of possible challenges and risks related to the implementation of the FIELDS training to be piloted in France.

As the training pilot in France is targeted at farmers following training through advising channels, one of the goals of the pilot is to enable them to choose the training components that serve their respective skills development needs.

The purpose of the pilot is to test the suitability of the training for the selected target group and to obtain feedback for further development of the training. To this end, this Action Plan will identify specific training modules that are particularly useful for testing and for which participants will be directed to participate.

A clear statement of activity

To be completed

Time period

The lessons will be implemented in April-December 2023.

Quantity of inputs/outputs and unit costs

To be completed

Source of funding

The direct costs of training the trainers will be covered by the FIELDS project budget. The implementation of training will then be integrated in existing training modules aimed at farmers. These trainings are generally financed by existing training support for farmers. Additional work linked to the integration of the FIELDS modules into the training and to the management of monitoring (assessing the content, feedback from the participants, etc.) will be covered by the FIELDS project.

Entity responsible for implementation

The implementing agency for the pilot training described here in France is the Chambers of Agriculture, through the proxy of AC3A acting as the umbrella organization for the chambers.

Output indicators

To ensure the success of the pilot training, a feedback survey will be sent to the participants in the various lessons to assess the usefulness, delivery and adequateness of the training content. The attractiveness of the trainings will also be assessed through a feedback questionnaire addressed to the trainers.

The Ambition

To be completed

National Focus on skill needs and Occupational profiles

To be completed

Life-long learning perspective to both employers and employees

To be completed

Partnership building contributing to agri & food and forestry pacts for skills.

To be completed

The proposal and commitment

The governance and national p&c

To be completed

Evaluation

Assessment approach

To be completed

Key performance indicators

To be completed

9.3 Annex III: Finland

Introduction

The aim of the FIELDS project is to contribute to skill enhancement of workers in the agriculture, food industry and forestry sectors, to be able to make full use of the opportunities and comply with requirements of the ‘’Twin’’ Green and Digital transition. The FIELDS project focuses on the domains Digitalization, Sustainability, Bio-Economy and Management & Entrepreneurship. Skills include ‘’hard’’/ measurable and technology based skills as well as soft / social and experience based skills.

The National Roadmaps are a national declination of the European Strategy and therefore should follow the same structure and aim, taking into consideration the following elements:

- Identification and prioritization of job profiles and skill needs specific to the country
- The definition of major training modules (a coherent group of skills in a job profile; the focus in this questionnaire is on essential skills and essential knowledge).
- Key conditions under which these training modules are to be developed, as discussed in WP1 of the FIELDS project, but also aspects such as social fairness, VET flexibility and resilience, VET organization and governance etc.
- Definition of a pathway to agri-food and forestry pacts for skills/partnership, identifying main elements of governance and monitoring.
- The assessment of both the training modules and the programs of the partnership.

Method – NWG

This roadmap has been prepared by the Association of ProAgria Centres by using the views of the national working group and the survey results, plans and guidelines for the development of skills in the agriculture, forestry and bioeconomy sector prepared in other contexts of Finland. As the Federation of ProAgria Centres is the only actor in the FIELDS project in Finland, the Finnish roadmap emphasizes agriculture.

The composition of the national working group combines strong experience and vision of agriculture in Finland, which was brought to the working group from educational policy, vocational training and farm management perspectives. Members of the national working group are:

- Timo Teinilä/ Savonia University of Applied Sciences (Savonia UAS), Häme University of Applied Sciences (HAMK)

- Ari Toivonen/ ProAgria Southern Finland

- Susanna Lahnamäki-Kivelä/ AgriHubi - Knowledge Network for Farm Enterprises, Natural Resources Institute Finland

- Mikko Hakojärvi/ Mtech Digital Solutions

- Susanna Kumpulainen/ The Central Union of Agricultural Producers and Forest Owners (MTK), Chairman for the Skills Foresight Group

- Tauno Paakkari/ Farmer, ProAgria Oulu

- Timo Seppälä/ The Federation of Education in Jokilaaksot – Vocational Education Centre JEDU

- Krista Mikkonen/ Association of ProAgria Centres (facilitator and secretary)

The national working group met in Teams on 20th of June 2022 and 25th of August 2022 for two hours each time.

The discussions of the national working group were lightly based on the questionnaire developed by the FIELDS project. The discussion was directed into topics for which no information for the roadmap could be found in public sources or from internal discussions of the ProAgria Centres Association staff.

Context of education and policies at National level

The national education system and training needs related to the FIELDS objective

The Skills Foresight Group on Natural Resources, Food and Environment provides information on future skills and training needs for the National Skills Foresight Forum. The National Skills Foresight Forum promotes dialogue between working life and education together with the Ministry of Education and Culture and the Finnish National Board of Education.

(Source: Osaamisen ennakointifoorumi (OEF) | Opetushallitus (oph.fi) 3.8.2022)

The statement of the Skills Foresight Group on Natural Resources, Food and the Environment of 15 May 2019 summarizes that Finland has traditionally had a good level of expertise in the use of renewable resources, the circular economy, food quality, nutrition, food security and the state of the environment. However, this good situation has been deteriorating for years due to general cuts in teaching and research resources. This is due in particular to the fact that, for economic reasons, education providers have reduced the number of students in small fields of study. These include natural resources, food production and the environment. These sectors also have higher than average organizing costs. The attractiveness of some of these sectors has declined, which partly explains the gaps in the knowledge system.

The problem is reflected in the level of access to education and training:

Between 2014 and 2018, the number of priority applicants for vocational training in the natural resources sector has decreased by 37% and the number of applicants for the food sector by 44%. There has also been a slight decrease in the number of applicants to higher education. (Source: Statement of the Foresight Group on Natural Resources, Food and Environment, 15.5.2019: ASIAKIRJAPOHJA OPH)

The same statement summarizes the labour needs of the sectors; labour demand in agriculture and food manufacturing will remain at 2015 levels until 2035. In forestry, an increase in labour demand is foreseen until 2035.

The skills of the future will combine business skills, skills in the use, management and control of digital operations, and skills related to the environment and sustainability. In addition, the need for circular economy and environmental skills is expected to grow in all sectors. (Source: Statement of the Skills Foresight Group on Natural Resources, Food and Environment 15.5.2019): ASIAKIRJAPOHJA OPH)

According to a recent publication by the Finland-based Service Centre for Continuous Learning and Employment Finland has recently seen an increase in skills requirements, especially in digital skills and the green transition related competences of climate change, circular economy and bioeconomy.

(JOTPA: National Learning Gaps - Forecast results and snapshot for 2022: Valtakunnalliset osaamiskapeikot – ennakointituloksia ja tilannekuva vuodelle 2022 - JOTPA Valtakunnalliset osaamiskapeikot – ennakointituloksia ja tilannekuva vuodelle 2022.pdf)

The digital-green transition is also a key driver for the design of FIELDS training programmes, so this assessment by the Service Centre is fully in line with the FIELDS objectives.

Short analysis of education and training requirements specified in the national legal and regulatory framework associated with job profiles and skill needs identified

FIELDS occupational profiles

1. Technician for agricultural digitalization

2. Technician for food industry digitalization

3. Technician for agricultural bioeconomy

4. Technician for food industry bioeconomy

5. Technician for sustainable agriculture

6. Technician for sustainable food industry

7. Technician for sustainability, digitalization and bioeconomy in forestry

8. Operator for digitalization in agriculture, food industry, and forestry

9. Operator for bioeconomy in agriculture, food industry, and forestry

10. Operator for sustainability in agriculture, food industry, and forestry

FIELDS occupational profiles do not directly include any training or qualification required by law in Finland.

Although there is no need for legal qualification, many business activities in Finland require a license or a submission of a declaration.

As FIELDS occupational profiles can serve a wide range of business activities, the need for licensing will need to be reviewed as the business activity becomes more specific. Once the nature of the activity is clear, the license requirement can easily be checked via the Suomi.fi online service for Finnish citizens and entrepreneurs: Luvat - Suomi.fi

In Finland, the development of know-how in the agricultural, bioeconomy and circular economy is also indirectly guided by subsidies for business activities in these sectors. As Finnish agricultural subsidies are based on the EU's Common Agricultural Policy, the skills required for FIELDS occupational profiles are well aligned with Finnish agricultural subsidies. Therefore, the development of skills required for these occupational profiles in Finland also benefits the learner from a subsidy perspective.

Evaluation of the number of personnel within identified professional categories that will require training matching "fields profiles"

Training needs by sector

Finland has a National Skills Foresight Forum, which comprehensively gathers and collects information on the training and skills needs of different sectors, taking into account the needs of working life. The Natural Resources, Food Production and Environment foresight group focuses on the needs of these sectors.

The Skills Foresight Forum has produced training needs cards by industry groups, which include information on the size of the labor force in 2016, the estimated labor force in 2035, job openings in 2017-2035 and the level of skills needed in jobs by level of education. The information contained in the cards has been compiled in a comprehensive way from various sources. The cards can be found here: https://www.oph.fi/sites/default/files/documents/osaamisen-ennakointifoorumi-koulutustarvekortit-verkkoversio_2_0.pdf

Below is a selection of information from the training needs cards for agriculture, food and forestry.

It is estimated that 36 300 new jobs will be needed in agriculture, fisheries and veterinary services between 2017 and 2035. Of these, 55%, or 19 965 persons, are estimated to need vocational training. This figure does not include an estimation of the number of people who will need to upgrade their skills up to 2035. These figures alone indicate a high number of people in need of vocational training in agriculture.

The number of new workers in food processing is estimated to be at 16 500 by 2035. Of this number, 69% will be vocationally trained, i.e. 11 385 people. At the same time, the sector will still employ an estimated 57% of the current workforce, i.e. 19 437 people. This group can be expected to require further training, of which the number of new employees expected to be allocated to the professional level is equivalent to 13 412. Based on

the above estimates, by 2035, 11 385 + 13 412 people will need vocational training in food processing in Finland, or 24 800 people in round figures.

In the forestry sector, according to the training needs cards, 8,249 people entering the sector will need vocational training. Assuming that all workers still working in the sector at that time will undergo further or additional training, the number of these people will be 4,598. Thus, the total number of people to be trained in the forestry sector by 2035 is roughly 8250+4600= 12 850 persons.

The Skills Foresight Group on Natural Resources, Food and the Environment has identified a quantitative challenge in the forestry sector; the high number of people leaving the sector for other sectors compared to the number of people entering the sector, in particular the lack of suitable students for forest machine operator training. It is also seen as a problem that forestry vocational training units are far from the inhabitant centers, which affects the attractiveness of the training.

(Source: JOTPA: National skills gaps - Forecast results and snapshot for 2022)

VET providers system (flexibility, resilience, organization and governance etc.)

In the year 2018, Finland implemented a reform of vocational education and training.

In Finland, people continue to vocational education and training after completing basic education or in case they do not yet have a vocationally oriented qualification. Vocational qualifications are also obtained by people who are already in working life. The focus of training is on the acquisition of missing skills. Training is provided not only in schools but also in workplaces and virtual environments, for example.

Vocational education and training is flexible according to the needs of the student. VET offers the possibility to complete a full qualification, a part of a qualification or only one part of a qualification.

VET must respond to the constantly evolving needs of the working life. It must also respond to the needs of individuals for different types of vocational skills. In Finland, the role of vocational education and training is to ensure that a sufficiently skilled workforce is available in high employment sectors. It must also provide skills for small specialized sectors.

(Source: Ammatillinen koulutus Suomessa | Opetushallitus (oph.fi) Data retrieved 1.8.2022)

Development needs of the current system

The 2022 publication on the skills development pathways of the Service Centre for Continuous Learning and Employment has identified a number of areas for improvement in the current system of vocational skills development, the most interesting of which for the FIELDS project are highlighted below.

According to the Service Centre's publication, the organization of professional competence development must take into account the individual's self-motivation and desire to learn. This requires both easily accessible skills services and specific training at the level of the education system. In the future, there will be an increasing need for further and continuing training in the workplace immediately after employment (e.g. vocational and specialized qualifications).

This type of module-based and skills-based continuing training is currently partially supported by the VET qualification system. It is possible for students to complete parts of the qualification in a flexible way. Skills modules jointly developed by enterprises and training providers, combining working life tasks and new competences, are seen as an important means of extending on-the-job training. In this context, there is a need to develop the skills of workplace trainers, particularly in terms of knowledge of qualification requirements.

The Centre for Continuous Learning and Employment's publication National Skills Capacities - Forecasts and Snapshot 2022 suggests that qualification requirements could be reformed to allow more individual flexibility. The publication suggests that qualifications could be more consistent in their content or more permanent. Qualifications provide a solid basis for skills and employment in a job at the appropriate level. However, there should be more flexibility in teaching, so that it can always be adapted to the individual student's situation and existing skills.

The same assessment also identifies the appropriateness of shorter staff training and periodic on-board training, particularly for seasonal and part-time work. The whole population is also estimated to need non-degree skills development during their working life. Specific mention is made of fast-cycling sectors where qualifications cannot keep pace with skills development. In addition, the Covid-19 pandemic is said to have demonstrated the importance of flexibility in workers' skills. Consequently, training must also become increasingly flexible and adaptable.

In order to improve access to further training, the publication also calls for further efforts to recognize prior learning, taking better account of work experience, education and other individual skills. Complementary non-formal training would be supported by skills mapping services and, at the same time, by timely and accurate foresight of skills demand.

The Service Centre for Continuous Learning and Employment will collect and analyse the content and trends of competences related to the green transition. As a recommended source of information in this respect, the Service Centre mentions the European sustainability competence framework GreenComp. The framework provides a response to the growing need for people to improve and develop knowledge, skills and attitudes to live, work and act in a sustainable way. What makes GreenComp particularly noteworthy in the FIELDS project is its purpose to support lifelong learning education and training programs.

(Source: Valtakunnalliset osaamiskapeikot – ennakointituloksia ja tilannekuva vuodelle 2022 - JOTPA Valtakunnalliset osaamiskapeikot – ennakointituloksia ja tilannekuva vuodelle 2022.pdf)

Flexibility in skills development was also noted in the discussions of the FIELDS project's Finnish national working group, which highlighted the need for strong cooperation and networking between institutions in order to meet the diverse needs of students.

A recent example of excellent educational flexibility was mentioned. In Southwest Finland, a course in engineering for Ukrainian women fleeing the war in Ukraine had been quickly put in place in the spring. This was done because the men who had previously done the work in question stayed in Ukraine to fight. The machine course was completed within a few weeks of the need arising. This was helped by the opportunity to do a part-time degree.

The working group also raised the possibility of micro credentials or mini-diplomas. This option was considered to be of particular interest to students changing to a new career in agricultural counselling.

According to Marjatta Säysä, Counsellor for Vocational Education and Training, microcredentials are under discussion in Finland. At the moment, a degree component is the smallest unit recognized by our formal education system. According to Säysä, microcredentials may be particularly suitable for competences that involve the issuing of licences or permits, such as the hygiene passport.

Quality of training

In Finland, the Finnish National Board of Education is responsible for developing quality management in vocational education and training and supporting education and training providers in developing inhouse quality management. However, VET providers themselves are responsible for the quality of the qualifications, training, and other activities they organize and for the continuous improvement of quality management. An important element of the overall quality management system are the workplace committees, which take part in ensuring the quality of the skills assessment relating to vocational degrees.

The Finnish National Board of Education is responsible for acting as the Quality Assurance National Reference Point (NRP) for VET quality management. It develops quality management in cooperation with the European Quality Assurance Network EQAVET and the National Reference Points.

Ammatillisen koulutuksen laadunhallinta | Opetushallitus (oph.fi) (Data retrieved 1.8.2022)

Main Challenges

In Finland, farmers and farms differ significantly, particularly in terms of production type, size, life cycle stage, strategy and economic situation. As a long country in the north-south dimension, the climate is also very different, especially in Lapland and on the southern coast. The number of farms has decreased significantly in recent years, while their average size has increased. The increase in average size is accompanied by an increase in the number of workers employed on farms. Employment is expensive in Finland and as farm size increases, there is a stronger tendency towards automation and using new technology, for example, more than a third of milk is now milked by milking robots.

Farm profitability has been a major problem, especially in recent years. Even before Russia's invasion of Ukraine, dairy production was already suffering from the sanctions imposed on Russia, which led to a sudden end to significant exports of dairy products to Russia.

Agricultural support and subsidy systems appear to be becoming more complex. In Finland, the media and social media are blaming agriculture for climate change, making new demands for animal welfare, etc. Farmers are experiencing increased stress and pressure from public opinion. More attention needs to be paid to farmers' well-being and well-being in the future.

The role of the farmer is generally becoming more entrepreneurial. Farm development is becoming more and more like the development of any other business, with its strategies, visions, missions, budgets and action plans. This change has been rapid and farmers need more knowledge about business management.

There are new expectations for advisory work. The farmers of the future are more educated and need more specialized advice. The role of the adviser is becoming more and more similar to that of a business coach. They work as consultants, using new methods in an interactive way. Their work will need to be supported by greater use of digitalization and artificial intelligence, as well as support functions to save working time and control costs.

(Source: Jaana Kiljunen/ Association of ProAgria Centers)

Priorities in the Agri-food-forestry sector

The publication of the Centre for Continuous Learning brings together a number of surveys and studies related to skills foresights. From the perspective of the FIELDS project most interesting ones are pointed out below.

The publication summarizes the results of the report of the Skills Foresight Forum "Skills Structure 2035". The report identifies the main future skills needs by sector. The skills needs that are combined with the natural resources, food production and environment sectors are:

- skills in the use of digital solutions

- skills in managing and controlling digital operations

- skills in the use of digital platforms

- innovation skills

- automation management skills

In these areas, circulating water farming skills, management of digital feeding systems, management of GPS and geographic information systems, management of harvesting guidelines and knowledge of environmental

legislation in agriculture and forestry are becoming increasingly important. (Source: JOTPA: National skills gaps - Forecast results and snapshot for 2022)

These future skills identified in the study are very similar to those identified in the FIELDS project. Of the above, the FIELDS project has not taken into account the circulating water farming skills or the management of harvesting guidelines, which can be explained by the absence of fisheries and the general nature of forestry in this project.

In the food processing sector, in addition to the aforementioned use of digital solutions, the need for skills will in future be emphasized in the ability to develop digital solutions themselves. Other important skills needs in this sector are circular economy skills, energy and resource efficiency, carbon and water footprint and carbon neutrality (Source: JOTPA: National Skills Capacities - Forecast results and snapshot for 2022).

These food-related competences are also taken into account in the FIELDS project, with the exception of the carbon and water footprint.

The publication of the Centre for Continuous Learning includes information about a survey on the impact of the Covid-19 pandemic. According to these unpublished results, the need for digital skills has grown rapidly in recent years across all sectors. The growing need for digital skills is divided into the following themes:

- Digital and e-commerce skills

- Digital sales and service skills

- Digital customer management

- The skills to use digital services

- The skills to develop and provide digital services

- Customer data and digital skills management (collection, analysis and management of customer data)

- Increasing need for data analytics skills

- Highly variable level of general digital skills, updating of skills to meet current requirements

- New skills for remote or multi-channel work

(JOTPA: National Skills - Forecast results and snapshot for 2022 p. 44/76: Valtakunnalliset osaamiskapeikot – ennakointituloksia ja tilannekuva vuodelle 2022 (okm.fi))

In the FIELDS project, digitalization forms a specific competence area and in some cases cuts across all the training programmes included the project. The digitalisation needs described above are broad and, in this scope, are not fully covered in FIELDS trainings. However, they are included, at least to some extent, in the digitalization training module of the project.

3.1.1 European reference framework and links with the national framework (e.g. different levels of operations)

The Finnish National Framework fo Qualifications is shortened as FiNQF.

A description of the framework for Finnish qualifications can be found on the website of the Finnish National Board of Education: Tutkintojen viitekehykset | Opetushallitus (oph.fi):

Levels four and five of the Qualifications Framework

The FIELDS project's training aim to develop the skills required by the European Qualifications Framework at levels 4 (basic vocational qualifications) and 5 (specialized vocational qualifications).

The table on the website of the Finnish National Agency for Education and Training shows the parallel descriptions of levels 4 and 5 of the Finnish and European frameworks: https://www.oph.fi/sites/default/files/documents/tutkintojen_viitekehysten_osaamistasokuvaukset_fi_sv_en.pdf)

When comparing the descriptions of skills in the Finnish and the European Qualifications Framework, the European description seems to summarize the Finnish description, except for the descriptions of competences in a second national language included in the Finnish Framework. In particular, the Finnish Framework describes competences related to communication and entrepreneurship in a broader sense. In the FIELDS project, special attention is paid to the soft skills which is in line with the emphasis on communication and entrepreneurial skills in the Finnish Framework.

The first conclusion of the comparison of the frameworks is that the FIELDS curriculums need to be complemented with the second official language skills in Finland in order to fulfill the description of the Finnish Qualifications Framework.

The second conclusion is that, despite the differences mentioned above, the descriptions are sufficiently convergent to provide a basis for harmonization of the knowledge ecosystem in agriculture and forestry, which is one of the main principles of the FIELDS European Skills Development Strategy.

3.1.2. Sectoral upskilling and reskilling framework

The FIELDS project's trainings aim to develop the skills required by the European Qualifications Framework at level 4 (initial vocational qualifications, vocational qualifications) and level 5 (specialised vocational qualifications). Therefore, the following is a summary of existing formal training and the current vocational degree qualifications in the areas of agriculture, food industry and forestry.

Basic vocational qualifications, EQF level 4

The list of vocational qualifications can be found on the website of the Finnish National Board of Education: Ammatilliset perustutkinnot | Opetushallitus (oph.fi)

The FIELDS project's objectives in the field of vocational qualifications include a basic vocational qualification in food, a basic vocational qualification in agriculture and a basic vocational qualification in forestry.

Basic vocational qualification in Food Industry: There are currently 26 training providers in Finland offering training in the field of food technology (data retrieved from Opintopolku on 5.8.2022: Elintarvikealan perustutkinto - Opintopolku) Digitalisation and bioeconomy are not very much included in the trainings, thus it could be interesting to include them in the FIELDS curriculums. Sustainable development is already taken into account in the basic qualification in the food sector, so a strong focus on it in the FIELDS project is desirable.

Basic vocational qualification in Agriculture: It seems, it is not necessary to include the basic knowledge of the different agricultural production sectors in the training material to be created in the FIELDS project, since there is a large amount of training offered in Finland to this end. Nor is it necessary to provide training in the use and maintenance of agricultural machinery, whether livestock or agricultural machinery, through FIELDS training, as training is already available in this area.

In the reform of the basic agricultural qualification, a new part of the qualification has been included, which includes for example, climate-responsible activities, renewable energy production and online trading in the natural resources sector. From the perspective of the future skills needs identified by the FIELDS project, these reforms are important and in line with the needs identified by the project. As these topics are new to the diploma, not many training providers have yet started to offer related courses. Thus, their inclusion in the training provided by the FIELDS project can fill a training gap in Finland.

Basic vocational qualification in Forestry: FIELDS occupational profiles require the development of skills in sustainable bioeconomy, biomass and biofuels and bioeconomy innovation. Although the bioenergy and biofuel themes in the forestry basic degree are related to these, the themes are mainly complementary. In the Finnish forestry basic vocational degree, the emphasis is on traditional forestry, which is not included at all in the FIELDS training. The FIELDS project's bioeconomy-related courses can partly serve the basic forestry degree, but only marginally.

The basic vocational qualifications also include common diploma components. The common components have a total of 35 skills credits. The inclusion of these modules in the FIELDS training offer will allow them to be used for the acquisition of skills credits for the basic vocational qualifications.

Specialist qualifications, EQF level 5

There are many similarities between the components of the specialized vocational qualifications in agriculture and the planned training content relating to agriculture in the FIELDS project. In particular, the diploma components on programming and operation of agro-automation and field automation are of interest for the FIELDS training package. These relate especially to two occupational profiles: Technician for agricultural digitalisation and Operator for digitalisation in agriculture, food industry, and forestry.

Conclusions

In Finland, the most important aspect of vocational qualifications is nowadays skills, rather than the way in which they are acquired (e.g. traditional classroom teaching). This is reflected in the shift in the qualifications from study credits to skills credits. Skills can be acquired in whatever way. A skill is included in a vocational degree when it is demonstrated and assessed in the way described in the qualification criteria by an accredited qualification provider. This creates a lot of flexibility in the way the needed skill may be acquired.

The FIELDS project aims to build training programs specifically for seven future occupations in the agriculture, forestry and food chain sectors. The range of lessons from which a training package can be built, is intended to be broad. It is also possible to construct a study path that is tailored to individual needs, and a country-specific training programs that complement existing trainings and meets the most relevant training needs.

The flexible system of vocational education and training in Finland is ideal for making use of the FIELDS curriculum. Anyone can learn the training parts that suit their needs and, if they wish to have their skills officially recognized, they can apply to become a student at a vocational school and have their skills credited as part of a vocational qualification.

Of particular interest to the FIELDS project in the current trainings offered in Finland is training developing the skills required in the reformed Basic Agricultural Qualification and the Specialised Vocational Qualification in Agriculture. As these qualifications have only recently been reformed, there is still very little training available for them. The training provided by the FIELDS project can meet this need and serve the Finnish vocational training needs perfectly.

3.1.3. Major training modules (for coherent groups of skills) soft skills should be part of any job profile training program

Under the leadership of the Finnish National Board of Education, the most important skills related to food production, farmers' skills and forestry have been brought together in the form of skills cards.

In the food preparation skills card, the main skills needs are listed as:

- Know how to use digital solutions

- Skills for reprocessing and integration of digital content

- Creative use of digital technologies

- Ability to apply digital tools

- Development and management of personal competences

- Competence in protecting personal information and privacy

- Innovation skills (ability to generate and apply new ideas to create economic added value)

- Sustainability and responsibility

- Cost management

- Manual skills

- Business skills

- Logistics skills

(Source: Food Manufacturing Competence Card: er1_osaamiskortti_2.pdf (oph.fi) Data retrieved 3.8.2022)

The main skills needs listed in the Farmers' Skills Card are:

- Agri-ecological skills

- Automation management skills

- Digital platform exploitation skills and cybersecurity of systems

- Innovation skills (ability to generate and apply new ideas to create economic value)

- Plant health competences

- Competence in the use of machinery and equipment

- Business skills

- Farming skills

- Robotics

- Networking, partnership and stakeholder skills

(Source: Farmers' Skills Card: er1_osaamiskortti_2.pdf (oph.fi) Data retrieved 3.8.2022)

The Forestry Skills Map lists the main skills needs as:

- Customer-oriented thinking

- Knowledge of ecology

- Management and coaching of people and skills

- Self-direction

- Leadership skills

- Knowledge of the principles of sustainable development

- Business skills

- Marketing and sales skills

- Multidisciplinary skills

- Organizing skills

- Cooperation skills

(Source: Forestry Competence Card: er1_osaamiskortti_2.pdf (oph.fi) Tiedot kopioitu 3.8.2022)

Climate expertise needed in all sectors

In the Climate Competence Survey conducted by the Finnish National Board of Education in 2020 it was seen important to integrate climate competence into the development of competences in all sectors. Albeit with different content for different sectors. Below are the themes of climate competence related to agriculture, forestry and bioeconomy:

1. sustainable energy solutions (e.g. energy efficiency, renewable energy in heat and electricity production, carbon capture and storage, renewable energies and their life-cycle impacts)
2. know-how for the exploitation of carbon sinks (e.g. in agriculture, developing farming techniques, in forestry, increasing the average age of forests and sequestering carbon in long-term storage, such as wood construction. Other issues highlighted include crop rotation, biogas, soil improvement fibers, recycled nutrients and products processed from by-products)
3. productive processes and business (e.g. developing life cycle thinking and increasing systemic understanding, taking climate change into account in investments, improving material efficiency in production, utilization of side streams and secondary raw materials in processes from a material and production technology perspective, improving production and energy efficiency, utilization of process side streams).
4. soil and water management skills (e.g. sampling and analysis, dynamics of soil carbon sinks in the built environment, effects of climate change on soil carbon sinks, water management skills in urban planning, prevention of eutrophication of water bodies, wastewater treatment and wetland enhancement)
5. development of innovation, interdisciplinary and inter-industry cooperation (e.g. multidisciplinary theses, co-learning between different levels of education and training and development of systems thinking)
6. understanding the importance of community action, new sharing economies and cooperation (e.g. collaborative skills with customers and energy communities)
7. the impact of health and nutrition choices (e.g. using research knowledge and attitude development)
8. ethical issues and doing less (e.g. critical thinking and minimalism as a positive design principle)

(JOTPA: National Centres of Excellence - Forecast results and snapshot for 2022)

Many of the above-mentioned climate competence themes (1-4) related to the agriculture, forestry and bioeconomy are included in existing vocational education and training qualifications in Finland. These themes are also familiar to the FIELDS project.

The largely unmeasurable and non-sector-specific competences (5-8) at the end of the list certainly deserve further attention, as they are only partially identifiable both in the current Finnish VET qualification and in the FIELDS project's planned training modules on soft skills.

Summary of the main training modules

Based on the skills needs and estimation of exciting trainings described above, the FIELDS training modules can be prioritized as follows:

Main training modules	Priority
FORESTRY	
1.The Technician for sustainability, digitalization and bioeconomy in Forestry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability and bioeconomy requirements and to implement digital technologies in all aspects related to the production and management of a forestry related business. These tasks usually include (in a forestry related business): - Monitoring and improving the efficient and sustainable use of resources (including energy) and their circularity - Implementing and monitoring sustainable processing technologies and the transformation of primary products - Implementing and monitoring of the application of bio-economy principles to all production processes, including sustainable packaging, waste management and valorisation - Implementing and improving digitization- and digital techniques, methodologies and procedures, including the use of drones and robots for sustainable forestry - Managing operations, including sustainable product development, raw materials purchasing, identification of new marketing chains etc., with particular attention to the sustainability of processes and products and the principles of circular economy	**medium**
BIOECONOMY	
2.The Technician for Agriculture in Bioeconomy (LEVEL 5) manages and controls the production processes by identifying and coordinating procedures useful for saving resources and developing the company according to the reference territorial context. Tasks performed usually include: - manage the operational organization, the implementation of continuous improvement procedures - monitoring and evaluation of the results using digital methodologies and technologies - oversight of executive activities carried out by others - technical training in the use of methodologies, tools and information specialized in the bioeconomy	**medium**

- management of production addressing areas such as investments, marketing chains, etc. - design and Implementation of sustainability processes and products.	
3.The Technician for Food industry bioeconomy (LEVEL 5) performs technical tasks to support the development of the company from a bioeconomy perspective in aspects related to production, management and business. Tasks performed usually include: monitoring the efficient and sustainable use of resources (including energy), implementation and monitoring bio-economy principles applied to food processing, sustainable packaging, waste management and valorisation, implementation and monitoring of continuous improvement procedures, identification of new marketing chains, administrative tasks and supervision of activities carried out by others.	medium
4. The Operator for Bioeconomy in agriculture, food industry and forestry (LEVEL 4) operates at executive level in the field of agricultural -, forestry -, or agri-food production, focusing at implementation of bio- and circular economy principles. The operator applies relevant methodologies, tools and information to collaborate in the production, management and business activities of companies active in bio-economy and /or circular economy. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures to run and improve a production system based on the circular economy principles. - Carrying out fundamental operations for sustainable (e.g. circular) use of resources and transformation of primary products, within the production processes of agricultural, forestry, or agri-food sectors. - Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	medium
SUSTAINABILITY	
5.The Technician for sustainable agriculture (LEVEL 5) performs technical tasks related to production, resources preservation and company development according to sustainability requirements and the local context. Tasks performed usually include: - the supervision and control of production processes - the implementation of continuous improvement procedures - monitoring and evaluation - identifying and coordinating procedures useful for resource preservation and developing the company according to the local context - Operational organization - the implementation of regulations of continuous improvement procedures - the monitoring and evaluation of the results using digital methodologies and technologies. the supervision of activities carried out by others - management of production addressing areas such as investments, marketing chains, etc. - Design and Implementation of good agricultural practices, sustainability processes and products.	**medium**
6.The Technician for Sustainable Food industry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability requirements in the production, management and business activities of a food company. These tasks usually include: purchase of sustainable raw materials, monitoring the efficient use or resources, implementation and monitoring of sustainable processing technologies, sustainable product development and packaging, waste management, implementation and monitoring of continuous	medium

improvement procedures, sustainable marketing chains, administrative tasks and supervision of activities carried out by others.	
7. The Operator for Sustainability in agriculture, food industry and forestry (LEVEL 4) intervenes at the execution level. The operator applies basic methodologies, tools and information to collaborate in the sustainable production, management and business activities of the company. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures resulting in protection of the environment and biodiversity within the agricultural, forestry and food industry production processes. - Application of practices and procedures to ensure sustainability (e.g. sustainable use of resources, reduced emissions, human rights) in the agricultural, forestry and food industry sectors. - Taking responsibility in the production processes and management systems to ensure the sustainability of the production operations, in the agricultural, forestry and food industry sectors. Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	**medium**
DIGITALISATION	
8.The Technician for agricultural Digitalisation (LEVEL 5) performs technical tasks related to the programming, management and supervision of industrial machines, plants and automatic systems, integrating and connecting them according to the new needs of the Smart Farm. Tasks performed usually include: - programming, robotics and advanced industrial automation - Push connectivity (IOT; IIOT) - assembly, hardware and software configurations - testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems. - selection and management of production systems and the definition of maintenance policies for production systems and after-sales - integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	high
9.The Technician for Food Industry digitalisation (LEVEL 5) performs technical tasks to support the implementation of digital technologies according to the needs of the new Smart Factory; dealing mainly with programming, management and supervision of industrial machines, plants and automatic systems, their integration and connection. Tasks performed usually include: - sensor programming, robotics, and advanced industrial automation - -pushed connectivity (IOT, IIOT) - assembly, hardware and software configuration, testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems - selection and management of production systems and the definition of maintenance policies for production systems and after-sales	**medium**

- integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	
10.**The Operator for Digitalisation in agriculture, food industry and forestry (LEVEL 4)** operates at executive level in the field of sustainable agricultural, forestry, or agri-food production, focusing at maintaining digitized processes or digitalisation of sustainable production processes. The operator applies relevant methodologies, software and hardware tools and information to collabour ate in the production, management and business activities of agricultural, forestry or agri-food companies. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures to run and improve digitized production processes within the field of sustainable production in agriculture, food industry and forestry sectors - Using drones and robots in different activities of the agriculture -, forestry -, and food industry. - Analysing and handling data. - Providing support in the different phases of the agriculture, forestry and agri-food production processes, using digitized machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	high

The Action Plan

This action plan describes the measures, course content, number of trainees and cost estimation of the pilot training and an assessment of possible challenges and risks related to the implementation of the FIELDS training to be piloted in Finland.

As the training pilot in Finland is targeted at agricultural advisors already employed, one of the goals of the pilot is to enable them to choose the training components that serve their respective skills development needs.

The purpose of the pilot is to test the suitability of the training for the selected target group and to obtain feedback for further development of the training. To this end, this Action Plan identifies specific training modules that are particularly useful for testing and for which participants will be directed o participate.

A clear statement of activity

In the assessment of skills needs and exciting trainings described in the previous chapters, digitalization in agriculture emerges as an essential training topic.

As it is not meaningful for ProAgria advisors to participate in whole curricula training, the lessons related to digitalization and the number of target participants in each lesson are described here. The lessons may be participated by the same and or different people.

For the target group, it is important that the learning takes place in the workplace, as tightly related to the work itself as possible. The travel time required to attend in-class training is a challenge. Efforts are made to include in-class training in events and activities where additional travel will not be required. In some cases, in-class training might be useful to be replaced by live training via Teams.

Digitalization

Lesson	Number of participants	Number of hours
What is digitalisation?	6-16	8
Technologies by Agricultural Farming Sub-sectors	6-16	8
Digitalisation & the Impact of Technology	6-16	4
Basic remote sensing, GPS, and GIS knowledge	4-10	16
Farm Management Information Systems	4-10	18
Industry 4.0 circular manufactoring	4-10	?
Introduction to digitalisation tools and machinery	4-10	8
Use of robots/drones	4-10	12
TOTAL		**estimation 80hours**

Soft skills and entrepreneurship

Lesson	Number of participants	Number of hours
Understanding the (digitalization/Sustainability/bioeconomy) principles	4-10	
Basic ICT skills	4-10	
Participation in peer groups	4-10	
Innovation management	6-16	
Business Modelling	6-16	
Organization and planning	4-10	
Team working, negotiation and conflict management	6-16	
Health and safety in the workplace	6-16	
From Traditional to Digital Food Marketing	4-10	
Lifelong learning and continuous learning	6-16	
TOTAL		**60 hours**

In addition to above described lessons, the pilot will include an apprenticeship scheme testing. It could be useful to tight this together with the orientation period of new employees. As it is not yet possible to predict at this stage when a new employee will start at a ProAgria centre to test this idea, a more precise plan cannot yet be made. However, the apprenticeship scheme can be planned, described and communicated to the managers of the different ProAgria Centres so that they can consider the possibility of using it when a new employee starts in the spring or summer of 2023.

The risks to the implementation of the learning modules described above are mostly related to time management. It is challenging for busy advisors to take time off from work to learn new things. This risk can be managed mainly in two ways, by informing about the training well in advance and by clearly communicating to potential participants the benefits of the new learning for their work.

In the draft for the European strategy on agri-food-forestry skills different tools are described that can be used to manage the above mentioned time challenge.

Timing tools:

- Design flexible and interactive e-learning courses e.g. supported by decentralized webinars
- Schedule in off peak time (evening, weekends) or in hybrid mode. In general, adapt time scheduled according to the availability of the trainees
- Divide modules/ training in short lessons (e.g. less than 1hour)
- Design Fast Tracks for business management
- Make courses tailor made to use time most efficiently

Also the structure tools and communication tools listed in the European strategy draft could be very useful here.

In case the apprenticeship scheme cannot be included in a new employee orientation period due to either not finding a suitable situation of a new employee starting or due to for example a delay in the FIELDS project, summer of 2023 offers a possibility to test the planned apprenticeship scheme with some of the summer trainees.

An important action relating to this roadmap is to keep the national working group in Finland still active. The members of the working group have a wide range of influence possibilities on the development of agricultural skills in Finland, from developing the education system, research, technological development, advisory work, training, teaching and farming in Finland. Participating in the working group meetings is voluntary and should therefore continue to be interesting, stimulating and useful for the participants. For this reason, it is important to keep the content and timing of meetings flexible. The next meeting of the Working Group will take place in November 2022.

Time period

The lessons described above will be implemented in January-June 2023.

The aim is to carry out the apprenticeship scheme at latest between June and August 2023, if no suitable opportunity for the orientation of a new employee arises before this.

Quantity of inputs/outputs and unit costs

The implementation of the pilot training consists mainly of giving training and coaching the apprenticeship scheme.

Item	hours, days	€/Day	Total cost
Teacher/Trainer/Researcher	140hours, 19 days	270€/Day	5130€
Materials & Software			2000€
Others			1000€
Total cost			**8130€**

Source of funding

The direct costs of the pilot training will be covered by the FIELDS project budget. The pilot training will generate indirect costs related to travel of participants, working time for study and administrative work related to the participation. These costs will be covered on behalf of the employers of the participants in the pilot training.

The teaching of new technologies in agriculture currently suffers from a lack of teaching facilities in Finland. The latest technologies cannot be fully exploited in traditional teaching facilities.

The draft for the European strategy on agri-food-forestry skills points out useful funding tools:

- Provide e-learning for free, vie e-learning platform (excl. a certificate)
- Invite externals for free (social entrepreneurship)
- Financial support through EU programs, national funds and scholarships on competitive basis. For example the Covid 19 recovery plan (NextGenerationEU) as well as the investment pillar pf the Green Deal give new opportunities for sectors in transition such as agriculture, food industry and forestry
- Financial support of companies (for employees), private corporate and public scholarships for internships, compensation of training time, or sabbatical like approach. For example in Finland there is a system in apprenticeship training where the government funds traineeships by handing “training allowances” to employers.
- Link subsidies to training certificate requirement (for example organic farmes need to follow a 5-day course to achieve subsidy
- Individual learning accounts available in EU countries could grant funding

Entity responsible for implementation

The implementing agency for the pilot training described here in Finland is the Association of ProAgria Centers. Participants in the pilot trainings will be ProAgria employees and possibly employees of other close partners of ProAgria.

Output indicators

To ensure the success of the pilot training, a feedback survey will be sent to the participants in the various lessons to assess the usefulness, delivery and excitement of the training content. The attractiveness of the trainings will also be assessed through a feedback questionnaire addressed to the managers of the ProAgria centres and to the competence coaches within ProAgria Centers.

The Ambition

In the discussions of the FIELDS national working group, it was commonly agreed that agriculture needs strong skills and talent. The high level of skills of farmers in Finland is essential to compete in international food production. In the next five to six years, a large number of advisors, teachers and farmers will retire.

The use of digital tools in farming is increasing. Virtual and artificial intelligence assistants will open up new possibilities for streamlining daily work. There is a need for the designers and programmers of these.

Success in the digital transition is imperative. Best practices in new working methods and tools need to be shared widely.

In Finland, AgriHubi and the Finnish AKIS network are working well together to support this. Still, there is further need for attention in the flow of information and co-creation of innovation within agricultural networks.

National Focus on skill needs and Occupational profiles

All FIELDS occupational profiles contain skills identified as essential for the future in Finland. The pilot training will help to estimate the suitability of FIELDS trainings for Finland. If the pilot trainings are successful, it makes sense to extend the trainings to farmers and students. The national working group can act as a catalyst for this dissemination work.

Life-long learning perspective to both employers and employees

According to a survey by the Technology Industry (2021), three out of four companies consider the ability and motivation to continuous learning as the most important generic skill to increase their importance. Of the generic skills customer orientation and leadership are highlighted. Digitalization is seen in the top skills in all job advertisements in all main sectors. Low-carbon and circular economy skills will also become more important in the coming years. For a quarter of companies, they are already of paramount importance for business.

(Source: JOTPA: National Competence Capacities - Forecast results and snapshot for 2022, p.27/76)

In agriculture and food manufacturing, enabling continuous learning is a key area for development. Funding and support schemes should be developed to ensure that skills development is always more profitable than unemployment. Continuous learning is also linked to the observation of the experts of the Skills Foresight Forum that training content in the food chain should be available from early childhood to lifelong learning.

(Source: JOTPA: National Skills Capacities - Forecast results and snapshot for 2022)

Partnership building contributing to agri & food and forestry pacts for skills.

In Finland, AgriHubi and the national AKIS system aim to promote partnerships in the agriculture, forestry and food sectors. In addition to the FIELDS project, a direct partner in the current Pact of Skills from Finland is the The Central Union of Agricultural Producers and Forest Owners (MTK) whose Director of Training Susanna Kumpulainen is a member of the national working group for this roadmap.

The proposal and commitment

The governance and national p&c

As part of the foresight process, the Natural Resources, Food and Environment foresight team has assessed changes in skills and employment against a number of different future scenarios.

The following quote provides a comprehensive description of the changes in skills in agriculture, the bioeconomy and the food sector in Finland:

"The climate is changing anyway, and we need to adapt in time. This will require new knowledge about plant diseases, for example, and the skills to combat them in changing conditions. The adaptation of crops and livestock to new conditions can be accelerated, for example by using the latest methods in genetic engineering. In a changing context, leadership is becoming more important and the need for training and development services is increasing. Climate change may even partly increase the need for workforce.

The production of new plant-based foods may increase food exports. This is possible if we can introduce new plant species, process them and improve the processing, fractionation and product development of plant products. New entrepreneurs are needed in the food chain to diversify the product range and business structure.

Finland needs more marketing, branding, service design and cultural skills to increasingly export highly processed food industry products to global markets. More people are needed in these areas.

Our water resources can be a major competitive advantage in the future bioeconomy. We have the know-how and knowledge of water-saving and recycling technologies. More skills are needed for the modernization of water utilities and water-related services. Technological know-how, including digitalization, is at a high level, but its application to water technology needs to be developed. There will be some increase in labor needs as water utilities are in need of renovation and the global shortage of clean water will increase the demand for water professionals.

The circular economy of nutrients, water, fibers and energy will affect all production and activities. Circular economy skills must be available everywhere. Farms and rural businesses will diversify as the circular economy grows. The circular economy can increase the need for labour.

Continuous improvement through incremental innovation will increase rationality in the food chain. This requires a broad vision, the ability to innovate, business and process skills. The need for leadership will become more pronounced and the need for training and development services will increase."

(Copied 3.8.2022 p. 19/53): **Luonnonvarat, elintarviketuotanto ja ympäristö: Osaamisen ja työllisyyden muutoksia. OEF-ennakoinnin III vaiheen tuloksia)**

Evaluation

Assessment approach

This roadmap describes a broad vision for meeting the Finnish skills needs, especially in the agricultural sector, through existing trainings which ideally are complemented by FIELDS trainings. It also describes an action plan for the FIELDS training pilot in Finland, which is a first step towards the wider use of FIELDS trainings in Finland.

Therefore, it is essential to carry out the assessment at three levels; pilot training, filling the essential training gap and partnership development.

Key performance indicators

The key performance indicators for the pilot training are:

- Participants' assessment of the of the training

- Evaluation of the attractiveness of the trainings by the key players in the skills development of the ProAgria Centres (managers and competence coaches)

The key performance indicators for trainings to fill the skills gap in agriculture are:

- Utilization of FIELDS training as part of vocational trainings (number of training providers, number of participants in trainings)

- Utilization of FIELDS training as a part of non-formal trainings (number of training providers, number of participants in training courses)

Key performance indicators for the partnership development:

- Continuation of the national working group; active meetings of the working group

In a longer term the key performance indicators recognized in the draft for European strategy on agri-food-forestry skills are important.

Assessment of the partnership:

- Stakeholders actively involved (who provide quality upskilling opportunities, in education/training; who play a role in sectoral drivers of change
- Coverage of countries and regions, (sub-)sectors
- Visibility and awareness
- Public opinion, consumer opinion
- Definition and maintenance of a strategic agenda
- Honest and clear communication to different target groups

- Best practice dissemination
- Willingness of partners to share information/knowledge
- Impact on training programs and interest for the training programs (number of interested participants)
- Employees actively interested in participating in Life-Long Learning
- Yearly growth rate of new courses
- Raised level of final degrees of food employees
- Link with our scenarios, see whether profiles support desirable outcomes

Assessment of training modules and courses:

- Number of students, companies in the course
- Number or % of participants from underrepresented groups
- Achievement of learning goals (e.g. increased level of knowledge - tests before and after taking the module by trainees)
- Student evaluation/satisfaction of training content and method
- Numbers of certificates achieved
- Flexibility of programs (hours, ECTS, online/face-to-face, ...)
- Renewal of programs (new elements added year to year)
- Resources per module (human resources, financial, technology...)
- Weight of virtual, augmented and connected reality in the training modules, % of audio visual learning vs class learning
- Use of educational material and acquired skills in the workplace
- Learning outcomes in practice (logbooks, blogs, ...)
- Employment status of trainees after graduation, incl. job promotions
- Placement rate for unemployed learners
- Trainees and employer job impact evaluation (better execution of tasks, increased salary, new employment,….)
- Rate of young people/workers recruited in agri-food sector
- Employer satisfaction

9.4 Annex IV: Italy

1. Introduction

1.1 Method- NWG

Within the FIELDS project, 10 profiles have been created reported in paragraph 3.1 for the 2030 agri-food sector (technical level 4 and 5) and within the National Working Group of 13 July 2022. Some questions were asked to the participants for better orient the activity of the Fields project in the Italian scenario.

The discussion concerned the joint assessment of the new profiles and their correspondence or not with the needs and requests of the companies and whether a training module lasting 600 hours was suitable for all types of training courses (e.g. modules intended for unemployed), it was essential to insert segmented and certified informal training courses for those who already work and to guarantee homogeneity in terms of regional proposals and times.

The NWG after extensive discussion identified priorities for the various modules and the main priority fell on the "Technician for Food Industry digitalisation" course assumed to last 360 hours.

2. Context of education and policies at National level

2.1 The national education system and training needs related to the FIELDS objectives

The Italian education and training system is structured on the basis of the principles of subsidiarity and autonomy of educational institutions.

The state has exclusive legislative power with regard to the general rules and the determination of the essential levels of services provided throughout the national territory, while the regions have concurrent legislative competence in the field of education and exclusivity in the field of vocational training.

Compulsory education has a total duration of 10 years, from 6 to 16 years of age and is taught within state schools or private schools.

The education system provides:

- a first cycle of education including primary and lower secondary school;
- a second cycle of education divided into two alternative paths, namely:
  - secondary school (high school, technical institutes and professional institutes) and
  - vocational education and training courses (VET) of regional competence;
- higher education offered by Universities, Institutions of Higher Artistic, Music and Dance Training (AFAM) and Higher Technical Institutes (ITS)

Postgraduate training includes PhD courses which fall within the sphere of higher education, are characterized by the presence of advanced scientific research and require the preparation of an original research thesis.

In addition, lifelong learning is intended as *"any activity undertaken by people in a formal, non-formal, informal way, in the various stages of life, in order to improve knowledge, skills and competences, in a personal, civic, social and occupational* "(Law 92 of 2012).

In particular, the fundamental lines of action with respect to the strengthening of active labour market policies, vocational training and the national education system concern:

- strengthening the governance of the overall education system through the adoption of the National New Skills Plan (PNNC);
- the promotion of the employability of workers in transition and the unemployed through the New National Program for the Guarantee of Employee Employability (GOL);
- the enhancement of the Dual System characterized by the alternation of theoretical and practical training sessions and
- the adaptation of the offer of professional technical education to the demand for skills relating to the digital, ecological and sustainable transition.

In the context of lifelong learning and continuous training, the VET Vocational Education and Training system is actively and continuously promoted by the European Union and aimed at improving the level of qualifications and professional skills of the population.

In this regard, in 2017 a significant reform was introduced into the Italian system which introduced significant changes in terms of training.

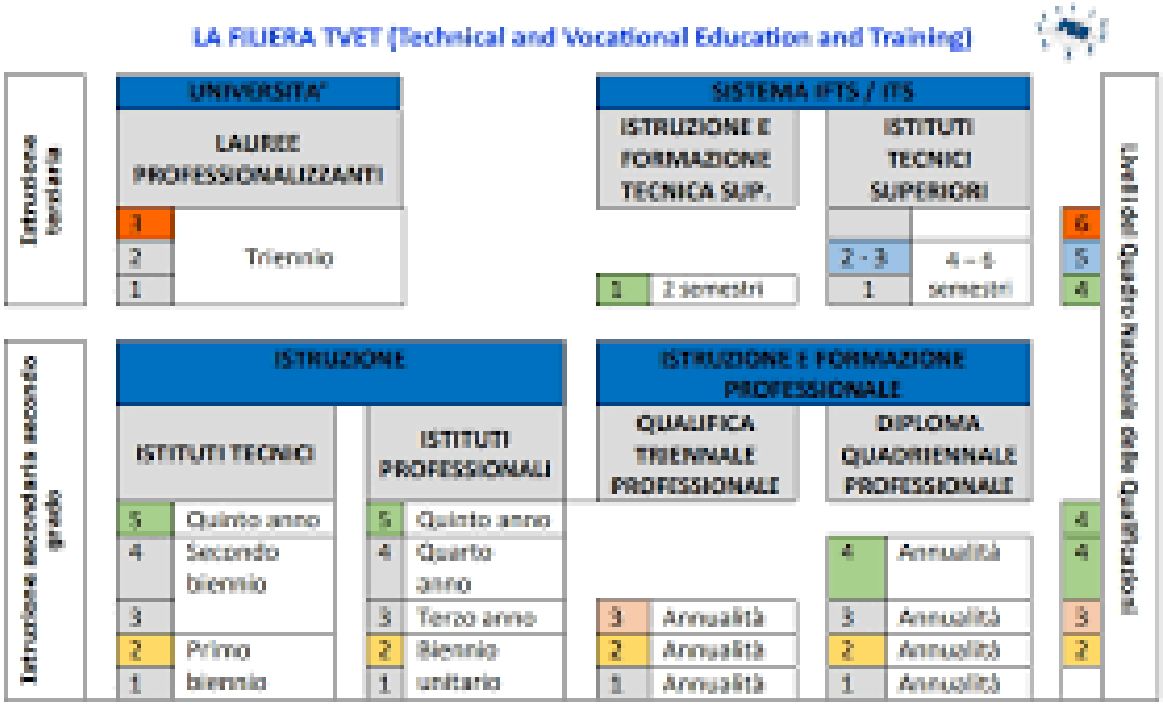
In particular, the two main innovative aspects aimed at professional institutes involved:

- the opportunity to model the training offer with respect to the needs in terms of skills required by the world of work and
- the personalization of learning in order to adapt the training proposal to the needs of the individual and allow the achievement of functional training for job placement

The organization outlined by the reform introduces 11 courses of study which, promoted by professional institutes, do not provide for a predefined training proposal in detail, but rather the identification of training standards to be followed.

This choice makes it possible to maintain flexible teaching tools that are always suitable for a rapidly evolving educational scenario with the aim of avoiding the obsolescence of training contents and the gap between supply and demand.

With reference to the personalization of the learning path, a periodic update of the Individual Training Project (PFI) was envisaged, aimed at enhancing the potential of the individual in a support and tutoring logic.



Currently the Italian VET provider system enjoys a good governance, as the VET organizations of Vocational Education and Training are inserted in an appreciable way within the company realities and benefit from the system of regional funds, which finance the training activities that start from below.

The Vocational Education and Training paths aim to train different professional figures that are compatible with the questions coming from different working contexts.

These figures are identified and periodically updated on the basis of the needs of territorial skills.

Following passing the final exam, the following are obtained:

- the Certificate of Professional Qualification at the end of the third year accompanied by a certification of the skills learned;
- The Professional Diploma at the end of the fourth year including an Annex certifying the skills acquired

Qualification and Diploma titles are part of the broader European Union panorama with reference to the levels of the European Qualifications Framework provided for in the Recommendation of 23 April 2008 regarding lifelong learning.

3. Main challenges

3.1 Priorities in the Agri-food-forestry sector

The statistical evidence allows us to identify the challenges that the national training system is required to face, highlighting the "main ones" on which attention should be paid:

- low levels of qualification
- insufficient mastery of digital skills
- low attractiveness of VET
- vertical and horizontal mismatch
- complexity of governance

In addition, there is a difficult job insertion of young people and reintegration of adults, a low participation in democratic life, a weak recognition of the value of education, training and more generally of individual growth, finally a scarce exploitation of the training proposal available.

These challenges are interrelated and have their effect on multiple levels. Therefore, it is necessary to act:

- on the accessibility of educational services through coordination between the learning phase and the working phase;
- on training contexts by integrating the classic proposal delivered face-to-face with satisfactory distance learning methods;
- on the flexibility and personalization of training courses

It also emphasizes the non-homogeneous presence in the territory of the offer of guidance services and the timeliness in the provision of information on needs (LMI and Skills intelligence).

From the point of view of the agri-food sector, in the medium term, the most reliable scenario will be characterized by the presence of specific factors of change with which the training system will have to interface like agricultural policies for the orientation of resources, progressive shift towards medium-high quality agri-food products, increasing internationalization, greater emphasis on traceability and certification, growth of organic agriculture and / or other agro-ecological systems, further push towards innovation, recovery agricultural and forest land, growth of secondary activities, promotion of supply chain integration with a view to better aggregation, localization of supply chains and increasing attention to product marketing.

The implications in the face of the previously outlined framework make it possible to identify emerging skills in the agri-food sector as also underlined by the INAPP (National Institute for Public Policy Analysis). The fundamental areas of development refer to:

- the sustainability of production processes
- quality and supply chain relationships
- food security in terms of supply
- adaptation to climate change
- managerial and financial capacity
- diversification and multifunctionality
- the ability to network
- the exponential reinforcement of digital skills

The Council of the European Union adopted a Recommendation on key competences for the whole lifespan of learning in 2018. The Recommendation identifies eight essential competences for citizens, for their personal fulfilment, for a healthy and sustainable lifestyle, for employability, active citizenship and social inclusion.

The Recommendation is a reference tool for the active parties in the field of training, it outlines a common basis relating to the skills needed today and in the future.

The framework presents effective ways to promote skills development through innovation in learning approaches, assessment methods and support for educational staff with the intention of enabling all learners to realize their full potential.

In order to meet different needs, the Recommendation encourages Member States to offer quality education, improve school education and ensure excellent teaching, to further develop vocational training by modernizing and promoting continuing education programs.

On 24 November 2020, the Council of the EU adopted a Recommendation on Vocational Education and Training for Sustainable Competitiveness, Social Equity and Resilience. The Recommendation defines the key principles to ensure a rapid response to the needs of the labour market and quality learning opportunities for both young people and adults.

It places a strong emphasis on greater flexibility in vocational education and training, on strengthening practice-based learning opportunities directly in the workplace, on apprenticeships and on improving quality.

The Recommendation also replaces the EQAVET Recommendation - European Quality Assurance in Vocational Education and Training and includes an updated EQAVET framework with quality indicators and descriptors. It repeals the previous ECVET Recommendation

On 30 November 2020, the ministers responsible for education and vocational training of the EU Member States, the candidate countries, the EEA-EFTA countries (European Economic Area - European Free Trade Association), the European social partners and the Commission approved the “Declaration of Osnabrück 2020” on vocational training, education and training, as a fundamental document with respect to a transition towards sustainable economic models.

The Osnabruck Declaration is supported by European level VET provider associations (VET4EU2) and VET student representatives (OBESSU, European Apprentices Network).

Establishes new policy actions for 2021-2025 to complement the Council Recommendation on Vocational Education and Training for Sustainable Competitiveness, Social Equity and Resilience:

• promoting resilience and excellence through quality, inclusive and flexible VET

- stimulates the creation of a new culture of lifelong learning that emphasizes the importance of education and digitization
- promote the sustainability of VET
- encourages the development of a European area of education, training and international VET

The Advisory Committee on Vocational Training has endorsed the opinion on the future of VET, which will contribute to the Commission's policies for the next decade.

On the certification side, the Decree of 5 January 2021 adopted the Guidelines that make the national system of certification of competences executive.

The Guidelines have strategic significance as they allow the operation of the National Skills Certification System, referred to in Article 4, paragraph 58, of the Law of 28 June 2012, no. 92 and Legislative Decree 16 January 2013, n. 13, being part of the wider national process of recognition of the individual right to lifelong learning.

In this framework, the certification of the skills acquired by the individual in formal, non-formal and informal environments, together with the construction of territorial networks and the implementation of the single information backbone through the interoperability of the existing central and territorial databases, allow the creation of an increase in the participation of people in training, as well as a usability of the skills acquired also in informal and non-formal contexts in the context of the labour market.

The recognition of services for identifying, validating and certifying skills, in regulations and policies, represents a fundamental point for increasing the levels of qualification, for the competitiveness of businesses and professions and for the modernization and effectiveness of measures related to labour policies.

Skills identification, validation and certification services will constitute an essential element for the innovation of education and training systems, involving the personalization of learning aimed at simplifying the transition phases from study to the world of work by programming the training proposal enriched by a wider involvement of businesses, professional associations, voluntary organizations and the third sector.

As regards the improvement of skills, the Pact for Skills project is part of this project, an initiative that brings together interested stakeholders, including the EU, the social partners, the EU umbrella organizations, businesses, vocational training and education, suppliers and public authorities.

The main objective is to ensure the highest possible quality within the vocational training and retraining of the European workforce in all ecosystems of the EU industrial strategy, including the agri-food sector.

This effort was undertaken with the aim of achieving the goals of the double green and digital transition, as well as attracting the workforce by improving the conditions themselves.

Below are the 10 EQF level 4 and 5 training modules selected in the project and their declaration as well as the level of priority assigned during the NWG, which is also necessary to select the pilot course to be implemented during 2023.

Main training modules	Priority
FORESTRY	
1.The Technician for sustainability, digitalization and bioeconomy in Forestry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability and bioeconomy requirements and to implement digital technologies in all aspects related to the production and management of a forestry related business. These tasks usually include (in a forestry related business): - Monitoring and improving the efficient and sustainable use of resources (including energy) and their circularity - Implementing and monitoring sustainable processing technologies and the transformation of primary products - Implementing and monitoring of the application of bio-economy principles to all production processes, including sustainable packaging, waste management and valorisation - Implementing and improving digitization- and digital techniques, methodologies and procedures, including the use of drones and robots for sustainable forestry - Managing operations, including sustainable product development, raw materials purchasing, identification of new marketing chains etc., with particular attention to the sustainability of processes and products and the principles of circular economy	**medium**
BIOECONOMY	
2.The Technician for Agriculture in Bioeconomy (LEVEL 5) manages and controls the production processes by identifying and coordinating procedures useful for saving resources and developing the company according to the reference territorial context. Tasks performed usually include: - manage the operational organization, the implementation of continuous improvement procedures - monitoring and evaluation of the results using digital methodologies and technologies - oversight of executive activities carried out by others - technical training in the use of methodologies, tools and information specialized in the bioeconomy - management of production addressing areas such as investments, marketing chains, etc. - design and Implementation of sustainability processes and products.	**low**
3.The Technician for Food industry bioeconomy (LEVEL 5) performs technical tasks to support the development of the company from a bioeconomy perspective in aspects related to production, management and business. Tasks performed usually include: monitoring the efficient and sustainable use of resources (including energy), implementation and monitoring bio-economy principles applied to food processing, sustainable packaging, waste management and valorisation, implementation and monitoring of continuous improvement procedures, identification of new marketing chains, administrative tasks and supervision of activities carried out by others.	**low**
4. The Operator for Bioeconomy in agriculture, food industry and forestry (LEVEL 4) operates at executive level in the field of agricultural -, forestry -, or agri-food production, focusing at implementation of bio- and circular economy principles. The operator applies relevant methodologies, tools and information to collabour ate in the production, management and business activities of companies active in bio-economy and /or circular economy. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include:	**low**

- Carrying out applicable techniques, methodologies and procedures to run and improve a production system based on the circular economy principles. - Carrying out fundamental operations for sustainable (e.g. circular) use of resources and transformation of primary products, within the production processes of agricultural, forestry, or agri-food sectors. - Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	
SUSTAINABILITY	
5.The Technician for sustainable agriculture (LEVEL 5) performs technical tasks related to production, resources preservation and company development according to sustainability requirements and the local context. Tasks performed usually include: - the supervision and control of production processes - the implementation of continuous improvement procedures - monitoring and evaluation - identifying and coordinating procedures useful for resource preservation and developing the company according to the local context - Operational organization - the implementation of regulations of continuous improvement procedures - the monitoring and evaluation of the results using digital methodologies and technologies. the supervision of activities carried out by others - management of production addressing areas such as investments, marketing chains, etc. - Design and Implementation of good agricultural practices, sustainability processes and products.	**medium**
6.The Technician for Sustainable Food industry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability requirements in the production, management and business activities of a food company. These tasks usually include: purchase of sustainable raw materials, monitoring the efficient use or resources, implementation and monitoring of sustainable processing technologies, sustainable product development and packaging, waste management, implementation and monitoring of continuous improvement procedures, sustainable marketing chains, administrative tasks and supervision of activities carried out by others.	**medium**
7. The Operator for Sustainability in agriculture, food industry and forestry (LEVEL 4) intervenes at the execution level. The operator applies basic methodologies, tools and information to collabour ate in the sustainable production, management and business activities of the company. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures resulting in protection of the environment and biodiversity within the agricultural, forestry and food industry production processes. - Application of practices and procedures to ensure sustainability (e.g. sustainable use of resources, reduced emissions, human rights) in the agricultural, forestry and food industry sectors. - Taking responsibility in the production processes and management systems to ensure the sustainability of the production operations, in the agricultural, forestry and food industry sectors. Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	**medium**

DIGITALISATION	
8.The Technician for agricultural Digitalisation (LEVEL 5) performs technical tasks related to the programming, management and supervision of industrial machines, plants and automatic systems, integrating and connecting them according to the new needs of the Smart Farm. Tasks performed usually include: - programming, robotics and advanced industrial automation - Push connectivity (IOT; IIOT) - assembly, hardware and software configurations - testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems. - selection and management of production systems and the definition of maintenance policies for production systems and after-sales - integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	**medium**
9.The Technician for Food Industry digitalisation (LEVEL 5) performs technical tasks to support the implementation of digital technologies according to the needs of the new Smart Factory; dealing mainly with programming, management and supervision of industrial machines, plants and automatic systems, their integration and connection. Tasks performed usually include: - sensor programming, robotics, and advanced industrial automation - -pushed connectivity (IOT, IIOT) - assembly, hardware and software configuration, testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems - selection and management of production systems and the definition of maintenance policies for production systems and after-sales - integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	**high**
10.**The Operator for Digitalisation in agriculture, food industry and forestry (LEVEL 4)** operates at executive level in the field of sustainable agricultural, forestry, or agri-food production, focusing at maintaining digitized processes or digitalisation of sustainable production processes. The operator applies relevant methodologies, software and hardware tools and information to collabour ate in the production, management and business activities of agricultural, forestry or agri-food companies. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures to run and improve digitized production processes within the field of sustainable production in agriculture, food industry and forestry sectors - Using drones and robots in different activities of the agriculture -, forestry -, and food industry. - Analysing and handling data. - Providing support in the different phases of the agriculture, forestry and agri-food production processes, using digitized machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	**medium**

4. The Action Plan

This section reports the operational aspects of the implementation of the pilot course planned for Italy identified as the one with the highest priority during the project meetings and during the NWG in the Technician for Food Industry digitalisation (LEVEL 5). The selected module will consist of 360 hours of course divided into 150 hours of frontal classroom with specialized teachers, 150 hours of oriented self-learning and 60 hours of lessons on soft skills for the completion of training gaps and missing soft skills.

This chapter defines the activities that will be carried out, the content of pilot course, the number of trainees, the costs of pilot course with also clearly indicated the problems and risks associated with the implementation of the activities.

4.1 A clear statement of activity

This section analytically describes the contents of the pilot course for both the technical content and the soft skills part. Overall, the pilot course "**Technician for Food Industry digitalisation**" will last 360 hours and at the end it will be possible to certify both the technical and soft skills acquired during the course

Lesson	Learning Outcomes	common to technician food industry
What is Digitalisation	Understand comprehensively from different perspectives what is meant by digitalisation	
	Ability to describe what is meant by digital innovation	
	Ability to describe what is the difference between smart farm and precision farm concept	
Digitalisation & the Impact of Technology	Ability to summarize how digital technology has evolved in time and can name the future digitalisation trends ("Technological breakthroughs from the early days of farming to 2030 and beyond")	
Industry 4.0 circular manufactoring	Innovative circular manufacturing technologies enhanced with novel production mechanisms and digitalization aspects promoting energy efficient and low material consumption production processes, resulting in reduced greenhouse gas emissions and air pollutants.	
Forestry and agrifood production chain	Agrifood production supply chain management	
	Ability to find and use of mobile phones apps	
Introduction to digitalisation tools and machinery	Ability to name the various technologies available linked to farming activities and understands what can be achieved from using them	
	Software and online application use	

	Technician/Operator is able to maintain or ensure the maintenance of cleaning equipment, heating or air conditioning of storage facilities, sensors and the temperature of premises.	
Control the enviroment for storage	Ability to estimate the benefits and challenges relating to programming DIY vs Outsourcing / Contractors	
	able to compare devices and sensors, schedule irrigation, to set up temperatures, extra-time and CO2 fertilisation	
Greenhouse control for irrigation and protected environment conditions	Use semi-autonomous or autonomous machines which automatically carry out complex actions while being guided by digital or electronic software, such as driverless cars, drones and other machines. Drones legislation	
Precision farming, weather forecast knowledge and tools	Entering information into a data storage and data retrieval system via processes such as scanning, manual keying or electronic data transfer in order to process large amounts of data. (Data handling and analysis, data exchange)	
transferring data from application - data exchange	Collecting data and statistics to test and evaluate in order to generate assertions and pattern predictions, with the aim of discovering useful information in a decision-making process. (Data handling and analysis, data exchange)	
basic statistics	Traceability, equality signs and labels	
Logistics, warehousing, transportation	Opportunities and Challenges of Food Logistics 4.0	
Food processing technical skills	Fundamentals of Food Processing	
	Food manufacturing in the circular economy	
	HACCP principles, physical and chemical analysis principles	
Food processing automation	Application of sensors and control processing, being able to manage the elements of an IoT ecosystem, assembling hardware and configuring software (sensors programming, signal processing, real-time and local analytics, manage databases, cloud analytics)	
Food packaging	The packaging role in the digitalisation of agri-food production	
	Total hours	**150**

The teachers during the work activities in the classroom will provide the workers with self-learning material that they will have to consult during the 150 hours of self-learning.

Below are the modules selected for soft skills that concern transversal skills and entrepreneurship for a total of 60 hours that can be segmented according to the soft skills that are missing in the profile of workers.

Lesson	Learning Outcomes	hours
Understanding the (digitalization/Sustainability/bioeconomy) principles	Definition of soft skills & digital competencies	
Basic ICT skills	Utilise computers, IT equipment, software and modern-day technology in an efficient way.	
	Ability to acknowledge cyber security risks for the FMIS ("Cyber threath risks the digital ecosystem on a farm includes and how to avoid them")	
participation in peer groups	Utilise computers, IT equipment and modern-day technology in an efficient way.	
Innovation management	Ability to innovate together with the decision makers different lucrative future visions for the farm.	
	Ability to facilitate peer groups for innovative companies	
Business Modelling	Ability to substantially ideate, describe, evaluate, and discuss a business model using the Business Model Canvas	
	Ability to describe the current farm digital ecosystem	
	Basic of economic and financial issues	
	Analysis of Agri-food business modelling	
Organization and Planning	Achieving better results through effective planning and clarifying goals using SMART objectives	
	Applying a critical-path network system to estimate time and activities required for reaching objective, using planning tools such as Gantt Charts	
	Keeping things in perspective, practicing the principles of prioritizing work effectively	
Team working, negotiation and conflict management	Managing issues in team constitution (team roles)	
	Identifying the different stages of team development and how a leader can support the team at each stage	
	Understanding the needs of different personality styles and how to work with them	
	Discovering how to build deeper relationships through common understanding and improved communication	
	Becoming effective at delegating lower priority items	
Health and safety in the workplace	Applying principles, policies and institutional regulations aimed at guaranteeing a safe workplace for all employees	

	Analyse the duties of employers and employees as specified in current Safety, Health and Welfare at work legislation	
	Examine the role of the Health and Safety Authority	
	Explain the causes, prevention, emergency procedures, reporting and recording of accidents and dangerous occurrences	
	Analyse the causes and prevention of fire related events to include identification of emergency procedures, the fire triangle and fire equipment	
	Comment on specific hazards and risks when working with equipment to include mechanical and electrical equipment	
	Investigate how personal protective equipment (PPE) is used in the workplace	
From Traditional to Digital Food Marketing	Knowing the principles of managing the relationship between consumers and products or services for the purpose of increasing sales and improving advertising techniques.	
	Carrying a market analysis to understand customers behaviour	
	Understand the routes to market and the marketing approach	
	Identifying how to develop a marketing mix: product, price, promotion and place.	
	Creating an effective Digital Promotion Plan by enhancing internet business tools such as social media, PPC (Pay Per Click) advertising, SEO (Search Engine Optimization) and growing your contact list with DEM (Direct Email Marketing).	
	Doing analysis and online market research	
	Using Google Analytics and analysing statistics related to business website	
	Creating cases of studies and best practices in digital food marketing	
Lifelong learning and continuous learning	CPD (Continuous Professional Development)	
	Conscious decision making	
	Total hours	**60**

4.2 Time period

Below is the indicative calendar of training activities :

New Profiles	Jan 23	Feb 23	Mar 23	Apr 23	May 23	Jun 23	hours

Technician for Food Industry digitalisation level 5							**360**

classroom activity							150
Self-learning							150
Soft skill							60

4.3 Quantity of inputs / outputs and unit costs

The quantification of the costs of the pilot project is related to the category "Teacher / Trainer / Researcher" as defined in the project budget.

The experts of each Italian partner will participate on the basis of their specializations and the number of hours (previously defined) that each expert will have to dedicate to the realization of the pilot course.

Alongside the costs of the teachers, the ancillary costs relating to materials, software, teaching platforms and other costs necessary to activate the course were quantified.

Budget - italian partners

Item	hours	days	€/day	Total cost
Teacher/Trainer/Researcher	150	19	270,00 €	5.062,50 €
Materials & software				2.000,00 €
others				1.000,00 €
Total costs				**8.062,50 €**

4.4 Source of funding

The funds necessary for the realization of the pilot course are defined within the project budget. While the costs for the realization of the entire set of necessary courses can be drawn from the various national and regional funds connected with training activities such as ESF, ERDF and EAGGF programs as well as national funds and in particular inter-professional ones.

At national level it will be possible to launch a complete training campaign based on the 10 selected professional profiles and on the basis of the identified priorities and the respective financial budget can be drawn from different sources.

A massive investment in skills is needed. In addition to money from enterprise and governments, the EU is prioritising investing in people and their skills in our budget. The Recovery Plan for Europe proposed by the Commission in May 2020 will also focus on skills related activities.

EU investment in skills Programme Investment (in billions of euros)*

- European Social Fund Plus (ESF+) 61.5
- Erasmus 16.2
- InvestEU 4.9
- European Globalisation Adjustment Fund 1.1
- European Solidarity Corps 0.8
- Digital Europe 0.5

*Resources from the Recovery and Resilience Facility specifically for skills investment cannot yet be estimated

4.5 Entity responsible for implementation

The entity responsible for the implementation of the pilot course in Italy is represented by the group of Italian partners of the Fields project. their responsibility will be to make teachers and facilities available for the "Technician for Food Industry digitalization level 5" course as well as to supervise its development and evaluate its effects.

4.6 Output indicators

Indicators are tools capable of showing (measuring) the trend of a phenomenon that is considered representative for the analysis and are used to monitor or evaluate the degree of success, or the adequacy of the activities implemented.

The common output indicators refer both to the participants (all participants entering the operation, including those who abandoned it early) and to the entities.

Common output indicators for participants are:

- the unemployed, including the long-term unemployed;
- the long-term unemployed;
- inactive people;
- inactive people who are not following a teaching or training course;
- workers, including self-employed workers;
- people under the age of 25
- people over the age of 54;
- over the age of 54 who are unemployed, including long-term unemployed, or inactive and not following a teaching or training course;
- holders of a primary or lower secondary education diploma;
- holders of an upper secondary education diploma or a post secondary education diploma;
- holders of a tertiary education diploma;
- participants whose families are unemployed;
- participants whose families are unemployed with dependent children;
- participants living in a single adult family with dependent children;

- migrants, participants of foreign origin, minorities (including marginalized communities such as Roma);
- participants with disabilities;
- other disadvantaged people.

5. The ambition

5.1 National Focus on skill needs and Occupational profiles

Skill mismatch is pervasive in Italy. About 6% of workers in Italy are no-qualified while 21% are under-qualified. Meanwhile, about 35% of the workers work in the fields that are unrelated to their studies. Bringing the demand and supply of skills into a better balance requires more responsive educational institutions and training providers, more effective market policy work, better use of skills assessment and anticipation information, as well as greater efforts by the industry private to collaborate with these institutions.

5.2 Life-long learning perspective to both employers and employees

A new generation of skills and a lifelong learning ecosystem driven by central government and social partners need to be jointly developed to ensure a just and inclusive environment. A transition towards a future of work that contributes to sustainable development in its economic, social and environmental dimensions. Such an ecosystem should be part of an integrated approach to creating decent jobs for all, strengthening the supply-side pillar of functioning labour markets to complement the demand-side pillar and matching interventions. The system should be accessible to all, with a specific focus on women, people in precarious working conditions and all disadvantaged and vulnerable groups.

5.3 Partnership building contributing to agri & food and forestry pacts for skills.

The "Skills Pact" represents an opportunity to retrain the current workforce and make the agri-food ecosystem more attractive to young people, while providing a lifelong learning perspective for both employers and employees.

To achieve this goal, the FIELDS partnership has defined a common strategy to design and implement a sectoral requalification and requalification framework, maximizing the competitiveness of all the actors involved, improving the preservation of the workplace and the attractiveness of the work of the agri-food ecosystem under the Skills Pact.

The partnership has developed a first example of a pilot project to test the way towards this ambition. The aim is to reach all stakeholders in the agri-food ecosystem: from farmers, agri-food cooperatives, food processors and relevant associations, to education and training organizations.

6 The proposal and commitment

6.1 The governance and national p&c

It is clear that it is urgent to address the skills needs of the agri-food ecosystem in order to successfully achieve and benefit from green and digital transitions. The improvement of skills and the retraining of workers along the food chain will strengthen the resilience of this vital ecosystem. A crucial challenge for the agri-food ecosystem is to increase its attractiveness and master its ability to motivate people, especially young people, to be part of this ecosystem, especially in rural areas, where SMEs are the cornerstone of the economy.
and industrial fabric. Ensuring broadband internet access, high-quality availability, digital skills education and training can play a vital role in key rural areas and the entire ecosystem towards a successful digital transition.
Europe cannot overcome the global challenges facing the ecosystem without guaranteeing the acquisition of new skills, especially in the agricultural sector where the aging of farmers is a problem. Adequate support at European and national level is also essential for the ecosystem as a whole to address the current skills gap, strengthen its resilience and achieve the Green deal goals.

7 Evaluation

7.1 Assessment approach

Based on monitoring, evaluation is the systematic collection and analysis of data necessary to make decisions, a useful and necessary process to improve the activities of a training plan.

An evaluation is an assessment, as systematic and objective as possible, of an on-going or completed project, program or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, developmental efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors

7.2 Key performance indicators

The Key Performance Indicators (KPIs) identified by the Project, for the evaluation of the skills partnership and for the evaluation of the modules and training courses, are shown in Tables 1 and 2.

Table 1: Assessment of the partnership:

- Stakeholders actively involved (who provide quality upskilling opportunities, in education/training; who play a role in sectoral drivers of change
- Coverage of countries and regions, (sub-)sectors
- Visibility and awareness
- Public opinion, consumer opinion

- Definition and maintenance of a strategic agenda
- Honest and clear communication to different target groups
- Best practice dissemination
- Willingness of partners to share information/knowledge
- Impact on training programs and interest for the training programs (number of interested participants)
- Employees actively interested in participating in Life-Long Learning
- Yearly growth rate of new courses
- Raised level of final degrees of food employees
- Link with our scenarios, see whether profiles support desirable outcomes

Table 2: Assessment of training modules and courses:

- Number of students, companies in the course
- Number or % of participants from underrepresented groups
- Achievement of learning goals (e.g. increased level of knowledge - tests before and after taking the module by trainees)
- Student evaluation/satisfaction of training content and method
- Numbers of certificates achieved
- Flexibility of programs (hours, ECTS, online/face-to-face, ...)
- Renewal of programs (new elements added year to year)
- Resources per module (human resources, financial, technology...)
- Weight of virtual, augmented and connected reality in the training modules, % of audio visual learning vs class learning
- Use of educational material and acquired skills in the workplace
- Learning outcomes in practice (logbooks, blogs, ...)
- Employment status of trainees after graduation, incl. job promotions
- Placement rate for unemployed learners
- Trainees and employer job impact evaluation (better execution of tasks, increased salary, new employment,….)
- Rate of young people/workers recruited in agri-food sector
- Employer satisfaction

KPIs are needed for ongoing assessment of the skill partnerships (Pact for Skills) and for assessment of training modules/courses. KPIs can be used for monitoring progress and outcomes and to take decisions on the way to go forward. A system of KPIs should be limited in complexity, and be transparent and user friendly.

9.5 Annex V: The Netherlands

Introduction

The aim of the Erasmus+ FIELDS project is to contribute to skill enhancement of workers in the agriculture, food industry and forestry sectors, to be able to make full use of the opportunities and comply with requirements of the "Twin'' Green and Digital transition. The FIELDS project focuses on the domains Digitalization, Sustainability, Bio-Economy and Management & Entrepreneurship. Skills include ''hard''/ measurable and technology-based skills as well as soft / social and experience based skills (https://www.erasmus-fields.eu).

Earlier in the Fields project a trend and scenario analysis, on EU level and on country level (7 countries) was performed to depict context for a European strategy for skill enhancement to be developed. Further, a first study on EU level has been performed to define the prerequisites of such a strategy.

This report will develop a road-map (strategy) for the Dutch agriculture, food industry and forestry sectors, furthering on these studies. The roadmaps will include context, developments and policies in the Dutch green education system, the country needs, and specifically the role of the Dutch partners in the Fields project: a description of the tasks, in terms of curricula to be offered, target group of the training, awareness actions, resource map implementation, and stakeholders which can move forward the agricultural skill implementation agenda.

The country roadmaps that will be developed in the Fields project will be used as input for the EU strategy development.

The Dutch agri-food knowledge system

The Dutch agri- and food sector is recognized as very innovative and technologically advanced, with many start-ups and a strong position of SMEs. OECD (2015) characterised the Dutch Agricultural Knowledge and Information System (AKIS) as a Global frontrunner in product technology and innovation processes, aiming at input efficiency and sustainability. Average education level of farmers is high, most young farmer-starters followed higher education. Collaboration between farmers, especially in dairy and arable farming is strong. The Netherlands has one of the highest shares of farmers in cooperatives in agriculture in the EU.

In the Netherlands a strong collaboration has been established between businesses, education and government in the green sector, the so-called Golden Triangle. Groenpact (Green Pact in English) started in 2016 as a partnership between forty parties from the green sector, the green education and the government (ministry of agriculture) with 2025 as the time horizon. Goal is a sustainable future for the green knowledge and education system, as a crucial link for the top position of the sector. Since 2016 this collaboration has been further strengthened and extended to more than 80 organizations, including business sector organizations, educational institutes and government. Green Pact also addresses the Human Capital Agenda of the Agri & Food sectors and the labor market and training agendas of different sectors (https://www.groenpact.nl/international-about-groenpact).

National Working Group in the Erasmus+ Fields project

Within the FIELDS project, 7 occupational profiles (EQF level 4 and 5) have been created with the aim to identify job profiles and curricula that will be required in the 2030 agri-food sector, but which are currently not yet sufficiently provided for.

A National Working Group has been invited for a focus group discussion around 3 of the 10 profiles, all EQF level 4 (operator sustainability, operator digitalization, operator Bio-economy), and the associated soft and business skills (See Annex 3).

The aim of the discussion was:

- looking at the actual (future) needs for knowledge and skills in the sectors of sustainability, bioeconomy and digitalization,
- which are the required steps to take (and into which direction) to plan education and training programs, in order to satisfy these future needs.

The focus group met on 7th of September 2022, with participants from different organisations but all linked to either Groenpact, CIV or TKI, and working at different levels of the Dutch green education system. Members of this discussion group are named in Annex 2. The meeting lasted for 2 hours and was recorded. The focus group was structured according to a questionnaire which was partly derived from the Fields report on Prerequisites for strategy developments (see above). For the questionnaire, see Annex 1.

In this report we take a two-step approach. On the one hand we describe the Dutch strategy in green education, supported with information from the NWG discussion meeting. On the other hand we focus on our selected tasks in the FIELDS project, i.e. the development of an EQF level 4 curriculum on sustainability and digitalisation.

Context of education and policies at National level

The Dutch green sector has an international renowned green knowledge system that contributes to the adaptability of the Dutch green sector. The public-private collaboration between education, research, green businesses and policy is unique and strongly supported by the public-private organisation Groenpact since 2016 (see 1.1). Moreover, strong connections have been established between the different levels of the knowledge column.

The national green education system in the Netherlands

Below a scheme is given of the Dutch green education system. The green squares represent the levels where students study agricultural or related green subjects, from VET to University level. In vocational secondary education (blue squares) students can choose for a green focus, next to the common subjects taught in secondary education.

Secondary education in the Netherlands is differentiated in several levels, which determines in which level the student enters the professional education (EQF 4 to EQF 6). The arrows show which ‘route’ a student can follow through the system. When a student has graduated in a certain level (s)he has the right to enter the next level of education.

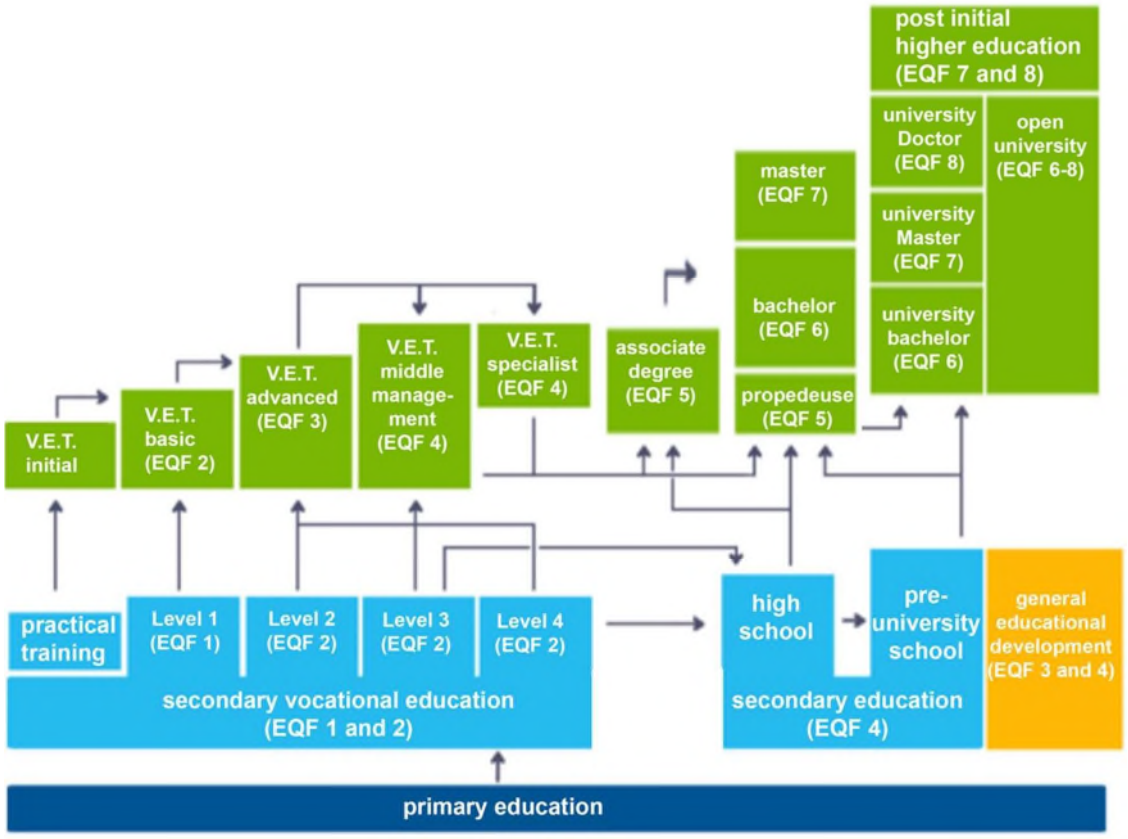


Fig. 1 Scheme: Dutch Green Education System

Adjusted from: https://leoloopbaan.nl/opleidingsinformatie/onderwijssysteem-in-nederland/

Note:

- *EQF level 4 is equivalent to the Dutch V.E.T. 'MBO level 3 and 4'.*
- *EQF level 5 is equivalent to Dutch 'HBO' and Associate Degree.*

The Dutch VET-system

Formerly there were many VET schools specialized at a certain profession. Nowadays many of these schools have been brought under larger umbrella organisations. For agriculture (and related) studies there are specific VET umbrella organizations each composed of several institutes at different locations. Dutch Agriculture VET institutions are: Aeres MBO, Yuverta, Lentiz, Terra MBO, Clucius College, Curio Prinsentuin, Zone College.

In VET (EQF levels 3 and 4) students have a choice to study full-time (BOL) or part-time (BBL). In the latter variant, it is compulsory to work 4 days a week in an accredited workplace and attend school 1 day a week. For EQF level 5 a part time study is often available as well.

VET education (EQF level 3 & 4) are 3-year courses. Students studying in VET spend at least 40% (680 hours) of their study in internships for skills training, the other 60% is theoretical lessons in class and time for assignments (1000 hours).

Internships are fulfilled in industry or companies (farms, greenery etc...). In the progress of the studies the student can narrow their internships towards their preferred specialization.

Examinations

Examination is done as follows:

- Professional knowledge exams, these exams are developed by the 'Groene Norm (Green norm, https://www.groenenorm.nl/). Nation-wide students who follow a certain study have to pass the same knowledge exams. The aim of this is to guarantee on national level that diploma's of students from different institutions have the same value.
- Professional skills tests at the location of internship or at another suitable location, examined by two accredited assessors. Criteria for this skills test are defined in the national qualification dossier, which is developed by the industry and SBB (see 2.3).

- General subjects (Dutch language, mathematics, English) are examined in centrally developed exams by CvTE (Government Agency for national exams, https://www.cvte.nl)

Regulatory framework of VET

Education structure, training requirements and criteria for graduation are set at national level. That means qualifications at different institutions are equal. These are covered by the same qualification dossier (see below).

Qualification structure, job profiles and identification of skill needs

The qualification structure defines the criteria that students should meet to graduate from VET. Each professional course has its own qualification dossier. The criteria cover professional knowledge, skills and attitude as well as general requirements. General requirements cover Dutch language, Mathematics, Social knowledge and skills and English as a foreign language.

SBB coordinates the development of the qualification structure[3]. The procedure is as follows:

1. The industry takes the initiative to decide for which job profiles a specific education or training is required.
2. After approval of several involved institutions, SBB is commissioned to develop the qualification dossier, in consultation with professional experts and VET institutions.
3. The proposed qualification dossier is tested, and legitimized by the SBB board, after which this has to be confirmed by the Ministry of OCW.

There are different agencies and ministries involved for the education and training requirements for skill needs:

SBB (Samenwerkingsorganisatie Beroepsonderwijs Bedrijfsleven)

SBB (https://www.s-bb.nl/) is an organization in between Vocational Education and the industry, linking the two, formulating quality requirements and criteria for graduation for VET and guaranteeing quality internship programs. SBB is executing tasks commissioned by the Ministry of Education, Culture and Science. The aim is to assure that Vocational Education delivers professionals that are well prepared for the labour market.

Ministry of Education, Culture and Science (Ministry of OCW)

In October 2022 the Ministry of OCW has set 3 priorities for improving VET in the Netherlands[24]:

- Improve the equal treatment of MBO students compared to University students
- Improve the connection between VET and the labour market, including internships
- Improve the quality of VET, including internships, applied research and innovation.

Inspection for quality of education

The agency for inspection of VET is part of the Ministry of OCW. The core of inspection is about control that quality requirements are met, in order to guarantee that students receive quality education.

Groene Norm – knowledge exams

The Groene norm (Green norm, https://www.groenenorm.nl/) is an accredited organization producing and delivering exams for green Vocational Education, both at secondary level as well as for VET EQF level 4.

MBO-raad (Council for VET)

MBO-raad is the branche organization for VET institutions. The organization provides advocacy for VET institutions, offers services and organizes activities around advocacy.

[3] From: (https://www.s-bb.nl/onderwijs/kwalificatieregister/ and https://www.s-bb.nl/onderwijs/kwalificatieregister/kwalificatiedossier-ontwikkelen/

[4] https://www.rijksoverheid.nl/ministeries/ministerie-van-onderwijs-cultuur-en-wetenschap/nieuws/2022/10/20/forse- ambities-voor-mbo-44-miljard-euro-tot-en-met-2027

VET framework, flexibility, resilience

The examination criteria for VET studies are thoroughly defined in a procedure under responsibility of the Ministry of OCW and executed by SBB, and valid nation-wide. The initiative to develop a new job profile needs to come from the Industry, after approval SBB takes on the task to define the criteria in a qualification dossier (see 2.3 above). This means that the framework of the types of VET studies provided for and the quality control is strong and resilient.

On the other hand, to initiate a new VET course for a new job profile, as might be the case with newly developed job profiles in the FIELDS project, a lengthy procedure is required. The initiative

needs to come from the industry. This is not an easy way to introduce new modules for new skills into VET studies.

More flexibility is found inside the curricula of existing studies and courses. As the examination criteria are set in qualification dossiers, the modules taught are decided upon by VET management. New modules developed by the FIELDS project can be incorporated in existing curricula, depending on management decisions of VET schools.

Lifelong Learning - Reskilling and upskilling

For LLL, the ministry of OCW is creating flexibility in rules and regulations around VET for adults, in order to stimulate adults to reskill or upskill, as to adjust to labour market requirements (https://www.rijksoverheid.nl/onderwerpen/leven-lang-ontwikkelen).

There are several ways in which adults and/or professionals can follow VET in order to reskill or upskill themselves[5]:

- VET institutions provide fulltime (BOL) or part time (BBL) for adults. There is the flexibility to adapt criteria for qualification according to the level of start-qualifications or experience of the trainee. The VET institute can offer a 'short track' of a specific study for a group of adults who all have certain education or experience at the start of the course.
- Third track (next to BOL and BBL), the third track is a flexible trajectory for adults to re- or upskill[6]. The qualification requirements are the same as for BOL or BBL studies, but there are no regulations for study time or maximum length of the study. Distance learning and on-the- job-learning are acceptable ways for learning. The trainee can decide if (s)he wants to do a complete course or if (s)he wants to do only part of it. These choices are agreed upon between the trainee and the institute. At a later moment the trainee can decide to (but is not obliged to) still fulfil the other parts of the curriculum.
- Certificate trajectory - VET institutes offer specific training courses (short courses), through which professionals can reskill or upskill.

[5] https://onderwijsenexaminering.nl/onderwijs/flexibel-onderwijs/handreikingen-rondom-leven-lang-ontwikkelen-in-het- mbo/

[6] 4 https://onderwijsenexaminering.nl/app/uploads/Handreiking-derde-leerweg-update-maart-2022.pdf (Dutch)

Numbers in the green sector and needs for training matching "FIELDS profiles"

In the Netherlands, the agricultural and green sector consists of just over 100,000 companies which collectively realised a turnover of 137 billion in 2021. Typical of these sectors is the highly fluctuating number of employees needed per season and the large flexible shell. A total of 325,000 workers were employed in 2019. Occupational fields with the most employees are greenhouse horticulture (82,100 employees), livestock farming (75,500 employees), open field farming together with horticulture, flower bulbs and tree nurseries (collectively 70,000 employees), landscaping (43,400 employees) and contract workers (42,700 employees).

There were 17,650 vacancies for permanent employees in the agriculture and green industry in 2019. 27% of these were represented by harvest workers, 16% by production workers and 11% by landscaping workers. More than a quarter of vacancies are difficult or impossible to fill. Table 1 clearly shows the number of graduates compared to the number of vacancies for each course (EQF level 4). This clearly shows that for many courses there are significantly fewer graduates than there is demand from the sector.

Table 1 Number of graduates versus number of vacancies 01-05-2022 (SBB, 2022)

Training	# Graduates	# Vacancies
Living environment consultancy and research	122	40
Agricultural production, trade and technology	1696	3340
Flower, greenery and styling	321	790
Tree care	0	120
Animal fertility and reproduction	0	Unknown
Animal care	2285	Unknown
Specialized laboratory animal care	26	<10
Green environment	1341	2620
Farrier	26	<10
Equestrian sports and horse husbandry	355	<10
Fresh produce management	13	100
Fresh produce craftsmanship	103	590
Food	333	410

Looking at the job profiles and their curricula (Annex 3) and comparing to the statistics of the sector as presented above, one can conclude the following:

- Considering that the agricultural sector in the Netherlands faces a number of challenges with a strong focus on innovative solutions to perpetuate growth, identifying the skills that (future) employees need to possess is important. At the same time, the sector is struggling to fill vacancies, making selection of candidates on pre-existing skills of secondary importance. Training skilled workers with the right skills can help reduce the number of vacancies. Companies then also do not have to train new staff internally themselves.
- Pressure from politics and society on the industry to produce in an increasingly sustainable way is strong. To maintain a right to exist as a company, this demand must be met. The new generation of employees and reskilled workers will therefore have to be trained with this in mind. This is the only way to meet the demand from industry for employees. The

"Operator for sustainability in the agriculture, forestry and agri-food industry" course is a direct response to this development.

- Food safety, integrated supply chain management and having data available at all times is an industry standard that is being worked towards. To this end, as more and more processes become digitised and automated, the demand for skills becomes significantly different. "Operator for digitalisation in the Agriculture, Forestry and Agri Food Industry is in line with this development.
- Of processes and sectors previously viewed in isolation, it is becoming increasingly clear how they influence each other. Companies need employees who understand the impact their actions have on the rest of the chain. A course such as Operator for Bioeconomy in the Agriculture, Forestry and Agri Food Industry meets this need.

Job profiles from the Fields project selected to be elaborated for the Dutch Roadmap

The job profiles selected for the Dutch Roadmap to focus on, are all on EQF level 4:

- Operator for Sustainability in the Agriculture, Forestry and Agri Food Industry
- Operator for digitalisation in the Agriculture, Forestry and Agri Food Industry
- Operator for Bioeconomy in the Agriculture, Forestry and Agri Food Industry
- Associated Soft skills and business skills

Trends, main challenges and ambition

Introduction

This chapter first discusses general trends and scenarios for the agri-food sectors in the Netherlands derived from the Trends and Scenario study in work package 1, Task 5 of the Fields project (https://www.erasmus-fields.eu/documents). Then the trends in Dutch Green education are summarized based on a report of SBB (https://trendrapport.s-bb.nl/vgg/).

From the trends, challenges for the agrifood sector and for the VET – the latter as discussed in the National focus group discussion - are elaborated. Finally the chapter will present the ambition as conclusion.

Trends in the Dutch Agri-food sector

Since the 50ties of the last century, Dutch agricultural policy has been largely focused on increasing productivity and efficiency, advanced technologies, competitiveness and export position objectives. In line with these policies, in the Netherlands but also internationally, Dutch agriculture has developed towards large scale intensive production with high pressures on environment, landscape and society. Consequently, in the last decades public support for agriculture has decreased because of the large impact of agriculture, in terms of agricultural pollution, health issues, pressure on land and decreasing biodiversity in the Netherlands.

As a reaction to these developments the Government in the Netherlands is now swiftly turning to more sustainable policies, coupled to the transition agenda Circular Economy (https://www.government.nl/ministries/ministry-of-economic-affairs-and-climate-policy). According to this policy, the bio-economy must contribute to the objectives of sustainable production, maintenance of bio-diversity, afforestation, reversing land degradation, recovery of eco-systems and improvement of food production and water security. Accordingly Dutch innovation policy is turning its focus to optimal valorisation of biomass and waste streams to circular biobased products, closing of nutrient cycles and

preservation of soil quality, diminishing of food waste, increasing the supply of sustainably produced biomass and protein transition.

Environmental pollution

Since 2019 the Netherlands is caught up in a nitrogen crisis. Nitrogen emissions and deposition exceeded permitted levels, impacting on air quality and biodiversity and in particular jeopardizing Nature 2000 areas. Intensive animal farming forms a major (but not the only) source of nitrogen pollution, in particular in the form of ammonia emissions. Therefore, agriculture is considered by the Dutch government the major sector where reductions in nitrogen emission can be achieved, on the one hand through reducing animal farming activities, and on the other hand by making farming more sustainable. Farmers are also stimulated to produce alternative sources of energy (solar, wind, manure).

Animal welfare

In all animal farming sectors there is increased attention to animal welfare, enforced through pressure of government, consumers and retailers. For example, several large retailers more and more focus on meat and eggs with sustainability labels. In this respect many initiatives for niche products (new brands, new labels) have emerged in the last decade in different sub-sectors, related to sustainable production, animal welfare and others.

Alternative protein sources

Part of the road to sustainable agriculture is to make the animal feed sector less depending on import streams. Currently a strategy is being developed to develop crops high in protein, for animals in the Netherlands. Also gaining protein from residual streams is part of this strategy (from plants, kitchen waste etc.), as well as gaining proteins from seaweed or the use of vegetable proteins as substitute for meat. In this regard a ‘’National Protein Strategy’’ has been developed.

Biodiversity

Only 4.3 % of the surface of the Netherlands is Nature 2000 area while the EU average is 10%. The Netherlands scores lowest of all EU countries in several Biodiversity indicators such as % of habitats with stable or positive biodiversity trends (only 3.8 %), number of farm birds, insects (75 % less insects in 2020 compared to 1990), etc. Main causes are too high N-deposition (manure), fragmentation and disappearance of semi-natural area (disappearance of borders of plots, landscape elements, etc.), drought, monocultures, use of chemicals for crop protection.

Digitalisation

In the near future most data flows in Dutch agriculture will be digitalised: invoices, supply messages, laboratory results, samples, etc. This will give a solid basis to further connect to the fast emerging on- farm IoT (Internet of Things) applications on farms: precision agriculture, circular agriculture, transparency (and certification).

In the Dutch food industry digital innovations focus on traceability, labelling, robotization and Artificial Intelligence, automatization and Internet of Things (IoT), as well as exchange of data with supply chain partners through EDI (Electronic Data Interchange). In processing the trend is towards smart industries, with minimal human intervention and maximum circular production (Rabobank, 2021). Dutch policies strongly support these developments with the Dutch Digital Agenda.

Business models

42 % of Dutch farmers in 2020 had developed multi-functional farms, including activities like farm gate sales/shop (the largest activity), health care, childcare, tourism activities, farm education, nature management and increasingly energy production (wind, solar). Farm gate sales is the largest activity (271 mln in 2018), followed by health care and recreation. (Meulen et al, 2019).

As the physical distance between countryside and cities in the Netherlands is low, this brings opportunities to the development of short chains, focusing on locally produced products. Although the number of short chain initiatives is still limited, many regional governments are starting programs to support farmer entrepreneurs to sell local products to local markets.

Implications (challenge) for education/training

The policy directions and the trends above imply some focal points of attention in education and training:

- Circularity of production throughout the food chain (as one of the main objectives of current Dutch agricultural policy)
- Environmental pollution, with a focus on animal farming and manure management
- Animal welfare
- Biodiversity maintenance
- New sources of protein production
- Digitalization of farms and smart food industries
- Multifunctional farming and short food supply chains

In the last decades education/training institutes have followed and supported these trends by setting up new courses in these areas on all EQF levels (see also chapter 2).

Scenarios for the Dutch agri-food sector

The Fields (Deliverable 1.8) report on trends and scenarios for the European agrifood and forestry sectors, distinguished between three scenarios: Sustainable Pathways, Established Pathways and High-Tech Pathways. In this report these scenarios are also worked out for the Dutch agri-food sector.

We will discuss the difference in trends between the two scenarios in which the agrifood sector is changing most: Sustainable Pathways and High-Tech Pathways.

Table 2: Focus points for skill development in High Tech and Sustainability scenarios for the Dutch agri- food sector[7]

Sustainable Pathway	**High Tech Pathway**
Consumers value plant based, local, traditional products	Consumers value healthy and personalized (processed) products
Local products	Global products (optimal selection and efficient logistics)
Multifunctional farms (small scale extensive farming with attention to integration of rural economic activities in the society)	Large scale production, efficiency and productivity focus

[7] Derived from Fields Deliverable 1.8 Trend and scenario analysis, https://www.erasmus-fields.eu/documents)

Crop diversification and biodiversity	Crop diversification focused on efficiency
Circular production (along the supply chain)	By products valorization, functional foods, 3D food printing etc.
Ethics in food	Economics in food
Biopesticides and organic fertilizers	Synthetic pesticides and fertilizers
Bio-energy (small scale)	Bio-energy (large scale), climate smart technology (e.g. geo-thermal energy)
Biobased products (SMEs)	New industrial crops and biobased products
Agro-forestry	Forests as production units
Precision agriculture (SME farms)	Precision agriculture (large farms)
Integration local/regional value chains)	Integration Global supply chains (advanced block chain technology)
Soft skills for marketing, communication, collaboration	Soft skills on management, leadership, organization
Entrepreneurship	Innovation management

Considering trends described in (par. 3.1) we see dual development in the Dutch (and European) agri- food sector: companies moving to a high-tech focus, companies moving to a sustainability focus and a mix of both. This means there is also attention in education and training to skill development for either or for a combination of scenarios. As Dutch policy moves towards more sustainable production while a focus on high-tech remains, a mix of both scenarios seems most realistic for the coming decade.

3.1.2 Challenges for Education and training based on Fields Occupational job profiles

Within the Fields project 7 Occupational profiles have been created, of which 3 were discussed in the NWG discussion, the job profile on soft and business skills was added to these profiles.

The NWG graded the skills to the needs of the Dutch Agrifood trends and ambition.

Fig 2: Skill needs in general occupational profiles graded according to trends in Dutch AgriFood sector

Operator for Bioeconomy in forestry, agriculture and food industry

Essential Skills	Prioriteit	Praktijk
Management of natural resources,	●●○○○	●○○○○
Biomass production and transformation	●●●○○	
Planning and coordinating production	●○○○○	●●○○○
Traceability	●○○○○	
Efficient use of resources and logistics	●●○○○	●●○○○
Production, management of renewable energy and its use	●●○○○	●○○○○
By-products and co-products valorisation	●●○○○	●○○○○
Essential Knowledge		
Bio-economy and circular economy principles	●●●●○	
Biobased products and ecosystem services, re-use, recycling; nutrients circulation vs nutrients removal	●●○○○	
Food waste reduction		
Energy efficient production methods	●●○○○	●○○○○
Knowledge about the forestry and agrifood production chain	●○○○○	

Operator for Digitalization in forestry, agriculture and food industry

Essential Skills	Prioriteit	Praktijk
Practical training with job-specific machinery/equipment and their maintenance	●○○○○	●●○○○
Use of robots/drones	●●●○○	●●●○○
Data handling and analysis; data exchange	●●●●○	●●●○○
Traceability	●●○○○	
Weather forecast knowledge and tools	●○○○○	
Essential Knowledge		
Knowledge of technical principles for digital agriculture, industry and forestry; smart systems and technologies introductory aspects;	●●●●○	
Basic remote sensing, GPS, GIS knowledge;	●○○○○	●○○○○
Knowledge of Management Information Systems	●●○○○	●○○○○
Knowledge about the forestry and agrifood production chain		
Legal framework when using autonomous machinery		
Industry 4.0	●○○○○	
Circular manufacturing aspects	●●○○○	

Operator for Sustainability in forestry, agriculture and food industry

Essential Skills	Prioriteit	Praktijk
Sustainable and multifunctional agriculture and forest management	●○○○○	
Ecosystem services	●●○○○	
Biodiversity, Prevention and management of natural disturbances, adaptation and mitigation to climate change	●●●●●	●○○○○
Water management, management of natural resources,	●●○○○	●●○○○
Soil nutrient health management	●○○○○	●●○○○
Traceability & food Production;	●○○○○	●●○○○
Animal welfare	●○○○○	
Essential Knowledge		
Renewable energy	●●○○○	●○○○○
Sustainable forest and agriculture management practices and planning;	●●○○○	●●○○○
Environmental management aspects; GHGs emission reduction; climate change	●●○○○	
Knowledge about the forestry and agri-food production chain		
Standards and regulations	●●○○○	
Soil	●○○○○	

Module soft skills and entrepreneurship

Essential knowledge and skills	priority	praktijk
Understanding the (digitalization/Sustainability/bioeconomy) principles	●●●○○	●●○○○
Basic ICT skills		●○○○○
participation in peer groups		●○○○○
Innovation management	●●○○○	●○○○○
Business Modelling	●○○○○	●○○○○
Organization and Planning	●●○○○	●○○○○
Team working, negotiation and conflict management	●●○○○	●●○○○
Health and safety in the workplace		
From Traditional to Digital Food Marketing		●○○○○
Lifelong learning and continuous learning	●●○○○	●○○○○

Major modules

As figure 2 shows major modules as identified by the focus group participants were:

Bioeconomy:

- Biomass production and transformation
- Bio-economy and circular economy principles

Digitalisation:

- Use of robots/drones
- Data handling and analysis; data exchange
- Knowledge of technical principles for digital agriculture, industry and forestry; smart systems and technologies introductory aspects;

Sustainability:

- Biodiversity, Prevention and management of natural disturbances, adaptation and mitigation to climate change

Soft skills & Entrepreneurship:

- Understanding the (digitalization/Sustainability/bioeconomy) principles

Trends analysis by SBB for Dutch green labour market and VET

As laid out in Chapter 2.3, SBB is an organization in between VET and the industry, linking the two and formulating quality requirements for VET and guaranteeing quality internship programs. SBB regularly analyses the trends and the labour market in several sectors and advises on the impact on VET, in order to make sure that VET delivers professionals prepared for the labour market.

Below is a summary of trends in the Agri-food labour market as assessed by SBB (https://trendrapport.s-bb.nl/vgg/). These trends can be read as complementary to those identified in section 3.2 and a further elaboration towards trends in the Dutch green labour market. Moreover, the objective of this section is to relate these trends directly to skill needs of students and practitioners. The description of trends shows two categories, Smartification and Sustainability, which are corresponding with the High-tech and Sustainable scenario's as described in section 3.3. Next to those there are the categories Humanization and Market liberalization.

Smartification

Smart data

Intelligent ICT applications, data collection and new technology applications are increasingly finding their way into the agricultural sector. There are many examples: Agricultural companies are using artificial intelligence to track the movement, temperature and feed consumption of their animals. Through machine learning and use of sensors, farmers are gaining more insight into the health of their crops or livestock. GPS techniques, allow a farmer to work more precisely in crop farming. The use of these innovative techniques contributes to cost efficiency, higher yields, less waste and healthier products.

The same developments are seen in other industries, such as the use of sensor technology in tree care or furriery industry. In the horse industry, (stable) management systems and health systems (supporting physical observations) are on the rise. In laboratories computer models are used for testing drugs, which contributes to animal welfare.

The new techniques require new and different competencies from professionals in the industries, obviously computer skills, handling software are basic skills and especially data handling is required. For contractors and other service providers, there is at the same time a need that they learn communication ans social skills. Clients have more information (data) and want to be involved in decision making.

Transparent information

Consumers require information about the quality of their food, enhancing the need for transparency in the food chain. The floriculture industry is using radio-frequency identification (RFID) to create transparency in the chain. Blockchain technology provides data to create transparency and traceability in the food chain from production, transactions and processing activities. In animal husbandry and trading there is a high importance for traceability, due to animal diseases, animal welfare and laws and regulations for these aspects.

In addition, farmers are increasingly collaborating in closed chains so they can agree on margin sharing and are better able to gain consumer trust.

In order to create transparency professionals have more administrative work. Computer skills and the ability to cooperate fruitfully become more important.

E-business

E-business is about the transformation of business processes using technology. More and more specialized companies deliver products directly from farmers to consumers through online stores and meal boxes. Sales in this way have doubled since 2020 compared to 2019. Online sales of green products (flowers, plants, garden supplies, etc.) and animal supplies have also increased significantly partly due to the corona crisis. Pet stores, garden centers, equestrian retailers and flower stores are responding to this with initiatives that make buying online easier. For example, more and more (online) flower stores are starting to adjust their business processes to enable subscriptions, for example.

With the rise of e-business, professionals have more work preparing products for shipment and will work closely with the courier service responsible for transportation. There is little stock, products have to be quickly ordered from producers.

Consumers orient themselves well online and have high expectations of store workers. They expect a store worker to convey their knowledge and provide proper information. Advising skills are becoming even more important to add value compared to the online channel.

Co-botization

Co-bots are robots that do not replace human labour, but that support humans in executing labour. Cooperation between humans and robots is central in co-botization.

Industrial robots

Robotics has given the agricultural sector a huge boost. Think of field robots (planting, sowing, etc), milk- and feed robots and related hardware and software to perform data analysis. There are many developments in robot technology that make work for humans easier. But for fine- motoric operations and processes with a visual aspect, humans are still important.

Drones are used in agriculture to monitor fields or animals. Drones use sensors to collect data, these data are used to work more efficiently. E.g. Pesticides can be used much more focused and efficiently. Controlled Traffic Farming (CTF) is a technology that controls transport, e.g. tractors can drive and steer themselves based on GPS tools, computer maps and digital data. Robotic technology and smart data enable remote cultivation.

Because of co-botization, the role of the professional is changing. The skill of data handling becomes very important. The increased complexity of new machines makes technical

knowledge and skills are even more important. A professional must know what to do if the robot or machine breaks down. The risk of automating work is that the work that remains is more monotonous.

Sustainability
Circular
Economy

45% of agricultural land is affected by soil compaction due to working with machinery that is too heavy. Management of soil nutrients which is essential for food production can't be optimal due to soil compaction. Strip cropping and awareness of tyre pressure are measures to reduce soil compaction. In many areas, agribusiness is developing into a more sustainable industry, with elements of circular agriculture. Transparency in the waste stream is also important to achieve circular solutions. Better reuse of residual streams means that professionals in the green sector need to be knowledgeable of materials and ask themselves whether it is possible to reuse green waste. The livestock industry has been using waste streams from the food industry for years. Initiatives to combat food waste and a shift to less animal and more vegetable proteins are also part of a circular economy.

Climate adaptation

Agriculture and horticulture sector must prepare for more frequent extreme weather conditions. In the agricultural sector, excessively wet conditions result in insufficient oxygen in the soils for crops and cause indirect damage. The carrying capacity of wet soil is insufficient for grazing and for agricultural machinery. Longer periods of drought directly affect crop yields and cause loss of product quality. It is primarily up to farmers to take measures and adjust their operations accordingly. Contractor firms need to know about nature development ánd about new methods for crop production to adapt to climate change.

Increasing nature or green areas is an effective measure to reduce heat effect, specifically in cities. There is more work for gardeners to contribute to a green city. In doing so, however, gardeners must be able to inform and enthuse individuals, businesses and governments to opt for climate-adaptive measures.

Bio-diversity

Biodiversity is essential for world food security and for making production systems more sustainable and robust. To bring about change that leads to more biodiversity and living gardens, the basic part of training in agro-production as well as green space, should include knowledge about ecosystems and biodiversity. During verge management, ditching and dredging activities, professionals need to pay attention to biodiversity. To this end, more and more specific professional knowledge in the field of verge (road side) management is expected from contractors and their employees, advisory skills are important when thinking along with their clients.

Short chains

The large number of actors in a chain often causes the quality and sustainability of a product to be lost. The corona crisis has increased society's awareness of the importance of supporting the local economy. The number of companies working on shortening chains has risen sharply in recent years. For example, the florist, with an online channel, is buying more and more directly from the source. The shorter the chain, the fresher the product. Interaction with the community

is important in order to act together with local entrepreneurs. It requires other communication skills, such as being able to have a dialogue with one's community.

Energy transition

The agricultural sector is a crucial partner in achieving energy goals. After all, farmers have the space, buildings, roofs and biomass at their disposal. They can install windmills, equip roofs with solar panels or ferment biomass. Other sectors, such as animal and tree care, are also contributing to the energy transition. Changing the consumption of energy first requires knowledge of current energy consumption.

For soil works, the energy transition means a change in machinery: from large, robust diesel machines to electric ones. Contractors and their employees need to get used to that.

Humanization
Personalization

There is increasing demand for personalised products or products with special compositions. This means that professionals need hospitality and communication skills to be able to adjust products and services to the consumers' wishes.

Animal welfare

In recent years, the animal husbandry industry has been paying more attention to animal welfare as well as to the responsible handling and care of animals. This stems from public discussions from politics and the media, the development of organic food and global diseases. Fierce reactions appear on social media channels when people see or hear that animals somewhere are not treated properly. To this, professionals working with animals must react appropriately and need communication skills. professionals need to know what animal welfare entails, the regulations and laws that apply and which quality marks are important. As attention to animal welfare increases, so do administrative tasks.

Market liberalization Increase in scale

The number of agricultural businesses in the agricultural sector has decreased. Cultivation has become more large-scale, more efficient and more intensive. Scaling up has, on the one hand, created new positions, such as administrators or middle managers. On the other hand, the increase in scale means that farmers are more likely to hire a contractor for farm work.

Contractors need a lot of knowledge about machinery and crop production methods. This requires that a contractor has both technical knowledge as well as communication skills in order to explain the use of the machines or the work approach to the farmer.

New business models

There is broadening of services. As a result, professionals have to deal with a broadening of tasks that require different types of knowledge. Farmers see new opportunities by combining the agricultural business with associated activities such as childcare, farm education, agricultural nature management, agritourism, farm sales or providing care at the farm. This gives the farm a multifunctional character. Urban agriculture can link local food and energy production in the city with social goals such as recreation, care or educational opportunities.

Socially-inclusive agriculture (such as Citizen Farms) focuses on the connection between citizens and farmers. One difference with direct sales is that the relationship between the citizen and the farm is more intense than just the exchange of goods.

Conclusion

Looking at the knowledge and skills requirements mentioned for the trends in the actual Dutch labour market, we can see the following for the different areas:

Smartification/Digitalization:

- Computer skills, handling software and especially handling data
- Technical knowledge
- Communication & social skills
- Administrative skills

Sustainability and bioeconomy

- (Technical) Knowledge (e.g. tyre pressure in relation to soil compaction, biodiversity and its importance, materials and possibilities for re-use)
- Advisory & communication skills,

Organizational and didactical challenges for VET (identified by the NWG)

The NWG (National Working Group) consisted of members of several institutions linked to Green Pact. A round table discussion was organized on September 7, 2022.

The aim of the discussion:

Looking at the actual (future) needs for knowledge and skills in the sectors of sustainability, bioeconomy and digitalization, which are the required steps to take (and into which direction) to plan education and training programs, in order to satisfy these future needs.

The NWG emphasized the following challenges and possible solutions to bring about change. The full report is attached in Annex 2.

Maintaining a close cooperation with innovating partners in the sector and industry.

- Flexible craftmanship: Students get opportunities for real-case based learning. Which offers opportunities to develop skills such as creativity and gaining insight into what ís and what is nót important, such as changing technologies. Flexible craftsmanship is developed by working in a company.
- Teachers and students experience and learn on innovations
- Companies provide learning environments with modern machinery and innovative techniques, to prepare students for the future needs.
- Students can graduate in split examination: A theoretical exam after a basic course of 2 years and grading for an assignment (real-case) in a company after another 1 or 2 years. *(Dutch: 'Leerweg onafhankelijke toetsing').*
- A close cooperation can be established through Meeting Points where companies and educational institutions (teachers and students) meet.

Changing role of teacher

- To improve and shape the cooperation between industry and education, teachers should get and keep a close relationship with industry. This could be done by teachers regularly doing internships.
- Teachers and students should learn together, the teacher becomes a coach or facilitator. Students will learn more from a coaching teacher.

Quality of education

- Students need to learn sufficient basic knowledge to back up the mastered skills and techniques, so they are able to apply their knowledge in new situations. This 'flexible craftmanship' is a quality expected to become important in industries where technologies change fast.
- The sector needs well trained professionals, on top of that the link to HBO (EQF level 5-6) is important.

High expectations from MBO (EQF-level 3-4) students and Life Long Learning

- It is not realistic to educate young people to be a fully trained professional in just a couple of years. There is a need for a smooth overlap of formal education, informal education and Life Long Learning.
- Pilots are done to develop informal training based on requests of the sector and to mix students who are in formal education with farmers into learning groups. Experiences vary.
- Challenge is the examination and accreditation. Experiments are done with 'sub-

certificates' (Scandinavia) and micro-credits (ICOS, Ireland).

Target groups

- Many students at agricultural VET EQF level 4 are from the countryside and have a background in agriculture. At secondary level there is a high diversity among students, but many have a negative attitude towards green studies.
- There is a need to make the agricultural sector more attractive to youngsters who are not from a green background. Options:
  - An opportunity might be in the food sector, where a high need of workers is expected, a link to agricultural jobs could be there.
  - Integrating agriculture studies with other studies, e.g. technical studies, this creates added value, and might stimulate some youngsters to at least partly study agriculture.
  - In the food sector a shortage of workers is expected. New residents (ex-refugees) could be a target group to reduce shortages of workers. But there are challenges to adjust the education for them, as their levels of education vary a lot.
  - Innovations might attract youngsters from a city background
  - Examples of 'new people' in the sector might help to stimulate others.

School as learning organization

- The school to be a learning organization is key to deal with the challenges of a rapidly changing environment and requirements for skills and knowledge.
- Making changes happen depends on the management of a school. The management of the school should be: Open minded to change, taking the lead to change and prepared to invest in changes.

Life Long Learning

- Professional learning should be integrated in educational institutions. Farmers and students can learn from each other.
- In practice, farmers like to learn from other farmers. Students make outcomes of practical learning measurable and impact visible (more so for EQF level 5).
- Organization wise learning together between farmer and student proves difficult, but when the right form is found, both groups can inspire each other.

Highlights on challenges for VET

In sections 3.2-3.4 the trends in Dutch Agri-food sector are described. Two scenarios are laid out: The Sustainable pathway and the High-tech pathway and the conclusion that both pathways are developing in the Netherlands.

This resulted in focal areas for VET, major modules (knowledge& skills areas) and organizational and didactical focus points. Highlights are the following:

In the sustainable pathway we see major competences to be:

- Understanding the principles of sustainable production
- Biodiversity, prevention and management of natural disturbances, adaptation and mitigation of climate change

- Water management
- Renewable energy
- Bio-economy and circular economy principles
- Biomass production and transformation
- Handling software and handling data (e.g. precision agriculture)
- Technical knowledge and skills
- Soft skills such as: collaboration, communication & advisory skills
- Attitude change e.g. working with electric machinery

In the High-tech pathway we see major competences to be:

- Technical knowledge (smart farming practices and systems and smart forestry practices and systems)
- Understanding the principles of high-tech production
- Use of robots and drones
- Renewable energy
- Handling software
- Data handling and analysis, data exchange
- Communication and social skills
- Administrative skills

In the area of organization and didactics, focal points are:

- Establish close cooperation with innovating companies, which will create opportunities for real-case-based learning, teachers and students experience and learn in innovative environment
- Stimulate the role of teachers to change to become more flexible, more coach and facilitator in-stead of the all-knowing teacher
- Keep the level of education high
- Broaden the target group in order to increase the number of students in Agri-food studies, as the industry is in need of professionals.
- Create a smooth overlap of formal education, informal education and Life Long Learning, including experimentation with other ways of handing out certification for students
- Stimulate schools to become learning organizations.

Ambition

The ambition below is split up in two levels. Groenpact is a partnership of several organizations in the green sector with the goal to develop a sustainable future for the green knowledge and education system. The ambition of Groenpact is leading for the national green education system. Next to that we have included an ambition on the level of the Fields project which will contribute to the Groenpact ambition.

Groenpact

The main ambition as formulated by Groenpact remains contributing to solutions for strengthening the sustainable competitiveness of the green sector in line with the large societal tasks (see 3.2). This

contribution lies mainly in attracting and training sufficient talent, the innovation of education and the transfer of knowledge into practice. The aim is to fit in with the labor market of the future and the big social issues in the fields of food and green. Thereby, the main effect of Groenpact lies in strengthening cohesion and boosting cooperation between sector, education, research and policy. (Groenpact, 2021)

Erasmus+ Fields project

The Fields project stands for: Addressing the current and **F**uture skill needs for sustainabilty, digitalization, and the bio-Economy in agriculture. European skills agenda and **S**trategy.

The concrete ambition for FIELDS in the Netherlands is that the FIELDS project contributes to the development of an EQF level 4 curriculum on sustainability and digitalization addressing the future skill needs for both the Sustainable pathway as well for the High-tech pathway. Students. As the sector is in swift transition to more sustainable policies and practices, there is a need for content material for VET students.

The goal is that modules are developed and prepared, benchmarked with the relevant organisations, such as Groenpact and SBB, and made available to VET in the green sector. The form of the modules should be such that they can easily be incorporated into existing curricula.

4 Commitment, proposal and action plan

Commitment and governance

Public and private partners in the green education sector in the Netherlands have committed to the strategy as formulated by Groenpact. The operating budget of the national platform organization is around 600.000 euros/year and includes coordination, strategy formulation and positioning.

However, the joint investments of the partners in the program are estimated at around 15 million.

Groenpact

Groenpact has four interrelated components: the network platform, the basic infrastructure, the acceleration programs and the practical arrangements. The network (multi-stakeholder) platform has a national character. The basic infrastructure consists of the CIV Groen (Center for Innovative Craftsmanship Green – focusing on EQF level 3,4 (MBO)), CoE Groen (Center of Expertise Green, focusing on EQF level 5, 6 (HBO)) and Wageningen UR knowledge transfer - focusing on EQF level 7,

8. With robust expertise and practice clusters, these promote cooperation in the green knowledge column. Further, there are four acceleration programs aiming at: the labor market, knowledge sharing, internationalization and digitization & technology. The practical arrangements are diverse. These programs focus on a flexible, thematic and cross-sectoral cooperation (www.Groenpact.nl).

National strategy (the proposal)

In its 3rd phase plan, 2021-2025 Groenpact formulated the following foci[6]:

Network platform focus:

- The core of the work is establishing substantive relationships between the policy and sector agendas and programs. This includes creating and stimulating relevant networks and activities.
- Operationalization of the RVO[7] support center (Dutch public organization for information, advice and funding).
- Realizing a structural approach for youth participation, including young professionals.
- Designing and operationalizing a target group-oriented communication, also internationally.
- Developing a Green Pact impact model and monitor (see also, chapter 5 of this report).

Basic infrastructure focus:

CIV Groen

The Center for Innovative Craftsmanship Green (CIV Groen) is the driver for innovation in the green MBO (EQF level 3, 4). It strengthens the cooperation between regional business and green vocational education in the field of educational innovation, practice-oriented research, knowledge sharing and lifelong development in line with the labor market and social question. The CIV Groen consists of five national practice clusters in the Plant domains (Agro, Horticulture and Starting Materials), Animal, Food, Nature and Living environment. Each practice cluster has regional meeting points. All educational institutions with green MBO have become actively connected to at least one, but often several, regional meeting points or practice centers, for example the Green Hotspots, the Poultry Expertise Centre, the Food Academy Nijkerk, the World Horti Center and the Agrofood cluster

[6] The text of this subsection is derived from (www.Groenpact.nl, Brochure on 3th phase of Groenpact, 2021)

[7] RVO: Netherlands Enterprise Agency, www.rvo.nl

Emmeloord. Each of the more than 30 meeting points has a liaison officer. In addition also a multitude of companies, sector organizations and education and training institutes are connected. The educational institutions are working towards approximately twenty green Practorates (R&D positions in MBO institutes).

Focus:

- Strengthening the position of the regional meeting points and increasing the involvement of teachers and students
- The expansion of the collaboration with practorates (MBO R&D functions) and lectorates (HBO R&D functions) and increasing knowledge circulation among other things through the Pilot Green Program Practitioners including professionalization of teachers.
- Exploring a cross-sectoral approach (incl. the green-blue connections), strengthening the connection to the regional networks and further development of LLL.

CoE Groen

The Center of Expertise Green (CoE Groen) has about five national expertise clusters in the domains Food, Plant (Open cultivation and Covered cultivation), Animal and Green, Nature & Living Environment. The CoE focuses on strengthening applied research for transitions and social challenges and increasing the impact of research on professional practice and education. The CoE Green is supported by the four green universities of applied sciences in the Netherlands (HBO, EQF level 5, 6), in close connection with

professional practice and the (regional) environment. Collaboration in practice oriented research should impact on professional practice and education. To this end, there are direct connections to the CIV Groen and Wageningen UR and there is cooperation with the business community, governments and various other parties, for example the World Horti Center, SIGN, TiFN Food and Nutrition, Food Valley.NL, De Liemerse Embassy and The Economic Board Arnhem Nijmegen.

Focus:

- Increasing the impact by continuous extension of the research programs to support the social issues, exploiting a wider range of tools, strengthening the effect on teachers and students and a lifelong development.
- The further expansion of the network of public-private partnerships for practice-oriented research, including regional and cross-sectoral anchoring and strengthening the connection with fundamental research in the context of the Knowledge and Innovation Agenda Agriculture, Water and Food.
- Reinforcing the (methodological) quality of practice-oriented research.

WUR knowledge transfer

Wageningen University&Research (WUR) has five science groups in which education and research takes place. Within the context of Groenpact, the emphasis is on strengthening of knowledge transfer for the benefit of the large social (transition) challenges and increasing of the pass-through of research results to the vocational education and practice. WUR knowledge transfer is realized in collaboration with different WUR components (such as the Corporate Staff, Wageningen University Library, Wageningen International Development Center, Wageningen Data Competence Center, Wageningen Academy) and with the CoE Groen and CIV Groen.

Focus

- Strengthening society-based education among others via the Science Shop, the Academic Master Cluster and the Wageningen Dialogues.
- Collaboration with the green education column, strengthening the programming of the top sectors.
- Hosting and redesigning Groen Kennisnet (an extended and integrated agri- and food knowledge database in the Netherlands), including cooperation with Kennis online (project information on WUR projects).
- Participating in the acceleration programs and in different practice arrangements.

Acceleration programs

Four acceleration programs have been defined for the coming years: Labor market, knowledge sharing, internationalisation, digitalisation&technology**.** The labour market acceleration program focuses on connection between labor market and education; the knowledge sharing acceleration program focuses on an integrated approach of knowledge sharing in the whole Dutch green knowledge system; the internationalization program focuses on the international orientation and position of the Dutch green knowledge; the digitalisation&technology program and education system focuses on education renewal.

(www.Groenpact.nl, Brochure on 3rd phase of Groenpact, 2021)

Action Plan

The action plan is at the level of the Fields project. The plan is about the testing of major modules, pilots will be carried out in the Netherlands.

Period	Goal	Activity	Details	Source of funding
Oct-Dec	Modules to be ready on content	FIELDS partners prepare content. Aeres responsible for Animal welfare& Animal nutrition and Biodiversity	Assignments are given to several partners in the Fields project.	Erasmus+ funds
Dec-Jan	Have number of modules relevant for knowledge and skills needs, important for the AF transitions in Nld	Make a selection of all modules prepared. Translation into Dutch.	Include other parties in the selection procedure (e.g. CIV) and use information gathered in this NRM.	Erasmus+ funds
February	Have trained trainers	Train the trainer Select Dutch trainers	Under responsibility of AP (Austria)	Erasmus+ funds

April - Sept	Material and trainers tested and improved	Carry out pilots in VET institution(s). Select an institution(s). Monitor the process and evaluate the training. Adjust the content and didactics where necessary	Aeres is responsible. Pilots at Aeres run parallel to pilots in other countries. To be decided if pilots are only at Aeres or that other VET institutions are involved.	Erasmus+ funds
Aug- Dec	Modules (materials) are available to VET institutions in the Netherlands	Disseminate the materials to colleague-VET institutions. Make the modules available through Groen Kennisnet.		Erasmus+ funds

Evaluation

Green monitor

Groenpact is working on a ‘’Green monitor’’ for education and labor-market research (www.groenpact.nl/groene-monitor).

The Green monitor uses three main sources:

- The labour market research of **Colland** (collaboration between funding schemes and regulations in the green sector, supported by social partners) (https://www.collandarbeidsmarkt.nl/rapporten/)

  Important data sources are:

  - Colland business register (includes all businesses under the Colland Collective Labor Agreement (CLA) (e.g. for categorization of businesses according to sector)
  - Central Bureau of Statistics (CBS), anonymized data (e.g. for job history and job data of individuals)
  - Basic registration of individuals (fueled by municipalities) (e.g. for person and job classifications)
  - Business register of Chamber of Commerce and Tax Administration (e.g. for business and job categorisation)
  - Student data of education institutes (e.g. student performance, study program data)
  - Additional surveys among companies on labor market related issues not provided by other sources

- Research of **ROA** (Research Centre for Education and the Labour Market). One of the working fields of ROA is on skills supply and demand on the labour market, with three main themes (https://roa.nl/research/research-themes):
  - Labour market information, and occupational and recruitment choices
  - Lifelong learning and employability
  - Older workers and retirement

ROA uses data of the Central Bureau of Statistics (CBS) on individuals (education levels and labor history). In collaboration with the Green Monitor a new classification has been developed of business sectors, professions and training/education. The new classification enables the comparison and linking of datasets: influx, throughput and outflow of education/training programs.

- **SBB**, data of the foundation for vocational education and business. SBB connects (training) companies to students, provides internship, apprenticeship and labor market information and in general connects vocational education and training with businesses. SBB performs tasks for the Dutch ministry of Education, Culture and Science, including the VET qualification structure and Work-based learning.

  The SBB performs research for multiple sectors on multiple labor market (demand and supply of skills) related subjects, applying multiple methods such as surveys, expert interviews, validation sessions, data from CBS and other public institutions, policy reports, research reports and articles.

Next to the research of these organizations there are many other sources, such as reports, online data, etc. that are used to give insight in the green sector. The Green Monitor is in progress.

KPIs defined in Erasmus+ Fields

Deliverable 2.3 of the Fields project aims to develop a European skills strategy. The first step towards this deliverable was a European series of expert interviews on prerequisites of such a strategy. This survey delivered among others a number of possible KPIs: on the one hand for the European partnership to be built (i.e. Pact for Skills), on the other hand for courses and training programs, see tables 2 and 3. These may be used as inspiration for the further discussion to define the major Dutch KPIs to be assessed on regular times.

Table 3: Assessment of the partnership:

Stakeholders actively involved (who provide quality upskilling opportunities, in education/training; who play a role in sectoral drivers of change
Coverage of countries and regions, (sub-)sectors
Visibility and awareness
Public opinion, consumer opinion
Definition and maintenance of a strategic agenda
Honest and clear communication to different target groups
Best practice dissemination
Willingness of partners to share information/knowledge
Impact on training programs and interest for the training programs (number of interested participants)
Employees actively interested in participating in Life-Long Learning
Yearly growth rate of new courses
Raised level of final degrees of food employees
Link with our scenarios, see whether profiles support desirable outcomes

Table 4: Assessment of training modules and courses:

Number of students, companies in the course
Number or % of participants from underrepresented groups
Achievement of learning goals (e.g. increased level of knowledge - tests before and after taking the module by trainees)
Student evaluation/satisfaction of training content and method
Number of certificates achieved
Flexibility of programs (hours, ECTS, online/face-to-face, ...)
Renewal of programs (new elements added year to year)
Resources per module (human resources, financial, technology...)
Weight of virtual, augmented and connected reality in the training modules, % of audio visual learning vs class learning
Use of educational material and acquired skills in the workplace
Learning outcomes in practice (logbooks, blogs, ...)
Employment status of trainees after graduation, incl. job promotions
Placement rate for unemployed learners
Trainees and employer job impact evaluation (better execution of tasks, increased salary, new employment,….)
Rate of young people/workers recruited in agri-food sector
Employer satisfaction

Further collaboration between the different stakeholders of the Dutch green knowledge system is necessary to define KPIs and develop an integrated monitoring system for the Dutch green sector.

Ways forward

The development of the Dutch Green Monitor is ongoing, just as the definition of the main KPIs necessary to monitor and assess the developments and performances of the Dutch agri-food knowledge ecosystem. Trends, challenges and policies as depicted in chapters 2 and 3 of this report remain the framework from which the Dutch educational system can further develop.

The Dutch agrifood sector is in need of and on its way to transformation towards more sustainable, circular, biodiverse production and a better balance with many other aspects of Dutch society. In this respect, the integration and collaboration in its knowledge ecosystem in the last decade are promising and of key importance to support the Dutch agri-food sector in these transitions.

Concluding, key points of attention for the development of the Dutch green knowledge ecosystem are:

- Furthering the collaboration between green businesses (industry), green education, government and societal organisations
- Further strengthening the collaboration and exchange of information, knowledge and innovation best practices in the Green knowledge column
- Stimulating the further development and use of the Dutch Green Monitor for policy making in the green education

Annexes

Annex 1 - Questionnaire on key topics

Questionnaire/topic list for National experts to feed National Roadmap

The aim of the FIELDS project is to contribute to skill enhancement of workers in the agriculture, food industry and forestry sectors, to be able to make full use of the opportunities and comply with requirements of the "Twin'' Green and Digital transition. The FIELDS project focuses on the domains Digitalization, Sustainability, Bio-Economy and Management & Entrepreneurship. Skills include ''hard''/ measurable and technology based skills as well as soft / social and experience based skills.

Bijgevoegd vindt u:

- Een artikel met achtergrondinformatie over de eerste fase van FIELDS. Het artikel bevat resultaten van de analyses om de 'skill-gaps' te analyseren in de hierboven genoemde domeinen en de trends/scenario's voor de sectoren, algemeen voor Europa. Voor nu de meest relevante paragrafen van het artikel: 2.4, 3.1, 3.2 met de tabellen en figuren.

  Als U meer informatie wenst, kunt u de website bekijken (http://www.erasmus-fields.eu) of wij kunnen extra informatie toesturen.

- 3 profielen van professies die wij voor Nederland verder willen ontwikkelen. Dit zijn de profielen uitvoerder duurzaamheid in Landbouw en Agri-Food Industrie, digitalisering en bio-economie op niveau EQF 4. Daarnaast een algemene module voor sociale/management vaardigheden. In totaal werkt FIELDS met 6 profielen, de andere 3 zijn op niveau EQF 5 (voor dezelfde professies). Van de profielen zijn er uitwerkingen in de maak om tot curricula te komen. Omwille de toegestuurde informatie compact te houden, sturen wij nu de 'kale' profielen toe. Heeft u interesse om de concept curricula te ontvangen en/of de profielen voor EQF 5 dan kunnen wij die toesturen.
- Een vragenlijst. Wij vragen u uw reactie op deze vragen voor te bereiden. De vragen 1 t/m 5 gaan concreet over de 4 profielen. *Graag het antwoord op vraag 1 dmv van highlight aan geven in de profielen en die vóór maandag 5 sept aan ons toesturen.*

Discussie

De 3 baanprofielen (uitvoerder duurzaamheid, digitalisering, bio-economie – EQF niveau 4) en de hierbij behorende behoeften aan training in sociale- en managementvaardigheden dienen als uitgangspunt voor de discussiebijeenkomst. Bij de bespreking van de vragen kan ook EQF-niveau 5 worden inbegrepen.

Als u bij het bekijken van de profielen van de professies vragen, op- en/of aanmerkingen heeft, wilt u ons die voor de bijeenkomst laten weten? Wij zullen die meenemen maar willen in de bijeenkomst niet tijd besteden aan de inhoud van de profielen. We kijken naar ontwikkelingen van nu tot 2030.

Vier schema's (de 3 baan profielen en de sociale/management vaardigheden) zullen op een scherm worden getoond, waarbij per schema onderstaande vragen worden bediscussieerd. *(Om de aansluiting met het Europese onderzoek te versterken zal in de schema's de Engelse terminologie worden gebruikt).* Het kan handig zijn om een afdruk van de vragen bij de hand te hebben.

Gegeven de Profiel schema's de volgende vragen (vraag 1-5): **Ontwikkeling van training**

1. Kies per profiel de 3 belangrijkste behoeften voor vaardigheden en kennis bij studenten, werkers en werkgevers waar nieuw onderwijs en training voor ontwikkeld moet worden?

   (Highlight dit in de lijsten en stuur aan ons terug voor 5/9)
2. Welke instellingen en type docent zouden deze training moeten ontwikkelen en geven? Welke (extra) training voor trainers is daarvoor nodig? Verschillen tussen de profielen?
3. Hoe kan validatie van vaardigheden (of van de training daarvoor) gebeuren? Zijn daar knelpunten bij te verwachten? En hoe zijn deze aan te pakken? Verschillen tussen de profielen?

Praktijk-training

4. Welke vaardigheden en kennis behoeven praktijkervaring als onderdeel van de training/het onderwijs? *(Maak een aantekening "Praktijk' in de profiellijsten en stuur aan ons terug voor 5/9).*

   In welke vorm kan praktijkervaring worden opgedaan? (wordt in bijeenkomst besproken)
5. Hoe de samenwerking met bedrijven gestalte te geven? Verschillen tussen de profielen?

Overkoepelende vragen (scope beperkt tot vaardigheden in de 4 schema's)

Doelgroepen

6. Zijn er specifieke **doelgroepen** die aandacht behoeven (leeftijd, opleiding, culturele achtergrond, sexe, ...) bij het ontwerpen van de training/ het onderwijs? Welke strategie te ontwikkelen?

Bronnen

7. Hoe om te gaan met gebrek aan fondsen en tijd van potentiële trainees? Welke strategie te ontwikkelen?

Online training

8. Wat zijn typische (groepen van) kennis en vaardigheden die geschikt (zullen) zijn voor online training? En welke beslist niet.

Vaardigheden ecosysteem

9. De ontwikkeling van behoeften aan nieuwe kennis en vaardigheden (en training) gaat snel. In welke groepen (van kennis en/of vaardigheden) gaat de ontwikkeling snel (het snelst)? Hoe kunnen we dynamiek in de ontwikkeling van training en onderwijs brengen om zodoende aansluiting te houden bij de ontwikkelingen in de arbeidsmarkt.
10. Welke (groepen van) kennis en vaardigheden zijn met name belangrijk voor LLL. Denk je daarbij aan specifieke doelgroepen? (SMEs, boeren,)
11. Welke monitoringpraktijken ken je, die functioneren binnen het Nederlands vaardigheden-ecosysteem (vraag

en aanbod van kennis en vaardigheden) zowel voor onderwijs en her&bijscholing? Hoe een goed monitoringsysteem vorm te geven? En wat zijn de belangrijkste indicatoren (max 5)?

12. Wat zijn knelpunten als het gaat om uitwisseling en harmonisatie van trainingsmodules en 'best practices' in Nederland, bijvoorbeeld tussen onderwijs instellingen.

Partnerschap

13. Welke zijn de belangrijkste stakeholders (partijen) van, die werken aan, het vaardigheden- eco-systeem tot 2030?

Annex 2 - Full report on National Working Group Discussion

Date of NWG meeting: September 7, 2022

Participants and their organisations:

Jantine Bouma	WUR / Groenpact
Lisa Ploum	WUR
Angela Luijten-Barendregt	Hoogendoorn Growth Management
Esther Wouters	CIV
Miriam van Bree	CIV - Groen
Laura Roebroeck	Groenpact
Erik Pekkeriet	WUR / TKI

Close cooperation with innovating partners in the sector and industry

VET has to keep pace with fast changes and innovations in the sector, but in the 'real word' teaching and training will always be somewhat behind. Staying in pace is not feasible, but being informed about ongoing innovations is feasible. At the same time it is important to look ahead and be informed about the long term developments.

Coping with rapid changes requires skills such as creativity and gaining insight into what ís and what is nót important, such as changing technologies (e.g. using drones or satellites). This could be achieved by (real) case-based learning, which could be best implemented in close cooperation with innovating companies.

Consequently, it is most important for VET institutes to stay in touch with innovative companies.

At the same time companies are interested in working with students and educational institutes. For students there are opportunities to work on real-case assignments. Including students in real case assignments is easier at HBO (EQF level 5). As these students are better geared towards research assignments. MBO (EQF level 4) students are more geared towards practical implementation. In MBO's the 'practorate' (MBO equivalent of lectorate) is a new development to stimulate research in VET (level 4).

Challenges:

- VET institutions face a need to prepare students for innovations in the sector but at the same time students are educated to enter the labour market at the current time, possibly

before certain innovations are mainstream.

- How can VET institutions secure to keep pace with innovation and rapid changes, will this be done in curricula or will this be secured by case-based assignments from companies?
- Creating a closer cooperation between companies and VET, could be achieved by stimulating teachers to have a closer relationship with companies, for example by doing internships. Students and teacher could even learn together in some situations.

Opportunity: Companies are not eager to share knowledge and experiences. Educational institutions are taken to be independent and can serve as a bridge between companies and facilitate companies to meet and possibly share. This role of MBO institutions will become stronger in future. Teachers have the role of facilitator more than as all-knowing teacher.

In a practical approach: For VET institutions it is not wise to invest in machinery as machines change due to changing technologies. A **close cooperation with the industry** can help to provide students with up-to-date technical installations, this is also interesting for the industry as they know students trained are ready to work for them.

Meeting points are being organized. A meeting point is a physical meeting place where industry and education meet, where queries from industry are being solved by close cooperation between company and students & teachers. Challenge is to make sure developed knowledge is not lost for others to learn from.

Example of synergy between education and business is the "World Horti Centre". This is one of the most comprehensive meeting points. There is a lot of money from business in this.

O2 lab (funded by the government) is also a partnership at MBO, HBO and WO level that has hubs in several places. Especially in the field of soft skills and entrepreneurship. These skills are identified as very important skills by all European countries.

Challenge: How to ensure that knowledge is shared?

Monitoring the needs of the sector and links to VET

Meeting points have a function to **monitor** the needs of the sector, as companies express their needs for knowledge here. Groenpact produces the Green monitor (De groene monitor, 2020). De Groene Monitor has analysed and shows in full the situation in the green labour market. (https://www.groenpact.nl/images/content/Groene%20Monitor/De%20Groene%20Monitor_RGB%20spread.pdf)

In HBO (level 5) there are sectoral advisory committees (werkveld advies commissies), these committees link study programs and the sector. These committees meet once in 2 years, creating changes through these committees is not easy.

For MBO, SBB (Samenwerkingsorganisatie Beroepsonderwijs Bedrijfsleven / Foundation linking VET and the sector) takes the role in monitoring needs in the sector and education programs offered.

In advisory committees often the usual traditional partners are involved. When transitions are needed, these partners are not necessarily most helpful. Other parties, such as innovators or nature organisations, are often not invited, while these organisations can stimulate needed change.

'We have to realize that in 10 years-time half of more of the actual professions will have disappeared.'

Split examination

> An example of how to deal with rapidly changing requirements is **split examination:** A theoretical part after a basic course of 2 years and grading for an assignment (real-case) in a company after another 1 or 2 years. *(Dutch: 'Leerweg onafhankelijke toetsing').*

This is common in EQF level 5 and level 6 education, but could be a possibility for EQF level 4. This requires a change in the system, but the advantage is that the school stays close to developments in the sector.

Flexible craftsmanship – learning in real cases, not in school– is an important way of learning to deal with rapid changes.

Challenges for MBO – quality of education

The challenge for MBO remains to ensure that students learn sufficient basic knowledge to back up the mastered skills and techniques, so they are able to apply their knowledge in new situations too. For example, when a student learns to use techniques to collect data, the student has to know what

data-collection is about, but also learn to be creative on how to transfer knowledge and skills into a new situation. The combination of skills, knowledge and the attitude is called the competency.

Required competencies are different for each industry. That means the Vocational training has to adapt to the specific characteristics of an industry (or a geographic difference).

It is very important to keep the level of MBO education to be high. The sector needs well trained professionals, on top of that the link to HBO is important. As MBO students have difficulties entering HBO, adjustments are made in the system and an Associate Degree has been initiated as a 2-years course. Question is if we adjust or if we keep the level of the MBO study high.

> Focus to be on competences is better (more complete) than focus on knowledge and skills.

Changing role of the teacher leading to high expectations of teachers

To improve and shape the cooperation between industry and education, teachers should get and keep a close relationship with industry. This could be done by teachers regularly doing internships.

Teachers and students should learn together, the teacher becomes a coach or facilitator.

Teachers will not anymore be the all-knowing person, and the teacher needs to feel okay that (s)he is not all-knowing. Students need to adjust as well, they appreciate an expert-teacher, while they will learn more from a coaching teacher.

The changing role implies a broader role of the teacher: Teaching basic knowledge, be a coach and be a facilitator. At the same time teachers are also requested to take part in other tasks, such

as examinations, research and projects.

The attitude of the teacher is challenged to be able to – on one hand - learn together with students, while at the other hand be the one who takes examinations.

School as a learning organization

The school to be a learning organization is key to deal with the challenges of a rapidly changing environment and requirements for skills and knowledge.

High expectations from MBO students

The requirements for MBO students are increasing. Is it realistic to educate young people to be a fully trained professional in just a couple of years?

A smooth overlap of formal education, informal education and LifeLong Learning has to be strengthened for that purpose. More integration helps to reduce the need for teachers as well. A pilot is being developed to develop informal training based on requests from the sector, the training is not linked to a certain educational institute. Setting is like intervision (participatory learning).

Challenge is the examination and accreditation. There are examples of ‘subcertificates’ (Scandinavia) or micro-certificates (ICOS, Ireland). These are informal certificates but valued by the industry that cooperates in the informal learning activities.

Flexibility in education programs

Introducing learning for future skills – the

In the Netherlands there are Sector Advisory committees for the educational institutes. They advise on the learning outcomes of specific programmes. Usually only traditional organisations are part of this committee. An improvement to adjust to future needs is to invite also organisations which have more interest in transitions (e.g. in agricultural studies to include nature organisations, or wáter boards)

For social skills: ‘Innovatie-schijf-van-vijf’ (Esther informatie?)

Life-long learning perspective to both employers and employees

A link between regular education and Life Long Learning would be very helpful to extract information from practice into the formal education. Professional learning should be integrated in educational institutions. This is high on LLL's agenda. Because the project is very much focused on EQF level 4, it is difficult to make the link to professional learning for that target group.

In practice, farmers like to learn from other farmers. The schools then have a role in making outcomes measurable and impact visible. The school helps in uncovering the right information. So this is actually another innovation in practice.

Learning together between farmer and student proves difficult in practice. Factors in this are separate money flows, the planning of education, group size. When the right form is found, however, both groups can inspire each other.

Target groups

Students who choose to study agriculture at level 4, are mostly from the countryside and often grew up at agriculture businesses. At VMBO's (secondary education) there are students from many different backgrounds, but very few of them enter agriculture studies. Contributing factor is that many youngsters have a negative attitude towards agricultural and green studies.

Looking at the future, there is a threat that the number of students will not be sufficient for the number of professionals needed in the sector.

There might be a change as ‘food‘ gets more and more into the picture and society starts to appreciate the value of food more and more. At the end of the agricultural chain more workers with different cultural backgrounds are seen.

This means that agriculture education needs to be made more attractive for young people who don't have a background in the agricultural sector, who do not come from the countryside or who have a different cultural background. There is a challenge how to do this, how to make the agriculture studies attractive and the environment ‘safe’ for ‘outsiders’.

- Integrating agriculture studies with other studies, e.g. technical studies, creates added value, and might stimulate some youngsters to at least partly study agriculture.

- In the food sector a shortage of workers is expected. New residents (ex-refugees) could be a targetgroup to reduce shortages of workers. But there are challenges to adjust the education for them, as their levels of education vary a lot.
- Innovations might attract youngsters from a city background
- Examples of 'new people' in the sector might help to stimulate others.

For seasonal labor, the shortages of workers are solved in different ways, e.g. :

- Robotics
- Foreign workers (European)
- Be alert. If nobody wants to do the work or if there is a chance that workers are exploited. It might be better to change the system, don't continue to seek workers from increasingly distant countries.

Factors that will stimulate changes

- Management of the school. (Open minded to change, taking the lead to change and prepared to invest in changes)
- Close cooperation with the industry, both the processing industry as well as the end users.
- Technical partner schools, can play a role
- Educational innovation clubs, to stimulate learning skills in different ways, e.g. by simulation
- Learning by using authentic sources, such as you tube, 'groen kennisnet' (selection by teachers)

Annex 3 - Occupational Profiles – graded by NWG

Operator for Bioeconomy in forestry, agriculture and food industry

Essential Skills	Prioriteit	Praktijk
Management of natural resources,	●●○○○	●○○○○
Biomass production and transformation	●●●○○	
Planning and coordinating production	●○○○○	●●○○○
Traceability	●○○○○	
Efficient use of resources and logistics	●●○○○	●●○○○
Production, management of renewable energy and its use	●●○○○	●○○○○
By-products and co-products valorisation	●●○○○	●○○○○
Essential Knowledge		

Bio-economy and circular economy principles	●●●●○	
Biobased products and ecosystem services, re-use, recycling; nutrients circulation vs nutrients removal	●●○○○	
Food waste reduction		
Energy efficient production methods	●●○○○	●○○○○
Knowledge about the forestry and agrifood production chain	●○○○○	

EP: alles

Note: Skills and knowledge interchanged

Operator for Digitalization in forestry, agriculture and food industry

Essential Skills	Prioriteit	Praktijk
Practical training with job-specific machinery/equipment and their maintenance	●○○○○	●●○○○
Use of robots/drones	●●●○○	●●●○○
Data handling and analysis; data exchange	●●●●○	●●●○○
Traceability	●●○○○	
Weather forecast knowledge and tools	●○○○○	
Essential Knowledge		
Knowledge of technical principles for digital agriculture, industry and forestry; smart systems and technologies introductory aspects;	●●●●○	
Basic remote sensing, GPS, GIS knowledge;	●○○○○	●○○○○
Knowledge of Management Information Systems	●●○○○	●○○○○

Knowledge about the forestry and agrifood production chain		
Legal framework when using autonomous machinery		
Industry 4.0	◯○○○○	
Circular manufacturing aspects	◯◯○○○	

EP: alles

Operator for Sustainability in forestry, agriculture and food industry

Essential Skills	Prioriteit	Practice
Sustainable and multifunctional agriculture and forest management	◯ ○○○○	
Ecosystem services	◯◯ ○○○	
Biodiversity, Prevention and management of natural disturbances, adaptation and mitigation to climate change	◯◯◯◯◯	◯ ○○○○
Water management, management of natural resources,	◯◯ ○○○	◯◯ ○○○
Soil nutrient health management	◯ ○○○○	◯◯ ○○○
Traceability & food Production;	◯ ○○○○	◯◯ ○○○
Animal welfare	◯ ○○○○	
Essential Knowledge		
Renewable energy	◯◯ ○○○	◯ ○○○○
Sustainable forest and agriculture management practices and planning;	◯◯ ○○○	◯◯ ○○○
Environmental management aspects; GHGs emission reduction; climate change	◯◯ ○○○	
Knowledge about the forestry and agri-food production chain		
Standards and regulations	◯◯ ○○○	

Soil ◯ ○○○○

EP: alles

Module soft skills and entrepreneurship

Essential knowledge and skills	priority	praktijk
Understanding the (digitalization/Sustainability/bioeconomy) principles	○○○○○	○○○○○
Basic ICT skills		○○○○○
participation in peer groups		○○○○○
Innovation management	○○○○○	○○○○○
Business Modelling	○○○○○	○○○○○
Organization and Planning	○○○○○	○○○○○
Team working, negotiation and conflict management	○○○○○	○○○○○
Health and safety in the workplace		
From Traditional to Digital Food Marketing		○○○○○
Lifelong learning and continuous learning	○○○○○	○○○○○

EP: alles

Lisa Ploum:

Note also the more commonly known sustainable entrepreneurship skills, such as: Interpersonal, Diversity and interdisciplinarity, Systems thinking, Strategic action, Normativity, Foresighted thinking

9.6 Annex VI: Spain

Introduction

Method- NWG

Within the FIELDS project, 10 profiles have been created reported in paragraph 3.1 for the 2030 agri-food sector (technical level 4 and 5) and within the National Working Group, of 21 September 2022, considering the report "Trends in Spanish Agriculture, Agri-Food Industry, Forestry and Bio-economy" (Deliverable 1.8). Some questions were asked to the participants for better orient the activity of the Fields project in the Spanish scenario. The discussion concerned the joint assessment of the new profiles and their correspondence or not with the needs and requests of the companies and whether a training module lasting 360 hours was suitable for all types of training courses, it was essential to insert segmented and certified informal training courses for those who already work and to guarantee homogeneity in terms of regional proposals and times.

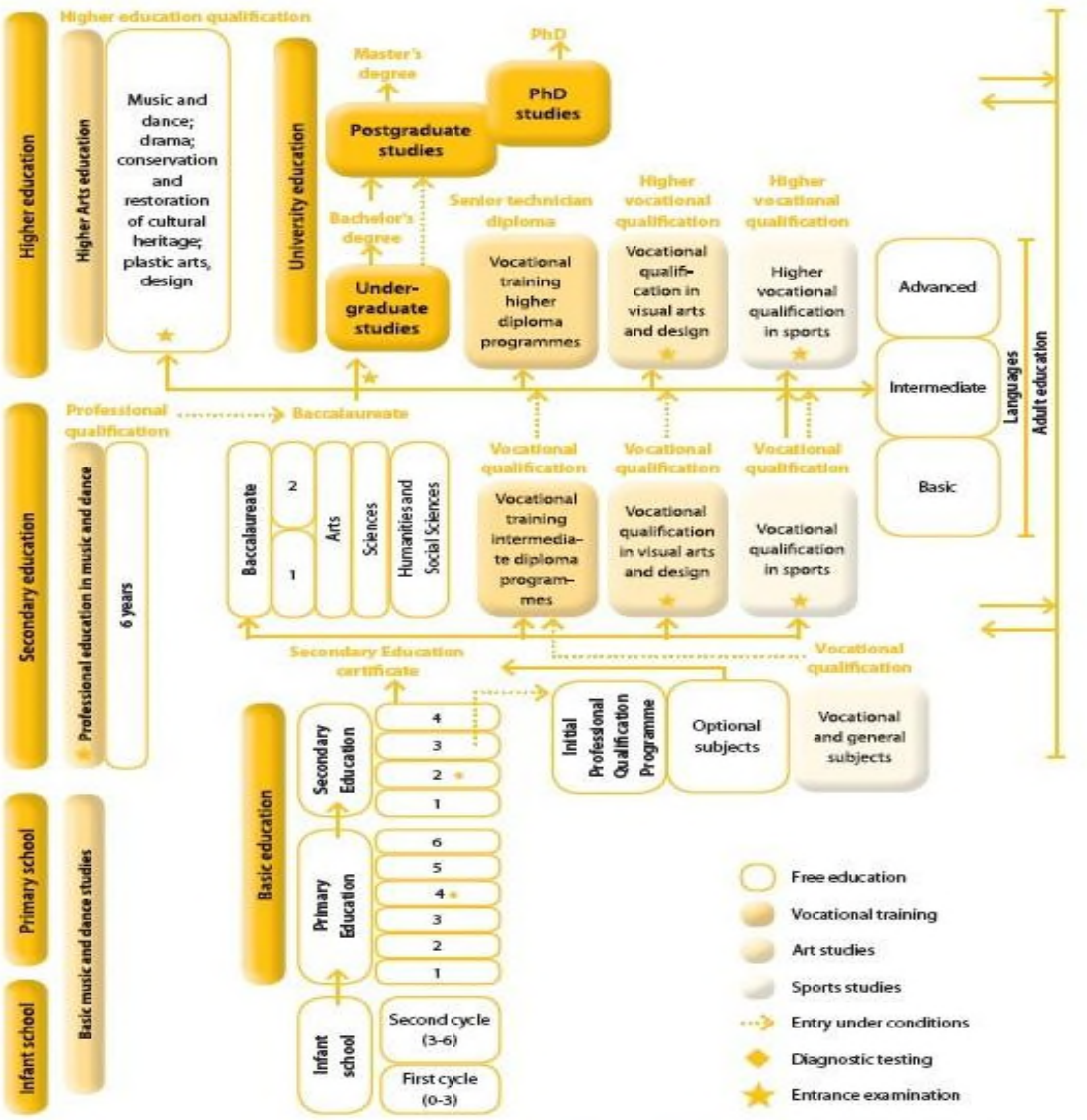
Following the recommendations of the Italian National Group and because of the similarities between the two countries, we have decided to share some common points in the document, only making the necessary modifications in the sake of a greater uniformization.

Context of education and policies at National level

The national education system and training needs related to the FIELDS objectives

According to the Spanish Ministry of Education and Vocational Training, the Spanish education and training system offers the following types of education: early childhood education, primary education, compulsory secondary education (ESO), Spanish Baccalaureate, vocational training (VT), language education, artistic education, sports education, adult education and university education.

Primary education, compulsory secondary education and basic vocational training constitute basic education.
Secondary education is divided into compulsory secondary education and post-compulsory secondary education.
Post-compulsory secondary education is made up of Spanish Baccalaureate, intermediate vocational training, professional artistic education in music and dance and intermediate plastic arts and design, and intermediate sports education.
University education, higher artistic education, advanced vocational training, higher professional education in plastic arts and design, and higher sports education constitute higher education.
Language education, artistic education and sports education are considered specialised education.
Organic Law 2/2006 on Education (LOE) as amended by Organic Law 3/2020 (LOMLOE) are currently the basic standards regulating the education system and defining its structure. In 2021, the structure of the Spanish education system corresponds to this organisational chart.



Regarding vocational training in Spain, it is regulated throughout the Organic law *Ley Orgánica 3/2022, de 31 de marzo, de ordenación e integración de la Formación Profesional.* https://www.boe.es/eli/es/lo/2022/03/31/3/dof/spa/pdf.

At present, many people in Spain do not have the personal, social, and professional skills and competencies that are essential to take advantage of the employment opportunities offered by economic and technological change, a change that requires adequate qualification and flexibility of human capital to adapt to the changing circumstances of the economy and technology. This circumstance, which affects practically half of the country's working population, limits the professional progress of many workers and, on many occasions, their own continuity in employment (preamble of Organic Law 3/2022, on the organization and integration of Vocational Training). The scarce development of intermediate qualifications in the Spanish training structure requires a rapid doubling of the number of people with intermediate training to be able to respond to the needs of the productive system.

Forecasts for Spain in 2025 identify that 49% of jobs will require intermediate qualifications, and only 14% of jobs will require low qualifications.

International organizations remind us how the absence of job skills and abilities in many people, or the lack of recognition and certification in others, is a huge handicap for creativity, innovation, dynamism, productive modernization, and growth of the Spanish economy.

Compared to other countries with similar economic and activity structures, the training structure in Spain is biassed upwards and downwards. On the one hand, we have a high number of people without qualifications adequate to the needs of today's economy. On the other hand, we have many people who are overqualified in relation to the work they do. We need to strengthen the group of professionals with intermediate qualifications. This is the feature that differentiates us from other developed European economies, whose main asset is this intermediate group of professionally qualified people.

The urgent need for reform of Vocational Training in Spain is facilitated by the opportunity now represented by the European Funds "Next Generation EU" to finance the new Vocational Training System.

The new Vocational Training law incorporates the transformations resulting from digitalization and the green and blue economy and sustainability in all economic sectors, as key vectors of employment, economy, and society to build the future and generate new socio-economic and, consequently, professional opportunities. All the offers will allow advancements in training itineraries leading to accreditations, certifications, and degrees with state and European recognition. On the other hand, all vocational training will be of a dual nature, as it will be carried out between the training centre and the company. In this law there is a specific item in which international programs are regulated (Article 107. "*Participación en proyectos y organismos internacionales*".)

Main challenges

European main challenges & Fields project

There are many challenges that the European training system must face, among which low attractiveness of VET in many countries stands out. In addition, insufficient mastery of digital skills is also worth to be highlighted. These facts coexist with an environment in which there is a difficult job insertion of young people and reintegration of unemployed adults and a weak recognition of the value of education and training. In the search of a solution to these important problems, actions should be taken on:

- the accessibility of educational services through coordination between the learning phase and the working phase;
- training contexts by integrating the classic proposal delivered face-to-face with satisfactory distance learning methods;

- the flexibility and personalization of training courses.

It also highlighted the non-homogeneous presence in the territory of the offer of guidance services and the timeliness in the provision of information on needs (LMI and Skills intelligence).

From the point of view of the agri-food sector, in the medium term, the most reliable scenario will be characterized by the presence of specific factors of change with which the training system will have to interface, with important areas that should be faced in a training program, including the sustainability of production processes, the adaptation to climate change, the managerial and financial capacity, the diversification and multifunctionality and the exponential reinforcement of digital skills

The Council of the European Union adopted a Recommendation on key competences for the whole lifespan of learning in 2018 which has become a reference tool for the active parties in the field of training. The Recommendation identifies eight essential competences for citizens, for their personal fulfilment, for a healthy and sustainable lifestyle, for employability, active citizenship, and social inclusion. It is aimed to promote skills development through innovation in learning approaches, assessment methods and support for educational staff with the intention of enabling all learners to realize their full potential. Recommendation encourages Member States to offer quality education, improve school education and ensure excellent teaching, to further develop vocational training by modernizing and promoting continuing education programs.

On 24 November 2020, the Council of the EU adopted a Recommendation on Vocational Education and Training for Sustainable Competitiveness, Social Equity and Resilience. The Recommendation defines the key principles to ensure a rapid response to the needs of the labour market and quality learning opportunities for both young people and adults. It replaces the EQAVET Recommendation - European Quality Assurance in Vocational Education and Training and includes an updated EQAVET framework with quality indicators and descriptors. It repeals the previous ECVET Recommendation. Less than one week later, on 30 November 2020, it was approved the “Declaration of Osnabrück 2020” (supported by European level VET provider associations (VET4EU2) and VET student representatives on vocational training, education, and training) as a fundamental document with respect to a transition towards sustainable economic models.

On the certification side, the Decree of 5 January 2021 adopted the Guidelines that make the national system of certification of competences executive. The Guidelines have strategic significance as they allow the operation of the National Skills Certification System, referred to in Article 4, paragraph 58, of the Law of 28 June 2012, no. 92 and Legislative Decree 16 January 2013, n. 13, being part of the wider national process of recognition of the individual right to lifelong learning.

Skills identification, validation and certification services will constitute an essential element for the innovation of education and training systems, involving the personalization of learning aimed at simplifying the transition phases from study to the world of work by programming the training proposal enriched by a wider involvement of businesses, professional associations, voluntary organizations and the third sector.

Within the FILEDS project 10 different profiles have been identified as the most important regarding the necessary improvement in skills for sustainability, digitalization and bioeconomy. Below are the 10 EQF level 4 and 5 training modules selected in the project and their declaration as well as the level

of priority assigned during the NWG in Spain, which is also necessary to select the pilot course to be implemented during 2023.

Main training modules	Priority
FORESTRY	
1.The Technician for sustainability, digitalization and bioeconomy in Forestry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability and bioeconomy requirements and to implement digital technologies in all aspects related to the production and management of a forestry related business. These tasks usually include (in a forestry related business): - Monitoring and improving the efficient and sustainable use of resources (including energy) and their circularity - Implementing and monitoring sustainable processing technologies and the transformation of primary products - Implementing and monitoring of the application of bio-economy principles to all production processes, including sustainable packaging, waste management and valorisation - Implementing and improving digitization- and digital techniques, methodologies and procedures, including the use of drones and robots for sustainable forestry - Managing operations, including sustainable product development, raw materials purchasing, identification of new marketing chains etc., with particular attention to the sustainability of processes and products and the principles of circular economy	**medium**
BIOECONOMY	
2.The Technician for Agriculture in Bioeconomy (LEVEL 5) manages and controls the production processes by identifying and coordinating procedures useful for saving resources and developing the company according to the reference territorial context. Tasks performed usually include: - manage the operational organization, the implementation of continuous improvement procedures - monitoring and evaluation of the results using digital methodologies and technologies - oversight of executive activities carried out by others - technical training in the use of methodologies, tools and information specialized in the bioeconomy - management of production addressing areas such as investments, marketing chains, etc. - design and Implementation of sustainability processes and products.	**low**
3.The Technician for Food industry bioeconomy (LEVEL 5) performs technical tasks to support the development of the company from a bioeconomy perspective in aspects related to production, management and business. Tasks performed usually include: monitoring the efficient and sustainable use of resources (including energy), implementation and monitoring bio-economy principles applied to food processing, sustainable packaging, waste management and valorisation, implementation and monitoring of continuous improvement procedures, identification of new marketing chains, administrative tasks and supervision of activities carried out by others.	**low**
4. The Operator for Bioeconomy in agriculture, food industry and forestry (LEVEL 4) operates at executive level in the field of agricultural -, forestry -, or agri-food production, focusing at implementation of bio- and circular economy principles. The operator applies relevant methodologies, tools and information to collaborate in the production, management and business activities of companies active in bio-economy and /or circular economy. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks	**low**

performed usually include: Carrying out applicable techniques, methodologies and procedures to run and improve a production system based on the circular economy principles. Carrying out fundamental operations for sustainable (e.g. circular) use of resources and transformation of primary products, within the production processes of agricultural, forestry, or agri-food sectors. Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	
SUSTAINABILITY	
5.The Technician for sustainable agriculture (LEVEL 5) performs technical tasks related to production, resources preservation and company development according to sustainability requirements and the local context. Tasks performed usually include: - the supervision and control of production processes - the implementation of continuous improvement procedures - monitoring and evaluation - identifying and coordinating procedures useful for resource preservation and developing the company according to the local context - Operational organization - the implementation of regulations of continuous improvement procedures - the monitoring and evaluation of the results using digital methodologies and technologies. the supervision of activities carried out by others - management of production addressing areas such as investments, marketing chains, etc. - Design and Implementation of good agricultural practices, sustainability processes and products	**high**
6.The Technician for Sustainable Food industry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability requirements in the production, management and business activities of a food company. These tasks usually include: ● purchase of sustainable raw materials, ● monitoring the efficient use or resources, ● implementation and monitoring of sustainable processing technologies, ● sustainable product development and packaging, ● waste management, ● implementation and monitoring of continuous improvement procedures, ● sustainable marketing chains, ● administrative tasks and supervision of activities carried out by others.	**medium**
7. The Operator for Sustainability in agriculture, food industry (LEVEL 4) intervenes at the execution level. The operator applies basic methodologies, tools and information to collaborate in the sustainable production, management and business activities of the company. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures resulting in protection of the environment and biodiversity within the agricultural, forestry and food industry production processes. - Application of practices and procedures to ensure sustainability (e.g. sustainable use of resources, reduced emissions, human rights) in the agricultural, forestry and food industry sectors. - Taking responsibility in the production processes and management systems to ensure the sustainability of the production operations, in the agricultural, forestry and food industry sectors. Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	**medium**
DIGITALISATION	

8.The Technician for agricultural Digitalisation (LEVEL 5) performs technical tasks related to the programming, management and supervision of industrial machines, plants and automatic systems, integrating and connecting them according to the new needs of the Smart Farm. Tasks performed usually include: - programming, robotics and advanced industrial automation - Push connectivity (IOT; IIOT) - assembly, hardware and software configurations - testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems. - selection and management of production systems and the definition of maintenance policies for production systems and after-sales - integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	**medium**
9.The Technician for Food Industry digitalisation (LEVEL 5) performs technical tasks to support the implementation of digital technologies according to the needs of the new Smart Factory; dealing mainly with programming, management and supervision of industrial machines, plants and automatic systems, their integration and connection. Tasks performed usually include: - sensor programming, robotics, and advanced industrial automation - pushed connectivity (IOT, IIOT) - assembly, hardware and software configuration, testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems - selection and management of production systems and the definition of maintenance policies for production systems and after-sales - integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	**medium**
10.**The Operator for Digitalisation in agriculture, food industry and forestry (LEVEL 4)** operates at executive level in the field of sustainable agricultural, forestry, or agri-food production, focusing at maintaining digitized processes or digitalisation of sustainable production processes. The operator applies relevant methodologies, software and hardware tools and information to collaborate in the production, management and business activities of agricultural, forestry or agri-food companies. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures to run and improve digitized production processes within the field of sustainable production in agriculture, food industry and forestry sectors - Using drones and robots in different activities of the agriculture, forestry, and agri-food industry. - Analysing and handling data. - Providing support in the different phases of the agriculture, forestry and agri-food production processes, using digitized machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	**medium**

Spanish main challenges

In relation with the priority level assigned in the previous section and as a conclusion of the meeting of the focal Iberic group and of the development of the different activities of the FIELDS project including the report "**Trends in Spanish Agriculture, Agri-Food Industry, Forestry and Bio-economy**" (deliverable 1.8) it was detected two main weaknesses that should be covered in Spain and

that were related with the sustainability in agriculture and in the agri-food industry. In the two next subsections the mains points to be covered in a training program are summarized.

Priorities in the sustainability of the agriculture sector in Spain

In its Communication on the future of Food and Farming of 29 November 2017 (European Commission, 2017), the European Commission underlined that support for knowledge, innovation and technology will be essential for the Common Agricultural Policy (hereinafter CAP) if it is to be ready for the future. Based on that document, the European Commission has drafted regulations to define the future CAP. Article 6 of the Regulation proposal sets out the nine specific objectives of the CAP that must be considered for the agriculture sustainability, which are (EUR-Lex 2013):

1. Support **viable farm income and resilience** across the Union to enhance food security;
2. **Enhance market orientation and increase competitiveness,** including greater focus on research, technology and digitalisation;
3. **Improve the farmers' position in the value chain;**
4. Contribute to **climate change mitigation and adaptation, as well as sustainable energy;**
5. Foster **sustainable development and efficient management of natural resources** such as water, soil and air;
6. Contribute to **the protection of biodiversity**, enhance **ecosystem services** and **preserve habitats and landscapes;**
7. **Attract young farmers** and facilitate business development in rural areas;
8. Promote **employment, growth, social inclusion** and local development **in rural areas**, including bio-economy and sustainable forestry;
9. Improve the response of EU agriculture to societal demands on **food and health, including safe, nutritious and sustainable food, food waste, as well as animal welfare**.

Some of the main conclusions of Spain/Portugal focus group for addressing the current and future skill needs far sustainability, digitalization, and the bio-Economy in Agriculture indicate that **adequate legislation, planning and water management as well as good agricultural practices** are essential to guarantee agri-food production and the sustainability of agriculture in Europe, and especially in southern countries, where without irrigation aid would not be possible to achieve viable and sustainable agriculture, both economically and socially. Faced with the anticipation that climate change will reduce the availability of water for agriculture, it is essential to increase training and information for farmers along with the development of **tools and models to help decision-making, available on online platforms, to help improve and guarantee the economic and environmental sustainability of agroecosystems** in Europe and the Mediterranean, improving the agronomic and economic **efficiency of irrigation water and associated energy**.

It is therefore necessary to give an overview of the key technologies included in the literature that can contribute directly to improving the use of water and energy in irrigation. These technologies, applied mainly in areas with water scarcity, high water prices due to energy costs, and a low gross margin for farmers, can be grouped as:

a) **Tools and models for saving water and selecting the proper crop pattern at the farm level,** with a goal of optimizing economic water productivity and minimizing the environmental impact. This can be performed with the use of precision agriculture, information and communication technologies (ICT) or remote sensing at different resolutions for crop status determination, combined with decision support system (DSS) models and tools.
b) **Tools and models for improving irrigation infrastructure design and management as a whole**, based on water and energy savings, such as: (b-1) optimal design, size and management of pressurized irrigation systems on the plot scale with low pressure sprinklers and emitters, (b-2) collective irrigation networks, (b-3) pumping systems.
c) **Actions to reduce energy consumption and/or cost** such as the use of: (c-1) benchmarking techniques, (c-2) energy audits, (c-3) models for optimal use of specific electricity tariffs, (c-4) telemetry and remote-control systems, (c-5) renewable energy.
d) **Proper design and management of irrigation systems,** promotion of the application and usefulness of Irrigation Advisory Services and web-GIS platforms to transfer and share real-time information with farmers in a feedback process are some of the best tools for improving consumption of water, energy, and other production inputs.

Policy for the distribution of water is a matter of continuous conflict between Spanish regions and the disjunctive between the choice of water transfer between basin areas or the need of contribution and operation of large-scale desalination technologies is a primary unsolved question. Also, management of the rejection streams of desalination, is a serious problem in the Mediterranean coast.

Water scarcity also has an influence on the impact of agrochemicals on drinking water resources and ecosystems health. To minimize risks, it is necessary to implement **practices for the sustainable use of** phytosanitary **products; promote integrated pest management; and use alternative techniques to phytosanitary products such as control with non-chemical agents** that are coordinated by the Ministry of Agriculture, Fisheries and Food through the regulations developed for this purpose, and especially the Registry of Phytosanitary Products.

Last but not least, within a country with a high capacity of production of green energies, the use of thermal, photovoltaic solar energies and mini-hydraulic and wind turbines is seen as mandatory. The draft Law on Climate Change and Energy Transition of Spain (MITECO, 2020b) proposes that the electricity system be 100% renewable and neutral in greenhouse gas emissions for the economy as a whole in 2050. Farmers who have opted for this type of facilities, have obtained long-term benefits. In some cases, savings of up to 70% on the electricity bill in those farms who have opted for photovoltaic solar energy to supply their pumping.

Priorities in the sustainability of agri-food industry sector in Spain

Scarcity of water is also associated to the poor quality of reservoirs which affects land irrigation and also the provision of high-quality water for agri-food industries. There is a necessity of providing **low-**

cost technologies that help to increase water quality in order to be fully competitive with countries in which water does not generate such an important problem.

The transition towards a more sustainable energy model, driven by the majority **use of renewable energy sources and a more efficient management of the supply chain and distribution** (cold chains, supermarkets, warehouses ...), is already accelerating to gain a greater control over costs and means of production.

Other trends in sustainability:

- **Packaging: eco-design to achieve increasingly sustainable packaging**
  - Incorporation of recycled material as raw material, especially plastic (the restrictions of the legislation on materials in contact with food must be considered)
  - Increase in the use of compostable / biodegradable plastics
  - Increase in the use of plastics made from raw materials of renewable origin (for example, vegetable)
  - Tendency towards the simplification of materials used in the same packaging (mono material versus multi-material)
  - Use of sustainable raw materials, certificates of sustainable management of raw materials (for example, PEFC, FSC ...)
- **Use of by-products from the food and beverage industry for animal feed (and for other industrial applications,** such as the pharmaceutical industry, cosmetics, etc.). Some examples: use of coffee grounds as feed for sheep and dairy cows (ECOFFEED Project, 2016), recovery of by-products from the beer industry for aquaculture feed (Life Brewery Project, 2017)
- **Sustainable water management:** efficient use of water, minimizing consumption; innovative technologies for wastewater treatment; regeneration and reuse of water; etc.
- **Sustainable mobility:** fleets of low-emission or electric vehicles

The Action Plan

This section reports the operational aspects of the implementation of the pilot courses planned for Spain identified as the one with the highest priority during the project meetings and during the NWG: **Technician for Sustainable Agriculture**. The selected modules will consist of 360 hours of course divided into 150 hours of frontal classroom with specialized teachers, 150 hours of oriented self-learning and 60 hours of lessons on soft skills for the completion of training gaps and missing soft skills.

This chapter defines the activities that will be carried out, the content of pilot course, the number of trainees, the costs of pilot course with also clearly indicated the problems and risks associated with the implementation of the activities.

A clear statement of activity

This section analytically describes the contents of the pilot course for both the technical content and the soft skills part. Overall, the pilot courses "**Technician for Sustainable Agriculture** (LEVEL 5)" will last 360 hours and at the end it will be possible to certify both the technical and soft skills acquired during the course. The course will have the following modules and lessons

Module	lessons
Introduction to Sustainability	Resilience; Climate change; Management of resources; Systematic approach; Systems Thinking; Life Cycle Assessment
Water & Sustainability	Water: general introduction; sources, availability, specification for uses; Water – quantity; Water – quality as a resource/ an input, management, treatment; Wastewater as an environmental emission
Sustainability in agriculture	Nutrient Management, Application Practices and Use of Pesticides; Farmland Management & Practices Surface water Management (leakage)
Sustainability in agrifood industry (optional for Technician in Sustainability in Agriculture)	Water for heat exchange; Water for transformation process (eg: cooking); Water for cleaning" Surface water Management (leakage)
Biodiversity	What is biodiversity; Biodiversity as a resource; Biodiversity impacted by practices
Soil Functioning and Preservation	Soil: general introduction, types, and specification for uses; Soil as a resource; Soil impacted by Agri and Food activities; Soil impacted by industrial activities
Air and atmosphere	Air: general introduction, atmosphere, and emission from activities; GHG's Emissions reduction; Climate Change
Energy Efficiency	Energy sources; Agri and food industry consumption of energy; Agri and food industry producing energy
Good Agricultural Practices: Sustainable Crop Production	Crop Rotation; New Crop Techniques; Agri-Environmental Practices; Low emissions Spreading/Spraying Equipment & Practices; Integrated Pest & Disease Management; Crop Diversification Conservation farming; Agri-Forestry

	Crop Protection; Grassland Management; Smart Farming; Sustainable Feed Sources; Animal Nutrition; Sustainable Sourcing; Reducing Emissions; Animal Welfare; Responsible Use of Antibiotics
Good Practices in Agri-Food Industry (optional for Technician in Sustainability in Agriculture)	BATs in Transformation processes; BATS for Heat Exchange; BATS Fluid and solid transport; BATS Conditioning & preservation; Best practices in stockage and delivery; Innovation in energy powering; Industry 4.0; Product & process innovation for sustainability; Waste minimization assessment
Waste & By-Product Management (optional for Technician in Sustainability in Agriculture)	What is waste? Characterisation of waste; Efficiency: Waste Prevention Waste: management; By-products: valorisation)
Economic and financial Sustainability	Basic of economy at farm level; Lean; Sustainable Marketing & communication
Social Sustainability	Social sustainability for the worker; Social sustainability for the society
Sustainability Policy & Regulations: The Law	Policy Regulatory frameworks Traceability
Soft skills	Understanding the (digitalization / Sustainability/ bioeconomy) principles; Basic ICT skills; participation in peer groups; Innovation management; Business Modelling; Organization and Planning; Team working, negotiation and conflict management; Health and safety in the workplace; From Traditional to Digital Food Marketing; Lifelong learning and continuous learning
Total hours: 360	

The teachers during the work activities in the classroom will provide the workers with self-learning material that they will have to consult during the 150 hours of self-learning

Time period

Below is the indicative calendar of training activities:

New Profiles	Feb 23	Mar 23	Apr 23	May 23	June 23	hours
Technician for sustainability in Agriculture level 5						**360**
classroom activity						150
Self-learning						150
Soft skill						60

Scheduling for classroom activities will be 4 hours a day (16:00-20:00) for 4 days a week which means two months and a half of class activity (150 h). During the next two months and a half, on- line materials will be provided to complete the 360 hours, including 60 hours of soft skills.

Quantity of inputs / outputs and unit costs

The quantification of the costs of the pilot project is related to the category "Teacher / Trainer / Researcher" as defined in the project budget. The experts of each Spanish partner will participate based on their specializations and the number of hours (previously defined) that each expert will have to dedicate to the realization of the pilot course. Alongside the costs of the teachers, the ancillary costs relating to materials, software, teaching platforms and other costs necessary to activate the course were quantified.

Budget - Technician

Item	hours	days	€/day	Total cost
Teacher/Trainer/Researcher	150	20	270,00 €	5.400,00 €
Materials & software				2.000,00 €
others				1.000,00 €
Total costs				**8.400,00 €**

Source of funding

The funds necessary for the realization of the pilot course are defined within the project budget. While the costs for the realization of the entire set of necessary courses can be drawn from the various national and regional funds connected with training activities such as ESF, ERDF and EAGGF programs as well as national funds and in particular inter-professional ones.

At national level it will be possible to launch a complete training campaign based on the 10 selected professional profiles and on the basis of the identified priorities and the respective financial budget can be drawn from different sources.

A massive investment in skills is needed. In addition to money from enterprise and governments, the EU is prioritising investing in people and their skills in our budget. The Recovery Plan for Europe proposed by the Commission in May 2020 will also focus on skills related activities.

EU investment in skills Programme Investment (in billions of euros) *

- European Social Fund Plus (ESF+) 61.5
- Erasmus 16.2
- Invest EU 4.9

- European Globalisation Adjustment Fund 1.1
- European Solidarity Corps 0.8
- Digital Europe 0.5

*Resources from the Recovery and Resilience Facility specifically for skills investment cannot yet be estimated

Entity responsible for implementation

The entity responsible for the implementation of the pilot course in Spain is represented by the group of Spanish partners of the Fields project. Their responsibility will be to make teachers and facilities available for the " **Technician for Sustainable Agriculture**".

Output indicators

Indicators are tools capable of showing (measuring) the trend of a phenomenon that is considered representative for the analysis and are used to monitor or evaluate the degree of success, or the adequacy of the activities implemented. The common output indicators refer both to the participants (all participants entering the operation, including those who abandoned it early) and to the entities. Common output indicators for participants are:

- the unemployed, including the long-term unemployed;
- inactive people;
- inactive people who are not following a teaching or training course;
- workers, including self-employed workers;
- people under the age of 25
- people over the age of 54;
- over the age of 54 who are unemployed, including long-term unemployed, or inactive and not following a teaching or training course;
- holders of a primary or lower secondary education diploma;
- holders of an upper secondary education diploma or a post-secondary education diploma;
- holders of a tertiary education diploma;
- participants whose families are unemployed;
- participants whose families are unemployed with dependent children;
- participants living in a single adult family with dependent children;
- migrants, participants of foreign origin, minorities (including marginalized communities such as Roma);
- participants with disabilities;
- other disadvantaged people.

The ambition

National Focus on skill needs and Occupational profiles

Skill mismatch is pervasive in Spain, we have a high number of people without qualifications adequate to the needs of today's economy. On the other hand, we have many people who are overqualified in relation to the work they do. We need to strengthen the group of professionals with intermediate qualifications. This is the feature that differentiates us from other developed European economies, whose main asset is this intermediate group of professionally qualified people. Bringing the demand and supply of skills into a better balance requires more responsive educational institutions and training providers, more effective market policy work, better use of skills assessment and anticipation information, as well as greater efforts by the industry private to collaborate with these institutions.

Life-long learning perspective to both employers and employees

A new generation of skills and a lifelong learning ecosystem driven by central government and social partners need to be jointly developed to ensure a just and inclusive environment. A transition towards a future of work that contributes to sustainable development in its economic, social and environmental dimensions. Such an ecosystem should be part of an integrated approach to creating decent jobs for all, strengthening the supply-side pillar of functioning labour markets to complement the demand-side pillar and matching interventions. The system should be accessible to all, with a specific focus on women, people in precarious working conditions and all disadvantaged and vulnerable groups.

Partnership building contributing to agri & food and forestry pacts for skills.

The "Skills Pact" represents an opportunity to retrain the current workforce and make the agriculture and agri-food ecosystem more attractive to young people, while providing a lifelong learning perspective for both employers and employees.

To achieve this goal, the FIELDS partnership has defined a common strategy to design and implement a sectoral requalification and requalification framework, maximizing the competitiveness of all the actors involved, improving the preservation of the workplace and the attractiveness of the work of the agriculture and agri-food ecosystem under the Skills Pact.

The partnership has developed a first example of a pilot project to test the way towards this ambition. The aim is to reach all stakeholders in the agriculture and agri-food ecosystem: from farmers, agri-food cooperatives, food processors and relevant associations, to education and training organizations.

Evaluation

Assessment approach

Based on monitoring, evaluation is the systematic collection and analysis of data necessary to make decisions, a useful and necessary process to improve the activities of a training plan. An evaluation is an assessment, as systematic and objective as possible, of an on-going or completed project, program or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, developmental efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors

Key performance indicators

The Key Performance Indicators (KPIs) identified by the Project, for the evaluation of the skills partnership and for the evaluation of the modules and training courses, are shown in Tables 1 and 2.

Table 1: Assessment of the partnership:

- Stakeholders actively involved (who provide quality upskilling opportunities, in education/training; who play a role in sectoral drivers of change
- Coverage of countries and regions, (sub-)sectors
- Visibility and awareness
- Public opinion, consumer opinion
- Definition and maintenance of a strategic agenda
- Honest and clear communication to different target groups
- Best practice dissemination
- Willingness of partners to share information/knowledge
- Impact on training programs and interest for the training programs (number of interested participants)
- Employees actively interested in participating in Life-Long Learning
- Yearly growth rate of new courses
- Raised level of final degrees of food employees
- Link with our scenarios, see whether profiles support desirable outcomes

Table 2: Assessment of training modules and courses:

- Number of students, companies in the course
- Number or % of participants from underrepresented groups
- Achievement of learning goals (e.g. increased level of knowledge - tests before and after taking the module by trainees)
- Student evaluation/satisfaction of training content and method
- Numbers of certificates achieved
- Flexibility of programs (hours, ECTS, online/face-to-face, ...)
- Renewal of programs (new elements added year to year)
- Resources per module (human resources, financial, technology...)

- Weight of virtual, augmented and connected reality in the training modules, % of audio-visual learning vs class learning
- Use of educational material and acquired skills in the workplace
- Learning outcomes in practice (logbooks, blogs, ...)
- Employment status of trainees after graduation, incl. job promotions
- Placement rate for unemployed learners
- Trainees and employer job impact evaluation (better execution of tasks, increased salary, new employment, ...)
- Rate of young people/workers recruited in agri-food sector
- Employer satisfaction

KPIs are needed for ongoing assessment of the skill partnerships (Pact for Skills) and for assessment of training modules/courses. KPIs can be used for monitoring progress and outcomes and to take decisions on the way to go forward. A system of KPIs should be limited in complexity and be transparent and user friendly.

9.7 Annex VII: Ireland

Introduction

Method- NWG

Within the FIELDS project, 10 profiles have been created reported in paragraph 3.1 for the 2030 agri-food sector (technical level 4 and 5) and within the National Working Group, of 21 September 2022, considering the report "Trends in Irish Agriculture, Agri-Food Industry, Forestry and Bio-economy" (Deliverable 1.8). Some questions were asked to the participants for better orient the activity of the Fields project in the Irish scenario. The discussion concerned the joint assessment of the new profiles and their correspondence or not with the needs and requests of the companies and whether a training module lasting 360 hours was suitable for all types of training courses, it was essential to insert segmented and certified informal training courses for those who already work and to guarantee homogeneity in terms of regional proposals and times.

Following the recommendations of the Italian National Group and because of the similarities between the two countries, we have decided to share some common points in the document, only making the necessary modifications in the sake of a greater uniformization.

Context of education and policies at National level

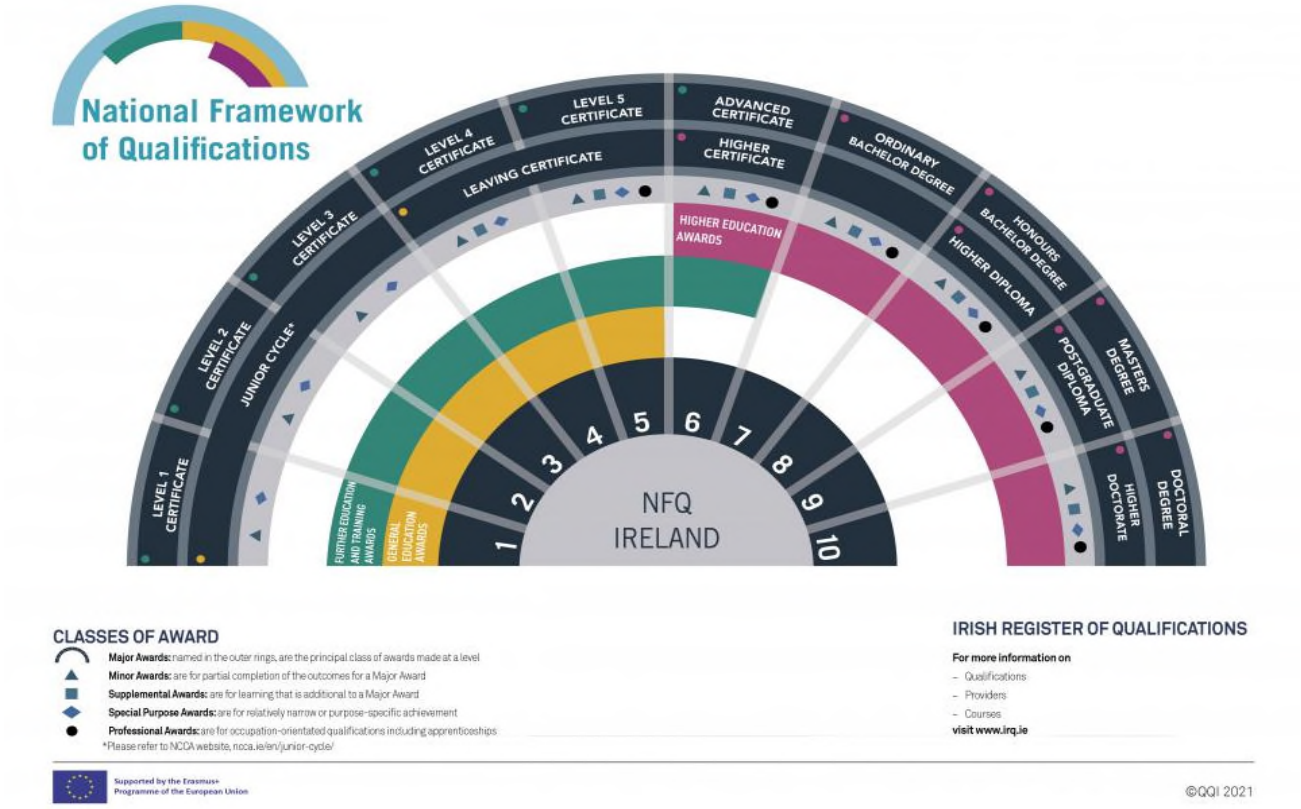
The national education system and training needs related to the FIELDS objectives

The Irish education system is made up of primary school, post-primary school and third-level education. Children must get a certain minimum education from the age of 6 to the age of 16 or until they have completed 3 years of post-primary education. Many people continue on after post-primary to further education and third-level education.

After post-primary school many students move on to further education or third level (see third-level education below). The National Framework of Qualifications (NFQ) has 10 levels of education and allows learners to compare the different standards and levels of education available across the education system.

The Education and Training Boards (ETBs) run a range of adult and further education and training programmes nationwide including Post-Leaving Certificate (PLC) courses. PLCs offer technical and practical education as well as a route to higher and third-level education. Other programmes offered through ETBs include the Vocational Training Opportunities Scheme (second-chance education for adults); Youth reach for early school-leavers; other literacy and basic education; and self-funded evening adult programmes.

Apprenticeships provide on-the-job training and off-the job education. Apprenticeships are offered in traditional craft trades such as plumbing and electrical engineering but also new apprenticeships such as ICT, finance, software development and hospitality. Applicants must be at least 16 years of age and may need a minimum grade in Junior Certificate or equivalent exam.



Third-level education is made up of a number of sectors that are substantially funded by the State.

- University sector
- Technological sector
- Colleges of education

Universities in general are autonomous and self-governing. They offer degree programmes at bachelor, masters and doctorate level.

The technological sector includes technological universities (TUs) and institutes of technology (ITs) which provide programmes of education and training in areas such as business, science, engineering, linguistics and music to certificate, diploma and degree levels.

The colleges of education specialise in training for primary school teachers. Training for post-primary teachers is provided by many third-level institutions.

Training and educational systems in Ireland appear to suitable in formal settings, to develop the skills required across all seven skills categories. Informal education and training appear to more dispersed and there is a level of uncertainty around the accessibility of informal training. A key focus on future skills identified digitalisation, sustainability and business and entrepreneurship skills as being the core focus over the next 5-10 years, although some gaps in training provision have been identified,

specifically around New Technologies, Digitalisation, Sustainability, Climate Neutrality, Renewable Options, Food Supply Chain, Soft Skills Development and Dynamic Data Analytics.

When considering the relevance of recognition of training and education and the attainment of qualifications, organisations valued the idea of achievement of qualifications, more so than individuals. Equally, on the skills front, whilst individuals valued having the skills to perform the task, this appeared to be significantly more critical at organisational level.

Main challenges

European main challenges & Fields project

There are many challenges that the Irish training system must face, among which low attractiveness of VET in many countries stands out. In addition, insufficient mastery of digital skills is also worth highlighting. These facts coexist with an environment in which it is difficult inserting young people and reintegrating unemployed adults and a weak recognition of the value of education and training. In the search of a solution to these important problems, actions should be taken on:

- the accessibility of educational services through coordination between the learning and working phases;
- training contexts by integrating the classic proposal delivered face-to-face with appropriate distance learning methods;
- the flexibility and personalization of training courses.

The inconsistent availability of guidance services and the timeliness in the provision of information on needs (LMI and Skills intelligence) is also an important factor.

From the point of view of the agri-food sector, in the medium term, the most reliable scenario will be characterized by the need for change in how the training system will have to interface, with important areas that should be faced in a training program, including the sustainability of production processes, the adaptation to climate change, the managerial and financial capacity, the diversification and multifunctionality and the exponential reinforcement of digital skills.

The Council of the European Union adopted a Recommendation on key competences for the whole lifespan of learning in 2018 which has become a reference tool for the active parties in the field of training. The Recommendation identifies eight essential competences for citizens, for their personal fulfilment, for a healthy and sustainable lifestyle, for employability, active citizenship, and social inclusion. It is aimed to promote skills development through innovation in learning approaches, assessment methods and support for educational staff with the intention of enabling all learners to realize their full potential. Recommendation encourages Member States to offer quality education, improve school education and ensure excellent teaching, to further develop vocational training by modernizing and promoting continuing education programs.

On 24 November 2020, the Council of the EU adopted a Recommendation on Vocational Education and Training for Sustainable Competitiveness, Social Equity and Resilience. The Recommendation defines the key principles to ensure a rapid response to the needs of the labour market and quality learning opportunities for

both young people and adults. It replaces the EQAVET Recommendation - European Quality Assurance in Vocational Education and Training and includes an updated EQAVET framework with quality indicators and descriptors. It repeals the previous ECVET Recommendation. Less than one week later, on 30 November 2020, it was approved the "Declaration of Osnabrück 2020" (supported by European level VET provider associations (VET4EU2) and VET student representatives on vocational training, education, and training) as a fundamental document with respect to a transition towards sustainable economic models.

On the certification side, the Decree of 5 January 2021 adopted the Guidelines that make the national system of certification of competences executive. The Guidelines have strategic significance as they allow the operation of the National Skills Certification System, referred to in Article 4, paragraph 58, of the Law of 28 June 2012, no. 92 and Legislative Decree 16 January 2013, n. 13, being part of the wider national process of recognition of the individual right to lifelong learning.

Skills identification, validation and certification services will constitute an essential element for the innovation of education and training systems, involving the personalization of learning aimed at simplifying the transition phases from study to the world of work by programming the training proposal enriched by a wider involvement of businesses, professional associations, voluntary organizations and the third sector.

Within the FIELDS project 10 different profiles have been identified as the most important regarding the necessary improvement in skills for sustainability, digitalization and bioeconomy. Below are the 10 EQF level 4 and 5 training modules selected in the project and their declaration as well as the level of priority assigned, which is also necessary to select the pilot course to be implemented during 2023.

Main training modules	Priority
FORESTRY	
1.The Technician for sustainability, digitalization and bioeconomy in Forestry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability and bioeconomy requirements and to implement digital technologies in all aspects related to the production and management of a forestry related business. These tasks usually include (in a forestry related business): - Monitoring and improving the efficient and sustainable use of resources (including energy) and their circularity - Implementing and monitoring sustainable processing technologies and the transformation of primary products - Implementing and monitoring of the application of bio-economy principles to all production processes, including sustainable packaging, waste management and valorisation - Implementing and improving digitization- and digital techniques, methodologies and procedures, including the use of drones and robots for sustainable forestry - Managing operations, including sustainable product development, raw materials purchasing, identification of new marketing chains etc., with particular attention to the sustainability of processes and products and the principles of circular economy	**medium**
BIOECONOMY	

2.The Technician for Agriculture in Bioeconomy (LEVEL 5) manages and controls the production processes by identifying and coordinating procedures useful for saving resources and developing the company according to the reference territorial context. Tasks performed usually include: - manage the operational organization, the implementation of continuous improvement procedures - monitoring and evaluation of the results using digital methodologies and technologies - oversight of executive activities carried out by others - technical training in the use of methodologies, tools and information specialized in the bioeconomy - management of production addressing areas such as investments, marketing chains, etc. - design and Implementation of sustainability processes and products.	**low**
3.The Technician for Food industry bioeconomy (LEVEL 5) performs technical tasks to support the development of the company from a bioeconomy perspective in aspects related to production, management and business. Tasks performed usually include: monitoring the efficient and sustainable use of resources (including energy), implementation and monitoring bio-economy principles applied to food processing, sustainable packaging, waste management and valorisation, implementation and monitoring of continuous improvement procedures, identification of new marketing chains, administrative tasks and supervision of activities carried out by others.	**medium**
4. The Operator for Bioeconomy in agriculture, food industry and forestry (LEVEL 4) operates at executive level in the field of agricultural -, forestry -, or agri-food production, focusing at implementation of bio- and circular economy principles. The operator applies relevant methodologies, tools and information to collaborate in the production, management and business activities of companies active in bio-economy and /or circular economy. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: Carrying out applicable techniques, methodologies and procedures to run and improve a production system based on the circular economy principles. Carrying out fundamental operations for sustainable (e.g. circular) use of resources and transformation of primary products, within the production processes of agricultural, forestry, or agri-food sectors. Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	**high**
SUSTAINABILITY	
5.The Technician for sustainable agriculture (LEVEL 5) performs technical tasks related to production, resources preservation and company development according to sustainability requirements and the local context. Tasks performed usually include: - the supervision and control of production processes - the implementation of continuous improvement procedures - monitoring and evaluation - identifying and coordinating procedures useful for resource preservation and developing the company according to the local context - Operational organization - the implementation of regulations of continuous improvement procedures - the monitoring and evaluation of the results using digital methodologies and technologies. the supervision of activities carried out by others - management of production addressing areas such as investments, marketing chains, etc. - Design and Implementation of good agricultural practices, sustainability processes and products	**high**
6.The Technician for Sustainable Food industry (LEVEL 5) performs technical tasks to support the implementation and supervision of sustainability requirements in the production, management and business activities of a food company. These tasks usually include: ● purchase of sustainable raw materials, ● monitoring the efficient use or resources, ● implementation and monitoring of sustainable processing technologies, ● sustainable product development and packaging, ● waste management, ● implementation and monitoring of continuous improvement procedures,	**high**

• sustainable marketing chains, • administrative tasks and supervision of activities carried out by others.	
7. The Operator for Sustainability in agriculture, food industry (LEVEL 4) intervenes at the execution level. The operator applies basic methodologies, tools and information to collaborate in the sustainable production, management and business activities of the company. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures resulting in protection of the environment and biodiversity within the agricultural, forestry and food industry production processes. - Application of practices and procedures to ensure sustainability (e.g. sustainable use of resources, reduced emissions, human rights) in the agricultural, forestry and food industry sectors. - Taking responsibility in the production processes and management systems to ensure the sustainability of the production operations, in the agricultural, forestry and food industry sectors. Providing support in the different phases of the agriculture, forestry and agri-food production processes, using machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	**medium**
DIGITALISATION	
8.The Technician for agricultural Digitalisation (LEVEL 5) performs technical tasks related to the programming, management and supervision of industrial machines, plants and automatic systems, integrating and connecting them according to the new needs of the Smart Farm. Tasks performed usually include: - programming, robotics and advanced industrial automation - Push connectivity (IOT; IIOT) - assembly, hardware and software configurations - testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems. - selection and management of production systems and the definition of maintenance policies for production systems and after-sales - integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	**medium**
9.The Technician for Food Industry digitalisation (LEVEL 5) performs technical tasks to support the implementation of digital technologies according to the needs of the new Smart Factory; dealing mainly with programming, management and supervision of industrial machines, plants and automatic systems, their integration and connection. Tasks performed usually include: - sensor programming, robotics, and advanced industrial automation - pushed connectivity (IOT, IIOT) - assembly, hardware and software configuration, testing and maintenance of individual automatic machines, intelligent plants and production lines, artificial vision systems, which make widespread use of local and remotely managed software systems - selection and management of production systems and the definition of maintenance policies for production systems and after-sales - integration of different technologies to make machines, anthropomorphic and collaborative robots, virtualization tools of the production process and rapid prototyping communicate with each other	**medium**
10.**The Operator for Digitalisation in agriculture, food industry and forestry (LEVEL 4)** operates at executive level in the field of sustainable agricultural, forestry, or agri-food production, focusing at maintaining digitized processes or digitalisation of sustainable production processes. The operator applies relevant methodologies, software and hardware tools and information to collaborate in the	**medium**

production, management and business activities of agricultural, forestry or agri-food companies. He/she operates autonomously and responsibly within the limits as provided by the procedures and methods of its operation. Tasks performed usually include: - Carrying out applicable techniques, methodologies and procedures to run and improve digitized production processes within the field of sustainable production in agriculture, food industry and forestry sectors - Using drones and robots in different activities of the agriculture, forestry, and agri-food industry. - Analysing and handling data. - Providing support in the different phases of the agriculture, forestry and agri-food production processes, using digitized machines and digital tools geared at processing cycles with particular regard to sustainable and quality processes.	

Main challenges - Ireland

The focus group considering the development of the different activities of the FIELDS project including the report "**Trends in Irish Agriculture, Agri-Food Industry, Forestry and Bio-economy**" (deliverable 1.8) identified two key areas in need of development in Ireland. These were sustainability and the bioeconomy. In the following subsections the main points to be covered in a training program are set out.

Emerging business trends in Ireland are aligned to the future skills needs identified in the skills analysis conducted. The core business operational model is business-to-business and the strategic focus for businesses is on sustainability, innovation, and increasing competitiveness. Essential strategic business skills include, providing leadership, change management and good governance. The most common analytical tools to support business strategy are SWOT Analysis, Strategic/Balanced Score Card and PESTLE Analysis.

However, some in industry feel that there is no 'specific body' to train manual workers, we find that people who are trained and are managers as opposed to labourers they tend to be well trained already. There is a gap for 'training the trainer' i.e. how to manage people and for many of us we are employers for the first time in our 50s and this brings challenges.

farming support (government) bodies have a role here and while Teagasc has done a lot, there is more to do. Because of the labour crisis in the sector (farming) the Co-op has a role to play in training and creating a 'database' of potential part time workers. Companies like FRS and other 'bodies' are available but there is a substantial cost associated. For farmers who require part time help this cost can be prohibitive.

There is a gap in digital skills. Some have sourced help off farm through Agri Advisers, Agri Audit specialist, Grass measuring specialists etc. The young trainee farmer is very computer literate and could give the course. There may be a role in training around visual recording so if you are showing someone how to do a 'job' that is repetitive it would make sense to record and play back until they are familiar rather than having to do the job again and again.

A lot of farms are incorporating and as such have more paperwork than an SME with tax returns, wages. Generally, this work is outsourced due to time and lack of skill set.

There is a function through the farming organisations again around wages, working time act and putting appropriate contracts in place – this employer training is lacking and often ends up firefighting using the accountant or another specialist /if an issue arises. A 'go to skilled educator' for the sector should be set up through Teagasc or Co-ops that everyone could tap into - ranging in from simple things like logging on to Agri-food or Pasture Base, through to managing wages packages (simple / basic).

Priorities for the sustainability of the Irish agriculture sector

In its Communication on the future of Food and Farming of 29 November 2017 (European Commission, 2017), the European Commission said that support for knowledge, innovation and technology will be essential for the Common Agricultural Policy (CAP) in the future. On that basis, the European Commission has drafted regulations to define the future CAP. Article 6 of the proposed regulation sets out the nine specific objectives of the CAP for sustainable agriculture, which are (EUR-Lex 2013):

10. Support **viable farm income and resilience** across the Union to enhance food security;
11. **Enhance market orientation and increase competitiveness,** including greater focus on research, technology and digitalisation;
12. **Improve the farmers' position in the value chain;**
13. Contribute to **climate change mitigation and adaptation, as well as sustainable energy;**
14. Foster **sustainable development and efficient management of natural resources** such as water, soil and air;
15. Contribute to **the protection of biodiversity**, enhance **ecosystem services** and **preserve habitats and landscapes;**
16. **Attract young farmers** and facilitate business development in rural areas;
17. Promote **employment, growth, social inclusion** and local development **in rural areas**, including bio-economy and sustainable forestry;
18. Improve the response of EU agriculture to societal demands on **food and health, including safe, nutritious and sustainable food, food waste, as well as animal welfare**.

The conclusions of the Irish focus group for addressing the current and future skill needs for sustainability and the bio-economy in agriculture indicate that **1) business planning/model and strategic management, 2) mitigation and adaptation to climate change and 3) soil nutrient and health management** are essential to guarantee agri-food production and the sustainability of agriculture in Europe, and especially noting that the sector needs to be:

- employing people that are familiar with climate change and that are able to talk about it;
- identifying renewable energy systems suitable for farms;
- facilitating transfer of knowledge in in these areas and looking at causes of the problems the role of agriculture in decrease in greenhouse gases and increasing resources in this area and looking at making changes to current and future climate change effects;
- exploring the area of industrial crops and bioproducts in creating awareness around the different opportunities and that Ireland and agriculture in Ireland can access;

- getting soil nutrition right for farmers, advise them correctly on the proper management of our soils, issues with soils that need to be corrected.
- reassessing what the industry does on a day-to-day basis, avoid pushing additional costs onto the customer, reduce waste and understand where it's going and be prepared for what's happening in the future.
- Planning and coordinating, resetting how things are done internally, making sure there is a map so everybody understands and that it's done properly.

Priorities for the sustainability of the Irish agri-food industry sector

The Irish focus group noted that unless it's sustainable it won't be profitable and it won't survive, so sustainability is fundamental for the agri-food industry, also adding that that there's an article in climate change in the paper the news every day: "So, it's I guess it's kind of screaming at us a bit" and the industry have to take a long-term approach and it will require a lot of managing and resources. The Groups agreed that it encompasses all of the practices of I suppose of farming and agriculture that were referring to in 'Farm to Fork' so there are more so many points at which you can optimize what you're doing in terms of efficiencies and environmental impact.

The Action Plan

This section reports the operational aspects of the implementation of the pilot courses planned for Ireland identified as the one with the highest priority during the project meetings and during the NWG: **The Operator for Bioeconomy in agriculture, food industry and forestry**. The selected modules will consist of 360 hours of course divided into 150 hours of frontal classroom with specialized teachers, 150 hours of oriented self-learning and 60 hours of lessons on soft skills for the completion of training gaps and missing soft skills.

This chapter defines the activities that will be carried out, the content of pilot course, the number of trainees, the costs of pilot course with also clearly indicated the problems and risks associated with the implementation of the activities.

A clear statement of activity

This section analytically describes the contents of the pilot course for both the technical content and the soft skills part. Overall, the pilot courses "**The Operator for Bioeconomy in agriculture, food industry and forestry** (LEVEL 4)" will last 360 hours and at the end it will be possible to certify (recognition only) both the technical and soft skills acquired during the course. The course will have the following modules and lessons

Module	lessons

Introduction to the bioeconomy	Understanding the Bioeconomy, Principles of the bioeconomy, EU & National Bioeconomy Strategies, Benefits of the Bioeconomy
Biomass and the Bioeconomy	Forest Biomass Usage, Agricultural Biomass Usage, Blue Biomass Usage, Waste Biomass Usage
Innovations in the Bioeconomy	Biotechnology and Bioconversion Processes, Anaerobic Digestion Processes, Biorefineries, Agri-Tech Innovations
Workplace Safety	Legislation & Safety Management, Safe Access & Movement, Safety Precautions Using Machinery, Controlling Hazardous Substances
Working in the Bioeconomy	Working in the Bioeconomy
Soft skills	Understanding the (digitalization / Sustainability/ bioeconomy) principles; Basic ICT skills; participation in peer groups; Innovation management; Business Modelling; Organization and Planning; Team working, negotiation and conflict management; Health and safety in the workplace; From Traditional to Digital Food Marketing; Lifelong learning and continuous learning
Total hours: 360	

The teachers during the work activities in the classroom will provide the workers with self-learning material that they will have to consult during the 150 hours of self-learning.

Time period

Below is the indicative calendar of training activities:

New Profiles	Nov 22	Dec 22	Jan 23	Feb 23	May 23	June 23	hours
The Operator for Bioeconomy in agriculture, food industry and forestry level 4							**360**
classroom activity							150
Self-learning							150
Soft skill							60

Scheduling for classroom activities will be 3 hours a day (16:00-19:00) for 3 days a week which means three months of class activity (150 h). During the next four months, on- line materials will be provided to complete the 360 hours, including 60 hours of soft skills which will be delivered both in person and online.

Quantity of inputs / outputs and unit costs

The quantification of the costs of the pilot project is related to the category "Teacher / Trainer / Researcher" as defined in the project budget. The experts of each Irish partner will participate based on their specializations and the number of hours (previously defined) that each expert will have to dedicate to the realization of the pilot course. Alongside the costs of the teachers, the ancillary costs relating to materials, software, teaching platforms and other costs necessary to activate the course were quantified.

Budget - Technician

Item	hours	days	€/day	Total cost
Teacher/Trainer/Researcher	150	35	270,00 €	9.450,00 €
Materials & software				2.000,00 €
others				1.000,00 €
Total costs				**12.450,00 €**

Source of funding

The funds necessary for the realization of the pilot course are defined within the project budget. While the costs for the realization of the entire set of necessary courses can be drawn from the various national and regional funds connected with training activities such as ESF, ERDF and EAGGF programs as well as national funds and in particular inter-professional ones.

At national level it will be possible to launch a complete training campaign based on the 10 selected professional profiles and on the basis of the identified priorities and the respective financial budget can be drawn from different sources.

A massive investment in skills is needed. In addition to money from enterprise and governments, the EU is prioritising investing in people and their skills in our budget. The Recovery Plan for Europe proposed by the Commission in May 2020 will also focus on skills related activities.

EU investment in skills Programme Investment (in billions of euros) *

- European Social Fund Plus (ESF+) 61.5
- Erasmus 16.2
- Invest EU 4.9
- European Globalisation Adjustment Fund 1.1
- European Solidarity Corps 0.8

- Digital Europe 0.5

*Resources from the Recovery and Resilience Facility specifically for skills investment cannot yet be estimated

Entity responsible for implementation

ICOS as the Irish partner will be responsible for the implementation of the pilot training programme.

Output indicators

Indicators are tools capable of showing (measuring) the trend of a phenomenon that is considered representative for the analysis and are used to monitor or evaluate the degree of success, or the adequacy of the activities implemented. The common output indicators refer both to the participants (all participants entering the operation, including those who abandoned it early) and to the entities. Common output indicators for participants are:

- the unemployed, including the long-term unemployed;
- inactive people;
- inactive people who are not following a teaching or training course;
- workers, including self-employed workers;
- people under the age of 25
- people over the age of 54;
- over the age of 54 who are unemployed, including long-term unemployed, or inactive and not following a teaching or training course;
- holders of a primary or lower secondary education diploma;
- holders of an upper secondary education diploma or a post-secondary education diploma;
- holders of a tertiary education diploma;
- participants whose families are unemployed;
- participants whose families are unemployed with dependent children;
- participants living in a single adult family with dependent children;
- migrants, participants of foreign origin, minorities (including marginalized communities);
- participants with disabilities;
- other disadvantaged people.

The ambition

National Focus on skill needs and Occupational profiles

Emerging business trends in Ireland are aligned to the future skills needs identified in the skills analysis conducted. The core business operational model is business-to-business and the strategic focus for businesses is

on sustainability, innovation, and increasing competitiveness. Essential strategic business skills include, providing leadership, change management and good governance. The most common analytical tools to support business strategy are SWOT Analysis, Strategic/Balanced Score Card and PESTLE Analysis.

Training and educational systems in Ireland appear to be appropriate in formal settings, to develop the skills required across all seven skills categories. Informal education and training appear to more dispersed and there is a level of uncertainty around the accessibility of informal training.

When considering the relevance of recognition of training and education and the attainment of qualifications, organisations valued the idea of achievement of qualifications, more so than individuals. Equally, on the skills front, whilst individuals valued having the skills to perform the task, this appeared to be significantly more critical at organisational level.

Life-long learning perspective to both employers and employees

A new generation of skills and a lifelong learning ecosystem driven by central government and social partners need to be jointly developed to ensure a just and inclusive environment. A transition towards a future of work that contributes to sustainable development in its economic, social and environmental dimensions. Such an ecosystem should be part of an integrated approach to creating decent jobs for all, strengthening the supply-side pillar of functioning labour markets to complement the demand-side pillar and matching interventions. The system should be accessible to all, with a specific focus on women, people in precarious working conditions and all disadvantaged and vulnerable groups.

Partnership building contributing to agri & food and forestry pacts for skills.

The "Skills Pact" represents an opportunity to retrain the current workforce and make the agriculture and agri-food ecosystem more attractive to young people, while providing a lifelong learning perspective for both employers and employees.

To achieve this goal, the FIELDS partnership has defined a common strategy to design and implement a sectoral requalification and requalification framework, maximizing the competitiveness of all the actors involved, improving the preservation of the workplace and the attractiveness of the work of the agriculture and agri-food ecosystem under the Skills Pact.

The partnership has developed a first example of a pilot project to test the way towards this ambition. The aim is to reach all stakeholders in the agriculture and agri-food ecosystem: from farmers, agri-food cooperatives, food processors and relevant associations, to education and training organizations.

Evaluation

Assessment approach

Based on monitoring, evaluation is the systematic collection and analysis of data necessary to make decisions, a useful and necessary process to improve the activities of a training plan. An evaluation is an assessment, as systematic and objective as possible, of an on-going or completed project, program or policy, its design, implementation and results. The aim is to determine the relevance and fulfilment of objectives, developmental efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision-making process of both recipients and donors.

Key performance indicators

The Key Performance Indicators (KPIs) identified by the Project, for the evaluation of the skills partnership and for the evaluation of the modules and training courses, are shown in Tables 1 and 2.

Table 1: Assessment of the partnership:

- Stakeholders actively involved (who provide quality upskilling opportunities, in education/training; who play a role in sectoral drivers of change
- Coverage of countries and regions, (sub-)sectors
- Visibility and awareness
- Public opinion, consumer opinion
- Definition and maintenance of a strategic agenda
- Honest and clear communication to different target groups
- Best practice dissemination
- Willingness of partners to share information/knowledge
- Impact on training programs and interest for the training programs (number of interested participants)
- Employees actively interested in participating in Life-Long Learning
- Yearly growth rate of new courses
- Raised level of final degrees of food employees
- Link with our scenarios, see whether profiles support desirable outcomes

Table 2: Assessment of training modules and courses:

- Number of students, companies in the course
- Number or % of participants from underrepresented groups
- Achievement of learning goals (e.g. increased level of knowledge - tests before and after taking the module by trainees)
- Student evaluation/satisfaction of training content and method
- Numbers of certificates achieved
- Flexibility of programs (hours, ECTS, online/face-to-face, ...)

- Renewal of programs (new elements added year to year)
- Resources per module (human resources, financial, technology...)
- Weight of virtual, augmented and connected reality in the training modules, % of audio-visual learning vs class learning
- Use of educational material and acquired skills in the workplace
- Learning outcomes in practice (logbooks, blogs, ...)
- Employment status of trainees after graduation, incl. job promotions
- Placement rate for unemployed learners
- Trainees and employer job impact evaluation (better execution of tasks, increased salary, new employment, ...)
- Rate of young people/workers recruited in agri-food sector
- Employer satisfaction

KPIs are needed for ongoing assessment of the skill partnerships (Pact for Skills) and for assessment of training modules/courses. KPIs can be used for monitoring progress and outcomes and to take decisions on the way to go forward. A system of KPIs should be limited in complexity and be transparent and user friendly.