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Addressing the current and Future skIIIl needs for sustainability, digitalization and the bioeconomy in agricuLture: European skills agenDa and Strategy

D1.5 Focus Group Analysis	
Document description	The report will present the analysis of the focus groups. It will contain information on identified needed skills, training needs, best methods to deliver training per target groups, national difference, trend analysis, general feedback.
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Partner responsible	ISEKI-Food Association
Author(s)	Luis Mayor, Line Lindner, Christoph Knöbl
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1 Introduction

In the period from May to July 2020, 11 focus groups were conducted (see Table 1), nine of which were conducted at the national level and 2 of which were conducted at a pan-European level on EU policy and on forestry issues, respectively.

Table 1. FIELDS focus groups

No.	Country	Date (2020)	Partners
1	Italy	8 June	CONFAGRI, UNITO
2	Ireland	27 May	ICOS, PA
3	Spain-Portugal	26 June	FIAB, UCLM, FENACORE, SCOOP, CONFAGRI-PT
4	Netherlands	23 June	AERES, WUR
5	Austria	18 May	ISEKI, LVA, JF-BLT, AP
6	Germany	10 June	UHOH
7	Greece	25 June	EFB, GAIA, SEVT, CERTH
8	France	15 June	ANIA, AC3A, ACTIA
9	Slovenia	1 July	GZS
10	EU-Policy	9 June	FDE, LLL-P, EfVET, ISEKI, Plant ETP, CEPI, COPA-COGECA
11	EU-Forestry	2 July	CEPI

As part of task 1.3, so-called Focus Group Guidelines (D1.4) were prepared for the responsible project partners to plan, conduct and report the findings of the focus groups. For the preparatory phase, focus group organisers were asked to pertain to the instructions as described in the Guidelines as regards sending invitations to participants with an information sheet about the project and an informed consent form to be filled in by participants before the focus groups took place. These can be found in the Annexes to D1.4.

This deliverable 1.5 presents the findings of the focus group discussions held in 9 European countries plus two topical ones on forestry and policy issues, respectively. It is organised to firstly outline the way in which focus groups were prepared and conducted; a summary of the data processing and analysis phase; and finally, a presentation of the main findings at EU-level with conclusions and recommendations for the further work in the FIELDS project.

The primary data from each of the focus groups is presented in the Annexes VII-XVII where the reader will find data from each of the focus groups depicted quantitatively (in graphs) and qualitatively (with the executive summaries; quotations by participants and summaries of discussions) structured in the order in which questions were posed.

2 Focus Group Conduction

For the conduction of the focus groups, the organisers were encouraged to organise themselves as teams assigning roles and tasks to the partners to ensure a smooth preparation, performance and reporting phase. The Austrian and the Irish focus groups were treated as pilots for the three phases which in turn meant that the guidelines and instructions for reporting could be revised along the way thereby ensuring an efficient and smooth conduction.

Due to the COVID-19 situation in the spring of 2020, it was decided at a relatively early point to conduct all focus groups online using online web-conferencing tools. This meant that the initial Guidelines were adapted to the online format providing specific online set-up recommendations.

From the FIELDS proposal, a number of prerequisites had to be fulfilled for the purpose of identifying skills needs and future trends in agriculture, food industry, forestry and forest-based industry, by collecting information and qualitative data about:

- Identified needs in agriculture and forestry. Needs will be classified into 5 main categories: sustainability, digitalisation, bioeconomy, soft skills and business-entrepreneurship
- Industry needs (extrapolate skills needed in agriculture and forestry-based also on industry needs).
- Existing training in response to identified needs, and missing training for the identified needs.
- Identified target groups for training and curricula definition.
- Best methods to deliver training to each target group.

Thus, to fulfil these requirements, it was decided to prepare so-called skills lists on the main skills categories of sustainability, digitalisation, bioeconomy, soft skills; and business-entrepreneurship.

At first, a preliminary search on skills within these categories was prepared by the WP-leader, ISEKI-Food Association, and sent to all partners for them to check, add or move skills within the categories. This exercise allowed project partners to obtain different perspectives and backgrounds. The outcome was the production of an extensive list of skills within these 5 main categories. Within bioeconomy, it was decided to distinguish between agriculture, forestry and food sector and the fifth and last category “business-entrepreneurship” was added to better account for these skills separately, due to the significant number of skills on this topic provided by partners.

The five skills lists were sent to all participants of the focus groups prior to the performance of the focus group. Participants were asked to rank in order of importance (where 1 was most important and 5 least important) on each of the 5 skills lists, the 5 most important skills for the sector they represent (e.g., farmer, forester, food industry etc.). Furthermore, participants were asked to take a look at their rankings on each of the skills lists

and select among all 25 skills, the 10 overall most important skills and rank them in order of importance (where 1 is most important and 10 least important). This data was collected by email before the conduction of the focus group. Each of the focus groups followed the same procedure of conduction and the same questions were posed in all focus groups (see Annexes VII-XVI).

Each of the focus groups, according to the description of work in the FIELDS proposal, were recruited to include at least five of the following stakeholder profiles (the numbering corresponds to the same digits as in the ID-strings as explained below):

1. Farmers
2. Cooperatives
3. Agri-food companies
4. Education providers
5. Advisors
6. Foresters
7. Forest industries
8. Other

For the policy focus group # 10 and the forestry focus group #11, this composition was not mandatory. Thus, the nine national focus groups have all followed the same question guide and have all been composed of at least five of the eight stakeholder profiles as described above. All participants have been anonymised and assigned 5-digit ID-Strings composed of the Focus Group Number – Stakeholder Profile – Participant Number – Gender (last information relevant for the dissemination report). Moderators/rapporteurs were assigned the code "0" for stakeholder profile number. As an example, the participant with the ID-string ID57221 belongs to FG No 5 (Austria); is from the forest industry, was participant number 22 and male.

Table 2. Participant information coding

1st digit	2nd digit	3rd and 4th digit	5th digit
Focus group number	Stakeholder profile	Participant number	Gender

3 Focus Group Data Processing and Analysis

After conducting the pilot Austrian focus group, transcription was attempted using the IMAGIO/IBM Watson speech-to-text cloud service as indicated in the project description document pp. 166. It resulted in a bad quality transcription, mainly due to the fact that the software could not recognise adequately the voices from the transcription neither could it recognise dialect. Transcription of the Irish focus group was tried with the same procedure, obtaining similar results. Then it was decided to look for another method to transcribe the focus groups, freely available and as automatic as possible. Three tools were tested: speech-to-text Microsoft Word, speech-to-text tool from Google docs and the YouTube transcription tool. The last one was selected because it was the most automatic (just upload the video to YouTube and it was done automatically) and the one with most available languages.

To ensure a well-organised data processing phase, detailed instructions for transcribing and processing the data collected in all focus groups were prepared (see D1.4). Each Focus Group was asked to prepare:

1. Transcription of the audio file in English. As previously indicated in this section, it was recommended to use YouTube for transcribing the audio file into text and use a free translation tool for the translation. For some languages this was not possible, and they had to manually transcribe the audio file.
2. Focus Group Report with executive summary (template in Annex V of the Focus Group Guidelines).
3. The following 3 data processing files:
    - Index file in which organisers were asked to allocate ID-strings to each of the participants, moderator and rapporteur according to the codes described in the index template (see D1.4).
    - Skills list file in which the organisers were asked to insert the quantitative data they collected from participants to question 2.1, namely the ranking of each participant's 5 most important skills on each of the 5 skills lists: and the overall top 10 skills. Organisers were asked to assign a tab for every participant with the ID-string and insert each participant's 5 most important skills per skills list in the column "Ranking per skills list" and the overall top 10 most important skills per participant in the column "Top 10".
    - Data processing file in which organisers were asked to insert in the tab "Raw data" the spoken text from the transcript corresponding to the questions and to summarise the discussion of the group questions Q2.3, Q2.4, Q3.3, Q3.5. Furthermore, organisers were asked to code or categorise the data that came out of the discussion to Q2.2, Q3.1, Q3.2 and Q3.4. In this exercise, organisers were asked to extract keywords from the spoken text.

Organisers were asked to submit the English transcript; the Focus Group report and all 3 data processing files to the task leader, the latest 31st July 2020. Most of the focus groups sent the documents in due time, but in some cases the files did not arrive till the end of September 2020, delaying the analysis of the focus groups at European level and consequently the preparation of Deliverable 1.5.

Data was processed at the national and topical level which can be found in Annexes VII-XVI question by question. Skills have been depicted graphically using identical custom colours, as can be seen also above. For some participants, however, selected skills are marked in dark red which indicates that the skills they selected were not usable (i.e., their selection was not clear and could not be confirmed by the organisers) and for other participants selected skills are marked in grey as these were missing.

4 Pan-European Focus Group Analysis

4.1 Skills

4.1.1 Most important skills by categories and sectors

As a preliminary exercise previous to the focus group conduction, participants from all focus groups were requested to check the 5 skills lists, as explained earlier, each one related to different skills categories: sustainability, digitalisation, bioeconomy (sub-lists for the agriculture, food industry and forestry), soft skills and business-entrepreneurship skills. They had to select and rank the 5 most important skills for each category, leading to the selection of 25 skills. In a second step they had to rank, from the 25 skills, those 10 most important skills for them, resulting in a ranking with skills coming from different categories. 95 participants carried out the 10-ranking exercise properly, and their data were used for the national and European analysis. During the focus groups, all participants were asked to present their top 10 rankings and each participant was requested to present his/her 3 most important skills in a reasoned manner. Top 10 skills tables for each focus group can be consulted in Annexes VII-XVI. In this section only results at European level are presented. Figure 1 shows the most selected skills at European level, as well as the share of selection by category.

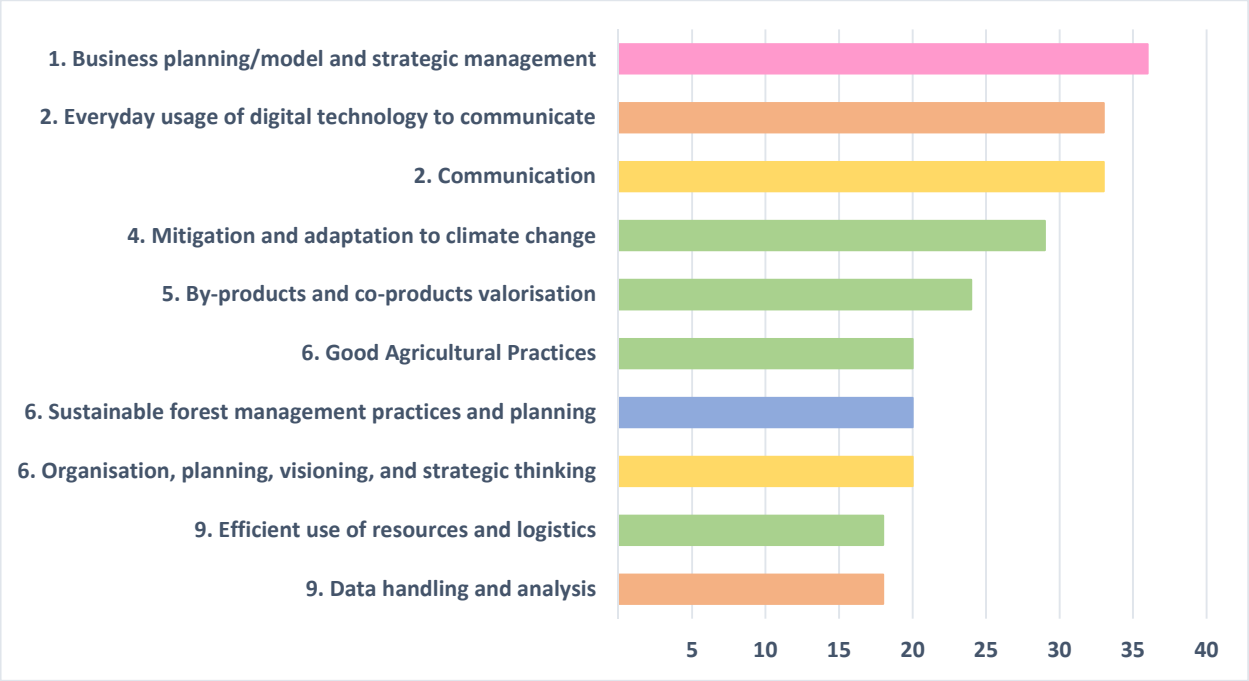

Figure 1: Most selected skills at European level [n=95]

Looking at Figure 1, the most selected skill was *business planning /model and strategic management* followed by two skills related to communication: e*veryday usage of digital technology to communicate* and *communication* (both the same number of selections). After that, three skills from the sustainability category: *mitigation and adaptation to climate change*, *by-products and coproducts valorisation* and *good agricultural practices* were selected. The only bioeconomy skill among the 10 most selected, but also related to sustainability was *sustainable forest management practices and planning*, followed by *organisation, planning,*

*visioning and strategic thinking (*soft skill), *efficient use of resources and logistics (*sustainability skill) and *data handling and analysis* (digital skill).

It is interesting to note that skills related to management/planning, sustainability, digitalisation, and communication predominate in this list. The trend towards business and entrepreneurship skills was already confirmed when the project partners developed the skills lists where it soon became apparent that it was necessary to treat these skills separately as one skill category and not subordinate to bioeconomy skills. Furthermore, it is evident that bioeconomy skills related to the food industry, forestry and agricultural sector do not predominate the selection, but rather that the non-technical skills on sustainability, business and entrepreneurship skills, digital skills and soft skills all have a fair share of the predominating skills. When looking at the whole picture (Figure 2), there is not clear evidence on a predominant skills category among the selected skills.

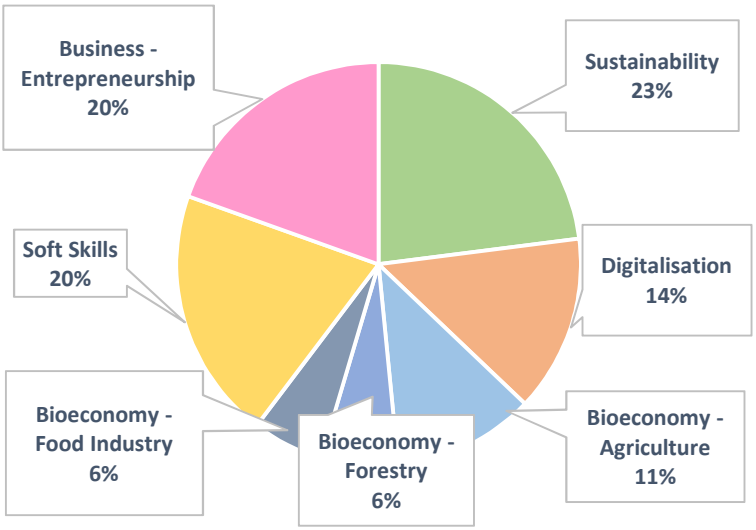

Figure 2: Distribution of skills among the categories

Brief summaries for the first three skills in each category are given below, including some relevant quotes.

Sustainability skills

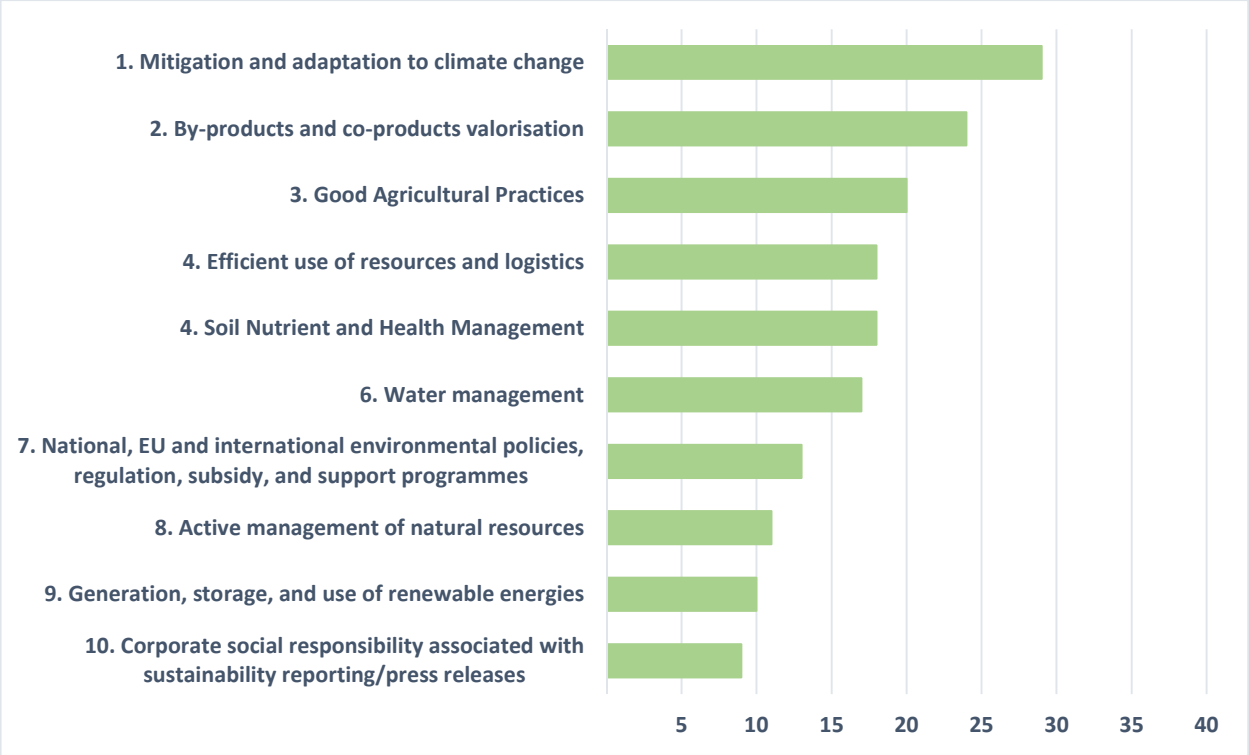

Figure 3: Most selected skills for the sustainability category [n=95]

- *Mitigation and adaptation to climate change*. This skill appears as the most important sustainability skill for participants, not only for a more sustainable and adaptable agriculture, but also to learn to communicate to society that the agricultural sector is already a key actor in environmental sustainability.
  - *"The last few years in particular have shown us that the weather and the climate are constantly changing and that extreme weather events must be taken into account, and we must find solutions to this and make adjustments, especially in the producing sector of agriculture*" (farmer, 51111)
  - *"[…] I would, however, raise the word mitigation, on which we still have little room for progress, few levers, but rather on adaptation"* (farmer, 81151)
  - *"I see it as a really big challenge and the need to have and to get really simple practices out there into practice on farms to try and give people the confidence, and I suppose an attitude change to how they can do an awful lot to contribute towards those challenges in terms of climate"* (advisor, 25161)
  - *"It's absolutely critical that we will be employing people that know this, that are able to talk about this and who can basically go one-to-one with de NGOs and others that are attacking our sector*" (cooperative, 22221)
  - *"Climate change is omnipresent. Only with a broad product chain from sustainable forestry and forest management can we combat or mitigate climate change. "* (forest industry, 57221)

- *By products and co-products valorisation*. Very important in the context of a circular economy, resources efficiency and conservation. Their use as an energy source or to make something innovative to bring to the market. It is also seen as an opportunity for creating or relocating jobs.

- *"I think that a fundamental element for the bioeconomy is also the knowledge of potential resources. The biomass field is not well known; I think that there is enormous potential and I think that there is training to be done in this area"* (agri-food company, 83131)
- *"By-product use and economic usability, is again connected with the bioeconomy, that new value-added chains can open up, and if you have something innovative that you can bring to market*" (farmer, 51111)
- *"When you need jobs that cannot be relocated, the bioeconomy is one of the major sectors that allows that, the valorisation of co-products is one of them"* (education provider, 84181)

- *Good agricultural practices*. In terms of sustainability, but also in terms of solving day-to-day problems in farming operations. Also, the normative aspect of these practices was noted as a market requirement.
  - *"It is essential to train farmers to know how to manage problems with good agricultural practices "* (govern. agency, 38192)
  - "*[…] to be able to deal with people who come onto the farm and really care for them*" (farmer, 21111)
  - *"It is not necessarily the normative aspect that interests us, that interests me, but rather the recognition of these practices, what we call good practices"* (farmer, 81151)
  - *"It is not enough just to harvest and transport to the premises of the cooperative, the product must also meet all these characteristics required by the market. The standards that our customers ask of us so that we can sell any product, GLOBAL GAP, ISO and various other standards that exist in agriculture and in any other sector are essentially the standards that we give priority for our producers"* (cooperative, 72121)

Soft skills

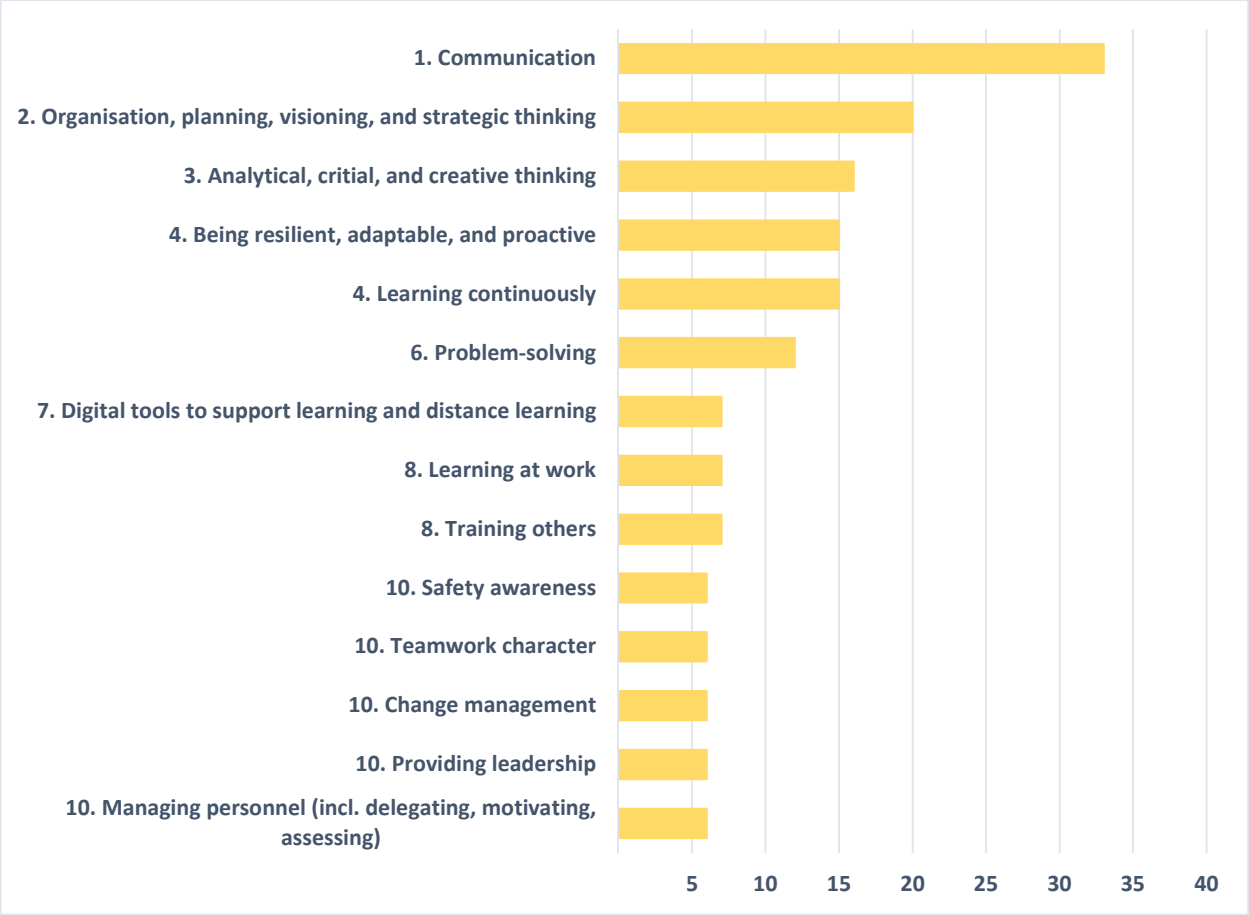

Figure 4: Most selected skills for the soft-skills category [n=95]

- *Communication*. It is the second most selected skill in general, and the first within soft skills. Communication at different levels: among day-to-day collaborators, between different producing sectors in the food and forestry chains and with consumers and society in general.
  - *"[…] the first one is communication, there's a vast amount of stakeholders that we need to engage with whether that's our own shareholders, board employees, customers, there's a vast amount so I think communication skills are critical in terms of creating a rationale for change and making sustainability or some of the complex concepts much more accessible and putting them into more laypersons terms"* (cooperative, 22212)
  - *"What is essential in cooperatives is communication as you need to know how to communicate with the members, to coordinate with them, also in the transaction itself, the purchase, such as for example why is it so, why not otherwise, why such price? If this works well, the cooperative has much less problems then if issues are handled without any discussions"* (cooperative, 92141)
  - *"This is the main tool that we use at our work. I see communication as the one tool to deliver technological, professional, financial, and other topics the farmers are interested in. The topics must be delivered impartially and professionally in an understandable way"* (advisor, 95161)

- *"I think that everywhere we have attacks on agriculture because it does it wrong because it spends this, because it spends that…. And I believe that agriculture is very important for everyone. And that agriculture does not know how to communicate what it does, what it does every day, the food it produces daily for everyone and in the times we are living, is important the skill to communicate and learn to publish what we do"* (advisor, 35121)

- *Organisation, planning, visioning, and strategic thinking*, in order to change our mindset and not only focus on the present but also to be able to think strategically and plan at middle and long-term.
  - *"Do a strategic planning, your digitization needs, your logistics needs, your training of personnel. Not in all agri-food companies has the culture of strategic planning been acquired and it is fundamental"* (cooperative, 32151)
  - "*I think that in general we have a problem with I would say collective intelligence. Along chains. strategic thinking, which means we focus too much on the present or on some short-term survival decision-making. Too little emphasis is given to strategic thinking* " (education provider, 94121)

- *Analytical, critical, and creative thinking*. For new employees, to decipher between what is learned in school/university and the real world; and for everyone attempting to adapt to the current and future challenges of the agri-food and forestry sectors.
  - *"[…] I see the lack of these skills in people who have just graduated, at the moment that there is an inability to kind of decipher between facts and fiction, so I think critical thinking is very important and I also think we probably need some more creative thinkers in our industry as well"* (cooperative, 22221)
  - *"it seems to me that it is a fundamental attitude. And a skill to develop to confront and adapt creatively to the permanent challenges and changes that integrating sustainability in the company entails, considering that today there is no specific definition of what should be understood by sustainability" (*govern. agency, 38192

Business-entrepreneurship skills

Figure 5: Most selected skills for the business-entrepreneurship category [n=95]

- *Business planning/model and strategic management*. It is the most selected skill, considering all the skill categories. Start from the basis of understanding business, the role of the company, its viability, how value and profit are generated. To be prepared to adapt our business to the current and future challenges (mainly sustainability but not only), whatever the size of the company, small, medium, or large
  - *"[…] All our farmers, ranchers, forest producers, small industry, big industry, everything being primary sector is a sector of economic development and it must be very clear what its role is, how value is generated, how profit is generated. For this, it must have a foundation as solid as possible. I have seen how farmers and ranchers have been successful, even as entrepreneurs, many times in businesses that they did not know […] But I think they started from a base of understanding the business, I think it is the first thing that a person in our sector should keep in mind"* (advisor, 35161)
  - *"I think this is just having organizations especially in today's sort of environment with low margins etc that we need to sort of reassess what we do on a day-to-day basis, we can't push additional costs onto the customer, so we need to look internally to try and reduce waste etc and understand where it's going and be prepared for what's happening in the future"* (agri-food-industry, 23201)
  - *We've always been a little focused on up-scaling. But I think it's just becoming much more important now to broaden and build up a bit of security within your company and not be focused on one thing but look what else can I do besides that and turn it off locally and do business with a focus on the environment"* (farmer, 41152)
  - *"And let's be honest with each other, in the end it's all about the fact that the things we do, no matter what area we come from, are affordable. That means I can have the greatest ideas, I can have the greatest other skills, but if the company or myself can't afford it, I won't do it. And you see this very*

often, that people come with great ideas, with their concepts, but it is just not financially feasible, and, in the end, it is really about money. That's why I think that this business modelling, business planning and so on is extremely important" (education provider, 54161).

- *New value chains/new business models*. What these new chains/businesses may offer to the farmer/forester and how these are related to bioeconomy, conventional and novel agricultural practices.
  - *"We are also experiencing changes in the farmers' supplies, many times we are removing the intermediaries for a greater direct sale of agricultural products and I think it is also essential that we go looking at these new business models where they take us and what they can bring us"* (34172, education provider)
  - *"What the actually new business models are that are important for the future farmer, organic or not organic and so on"* (advisor, 45171)
  - *"Particularly in the context of the bioeconomy, the use of by-products and new products and the further processing of residual materials is a major issue, which is why I believe it will be very important"* (farmer, 51111)

- *Project management*. It is a skill that was mainly selected by educators and researchers, but also by advisors and farmers.
  - *"Because projects are a closed short-term environment in which I can actually implement almost everything. And when it comes to change and so on, I can do something in the context of a project, I can implement a change, I can implement a new product, I can implement a new service, I can change a company, and that usually happens in projects. So, I think project management skills are just extremely important"* (education provider, 54161)

Digitalisation skills

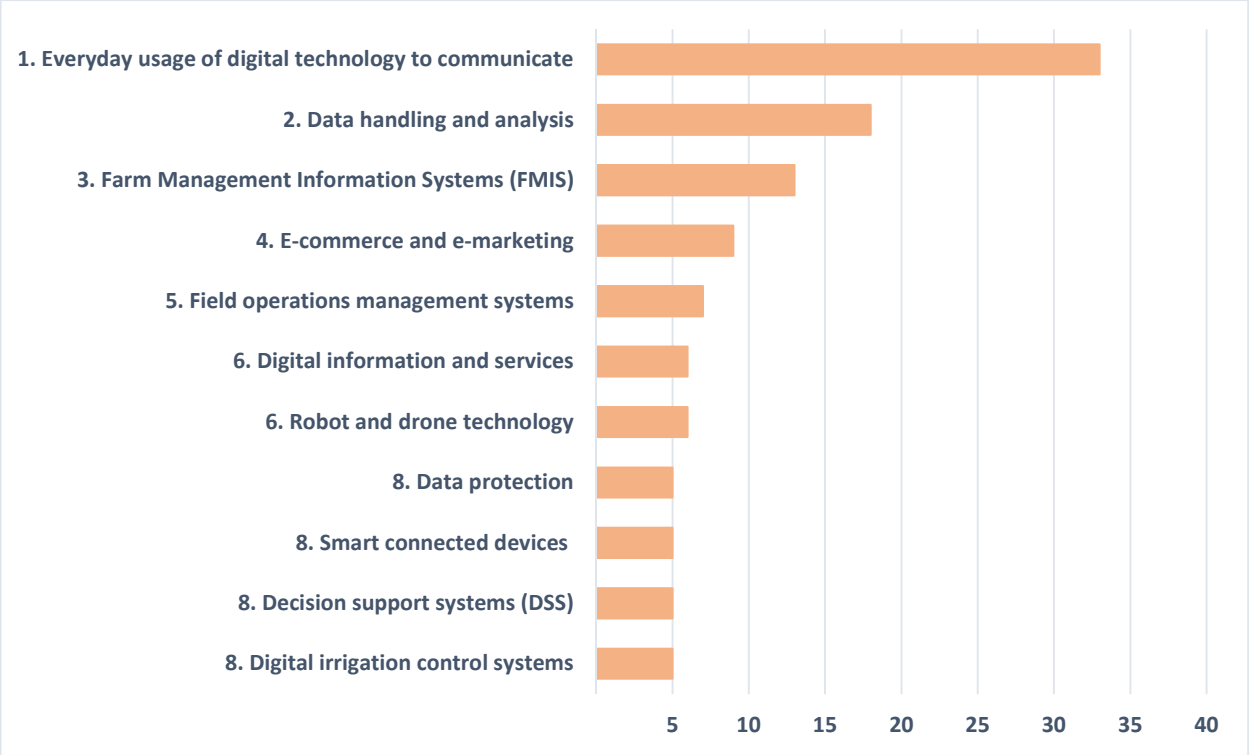

Figure 6: Most selected skills for the digitalisation category [n=95]

- *Everyday usage of digital technology to communicate.* It is the second most selected skill in the top 10 rankings. Digitalization is here to stay; it is everywhere and as a communication tool is a basic step to be accomplished before acquiring more demanding digital skills.
  - *"The daily use of digital technology to communicate is something that is of fundamental importance today and we realize that codes and instructions for use are not necessarily mastered by everyone"* (education provider, 84191)
  - *"The first in the ranking is for me simply the classical everyday life with very general simple things: computer, tablet and so on. If that doesn't work, people go for coffee, because then they don't know what to do at the moment. So, I think that's one of the most essential things we need at the moment, need in the meantime, simply the quite natural handling of these very simple classical media. If you can't do that, you can't also neither with many other digital things in the future"* (education provider, 54152)
  - *"We also offer various services and apps for our members and customers already today. When customers have to download field impact data from their Fiona application system, most of our customers already have a problem […] Many of the students who come to my house when we have applicants, very often only rudimentary knowledge is available, even when it comes to the installation of programs, systems or data transfer from one program to the next. The standard is much worse than is commonly thought"* (cooperative, 62141)

- *Data handling an analysis*. Not only the technical aspects related to it, but also other related issues such as GDPR, ethical issues, etc. Awareness on the strong potential that data handling and analysis may have in agriculture and forestry.

- *"Data processing and analysis aspect is only in its infancy. Farmers are big producers when it comes to the information they are given, but it is not fully exploited because of a lack of effective and competent treatment, certainly on the part of farmers, who do not always provide it in the best way. There is also a lack of visualization of the interest that this can have, particularly in pooling and massifying data"* (farmer, 81151)
- *"This is not only the matter of analysing the information at a technical level, but it also has many things associated with it. For example, using our personal data and privacy issues, ethical issues…that is, using the information well"* (education provider, 34141)

- <u>*Farm management information systems*</u>. It highlighted the potential of sharing data in combination with farm management information systems to improve the management of farms.
  - "*Simple field data files or farm management information systems, so that in the end there is also the possibility of merging, transferring and sharing data with others and generating added value for the agricultural enterprise*" (cooperative, 62141)

Bioeconomy skills

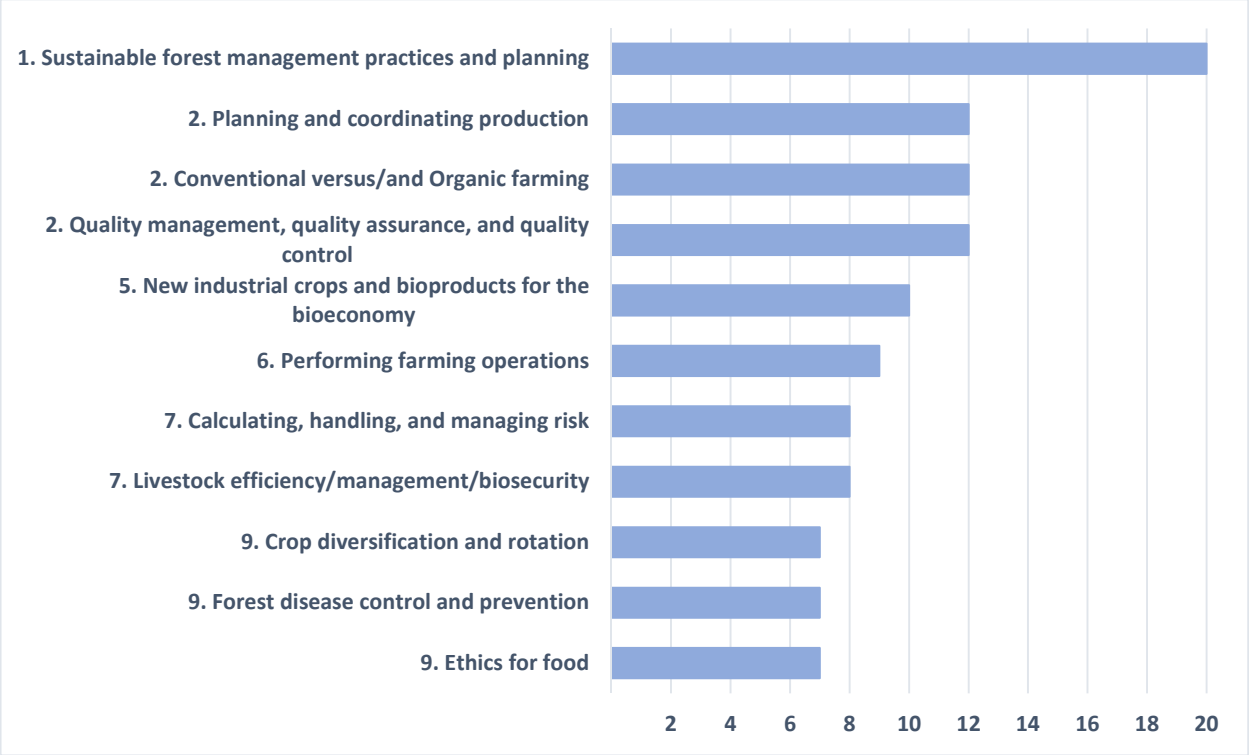

Figure 7: Most selected skills for the bioeconomy category [n=95]

- <u>*Sustainable forest management practices and planning*</u>. Because its relation to other topics, such as biodiversity and because policy trends for more strict forest regulations on sustainability. From another point of view, sustainable non-timber forest products for an innovative forest industry.
  - *" […] sustainable forestry or forest management, is also anchored in it from history, sustainability criteria and, current discussion, the biodiversity strategy at European level, because I believe that this*

is becoming increasingly important and, above all, is perhaps not so well known to the general public as forestry is already regulated or already has many regulations on sustainability, and yet there is still more pressure coming from the NGOs in the direction of more and stricter sustainability requirements in the forestry sector" (farmer, 51111)

- *"Products from sustainable forestry or from forestry in general, because I think there are some products that you can still discover here, what you can or cannot make out of wood, so there is also the term non-timber forest products. I believe that a great deal of knowledge can and should still be created here" (forest industry, 57221)*

- *Planning and coordinating production,* for the proper functioning of the business. It is also seen as a basic pillar for the agri-food entrepreneur.
  - *"Planning and coordination is just resetting how things are done internally, so you know making sure that when we have a flow within the organization that we have a map so everybody understands and that it's done properly"* (agri-food company, 23201)
  - *"I believe that is important to understand a little how the money is generated, to have a certain concern for the new marketing channels, obviously also to have a basic knowledge of production planning and coordination, because then we begin to have an agricultural entrepreneur, we start to have an agro-industry"* (advisor, 35161)
  - *"And that follows planning and coordinating production, is just resetting how things are done internally, to be sure that when we have a flow within the organization, we have a map, so everybody understands, and it's done properly."* (agri-food-industry, 23201)

- *Conventional vs. organic farming*. What these farming approaches, single or combined, can offer in terms of innovation. Also, organic farming as part of the whole sustainable farming system.
  - *"Conventional agriculture, organic agriculture, hybridization of systems, mixing around specifications, but also what ideas can be found in these systems and what contributions the diversity of existing systems can make in terms of innovation"* (education provider, 84191)
  - *"[…] to have an organic entry (I preach for my parish) and also to have an organic agriculture which is rather centred on autonomy, self-sufficiency by combining polyculture and livestock farming systems, to valorise the co-products of livestock farming in plant production and to have a rather global health of the soil and the products that we can have in food"* (researcher, 88141)

- *Quality management, quality assurance and quality control.* Always important for the agri-food companies. It was selected also in the top 10 for 2 cooperatives.
  - *"We are in food business so again the highest standards for that from a food safety perspective will always be one of our priority areas and especially when we're looking at that continuous improvement from a stat training perspective"* (agri-food company, 23191)

Figures 8 through 11 show the most selected skills for the related stakeholder profiles. The remaining diagrams for the other profiles can be viewed in Annex I. It is interesting to note that the number of sustainability skills decrease in the sequence farmer-cooperative-industry, whereas business skills increase.

Farmers

For farmers, although only one business-entrepreneurship skill appears in the list (business planning/model and strategic management) it is the first, indicating this skill is considered very important. Two skills not commented in the previous section appear within the three most cited.

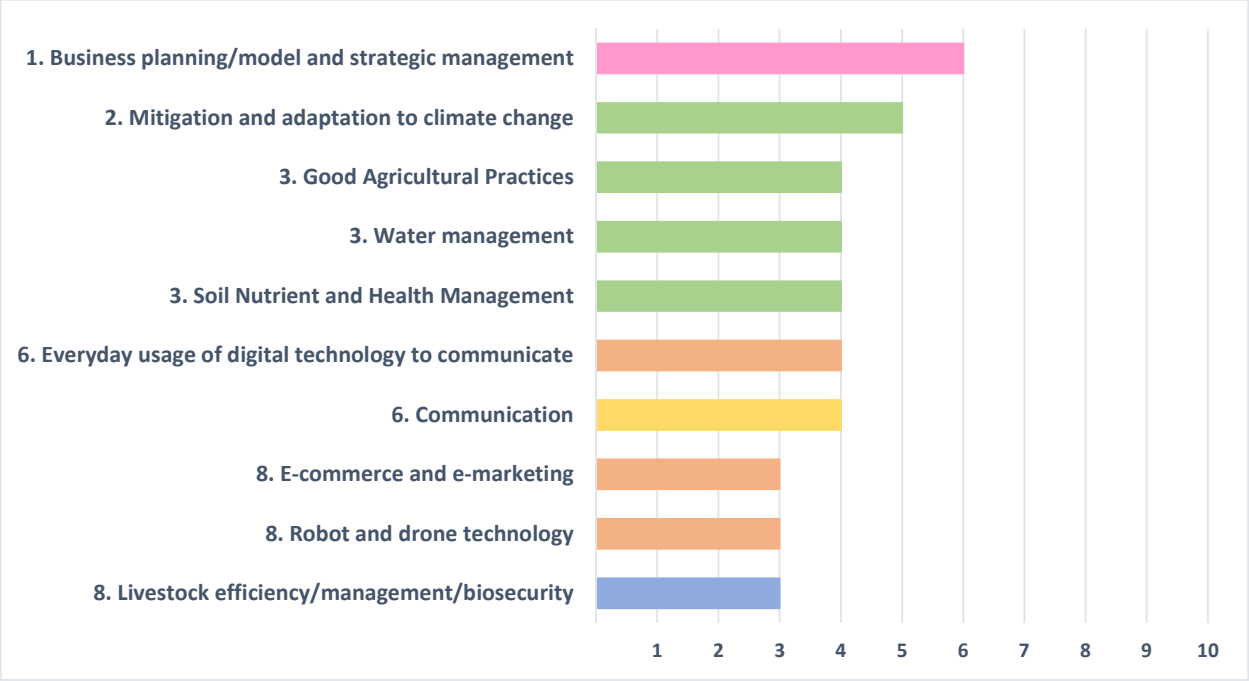

Figure 8: Most selected skills for the Farmers profile [n=11]

- *Water management*. Participants stressed the importance of water (quantity and quality) in agriculture. Planning, managing, technologies, legislation, are considered important aspects for training.
    - *"It all starts with the water. If there is water, everything can be accomplished. For example, my area is the highest productive area in cotton. We reached a limit, however, because the water was very low. We had unsuitable water, there was salinization, the drillings had to have 9500 conductivity, which means that it is unsuitable for all crops. So that's why we have to start with water"* (farmer, 71111)
    - *"There are many advances in technology to do good water management, both at the user and parcel level, but we also have to deep into planning and management, at the level of the state of the European policies; this is the great hope of Spanish agriculture to maintain its profitability. Either we learn to manage properly in this climate change situation that increases conflicts, or we will do a disservice to the next generations"* (farmer, 31181)
    - *"[…] A need, on the one hand, to manage the available water better or to use it in a more coordinated way, and on the other hand, I will have to know what all this has to do with it, and I will also have to adapt the framework conditions accordingly and build the necessary infrastructure."* (farmer, 51111)
- *Soil nutrient and health management*. The proper management of the soil and its relation to circularity and sustainability were important topics for participants.
    - *"[…] I preferred to put it in a global way and by also looking at production, the production behind it. Just looking at the resources, but also at the life cycle"* (farmer, 81151)

- *"[…] Our life comes from six inches of topsoil, so I feel as an advisor is very important to have that right for farmers to be able to advise them correctly and the proper management of our soils, issues with our soils that need to be corrected and it's a very important section"* (advisor, 25151)
- *"Since resources are becoming scarce, water also the nutrients in the form of regulation of the amount of fertilizer and so on, it is actually becoming much more important to operate more circular management and to look at the end how one can produce more sustainably.* (cooperative, 62141)

Cooperatives

For cooperatives, *cooperatives (values, legal framework and management)* appears as the second most selected skill. Quotes remark the importance of cooperatives as an intermediate actor in the value chain and as promoters of sustainability values among their members.

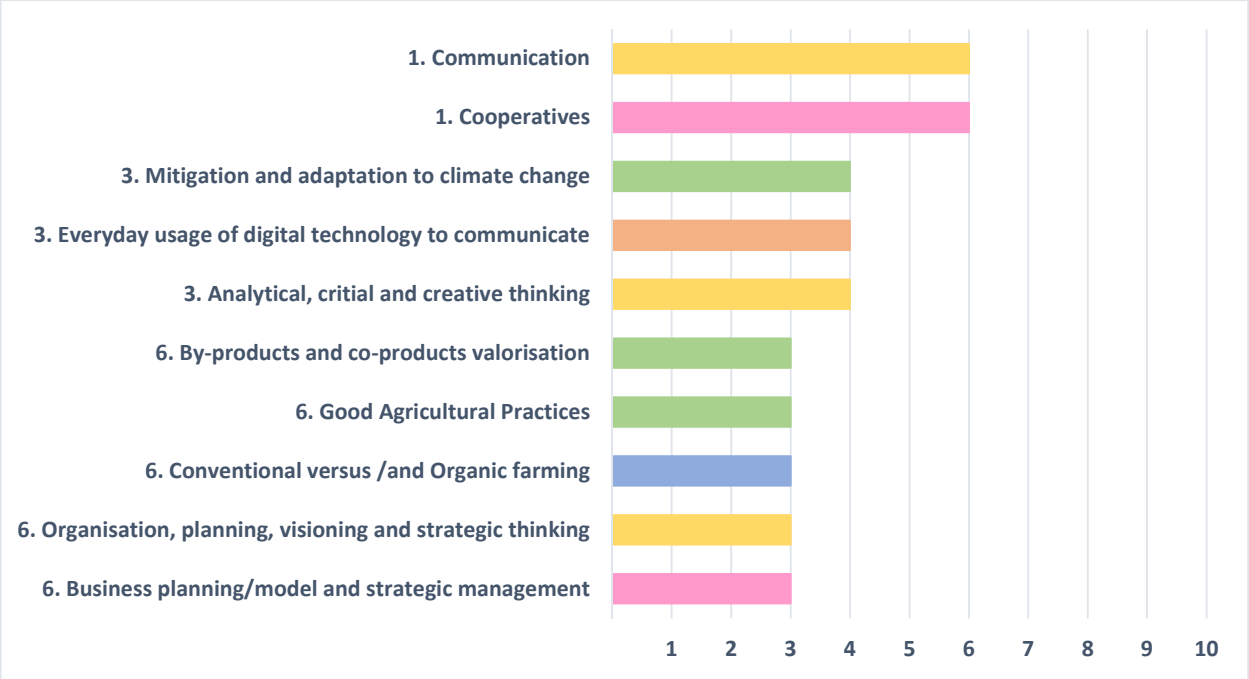

Figure 9: Most selected skills for the Cooperatives profile [n=9]

- *"In terms of sustainability, I am going to speak from the perspective of the cooperative. Of course, what we face in our daily lives is very important, not only to receive the products from the producers, but also to be able to promote them in the markets, to our customers"* (cooperative, 72121)
- *"[...] the objective of the farmer is to obtain a sustainable production and translate that production into an appropriate income for his work and risk. This objective must be contextualized in terms of the problems of the existing sectoral organization, the positioning of farmers in the value chain and in relation to the context of climate change and the use of natural resources, food security and globalization"* (cooperative, 32201)

Agri-food companies

As observed for farmers, *business planning/model and strategic management* (business-entrepreneurship skills) is the most selected skill in the top 10 rankings as well for the agri-food industry participants, followed by *communication* (soft skills) and then 4 skills with 3 selections: *ethics for food* (bioeconomy skill), *being*

resilient, adaptable and proactive (soft skill), *organisation, planning, visioning and strategic thinking* (soft skill) and *collaboration/cooperation across all sectors in the food chain* (business entrepreneurship skill). No quotes are available for *ethics for food,* but some are presented for *being resilient, adaptable, and proactive* and for *collaboration/cooperation across all sectors in the food chain*. For the first one, in the sense of a requirement for leading a team, managing people, and taking decisions.

Figure 10: Most selected skills for the Agri-food companies' profile [n=10]

- *"You sometimes need to push a bit in agriculture to move people. You have to know how to exercise your will or bang your fist on the table"* (cooperative, 92141)
- *"We have quite a lot of people working for us in the organization, but being resilient and adaptable and proactive are for sort of management of people, management of the teams etc. Having the ability to deal with day-to-day life and to keep themselves going strong, being adaptable and being able to see changes and you know make the right decisions on a day-to-day basis because we depend on them to make those decisions"* (agri-food industry, 23201).

For the second one, it is remarked the need of this communication/cooperation and also the need of knowing the whole food chain for this purpose:

- *"I find this cooperation from point A to Z extremely important because I often see that there are problems in communication and cooperation but simply because there is no interest or no time or no know-how and how to see through such a supply chain from beginning to end" (advisor, 65152).*

Forestry sector

For the forestry sector, it is better to address the Forestry focus group skills ranking (Figure 11) to identify the most important skills. In view of this figure, the most selected skill was *sustainable forest management practices and planning* (10 selections, in the bioeconomy skill-forestry list but also related to sustainability), followed by *everyday usage of digital technology to communicate* (digital skill) and *forest disease control and*

prevention (bioeconomy-forestry skill) both with 7 selections; *mitigation and adaptation to climate change* (sustainability skill, 6 selections) *multifunctional forests and ecosystem-services* (sustainability skill but related to forestry, 5 selections), *prevention and management of natural disturbances* (bioeconomy-forestry skill, 5 selections), *communication* (soft skill, 5 selections), *national, EU and international environmental policies, regulation, subsidy and support programmes* (sustainability skill, 4 selections), *water management* (sustainability skills, 4 selections), *reforestation, afforestation and restoration of forest ecosystems (*bioeconomy-forestry skill, 4 selections) and *new value chains / new business models* (business-entrepreneurship skill, 4 selections).

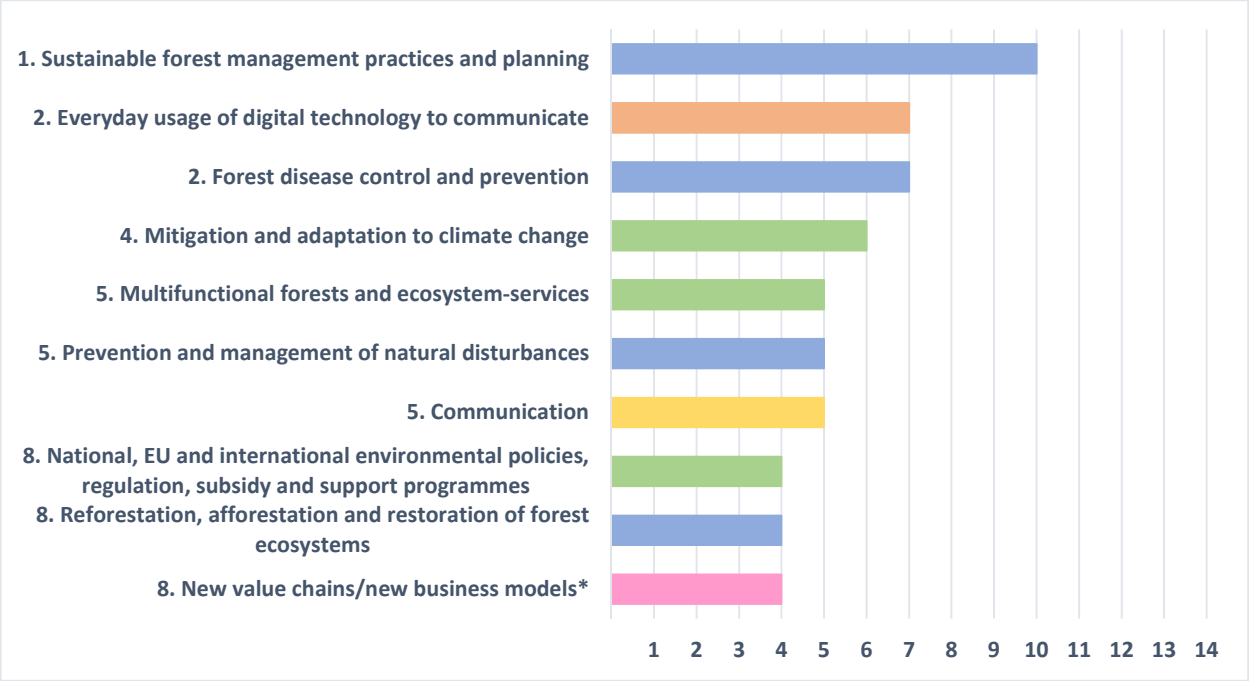

Figure 11: Most selected skills for the Forestry focus group [n=14]

In view of this list, it is clear that sustainability and bioeconomy-forestry skills predominate in the forestry focus group preferences. For most of these skills quotes have already been provided previously, for others no quotes are available (there were no comments on the selected skills in the forestry focus group). For *national, EU and international environmental policies, regulation, subsidy, and support programmes,* we can show some quotes, but not coming from forestry stakeholders. What is more, these are quite representative of all the FIELDS working sectors. These quotes stress the importance of this knowledge/skills because regulations affect the business strategy, they are helpful in risk prevention and important to obtain national and European funding:

- *"As an advisor to farmers again it's a big part of my job to make sure they're compliant in every way to collect their payments and get their maximum payments from Europe. A big part of my job is basically payment applications, loss applications like whatever in terms of all the different schemes. So very important being able to stay up to date with all those schemes for me as an advisor"* (advisor, 25151)
- *"We are in a situation, especially from this new century, where administrative regulation has been put in place above science, so if we want to focus on making farms profitable, we have to combine the two aspects [...] regulation, subsidies and support programs. In the end this is what marks the path that we*

are going to follow as farmers, it absolutely conditions the agricultural approach of a farm; we must to observe the decisions that Europe makes regarding the globalization of markets, we owe ourselves to those policies that we are now living in hydrological planning, where they want to change the course of how water resources are used in Spain" (farmer, 31181)

- *"I believe that we mainly depend on it [environmental policy] for any matter. It is better to prevent than to correct all those things that have happened, such as environmental disasters, it has been shown over time that they could have been avoided with good legislation, for me it is fundamental, the basis of everything is legislation"* (education provider, 34172)

4.1.2 Missing skills

Following from the first exercise in the focus groups, where the participants had gotten familiar with the lists of skills and had been asked to select and rank their most important skills, the next question participants were asked was if they would add any missing skills in the lists and why these skill/these skills are important (Q2.2). While some skills mentioned by participants are already in the skills list, these are not included in the list (See Annex III) but only the so-called "missing" skills. It is worth noting here that in some focus groups the discussion turned to focus not only on those skills missing in the provided lists but in general of the agri-food and forestry sector.

Generally, for farmers, mainly soft skills and sustainability skills were mentioned as missing skills. And one soft skill mentioned as missing, is the skill *time management*. Here two farmers mentioned time management in relation to being busy. As one farmer in Ireland expressed it: "*And time management I think is something, we can be very busy fools and that's something that I suppose I think technology supports, around time management that's the only thing I would add"* (farmer, 21122). This point was supported by the other Irish farmer who said that: *"there's a lot of farmers out there who haven't, shall we say who are very busy and they forget about health and safety, they forget about like what Maire said time management and how to do things better. I think those skills have been left out* (farmer, 21111). Another skill, which is closely related to the umbrella term communication, is *communication and engagement with civil society* and related to the ability to exchange knowledge and to be confronted with civil society which was mentioned by a farmer in France who said that *"There are social networks, neighbours, local residents and I think that today, what we lack a little in agriculture is the ability to exchange and to be confronted with civil society, which is not necessarily very familiar with our practices and can misinterpret or misunderstand them"* (farmer, 81151). Also related to engagement and communication is the skill mentioned as *"Connecting /communication with consumers and market"* which a farmer expressed as the ability of *"Telling the story to the consumer. Creating product awareness at the consumer"* (farmer, 41152). This skill was also emphasised by representatives of agri-food-companies who mentioned that this skill is lacking for farmers, both the collaboration between farmers for marketing and management purposes but also for sustainability purposes to decrease waste and promote circular production (agri-food industry, 43181). As a Greek representative of the agri-food industry mentioned: *"I clearly believe that the Greek producers want an education, a socialization, for us all to grow up together. No one is competitive alone. There is nothing that you can do on your own. Get organized to do serious work now. With young professionals, and the older farmers behind to help the situation with their experience."* (agri-food industry, 73131).

As regards sustainability skills, the missing skills mentioned was water use and in this connection the *management of ground water*. As Spanish farmer said: "*In Spain, we have a serious conflict when we talk about water use because the Hydrographic Confederation has fundamentally focused on managing surface water, but groundwater, on which a significant number of already depend hectares in our country, require specific treatment, they are the great unknown"* (farmer, 31181). The topic of water use was mentioned also in relation to *legislation regarding the issue of water*. Especially the topic of skills related to *rural biodiversity and synergies in the environment* were mentioned by farmers in Slovenia where one said that *"I would focus more on sustainable agriculture rather than organic farming. Because we know that sustainable agriculture can give good results even if it is not organic and does not have that certificate"* (farmer, 91182).

For representatives of agri-food companies as regards bioeconomy skills, "*process engineering*" was added by an Irish agri-food company representative who said that "*process engineering I think is a very important skill especially in our industry where you're dealing with very complex and technical equipment, so the process engineering settings is a huge opportunity and probably a gap as well"* (agri-food company, 23191). In relation to business and entrepreneurship skills, *lean management* was mentioned as a lacking skill where an Irish representative of an agri-food company said: *"[…] if you are to be serious about lean and continuous improvement it means a particular style of leadership is required, which is all around enabling people on the ground to identify the problems and to come up with the solutions as opposed to the historical directive management said which may have been more common in the past […]"* (agri-food company, 23191).

For foresters and forest industry representatives, also the soft skill of *"Connecting /communication with consumers and market"* was mentioned as a missing skill, similar to farmers. Other soft skills were *the "Concept of influencing"*; the *"Integration of competences/skills"*; "*systems thinking*" and "*facilitation skills*". The latter, "facilitation" was mentioned by a forestry industry representative in the forestry focus group who mentioned: "*One thing that we see in our work in many of the countries we're working in foresters might have very good technical training and qualifications but they are not usually very well qualified in terms of facilitation and understanding what problems many small holders in developing countries are facing, this is a chronic deficit in some basic forestry education"* (forester, 106221). Linked to soft skills, an advisor in the forestry focus group pointed to the importance of *stakeholder interaction* and mentioned: *"I was thinking that maybe you're missing this whole point of stakeholder interaction, and in the in the future this will be one of the crucial skills that will be required within a company or organization, because there will be many issues that need to be handled on the outside or explained or somehow facilitated through the process"* (advisor, 105182). As regards digital skills, the "*Use of digital products and GIS data in forestry*" was mentioned by a representative of the forestry industry in Austria who said that: "*the use of digital products, such as GIS, ArcGis, is an extremely important point, because you can simply manage up to 4000 or 5000 hectares on your own, or you can take charge of them, and it is impossible without digitalisation and digital maps, and many models are derived from them*" (forest industry, ID57221). Also, one of the education providers in the forestry focus group mentioned the skill "*education supported by technology*" and emphasised that *"the use of drones and of different kinds of cameras in operating machines can absolutely support the practical transfer of knowledge. It's very easy to use technology to support the education processes in practice, so that is one of the issues that absolutely might be a part of this"* (education provider, 104161). As regards the list of bioeconomy skills, one advisor in the Spanish-Portuguese Focus Group pointed out that certain skills were missing in the list of skills related to the forestry sector, namely: "[…] *water, air, erosion, fertilization of soils, pollination* […] (advisor, 35161). Besides these,

also "*Carbon markets + trading*" and "*Knowledge about the entire food and forestry system*" were skills mentioned by foresters and forest industry representatives. The latter, the ability to understand the whole production chain, was mentioned by a representative of the forest industry in the forest focus group, saying that: *"[…] if you work in silvicultural forest management or in the manufacturing plant, for everyone working in this industry, it is important to understand where the raw material comes from and how it is manufactured into the products that are ready for use*" (forest industry, 107242). Also "*Product life-cycle management and thinking*" was mentioned as a missing skill by an advisor in the forestry focus group*: "[…] product life-cycle management or thinking. I think that's very crucial to come closer to the circular economy and that kind of things, also in order to know what we're going to do with our products* (advisor, 105211)

As a general remark, a representative from a governmental agency in the Spanish-Portuguese Focus Group mentioned that: *"returnable, reusable, recyclable, compostable, with recycled content from lower weight renewable materials, with low energy consumption*" (govern. agency, 38132) should be added to the topic of sustainable packaging. Another general remark from an education provider was the ability to adapt and to change specialisation: *"What is important is that after training, and at least after initial training, engineers should be able to specialise afterwards and be able to change their specialisation during their career if necessary"* (education provider, 84191) and that: *[…] Being able to build up a background of specialisation and to develop their knowledge according to the context in which they are"* (education provider, 84191). Another skill mentioned several times, especially by education providers, but also by other stakeholder groups is the ability to connect or to integrate skills and competences. As one education provider from the Slovenian focus group put it: *"It is about connecting all of these skills […] If there is no sustainability along with business skills, digitalization cannot work. This means that the main thing is the relationship between these things that are methodologically defined"* (education provider, 94132).

The participants of the Policy focus group, in concordance with previous comments, indicated *communication with consumers* (environmental and social sustainability, risk management) of paramount importance to increase their trust in the agri-food sector. A participant indicated that there are so many agriculture and food options that consumers have started to question their quality, safety and particularly sustainability. In this context, new skills and competences (more in the commercial than in the technical side) should be developed to inform the public on those aspects. As far as sustainability is concerned, more awareness regarding food waste faces two issues: the need to avoid food waste, for example by providing better knowledge about the best before date information; and better consumer knowledge on how to properly dispose of unwanted food.

4.1.3 Change of skills

To question 2.3 - How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed? - in several of the focus groups, there was general agreement that such skills lists will constantly change in response to external factors. As one of the education providers in the Austrian focus group put it*: "this can never be a fixed list, but rather it will change all the time. Depending on the area of responsibility, the requirements are simply different, or the needs are different, the necessities. So, I think a list like this is a list that is constantly evolving"* (education provider, 54152).

Nevertheless, while in Greece, some participants were of the opinion that digitalization has been idealized and that there are more pressing challenges, such as water management, in Ireland several participants highlighted digitalisation as a key future skill, where specific emphasis was placed on Precision Agriculture (precision animal health, precision soil and nutrient control), Lean, Mechanical Operations and both Electronic and Robotic Automation, as well as Artificial Intelligence.

In Spain-Portugal, Ireland and Slovenia, many participants agreed that the area of sustainability will be a core future skill need, as highlighted by an Irish agri-food representative saying that: "*the sustainability agenda will continue to grow, so I think that will remain as number one but maybe in a more dominant fashion" (agri-food company, 23191).* In particular sustainability of the food system, climate change mitigation and efficient use of resources will be emerging topics in the near future.

In the forestry focus group, participants agreed on three sets of skills for the future:

- Technological skills: digitalization of processes and data management, application of IoT and distance working.
- Sustainability skills: efficient use of resource (especially water), risk management (including disease prevention), but also the ability to restore forests.
- Social Skills: effective communication in a view of conflict management and the building of interlinks with the communities. On a broader scale, the understanding of global trade dynamics and the Chinese language.

4.1.4 Differences within job responsibility levels

To question 2.4 if respondents see differences within their sector depending on the job level of responsibility, this question was not in all focus groups touched upon or understood well.

Nevertheless, in the Spain-Portugal focus group, there was some agreement that there will be different skills needs for different positions, but that there is a need to share knowledge and skills across different responsibility levels. As one participant put it:" I *do believe that in the future, there will be a change and the change is the data, when everyone has to analyse this data, I believe that the levels of sharing knowledge will be more and more similar, the technician will be forced to understand management issues and the manager will be obliged to understand the most technical issues*" (35161, advisor). The notion that there will be differences in responsibilities and therefore also in skills needs, was also shared by participants in the Dutch focus group where there was also agreement that all people, at different levels or at different positions in the chain, have to understand the necessity of skills in other levels of responsibility in order to create a mutual support for people at different job levels. This last point was also shared by participants in the Slovenian focus group, where one participant expressed that it is important that all employees agree on and are informed about the objectives and strategies of the company, but that often this communicated information is lost which in turn makes such differences occur. As this participant put it: *"I think there are differences and there should not be. Because I think it is very important that everyone from the top level to the lowest level agree on the objective of the company. So, we are constantly striving to make sure everyone is informed about where we wish to go, what our objectives are, what our guidance is. And this is where communication is a very important*

skill. It is about how something is communicated because we know that a lot gets lost in information flow. A short answer: yes, definitely there are differences, but I wish there were none" (advisor, 93152).

In the German focus group, the discussion also revolved around differences among types of enterprises that may have an impact on skills needs rather than the actual responsibilities of a certain position. Here, a representative of an agri-food company mentioned that: *"Smaller companies are more likely to need an all-rounder with more skills and competencies than larger companies, who perhaps have their own in-house consultancy and where the expert knowledge is bundled"* (63172, agri-food company).

In the forestry focus group, the shared idea was that the general level will have to increase, regardless of the role in the company, and that especially communication will be more important at all levels, due to higher societal awareness. As a cooperative put it: "*From a forester point of view, not everyone needs to have the full knowledge of climate change, for example. But we have as a general interest that a greater number of people in forestry need to be better on communication with public, even the low level."* (cooperative, 102121).

4.2 Training

4.2.1 Training needs based on the selected skills

In the previous section, the most important skills for sustainability, digitalisation, bioeconomy, soft-skills and business-entrepreneurship were identified. Section 4.2 focuses on training of the identified skills, and the first question (question 3.1) addressed the identification of the skills that need more training.

As a general remark, it is felt that participants of the focus groups took this question as a complement of the previous section, because apparently, they did not want to repeat information already provided in previous questions. In this sense, it can be assumed that most of the identified important skills in the previous questions were supposed to need training, and here only additional and general indications were done. Then, for the identification of skills that need training, not only question 3.1 (section 4.2.1) but also 2.1, 2.2, 2.3 and 2.4 (sections 4.1.1, 4.1.2, 4.1.3 and 4.1.4) must be considered.

Most of the inputs for this question came from education providers (21%) and advisors (22%), followed by cooperatives and agri-food companies (both 13%), other sectors (11%), forest industry (9%), farmers (7%) and foresters (3%). These inputs are mainly attributed to one or two participants. In 4.2.1 are only commented those skills with 3 or more attributions, and for those who want to consult the total inputs for question 3.1 the information is available in Annex IV.

Participants from different sectors indicated that *soft skills in general* need more training. Complementing comments done in previous sections, *their importance for career promotion*: *"Additionally, I think the soft skills are important for a person who looks at a lower level at this moment, it also will provide them some preparation of skills for them to move up on their career to a next level"* (forest industry, 107252). Within these skills, *communication* was selected by participants also from different sectors, *not only the day-to-day communication at work but also between different actors of the value chain and with society in general:*

"Communication, I am now always referring to the customers, our farmers, our members; the topic of communication, that they can communicate to the outside world, that they also dare to stand up and join in the discussion" (cooperative 62141); *"The communication from "Farmer to Plate" is very essential, to develop communication skills, to support the farmers in this. The modesty of the farmers is a nonsense slogan. The question is whether people see enough of what the farmers are doing, it is sometimes a forgotten child, while the farmer is so essential"* (agri-food company, 43181); *"Communication to also represent and to provide more information about the sector to the general public or to the European policymakers, in order to have a more relevant policy for the development of the sector in the future"* (forest industry, 107152). *Organization planning, visioning and strategic thinking* was also selected by participants from the education, advisory and forest industry sectors.

Business-entrepreneurship skills in general were indicated by cooperatives and advisors. As a Spanish farmer said: *"an entrepreneur is not born, an entrepreneur is made and if we do not have trained personnel looking for a company with good profitability, it is difficult for agriculture to maintain what we are looking for, profitability"* (farmer 31181). More specifically, *knowledge of the entire value chain* was selected by an education provider, a forest company, and a governmental agency. Comments from an education provider from the forestry focus group, also applicable to other sectors: "*I think interdisciplinary knowledge to assess the whole value chain. So that all people know the value chain and so that we have different kinds of opinions and angles of thinking and sciences involved, because forestry and forest industry have to deal with many kinds of sciences"* (education provider, 104161). *Innovation* was also chosen by some participants (one cooperative and two advisors): *"[…] but equally other professionals that are working with farmers as I said before on kind of areas of interactive innovation, I think there are lots of new stuff coming there that we, certainly as it as a community, need more training in*." (advisor, 25161).

For sustainability skills, training needs on *water management* were indicated by four participants from the Dutch focus group. As an agri-food company participant said: *"Water management is very important, extracting heat from manure, constructing water reservoirs and not letting the water drain away, but actually doing something with it. Filtering water, a good streamlining in the water network, bringing the water back to the land in a controlled way"* (agri-food company, 43181). *Energy management* was also cited by three participants.

Regarding bioeconomy skills, *food science & technology* was that with more indications on training needs and it is more focused on food industry. As an education provider said: *"Just a final comment is just based on again working with the industry, in the whole area of production supervisors, that's an area where people are just crying out for training really, not only on the soft strokes transversal skills side of things but also on the technical side because sometimes people are going into the industry and they're not, you know they've an induction program or whatever, but they're not all coming in with the same qualifications and so on and the basics of food technology, food science and so on"(*education provider, 24132)

For digitalisation skills, most inputs refer to *digitalisation skills in general*. Cooperatives were the sector with more comments on these skills: *"In Italy we have either Technologists or Farm workers. We need professionals who have the skills 'in the middle' and can help the CEO develop Innovation and digitalization and who are able to work well in a team*" (cooperative 12051); *"digitalization will need to be accelerated in co-operatives.*

According to my experience with certain co-operatives, it is sometimes quite a problem even to send an email. And for example, they do not have a president or a manager and then communication is done via some accountant or things are so obsolete that everything is really strange" (cooperative, 92141).

4.2.2 Needs of the training systems at national and European level

After the exercise of identifying those skills that need more training in question 3.1, question 3.2 aimed at identifying the needs of the training system in each country and sector. This question was not well understood in some focus groups, which focused the discussion on training methods. Information about training methodology has been added to that collected in question 3.4 and is not included in the results of this section.

Due to the particular situation of each country, needs at national level are described on the basis of each country focus group. Additionally, needs at European level and needs for the forestry sector, obtained from the Policy and Forestry focus group respectively, are also summarized in this section.

ITALY

The first conclusion in the Italian focus group was the need to avoid creating general training, creating professionals who end up being neither specialists nor soft skill based. There was also agreement on the need to think about creating curricula neither for MBAs nor for farm workers but for the interface between them. The participants almost unanimously thought that the best training systems for knowledge transfer would be ITS (technical schools) and professional studies, with an alternation of school-work approach. As a participant said: *"We need to push youngsters to choose professional education and then provide for them apprenticeship opportunities and lifelong learning"* (other, 18121).

Bachelor's degrees at university and Lifelong Learning developed by VET providers were also considered of great importance. A need to improve the relation food companies-education system was posed by an education provider: "*Food Companies need to invest a lot more on training and education, creating stable and trustworthy relationship with VET providers and institutes*" (education provider, 14081)

Agronomists, technologists, digital service providers and advisors need to come together and work with a team-based mentality. The skills need to be intertwined in a network of competences which will help develop a more sustainable and innovative way of working.

IRELAND

In the Irish focus group, the question focused more on the need of training specific skills, as was done before question 3.1. Here are only shown some general comments on the needs of the education and training system that some participants indicated.

An agri-food company participant emphasized that in reality the learning transfer process is not completed very often: *"I think there's a lot of training out there, but I think what's missing is the adaptability of the individual when they come back on site and try and transfer that learning on site. I think there's more thought process that needs to be put in there, so for instance a supervisor may have many tasks and structurally quite*

a busy day and then they're expected to come in and try and explain new leadership skills to a team of people who don't have an understanding of what they're talking about, they might try explain Lean management and then that training, a large part of that training, then isn't transferred and is forgotten about afterwards, and then there's an expectation on them to know everything" (agri-food company, 23201).

A forester claimed that the training offer for the forestry sector in Ireland is limited: *"From the forestry perspective really once you leave the universities or the Its that's it, the only training really you access after that is through field days, through professional field days, there would be very little".* This is particularly critical for environmental aspects: *"there is be very little training and the little forestry sector has transitioned quite recently through its licensing system that we must undertake very strict environmental screening on all activities that we do, and this has happened in the short space of time and it's left a lot of people, foresters young and old and everyone in between, trying to tackle"* (forester, 26172).

SPAIN AND PORTUGAL

There is general agreement on the need for more practical training, a more realistic approach, especially for university students. As a farmer said: *"New recruits (technicians) really lack real experiences throughout the education process. Education should be complemented with internships in some way that help in the tasks, that are formed not only in knowledge, but also in the practical matters"* (farmer 31181). It is also felt that universities must get closer to farms and companies, as an advisor said: *"training in general is good in universities, in centres, but connection with the company, with reality, doesn't exist […] in general the company will always be required to train previously for a time the person who receives in his workplace, because with the hyper specialization in general that exists we are obliged to do such training at the time the person is received"* (advisor 35161). On the other hand, there is an abundant offer of very good courses, but a lack of information and adequate dissemination of the training: *"There is a lack of general information at the daily level, which somewhere, even at the regional level, on regional television may report on these [training] cycles, give a bit of publicity, say that is worth it for this, job opportunities. There are many, many things that people are unaware of that exist"* (education 34172). Furthermore, a governmental agency participant indicated that training must anticipate the evolution of skills: *"training must anticipate the evolution of skills, what we want farmers to be able to do, not only what they already do, but what they should be able to do in the future"* (governmental agency, 38192).

NETHERLANDS

In the Netherlands, the question focused on the needs of training specific skills which was discussed simultaneously with question 3.1.Several areas were highlighted: In the field of business, marketing & sales training for agricultural entrepreneurs, as to gain more from the local market and be more independent; connecting with consumers and market; creating product awareness; value proposition development (incl. new concepts) and image building skills; use of social media for that purpose; collaboration between farmers, e.g. for marketing joined product packages, setting up farmer shops; CSR om the broader sense; and operationalisation of high-level skills to day-to-day practices. As for soft skills training, communication and collaboration between farmers, industry and stakeholders from the farm environment (within and outside the value chain); and system-thinking in relation to circularity, integration of skills/competences. In the field of

technical skills in the agricultural sector, soil management and awareness on how to use land (sustainably), new ways of fertilization were highlighted; as well as water management, irrigation in efficient ways, due to climate change; risk management/ safety and security/ awareness of Global perspective food system; introduction of new technology in farms and its consequences (e.g. ethical - for labor); capabilities to understand the applicability of technologies for the business and choose the right mix of technologies. Within forestry, agroforestry and valorisation of forestry products, e.g. plant-based proteins (nuts); AF-products like Hop and broad assortment of (''forgotten'') vegetables were mentioned.

AUSTRIA

More importance needs to be attributed to *the knowledge and awareness on the value chains*. It is impossible to know and do everything by oneself, this explains why importance should be given to stronger cooperation and organisation, and team building gets increasingly important. *Knowledge and cooperation along the value chains* also enables the people involved to take critical and well considered decisions, because they better understand the impact of their decisions. As a cooperative participant said: **"***Thinking in terms of entire value chains, if we only stay in this area, I still miss this a lot. Not so much training content, but background information that can be taught or informed about. Because many a decision that is made at one point somewhere in a business plan suddenly has a crazy effect on the entire value chain. And I have to say not everyone is always aware of what is triggered"* (cooperative, ID52131).

GERMANY

Most participants are quite satisfied with the qualification standards of the German educational systems, may it be higher education (universities) or vocational training (dual education). Universities also start teaching a more holistic approach in terms of food chains. For this, it is important to link knowledge from different areas, as a governmental agency participant said: *"linking knowledge is already what will be more important in the future than knowledge itself*." (governmental agency, 68112). Some participants agreed on the need of specific training for sectors and job positions: *"We have our own internal training for certain topics, but we are also developing more and more towards technical expertise, which means that we hire very specialised people with very specific qualifications to fulfil the functions in our company. You can see this, for example, in the area of sustainability"* (63172, agri-food company); "o*ffer soft skills courses more specifically for certain sectors, or to examine further training in specialist forums to see whether aspects such as cooperation or leadership understanding can be promoted and incorporated* (governmental agency, 68112)

GREECE

There is agreement on the lack of an organized lifelong learning system. Education is limited to young farmers, but even this is incomplete and not well-organized.

The problem is observed at the level of low-qualified trainers/instructors and participants who are not willing to be educated. There is a lack of trainers who are directly related to the agriculture knowledge area so that they can understand the contemporary educational needs. This leads to the devaluation of educational programs. An agri-food company participant commented that: *"there is a deficit on both sides: both by trainers*

and by trainees. That is, from good trainers who know the situation well to train someone, but also from the will of the trainees to be trained" (agri-food company, 73131). Education providers also feel frustrated: *"We have not put farmers in the culture of education. We ask farmers to come to the training programs for young farmers and they are willing to learn. But the lesson turns out to be a loss of time! I have studied forestry, but I will teach marketing. We disappoint them. It is our fault that we do not improve this culture"* (education provider, 74141)

It was commonly accepted that the lack of education and cooperative culture has created a problematic situation in the country's agricultural sector. The educational process in Greece should be re-designed through a bottom-up approach to provide an advanced general education before any specialization. As a cooperative participant said: "*I agree with the idea that there should be courses and directions for the farmer from high school, so that this culture of education and lifelong learning can be built. I'm not a producer but seeing the lack of education for the older generations of farmers, the sad thing is that I think the new generation of farmers will be lost…"* (cooperative 72121)*;* and an advisor commented: *"This education, the professional agriculture, should be done like a technical education in high school. The basic education, as in some professions. In some foreign countries this education exists. In other words, they become professional farmers, by starting from the high school"* (advisor, 75161*).*

Finally, it is important to link the agricultural sector with the country's universities and research centres to strengthen the cooperation in education and enable the exchange of the necessary know-how.

FRANCE

As regards the training offer in general, the training linked to all the skills mentioned in the skill lists exists. The difficulty consists rather in having access to it: how to find the training and how to finance it. The question of the funding of vocational training is a key issue. A farmer also commented that it is hard to interest the farmers to do training: *"I would like to say that the difficulty always lies in being able to showcase farmers and get them to come. Today, there is what is known as mixed digital training, i.e., a face-to-face part and a digital part. So, perhaps through these new forms of training, we could perhaps, start to interest farmers, but I think that this also applies to forestry"* (farmer, 81172*),* and perhaps it is necessary to include new communication tools in the trainings: *"I know that there are nowadays groups on social networks, for exchanging practices, and that these groups are helping to build up skills. Perhaps we should also imagine groups like that, which are a bit mixed, with a face-to-face part, a social network part, and that is precisely the importance of working on what we have said, on the digital part*" (farmer, 81172)

The French reform of the professional training law for farmers, which was passed in 2018, was mentioned several times by professional training organizations. Indeed, it defines several key points which were discussed during the focus group:

- Farmers' right to a personal training account (CPF), which allows them to acquire training rights throughout their careers, as well as to CEP (Professional Development Consulting)
- Development of training actions in the workplace (AFEST), which are defined as an educational path to achieve a professional objective. This route can be carried out in whole or in part remotely and also be carried out in a work situation. Not back yet because the tool is recent, but it looks promising.

Another aspect to improve, as in other countries, is the lack of practical experiences at higher education level. As an education provider said: *"[…] for new technicians and engineers, the level at which they are made to work in terms of technological maturity, which is still that of the bench, etc., is not sufficient when they enter the industry. Much more work should be done in industrial environments, in techno halls. It's the same in the field, you would really have to work in the field, work in the open field, etc. Because in the end, we do not go far enough on that scale for them to be fully operational when they arrive in industry"* (education provider, 84181)

SLOVENIA

Slovenia is organised quite well in the structure of NGOs within the agri-food sector. The issue is appropriately regulated, at least in terms of status. Things are slightly worse when it comes to knowledge transfer, since what is then missing is knowledge transfer, understanding or empathy between links in the chain, both upstream as well as downstream. In other words, links between the processing chain and all the participants or the participants in both chains in fact. Forest-timber and agri-food. This is precisely why we indeed have problems with the operation of these chains. As an education provider said: *"If we include also other players in the chain, we will maybe understand each other better and would work better together at the business level. Then I understand the mindset and challenges of another within the chain"* (education provider, 94121).

But there is still a lot of untapped potential, primarily in the sense of better system arrangement. Another education provider pointed to the need of taking into account intermediate institutions in the training process: *"Top-down training is mainly organized for individuals who are artificially put into some target groups and that is an obsolete approach. Of course, it is an appropriate approach but what is missing is taking intermediate institutions into account. These intermediate institutions are important because an individual is too distant from the state"* (education provider, 94132).

FORESTRY

Based on the views of most participants, digital training and online courses will expand further in the near future, as online platforms are very distance-efficient and time-efficient. However, it was stressed that experience on the ground is absolutely important as there are some practical things that cannot be taught online.

Combining company efforts with academic institutions is a priority as learning-by-working through trainee positions with Universities is an easy way to get new ideas or up-to-date ideas from students or trainees. As a cooperative participant said: *"Maybe connecting the industry with the academia together and building something beautiful going forward, because one thing is the basic training to become some sort of engineer or whatever, but then it's a continuous learning, the continuous training, which I think is at least as important or even more important, to be relevant for the company that you're employed in, the team that you're working in, the customers, the products, so on and so on*" (cooperative, 102111).

Also, strategic mentorship programs within big companies and on-the-job training have been proved very valuable tools to ensure knowledge transfer.

Knowledge and understanding of the total value chain was considered of relevant importance for an education provider: *"Example from the harvester to the saw miller and so on, there's a lot of broken exchange over the value chain here, the changes are really small steps here and small steps there, but they are not connected so data is not used and put into a structure or at least not good enough. So, for us it's really important to see that these values are taken care of and used in the production"* (education provider, 104161).

NEEDS AT EUROPEAN LEVEL (POLICY FOCUS GROUP)

When it comes to training activities, they are too often not equally recognised in different EU countries; there is a clear discrepancy between national and international level trainings. The EU established a framework to include all skills, ESCO; also in this EU framework challenges related to the differences from country to country or regions are highlighted. Sometimes these discrepancies are due to the fact that it is not easy to understand the names of the job positions and the skills needed because of the language barrier; in other cases, the definition of a job position and related skills are different among EU countries. Further dialogue is needed to overcome these differences.

In the agri-food sector there is a lack of understanding of the current skill challenges faced by employers and employees: the "Social Dialogue" should be strengthened, fostering communication between the employers and employees, at both EU and member states level, on relevant topics such as how to train the current workforce.

Social partners must provide evidence-based practices for policy makers. Good examples in this field are the recognition of universities as capacity building entities, or projects that bring together a community of different organisations and experts around a specific topic; another best practice could be to ensure access to lifelong learning for the entire workforce. In the end, the exchange of best practices is a powerful tool to improve EU policy.

There is a clear need for a lifelong learning approach[1] to update the current workforce: there has been a continuous decline of labour force[2] in the last ten years, especially due to the fact that the sector is no longer attractive to youth.

4.2.3 Training and target groups.

The question seems to have an obvious answer, good training is to be adapted to the target group and its context, selecting the best methodology. The aim of the question was more to ask about specific preferences on training methods for the different target groups of the project.

The first evident reaction to the question was to answer a big yes; as a German agri-food company participant said: *"I think it is always so situational and dependent on the person, background and also the function they*

[1] Augère-Granier, M. (2017). European Parliamentary Research Service: Agricultural education and lifelong training in the EU

[2] Policy Department for Structural and Cohesion Policies, European Parliament (2019). The EU farming employment: current challenges and future prospects

are supposed to fulfil in our company that it would be difficult to make any arrangements […] It has to depend on the content of the training, which skills I want to teach…" (63172, agri-food company).

Some respondents find age and level of education the first factors to consider, as a cooperative participant of the Iberian focus group said: "*age and level of education of the recipients require to adapt training that must be different, students with an older age should be more practical. For recipients with more academic qualifications, the level would be higher"* (cooperative 32201). In the Italian focus group, it was indicated that age is not a barrier, even considering digital training methods: *"I can tell you that farmers, even the oldest one, are very receptive when it comes to new knowledge. They all possess the basic skills but there is room for improvement. We see from the sample surveys that the old generation-skill combination with new technologies is not always true. I did not indicate the use of basic technologies' as a priority skill because, actually, this is already there"* (education provider, 14092).

In the Irish focus group, participants tried to go beyond and to propose training methods that best fit to different target groups. It was felt that people in education or in their early career development phase of their lives are more susceptible to a college and formal learning approach than someone who is learning throughout their working life and that the approach for teaching these two cohorts of people were totally different. All participants agreed that a blended bite sized approach (short training activities with a mix of different methodologies) was the best approach for lifelong learners (adult learners). This approach provides a lot more flexibility within the education system and across professional development programs. As an education provider said: *"I suppose a lot of the learners that we will be dealing with through the conversation that we've been having today are lifelong learners. So, a lot of these people will be in the workplace looking to go back and upskill, so you know they may not have been in education for a long time or they may be pressured with the amount of time that they can have to dedicate to their studies, so there's a need to be sensitive to that*" (education provider, 24232). In the Spanish focus group, it was also envisaged an evolution to mixed online training and practical experiences, as a governmental agency participant suggested: *"I wanted to say that they have to be adapted to the group, but the trend will be the evolution for online training and for exchanges with demonstration visits and innovation in agribusiness"* (govern. agency 38192).

In general, there was little input to this question from the different focus groups, however, it can be concluded that a blended microlearning approach, considering short courses in different formats (face-to-face, online…) and contents (theoretical knowledge, practical experiences…) may allow a flexible training suitable not only for different target groups but also for personal preferences.

4.2.4 Training methods

Question 3.4 focused on the preferred methods to support learning and knowledge transfer. As a general remark, inputs were received from all target groups but mainly from education providers. From the perspective of the people they have to train, we can generally say that all the input received represents quite well the sectors targeted in this project. As indicated previously, some comments coming from question 3.2 have a better place here and then have been included. A table with the collected inputs, grouped by categories of "training methodologies" can be consulted in Annex V. These categories are not exclusive and sometimes

overlap each other, but the grouping exercise allowed us to explain results in a more ordered manner. Specific comments and quotes on particular sectors have been included when possible.

LEARNING AT WORK

For this group of training methods inputs are distributed according to the working sector (2 farmers, 2 cooperatives, 2 agri-food companies, 1 educator, 1 advisor and 1 "other" sector).

Training operations, both students and workers, on the farm seem to be an important preference for farmers and cooperatives. For students to get real experiences, as a Spanish farmer said: *"New recruits (technicians) really lack real experiences throughout the education process. Education should be complemented with internships in some way that help in the tasks, that are formed not only in knowledge, but also in the practical matters*" (farmer 31181); and also an Irish farmer put the focus on safety at work *"there's a big need for training of operatives and also with the health and safety area in farming. There's a big need to train people to see how they work and make sure that they work safely."* (farmer, 21111). An interesting concept, "Farminars", was posed by an Austrian advisor: *a "webinar" is more or less a training online and a "Farminar" is directly on the farm or in the forest or elsewhere*" (advisor, ID 55201). Learning from experience gained at the job, but in a methodological way was also indicated by an Irish agri-food company: *I think that 70 % of all learning takes place on the job. But even though there's a lot of learnings through experience we're not able to assimilate it properly. It's a matter of giving our managers maybe a different mandate but also giving them the skills they need to mentor and coach, but also for the actual learners, to help them to capture their day to day learnings on the job, and that's not an easy ask"* (agri-food company, 23191). Formalized induction training, to assess the interaction between departments and to have a basic framework was also suggested by a governmental agency and a agri-food company, both from Germany: "*[…] an induction that everyone gets to know the company and the different functions in the company in a very detailed way, so that there is a very formalized system, so that when it is better to assess the interaction between the different departments, it is easier to understand. It ensures that everyone has a certain basic framework*" (63172, agri-food company).

PRACTICAL APPROACH

Taking people into the field is and engaging learning method, as a Dutch forester said: *"Once you take young people out into the field and show them what it's really about, then it sinks in. That's because it's such a different farming system. Once they see it, they see its benefits"* (forester, 46131). Best practices, because sometimes workers think they are doing things correctly, but they are not, as an Irish agri-food company said: *"because it's very hard for me to explain to somebody "this is how you do it" when they are professionals in their own heads, they feel that they are the best at what they're doing, but they're only doing what they've seen done before*" (agri-food company, 23201). In the German focus group, an advisor and a governmental agency suggested training of soft skills through practical activities: "O*ffer soft skills courses more specifically for certain sectors, or to examine further training in specialist forums to see whether aspects such as cooperation or leadership understanding can be promoted and incorporated* (governmental agency, 68112).

PERSONALIZED TRAINING

Interesting to note that participants indicating these methods came from sectors other than farmers and cooperatives. Education providers led the comments on this type of training.

Mentoring was one of these methods, as an education provider from the Forestry focus group said: *"A lot of times this [mentoring] just happens by chance but I think an effort to have more strategic mentorship programs within the sector or at least within bigger companies is a very valuable tool to ensure knowledge transfer within, but also to help younger people to actually find their way into the sector, into an organization"* (education provider, 104152). Coaching was also suggested, as an Dutch education provider said: *"We shouldn't just think in terms of training but also in terms of coaching, maybe a kind of buddy system that helps you help each other that we cross sector borders ... or go across sections of the chain - anyway, that you create groups that help each other* (education provider, 44142). For new employees a German researcher indicated a sponsorship procedure: *"we have a sponsorship procedure, always one person, we call it the chick school, then takes care of a new employee and is then a little bit of a sponsor, for all questions that are available to BLE, both organizationally and technically, for the new area of responsibility"* (68121, researcher).

COLLABORATIVE TRAINING

Mainly education providers recommended collaborative methodologies. Peer-to-peer learning was selected by one Slovenian farmer and one Dutch forester: *"Peer to peer learning. Especially referring to mutual understanding and transfer of these knowledge.*" (farmer 91171). Working in group training, as a kind of community of practitioners or on the job; as an Irish education provider said: *"networking and working together around particular sustainability challenges, I think is something as well that's worth considering as an alternative way to the kind of traditional learning as well"* (education provider, 24232) and a German cooperative: "*The possibility of group work, where the young people work together on some kind of project and work out and implement it using an example is very popular"* (62141, cooperative). Study circles were also suggested by education providers from Ireland and Slovenia. The emphasis of training in the field was also mentioned by a Dutch forester, who said. *"Workshops in the field and then farmer to farmer, that works best. Very much in the field. […] And also with young people. At the moment I also have a number of groups with young people. Once you take them out into the field and show them what it's really about, then it sinks in […] Once they see it, they see its benefits and then exchange them from farmer to farmer*" (forester, 46131)

VIRTUAL TRAINING

Participants from different sectors indicated a preference for online training. A member of the Forestry focus group emphasized its importance in the current global Covid-19 situation: "*I think digital training, online courses, will just even expand further, as Covid-19 has taught us lots of things, so how to do things and we have to get used to a new normality*" (cooperative, 102111). A farmer from the Iberian focus group remarked that the main advantage is its flexibility: *"it is a phenomenal and fundamental tool because if we have to combine our activities and make our time profitable, I believe that this is the best option to combine them"* (31131 farmer). A governmental agency from the German focus group commented on the suitability of online tutorials for young people: *"I observe, that especially for young people, online tutorials to get skills in the use of computer programs are totally helpful*" (68112, governmental agency). An advisor from the Iberian focus group, emphasized his preferences for a more interactive virtual classroom training: *"I do believe more in the*

part of what I would call virtual classroom training, with interaction, dynamism and effective collaboration [compared with non-interactive online training]" (35161 advisor).

BLENDED LEARNING

Mentioned in different ways: "blended learning", "variety of approaches", "combination of online and practical training", "balance between digital and practical approach" and "mixed online-f2f". As a Dutch farmer said: "*You could set up a blended learning system. For example, do theory lessons in the morning and apply them in practice in the afternoon. So that it sticks extra well*" (farmer, 41152); an agri-food company participant from Greece explained the limitations of online training in agriculture in favour of a blended approach: "*In the agricultural sector it is very difficult to have online training. That is, you want to show a pruning, you want to show some cultivation technique. The theoretical part can be done online. As I usually do with my own producers. We first have a discussion theoretically where we discuss what we are going to learn and then we go and see it in the field practically*." (73131, agri-food company). An education provider from the Forestry focus group said in the same direction: "*I think balance is needed, you will have an increase in digital or online learning. That's good for approaching new topics and broad things, but I also think this practical approach is super important because some things you just can't learn online and you never will*" (education provider, 104152).

GAME-BASED TRAINING

Some participants of the French focus group mentioned game-based methods for training, mostly software tools: *"there has been a development of serious games that also allow to approach the questioning to have and begins on a given subject that allows perhaps to approach things in a rather playful way and in a way to accompany the questioning of the learner"* (researcher, 88122); "*There was a tool, I don't remember what it's called, to learn how to run a farm, about global management. There is a serious game that has been around for a while now*" (84162, education provider); "*On forest management, there is also a game called Foster's Forest that we developed, and which is really geared towards forestry professionals, to find out how to manage a forest under the constraints of climate change, etc."* (education provider, 84181).

4.2.5 Professional Training Certification

Certifications can offer a way for proving or providing evidence of the acquisition of specific knowledge and skills, to potential or current employers. Several focus group participants were positive towards certification.

Also, the other way around, one representative of a cooperative mentioned, as an employer, that *"[…] if an employee or applicant comes along who can provide any proof, even on paper, that is always better"* (62141, cooperative). This notion was to some extent shared by a representative of the agri-food industry who mentioned that the importance of certifications depends on the expertise profile and that some training courses are offered internally and linked to a specific certificate which is necessary for employees to possess for the employer to ensure that employees possess the necessary qualifications to carry out the position. While it was mentioned that it is easier for employers (and in this case (forest companies) to identify the young students that have the skills but not necessarily the experience, the point was also brought up that

"Certification in general is very important, even many times for the farmer himself or the person who is in a totally stable situation, not only for the initial student, for the young person, but also already for veterans"(35161 advisor).

The point about evaluation criteria and evaluation methods and differences internationally among certification bodies was also highlighted and that *"[In Europe], "in order to get a certificate, you actually have to plan a project and defend yourself before a commission and get thrown into the situation; the American model is a multiple-choice test. I will be a project manager after both certifications. In one case I took a multiple-choice test, while on the other a commission assessed me and bombarded me with questions, trying to assess halfway objectively, as objectively as possible, whether I can actually apply these skills in such a situation […]". An advisor added that besides official documentation, "[…] The quality of the training depends on the content and on the methods and techniques you use and the materials, but it also depends on the passion and knowledge of the people who give it".* (education provider, ID 54161).

In the Policy focus group, one of the identified issues was the recognition and validation of prior learning, especially in the informal and non-formal sectors, that lack official certification. This is also a key element for the food industry and for the forestry industry, where the experience is inherited from small family businesses. Therefore, general education is important, including validation of "on the spot" learning, compared to formal learning. Specific key competences, such as "learning to learn" should be boosted, thus helping to shape the learning processes in different situations (e.g., COVID-19 and online learning). These aspects should also be considered as training needs.

4.3 Additional remarks

In the last question of the focus groups (question 4.1), participants had the opportunity to express their opinion on any topic not discussed previously. Inputs from this question were not abundant, in part because participants were satisfied with all the questions and discussions, but also due to the availability of time. Most of the comments were related to skills and training needs, although other topics were also covered.

Related to skills needs and training:

- **Skills related to farming with living beings and the living cycle: adaptability, reality, pragmatism and flexibility.** *"We are faced with nature, with climatic hazards, with imponderables. And this is both the strength, but also the great difficulty that we encounter, is having to adapt. It is also an exercise of reality, pragmatism, the flexibility that you need to be able to deal with precisely this living cycle, which is indomitable"* (farmer, 81151).
- **Training for organisation.** *"What's important is... we see fragmentation, of course, and also the positioning of the sector itself. I think farmers' organisations at regional and local level are important. I think farmers need to learn to organise themselves again, around their themes, their interests, their market, their business, their area. They need to learn to organise themselves again in that sense, to be heard and to position themselves. And that is a profession in itself"* (forester, 46131).

- **Self-awareness.** *"In relation to self-awareness, I think it's important from the point of view of a learner or anybody else in any type of industry, understanding themselves is very important to their own well-being, their resilience how they deal with things, I think the use of psychometrics could be very good at that as well."* (agri-food company, 23201).
- **Learning attitude.** *"Learning is an attitude that is a personal disposition that cannot be certified, but that is a proactive position and a disposition of curiosity and interest in the sector in which you are working" (govern. agency 38132).*
- **Training focussing at approaching problems with open mind, listening to others, looking cross borders and collaboration.** *"Being open to ask and wanting to step across the farm border if things don't go well. I often see that with students who come in from the college or directly from the farm, they sometimes have a closed mindset. That autonomy on the farm is actually becoming a prison, if they don't watch out."* (education provider, 44161*).*
- **Importance of including work placements and work experiences on formal training: exchange programmes between companies and between countries.** "*I think it has to be mentioned in terms of formal training the importance of work placements and work experience, and I think that this is something that maybe we should be working into programs, and the idea of having exchange programs where from one organization undergoing a training program would participate in training in another, or work experience in another environment, to achieve that skill of training, and would help with the motivation of learnings among the people."* (advisor, 25161). "*Even the international element, exchange programs given that this as Erasmus, you know that there can be quite different outlooks in terms of markets and social needs in different countries,"* (28181, govern. agency).
- **Creation of a framework to assess current and future training and training implementation needs**. "*[…] as one of the participants here has already pointed out, identify and adapt to challenges and take along a kind of framework that enables to cope with these different tasks, which will change permanently"* (food industry, 63172).

Related to other topics:

- **Competitive advantages that online training offers to some countries at international level**: *"I think that in the Iberian field, since we are the Iberian Focus Group, the online issue gives us the ability to take advantage of the common language, sensitivity and connections with Latin America, which I frankly believe that until now we were under-utilizing and also the possibility of having trainers from other countries even if we speak in our own language. It is a truly relevant competitive advantage"* (moderator, 30061).
- **Managing different types of innovation.** "*Just I was involved in an Innovation review across the Agri food sector and one of the things that had been pointed out to us by several agri-food companies that were interviewed for this process, was the difficulty in managing different types of innovation. So there can be short term innovation that's required and maybe medium and more radical innovation. And keeping a space for all these types of innovation given the different matters that come up and that the management have to deal with in the agri-food sector and bio-based sector can be significant*" (govern. agency, 28181).

- **Succession planning and passing businesses on to the next generation**. *"Particularly whether it's farming or forestry or the food industry, just in terms of an ascending happens with small could be retailers or small independent shopkeepers and self-employed businesses that in terms of trying to where was the business going to go in terms of the next generation. So, I don't know what the answers are but there is an issue there around succession planning and passing their business on to the next generation. "*(education provider, 24141).

5 Conclusions

For the purpose of identifying skills needs related to sustainability, digitalisation, bioeconomy, soft skills and business-entrepreneurship in the agricultural, bioeconomy and forestry sector; and of exploring existing and missing training in response to the identified **skills needs** as well as the methods to deliver the training, from May to July 2020, FIELDS partners organised nine national focus groups (in Italy, Ireland, Spain-Portugal, Netherlands, Austria, Germany, Greece, France and Slovenia) and two pan-European focus groups on EU policy and on forestry issues respectively.

In the national focus groups, participants were asked to present and reason their "most important skills" selections and rankings. The **most often selected skill** among all participants is *business planning /model and strategic management* and belongs to the skill category business-entrepreneurship skills. Essentially, strategic planning is about setting visions for an organisation and realising that vision through goals, strategies and actions and entails the ability to think in big pictures and drawing road maps thereby planning, organising and executing tasks, but it also entails the ability to communicate the vision, goals, tasks and the necessary steps to employees. Participants associated the basis of understanding business, the role of the company, its viability, how value and profit are generated with this skill. And indeed, business planning and strategic management is very much related to the ability to adapt and responding to current and future technological, environmental, social and economic challenges. The inclusion of the category business-entrepreneurship skills, justified initially by inputs on this topic by FIELDS partners in the skill lists, was confirmed to be relevant for focus group participants, proved to be confirmed both by the number of selections and by the position of one of these skills in the top 10 most selected skills (*business planning model and strategic management*, the first skill in the top 10 rankings).

The **second** and **third** most important skills were *everyday usage of digital technology to communicate* (digital skill) and *communication* (soft skill) reached the same number of selections and thus was selected equally often by all participants. Consequently, this shows that the ability to use digital technologies as a means to communicate and the ability to communicate overall was seen as a fundamental skill in transferring information to others and in engaging with immediate stakeholders as a means to transfer information about complex concepts, such as sustainability, in an easily understandable way. Furthermore, communication was touched upon in the discussion about missing skills, where several focus groups discussed the broader concept of communication, and the importance of engaging with civil society (particularly important for the forestry sector), but also connecting with consumers and other stakeholders not only for marketing and management purposes but also for sustainability purposes.

Business planning/model and strategic management and the two skills related to communication *(communication*, *everyday usage of digital technology to communicate*) are all skills that are included in the top preferences for farmers, cooperatives, agri-food companies. While sustainability skills decrease in the sequence farmer-cooperative-industry, business skills increase. For the forestry focus group, the two aforementioned communication skills, sustainability skills and bioeconomy skills specific for the forestry sector were predominant.

Following the first three most often selected skills, most participants in the national focus groups selected sustainability skills as the **fourth, fifth** and **sixth** most important skills, namely *mitigation and adaptation to climate change; by-products and coproducts valorisation*; and *good agricultural practices.* On the **seventh** place, *sustainable forest management practices and planning*, the only bioeconomy skill among the ten most selected, but also related to sustainability. On the **eighth** place, *organisation, planning, visioning and strategic thinking* (soft skill) and **nineth** place *efficient use of resources and logistics* (sustainability skill). On the **tenth** place *data handling and analysis* (digital skill).

It appears, from the selections, that especially non-technical skills – sustainability, soft, digital and business skills – stand out as important to stakeholders in the agri-food and forestry sectors. Particularly the latter, business and entrepreneurship skills and the ability to conduct business planning and strategic management stand out together with communication with various stakeholders.

While the skill category lists played a central role in the national focus groups, participants were also asked to point to **skills missing** in the provided lists. In this regard, farmers mainly indicated soft and sustainability skills to be missing*;* representatives of cooperatives indicated mainly soft, bioeconomy and business-entrepreneurship skills; representatives of agri-food companies business and sustainability skills; and foresters soft and business entrepreneurship skills. A common denominator mentioned as a missing skill was *communication and engagement with society* (particularly critical for the forestry focus group) and *with consumers/market.* Furthermore, the improvement of *stakeholders' interaction* and *knowledge/ability to understand the whole value chain* found common agreement as skills missing in the list. Also, *Languages* were mentioned as a missing skill (English, neighbour countries languages, Chinese for the forestry global market) although this is implicitly included in *communication*. Finally, several education providers pointed to the importance of including the ability to connect or to integrate skills and competences.

In general, there was throughout the national focus groups common agreement that **skills needs change** and will change continuously in response to external factors, however, that especially digital and sustainability skills will gain importance in the near future. In the Forestry focus group, three sets of skills for the future were indicated: technical, sustainability and social (soft) skills. Within organisations, while there will be different skills needs across jobs/positions, there was general agreement that there is a **common need to share knowledge and skills across different responsibility levels** and that different levels or different positions in the chain, have to understand the necessity of skills in other levels of responsibility in order to create a mutual support for people at different job levels. As an example, all employees would agree on and would be informed about the objectives and strategies of the company. A wide set of soft skills (particularly external communication but not only) more important at high responsibility levels. Also important is the size of the

business, since smaller organisations are more likely to need an “all-rounder” with more skills and competencies than larger companies.

Also in the forestry focus group, communication was highlighted as an essential skill where participants agreed that there is a general public interest in the forestry sector and its actions and that it is important to sustain communication with decision-makers and the wider public to place forestry in a central position in the general public’s everyday life. In this relation, soft skills were judged to be necessary for all workers at all level of their jobs, especially the ability to understand the whole value chain; stakeholder interactions; and the development of analytical, creative and critical thinking as well as the engagement into teamwork as well as interpersonal skills and business soft skills. Teamwork, interpersonal skills and business soft skills. Also, relations between company and universities as a knowledge-sharing and knowledge-transfer activity as highlighted as a priority.

Communication to and with the public was also a central theme in the focus group on EU-policy issues where the discussion centred around public concern over food quality, safety and sustainability and that new skills and competences in the sector should be developed to inform the public on these aspects so as to increase consumer trust and transparency in the agri-food sector through better communication.

Following from the identified skills, participants were asked in the focus groups to identify skills that need more **training**. In view of participant comments, it was evident that they saw a training need in relation to those skills they found most important. Taking this into account, participants saw a need for training on soft skills, and here special attention was given to *communication* related to the public image of the production sectors, particularly for farmers and foresters. Participants from the education, advisory and forest industry sectors indicated that there is also a training need on *Organization planning, visioning and strategic thinking*. For business-entrepreneurship skills *knowledge of the entire value chain* was selected by different sectors (education providers, forest industry, other) as well as *innovation* (farmers and advisors). Regarding sustainability skills, *water and energy management* need training for some participants (from food industry, education providers and advisors). For bioeconomy skills, *food science & technology* in general was indicated by a food industry participant and two education providers. In the EU-policy focus group, It was pointed out that Social Dialogue should be reinforced, thus promoting the interaction between the employers and employees (at both EU and member states level), in order to set the basis for the needed skills and training.

The needs of the **national education-training systems** show particular situations for each country. In Greece, it was agreed on the lack of an organized lifelong learning system, with low-qualified trainers/instructors and participants who are not willing to be educated. In the other side, Germany participants were quite satisfied with the qualification standards of the German educational system (vocational training and higher education). Participants from the other focus groups were quite satisfied with their educational systems but indicated some common needs: i) more practical training, a more realistic approach, especially for university students and ii) universities must get closer to farms and companies. In the forestry focus group it was agreed that digital training and online courses will expand further in the near future; on the other hand, experience on the ground is absolutely important as there are some practical things that cannot be taught online. Differences among educational systems at national level were also discussed in the EU-policy focus group and it was agreed on the need of further harmonisation between EU and national policies regarding education. Some recommendations to improve the **educational training system in Europe** were also proposed: a) strategies on

education and training for workers of the agri-food and forestry sectors should take into consideration a holistic approach for coherence of the skills and training provided at EU level; and b) there must be an evidence-based approach to provide guidelines to policy makers in the field of education. Some examples are the recognition of universities as capacity building entities or ensuring the access to lifelong learning for the entire workforce. These recommendations should be given by sectorial and educational representatives in collaboration with policy makers.

What concerns **training methods and target groups**, the Irish focus group made some interesting remarks of general application that are described as follows. Although training is to be adapted to the target group and its context, selecting the best methodology, people in education or in the early career development phase of their lives, are more susceptible to a college and formal learning approach. A blended bite sized approach (short training activities with a mix of different methodologies) is the best approach for lifelong learners (adult learners). This approach provides a lot more flexibility within the education system and across professional development programs. In a wider context, participants from the EU-policy focus group agreed that the lifelong learning system must be reinforced not only for a better trained workforce but also to increase the attractiveness of the sectors.

There was general agreement that **certifications** can offer a way for proving or providing evidence of the acquisition of specific knowledge and skills, to potential or current employers, several focus group participants were positive towards certification. The lack of official certification was mentioned in the EU-policy focus group as one of the factors that must be improved in the European policy landscape to enforce recognition and validation of prior learning, especially in the informal and non-formal sectors.

Expected project task outcomes (as indicated in the task description):

- *Identified needs in agriculture and forestry. Needs will be classified into 4 main categories: sustainability, digitalisation, bioeconomy and soft skills*

  This goal has been achieved. Most of the participants provided rankings on their most important skills, which were also the skills with more training needs. An additional category of skills was included: business-entrepreneurship skills.

- *Industry needs (extrapolate skills needed in agriculture and forestry-based also on industry needs).*

  Industry needs, agriculture and forestry needs were identified. The available time for the focus groups did not allow the extrapolation exercise.

- *Existing training in response to identified needs, and missing training for the identified needs.*

  In the main, participants were not able to identify specific training needs, but they informed on general needs of the training systems in their respective countries.

- *Identified target groups for training and curricula definition.*

  Overall, the focus groups discussions centred around the following target groups:

  - Students from secondary education (VET institutes).
  - Higher education students (Technical Schools and Universities).
  - People entering a work for the first time.
  - Farmers, foresters and industry employees.
  - Teachers, trainers.

- *Best methods to deliver training to each target group.*

No clear differences between target groups. In general, it was preferred a blended approach including different contents (theorical knowledge, practical experiences) and formats (face-to-face, online learning). Short courses better that long ones. This approach provides a lot more flexibility within the education system and across professional development programs.

Annex I: Most selected skills for the bioeconomy categories

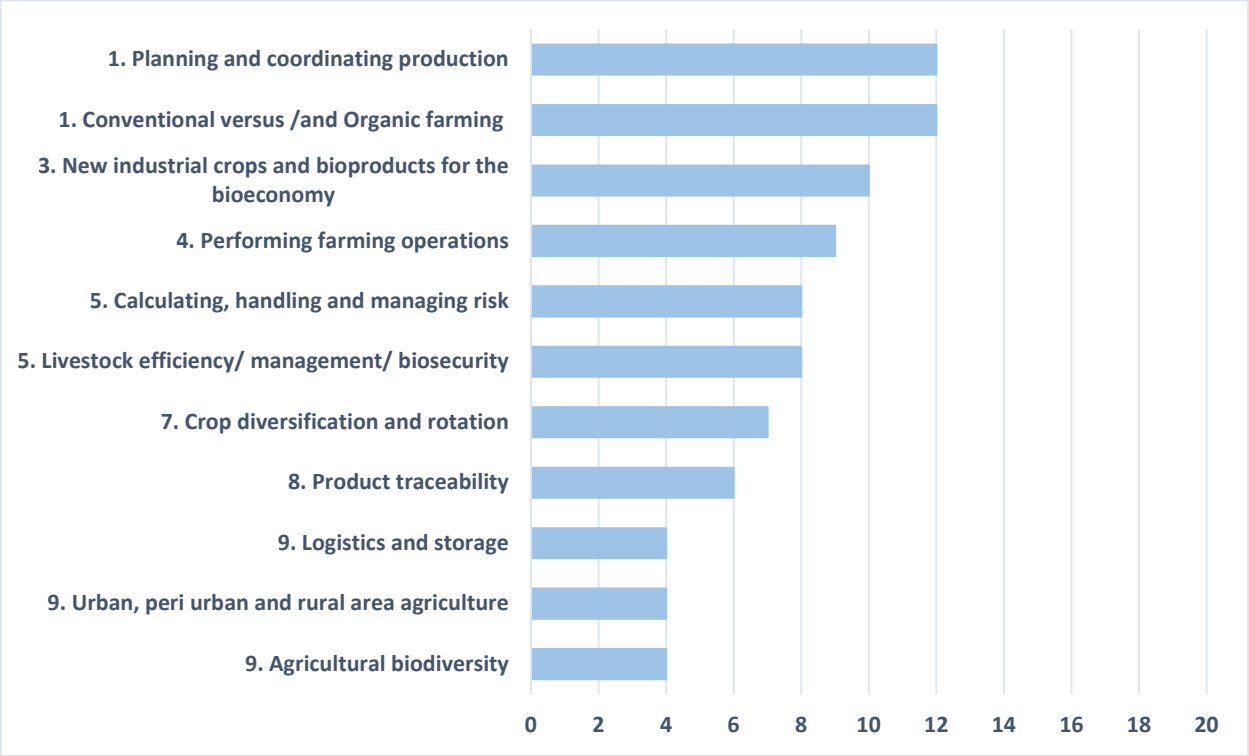

Figure A1.1: Most selected skills in the focus group rankings, Bioeconomy – Agriculture

Figure A1.2: Most selected skills in the focus group rankings, Bioeconomy – Forestry

Figure A1.3: Most selected skills in the focus group rankings, Bioeconomy – Food Industries

Annex II: Most selected skills by stakeholder profiles

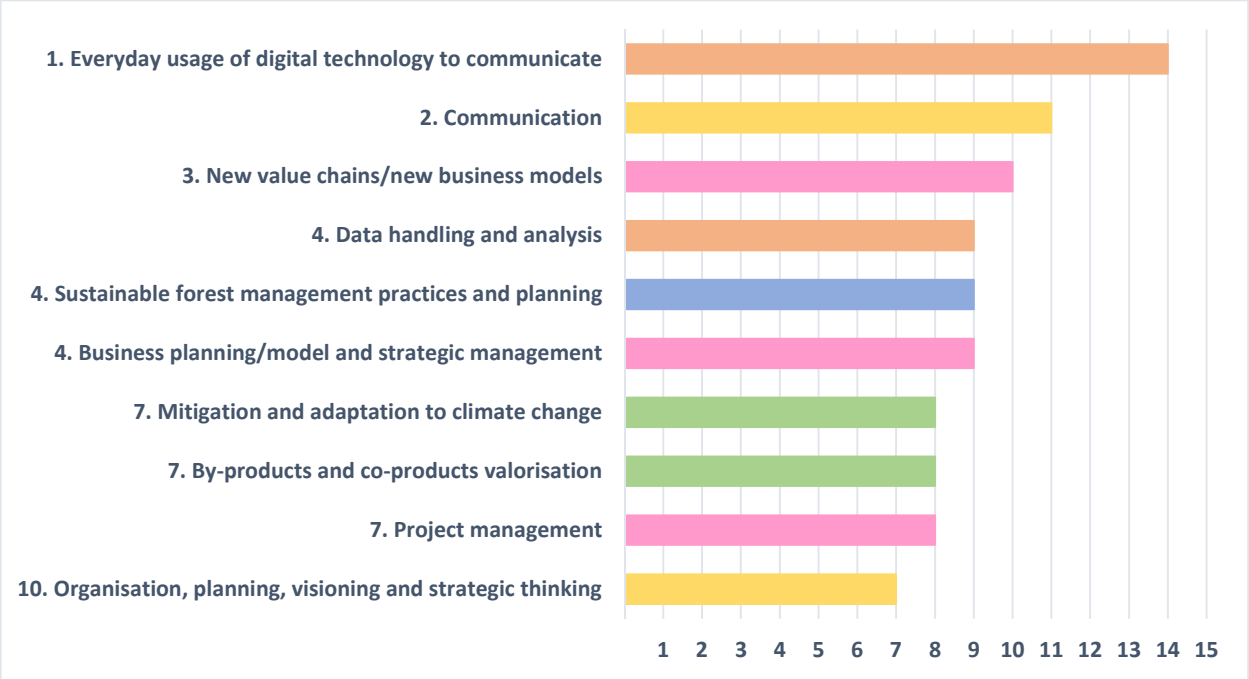

Figure A2.1: Most selected skills for the Education providers profile [n=30]

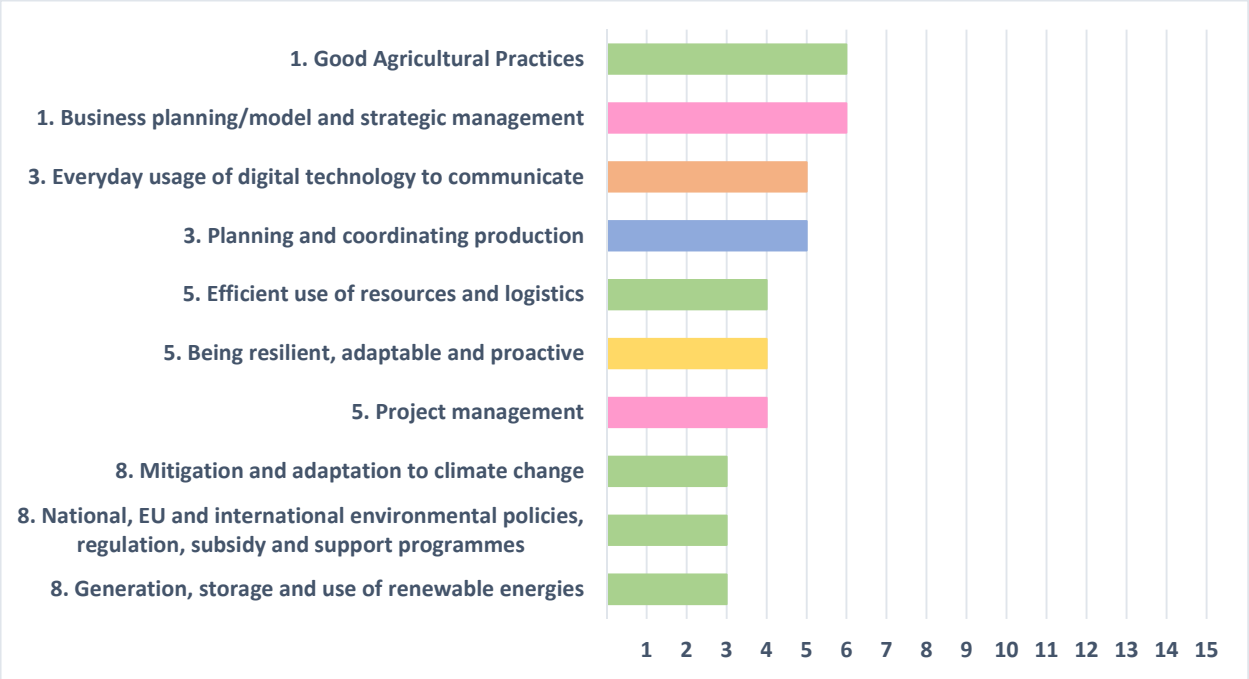

Figure A2.2: Most selected skills for the Advisors profile [n=16]

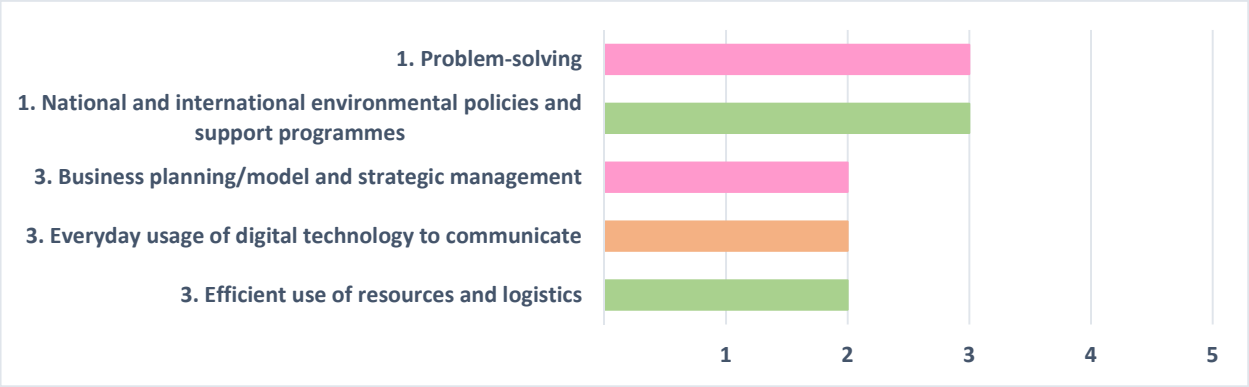

Figure A2.3: Most selected skills for the Foresters profile [n=4]

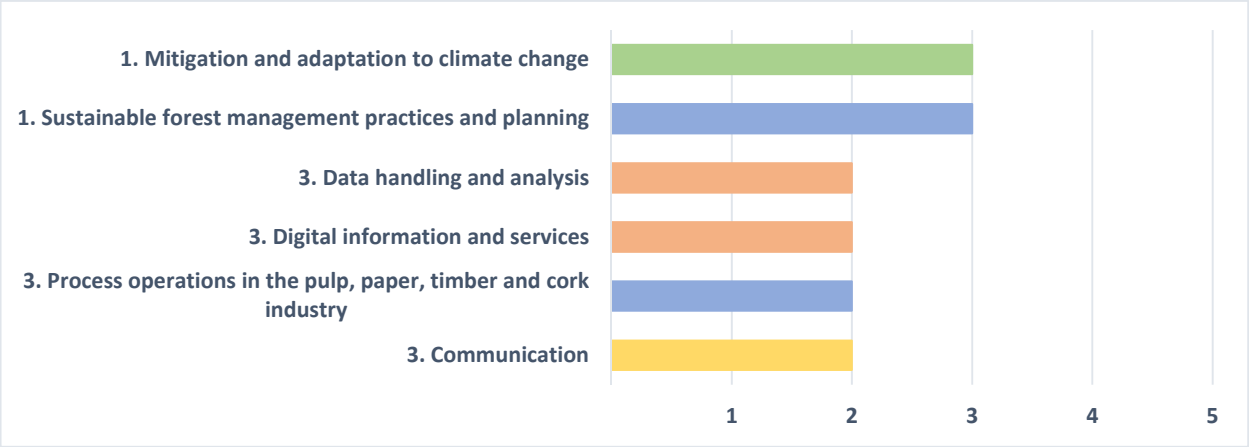

Figure A2.4: Most selected skills for the Forest Industry profile [n=3]

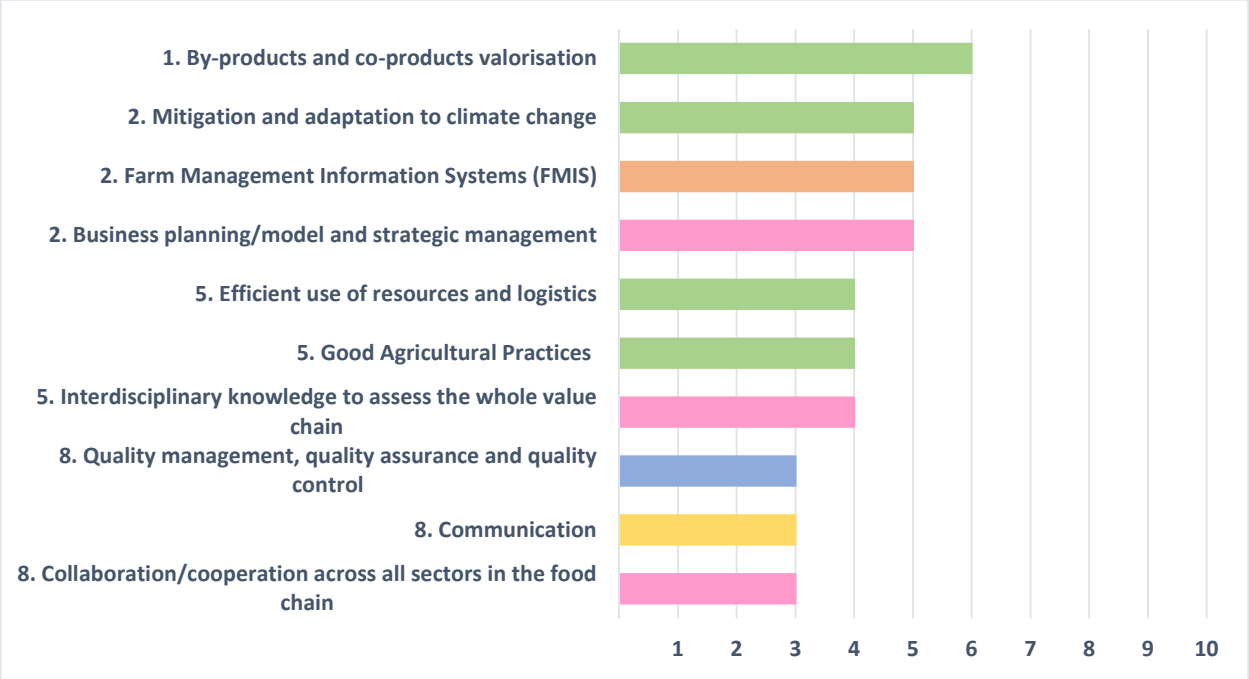

Figure A2.5: Most selected skills for the Others (govern. agencies, researchers) profile [n=12]

Annex III: Total list of missing skills (Q2.2)

	Stakeholder profile no*	1	2	3	4	5	6	7	8
Soft Skills	Time management	2				1			
	Better doing	1							
	Concept of influencing		1					1	
	Coaching		2	1					
	Farm advisory service		1						
	Farming impact on public health				1				
	Ability to listen					1			
	Social media	1							
	Connecting /communication with consumers and market	2	1		2		1		
	Integration of competences/skills				3	1	1		
	System thinking				1	1	1		
	Awareness of Global perspective food system					1			1
	Media competence				1				
	Cooperation		1						
	Ability to work under conditions of uncertainty				1				
	Learning through cooperation				1				
	Spanish language	1							
	Relational skills	1							
	Change in specialisation				1				
	Co-creation of knowledge				1				
	Social diversity				1				
	Facilitation skills						1		
	Stakeholder interaction					1			
Bioeconomy Skills	Food Technology		1				1		
	Lean practices	1			1	1			
	Carbon markets + trading		1				1		
	Process engineering			1	2	1			
	Refinery technologies					1			
	Agri tech engineering								1
	Safety at work and work insurance		1						
	Control of pandemics				1				
	Agroforestry				1	1			
	Industry 4.0					1			1
	Industrial biotechnology								1
	Novel technologies for the food industry								1
	(Awareness of) soil management	1			1				
	Forgotten vegetables				1				
	Operationalisation of high-level skills to day-to-day practices					1			
	Product labelling of origin					1			
	Knowledge about the entire food and forestry system							1	1
	Urban agriculture				1				
	Technology skills				1				
Business and Entrepreneurship Skills	E-commerce						1		
	Continuous lean improvement		1						
	Lean management		1	1					
	Value proposition development			1	2		1		
	Marketing - new concepts		1		1		1		

	Marketing – collaboration		1			1			
	CSR	1			1				
	Responsible innovation				1				
	Product life-cycle management and thinking					1			
	Jurisprudential and Fiscal systems understanding						1		
	Include legislation in water management	1							
Sustainability Skills	Circular economy concepts		1		1			**1**	
	Groundwater management	1			1				
	Food waste reduction								**1**
	CO_2 footprint assessment			1					
	Sustainability- collaboration			1					
	Territorial ecology				1				
	Wider, rural biodiversity	1							
	Biodiversity and synergies in the environment	1							
	Bio-process engineering				1				
Digital Skills	Consequences of new technologies				1				
	Understanding the applicability of technologies				1	1			
	Use of digital products and GIS data in forestry (forest industry							**1**	
	New technologies		1						
	Analysis of digital technologies								**1**
	Education supported by technology				1				

***1= Farmers; 2= Cooperatives; 3= Agri-food companies; 4= Education providers; 5= Advisors; 6= Foresters; 7= Forest-based industry; 8= Other**

Annex IV: Total list of skills that need more training (Q3.1)

Stakeholder Profile no.		1	2	3	4	5	6	7	8
Soft Skills	Soft Skills in general	1	1		1	3		1	1
	Communication		1	2	1	2		2	
	Language			1					
	Organization, planning, visioning, and strategic thinking				1	1		1	
	Analytical, critical, and creative thinking				1				
	Problem solving		1		1				
	Innovative Thinking				1				
	Lifelong Learning								1
	Safety at Work					1			
	Knowledge Transfer					1			
	Decision making				1				
	Leadership			1					1
	Networking							1	
	Tutoring and Mentoring		1	1					
	People Management			1					
	People Understanding			1					
	Taking Responsibility						1		
	Awareness of asking help				1				
	Management of complementary skills					1			
	Train all Skills				1				
Business and Entrepreneurship Skills	Business-/Entrepreneurship Skills in general		1			3			
	Quality management								1
	Marketing	1			1				
	Certification								1
	Jointly connecting to the market		1						
	Combining knowledge from different sectors								1
	Project management		1						
	Basics of financial issues				1				
	Business planning/model and strategic management	1							
	Understanding research funds			1					
	Social expectations/Consumer science behaviour								1
	Knowledge of the entire value chain				1			1	1
	Innovation		1			2			
	Facilitation Skills					1			
	Facilitation to Farmers					1			
Sustainability Skills	Sustainability Skills in general		1	1					
	Life cycle issues				1				
	Water management			1	1	1	1		
	Awareness of land	1							
	Efficient use of resources				1				
	Valorisation of by- and co-products								1
	Soil/Nutrient/Health management								1
	Energy management (e.g., heat extraction from manure)			1	1	1			
	National and international environmental policy regulation subsidies							1	
Bioeconomy Skills	Bioeconomy Skills in general	1							
	Food Science & Technology			1	2				
	Managing the Farms environment					1	1		
	Soil management					1			

	Soil fertilization	1							
	Complex systems associated with agroforestry parklands							1	
	Understanding forest property rights							1	
	Safety and quality standards			1					
Digitalization Skills	Digitalization Skills in general	1	3		1	1			1
	E-commerce				1				
	Digital technologies		1						

***1= Farmers; 2= Cooperatives; 3= Agri-food companies; 4= Education providers; 5= Advisors; 6= Foresters; 7= Forest-based industry; 8= Other**

Annex V: Preferred training methods (Q3.4)

TRAINING METHODS	1	2	3	4	5	6	7	8
Learning at work								
Practical training in farms for operatives and students	2	1			1			
Learning on the job - experiential learning		1	1	2				
Formalized induction training for new employees			1					1
Practical training								
Practical training in the field		1				1		
Best practices			1	1				
Soft skills through practical activities					1			1
Personalized training								
Mentoring			2	2	1			
Coaching			1	2				
Sponsorship procedure								1
Collaborative training								
Peer to peer (incl. farmer to farmer) training	1					1		
Working in group training		1		4				
Study circles				4				
Virtual training								
Online training	1	1		1				2
Virtual classroom training					1			
Blended training								
Blended learning	1		1	3	3			
Game-based training								
Game-based training				2				1

***1= Farmers; 2= Cooperatives; 3= Agri-food companies; 4= Education providers; 5= Advisors; 6= Foresters; 7= Forest-based industry; 8= Other**

Annex VI: Presentation slides focus groups

FIELDS Focus Group [country]

[name of facilitator and affiliation]
[name of rapporteur and affiliation]
[Date]

FIELDS – basics

- Erasmus+ Programme funded by the European Commission
- Sectoral Skills Alliances for Implementing a new Strategic Approach "Blueprint" to sectoral Cooperation on Skills
- Begin 1st January 2020 – End 31st December 2023.
- 30 Partners

Co-funded by the
Erasmus+ Programme
of the European Union

Main objectives of FIELDS

- FIELDS is a project structured to achieve a dynamic integration of skills and competences for the agriculture sector into a coherent framework linking knowledge and competition for a succesful and sustainable bio-based economy. It will develop a comprehensive and sustainable strategy for the feasibility of a skilled agriculture and circular bio-economy fully integrated into the stream of a global food supply chain consistent with the Uns SDGs. The FIELDS project will follow several actions that lead to the implementation of a new strategic approach to sectoral cooperation.
- Through the establishment of an Agriculture and Forestry Sector Skill Alliance, the goal is to deliver human capital solutions to supply food systems and bio-economy chains.
- The project will provide analysis of skills gaps for the bio-economy, digitalisation and sustainability, EU and country strategies, curricula, apprenticeship schemes, modular teching materials and opportunities for implementing further skills after the project ends.

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of the European Union

Purpose of this focus group

Co-funded by the
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Data Focus Group

- This focus group is video-recorded. The recording is confidential and will be used only by [Title and name of the Facilitator] and [Title and name of the Rapporteur] in preparing the summary report of the focus group.
- Any and all information you give will be treated in the strictest confidence. The researchers will take notes during the discussion but everything you say during the focus group will be fully anonymised. The outcomes of this research may be published externally in a journal, on a website or via a conference presentation. Your personal details will be kept strictly confidential and your name will be removed in any work published as a result of this research. However, we do want to be able to refer to the positions and some aspects of the identities (e.g., country) of those who are involved.

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Ground rules for online meeting

- Please keep your camera on during the whole discussion
- But keep your microphone muted when not speaking (to avoid too much background noise)
- Raise you hand, so that it is visible to me before speaking
- Remember that the goal is not that participants come to agreement on the topics, but rather that all participants should be able to express their different opinions.

Let's get started!

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1.Collaborators

Considering the whole food/forestry sector in which you are involved, who would you describe as being your most important collaboration partners in your daily work?

2.1 Skills needs

You received by email 5 skills lists on:

1. Sustainability skills
2. Digital skills
3. Bio-economy skills
4. Soft skills and
5. Business and entrepreneurship skills

You were asked firstly to rank in order of importance on each skills list the 5 most important skills in the sector you represent. Secondly, you were asked to select among these 25 skills the 10 most important in your sector.

In view of your 10 most important skills, please present the top three most important and outline why you have selected these

Skills needs

	1	2	3	4	5	6	7	8	9	10	11	12	13
Top 10 Skills	Farmer	Farmer	Educator	Educator	Advisor	Advisor	Forester	Govt.	Food Bus.	Food Bus.	Sustainabilty	Sustainability	BioEconomy / Educator
1	1.03	3a.18	4.01	4.01	1.19	1.01	1.01	1.01	1.08	4.05	4.01	1.01	1.01
2	1.17	3a.17	1.01	4.14	1.10	1.04	1.22	1.19	3c.05	5.07	1.10	4.01	1.04
3	1.09	3a.06	1.13	5.08	5.25	1.17	3b.15	2.05	3c.01	3c.02	4.04	4.03	1.07
4	1.19	5.07	5.07	4.06	3a.09	2.01	3b.03	2.07	3c.02	4.15	4.03	1.08	1.11
5	2.01	5.23	3c.04	5.07	3a.18	2.02	3b.13	3a.13	3c.04	3c.01	4.05	5.07	3a.15
6	2.05	1.09	3c.02	3c.01	1.17	3a.01	5.13	3a.15	3c.06	4.16	1.12	1.11	3a.16
7	2.17	1.17	4.20	5.06	1.02	3a.02	5.23	4.16	4.06	3c.06	1.11	5.02	4.22
8	3a.23	1.18	4.18	2.02	1.10	4.20	3a.20	4.20	4.08	5.08	2.18	5.10	4.19
9	3a.17	1.19	5.01	5.17	3a.02	4.21	3b.02	5.11	3c.10	1.07	1.19	3c.01	3c.15
10	4.01	2.01	5.11	4.13	1.12	5.17	2.05	5.14	5.07	5.06	3c.10	1.10	5.23

	1	2	3	4	5
Key	Sustainability	Digitalisation	Bio-Economy	Soft Skills	Business / Entrpreneurship
	28.46%	8.46%	25.38%	19.23%	18.46%

Q2.2: Would you add any skill you find missing in the lists? If so, why is/are important?

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?

Q2.4: You were asked to rank the 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?

1) low level, responsible of a task or group of tasks; 2) medium level, responsible of a group of persons; 3) high level, responsible of the farm/entreprise

Q3.1. Training needs. Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? why?

Q3.2. Skills vs. training suitability.
Based on your experience, is the available training suitable to cover the previously identified training needs?
Which is the missing training?

Q3.3. Training methodology vs. target groups.
Do you think skills need to be trained in different ways, depending on the people to be trained?

Q3.4. Training preferences
What type of training is available to support learning and knowledge transfer? Base your answers of the preferred methodologies that meet the overall sector needs

Q3.5. Training recognition.
Is it important for you to receive a professional certification for your training? Why?

Is there anything we have not discussed that you find important to update farmers, foresters and food industry employees skills, considering the current and future market/social needs?

Thank you for your participation!

Annex VII: Focus Group Italy

A7.1 – Executive summary

List of emerging positive and critical issues

- Does it really make sense to prioritize skills when we still do not have a crystal-clear idea of what the Farm of Tomorrow / Factory of the Future will look like? It would be great to identify 4/5 Company categories of Farm of Tomorrow and Factory for the Future and then adapt the skills to them, on the medium-long term period framework.
- The skills we analysed in the Focus Group are those of Graduates or people who have a Degree and a specialization, the top 10% of the human resources spectrum. What about the other 90% profiles needed? Technicians and executives in the Production Area and in Sales (Lab analysis, sales agents, computer scientists, till the bike riders under Covid-19....).
- The Entrepreneur will have to worry not only about Food Production and Profit but also about Innovation, E-commerce, Digitalisation and Logistics. Especially for small farm/companies, it would be crucial to have an Innovation Broker who would help them evolve and who would create a network of expertise around them.
- Salesmen need to be trained with basic Agri-food and Data Management knowledge. Communicating the added value of High-Quality Production is something that can be done only if issues such as Territory, Production, Sustainability, and innovation are properly underlined. The consumer is very conscious about his food choices nowadays, so we need to work a lot more on Storytelling. Furthermore, Italians salesmen need to learn how to speak English because our products do very well abroad.
- We need open-minded individuals and professionals who are able to offer High Value Products in terms of Quality/Nutrition and who will eliminate surplus on the supply chain. There needs to be a new Model of Coopetition to direct new Consumption models and promote Data Sharing among all the actors in our sector. From competition to cooperation and collaboration towards Coopetition.
- According to the participants, the items in the skill lists proved to be too many. Some were too specialized and even the more horizontal ones were too many. We need to avoid creating General Training, creating professionals who end up being neither specialists nor Soft skill based.
- As far as Training goes, we need to think about creating curricula neither for MBAs nor for farm workers but for the middle ground. How are we going to manage that? The participants almost unanimously thought that the best Training Method or Knowledge Transfer would be ITS (Technical School) and Professional studies, with an alternation of school-work approach. Bachelor's degrees at University and Lifelong Learning developed by VET Providers were also considered of great importance.
- Agronomists, technologists, digit providers and Advisors need to come together and work with a Team-based mentality. The skills need to be intertwined in a Network of Competences which will help develop a more sustainable and innovative way of working.
- Some participants raised the issue of poor Network or Infrastructure in the Italian landscape. It is hard to speak about Digitalization when there is no internet connection on the rural areas, internal Fields. There is also an issue with generational passage: older generations are not eager to pass the company onto their sons and that can create stagnancy.

- The participants all contributed to the discussion with enthusiasm. There were some differing opinions on the Interdisciplinarities of the skills and on the Level of Digitalization of Italian Farmers. We were not able to ask each question to each person as it would have created some clutter, but we followed the FIELDS Guidelines as much as we could. We definitely collected sufficient data on skills and Training, and we hope that our work will be beneficial to the research.

A7.2 – Composition of the Focus Group

The Italian Focus Group was comprised of 13 participants, 1 moderator and 2 rapporteurs.

Figure A7.1: Composition of the Italian Focus Group

A7.3 – Skills

In the Italian Focus Group, participants' overall selection and ranking of their top 10 skills, figure A7.2 shows that most respondents selected bioeconomy skills most often followed by digital skills and business-entrepreneurship skills. Soft skills and sustainability skills were selected least often.

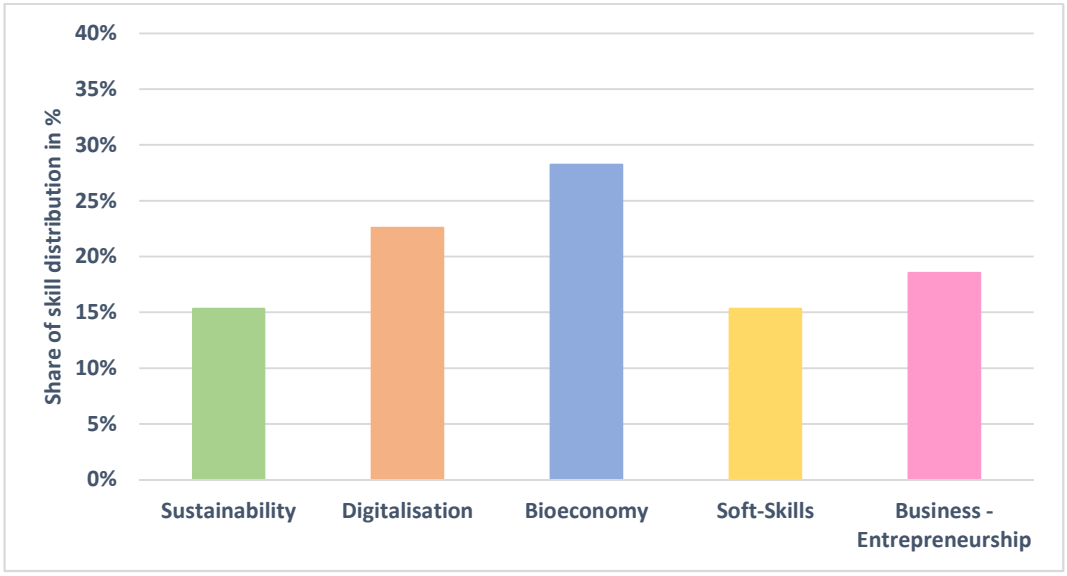

Figure A7.2: Share of selected skills in the top 10 rankings by skill category, Focus Group Italy

In greater detail, the stacked bar below shows that even though sustainability skills and digital skills were selected least often, they were ranked as the most important skills. In fact, 4 participants (from cooperatives, agri-food company, education provider and other) selected and ranked sustainability skills as the most important skills; and 4 other participants (one farmer and three education providers) selected and ranked digital skills as the most important skills.

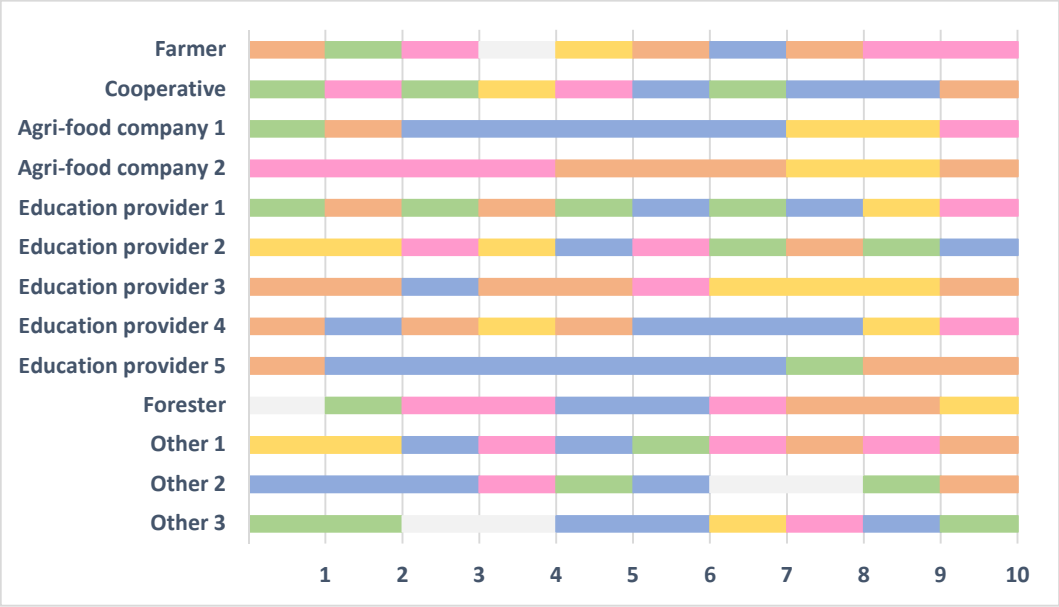

Figure A7.3: Stacked bar for the top 10 skills in the Italian focus group

Figure A7.4 shows the ten most selected skills overall for the Italian focus group:

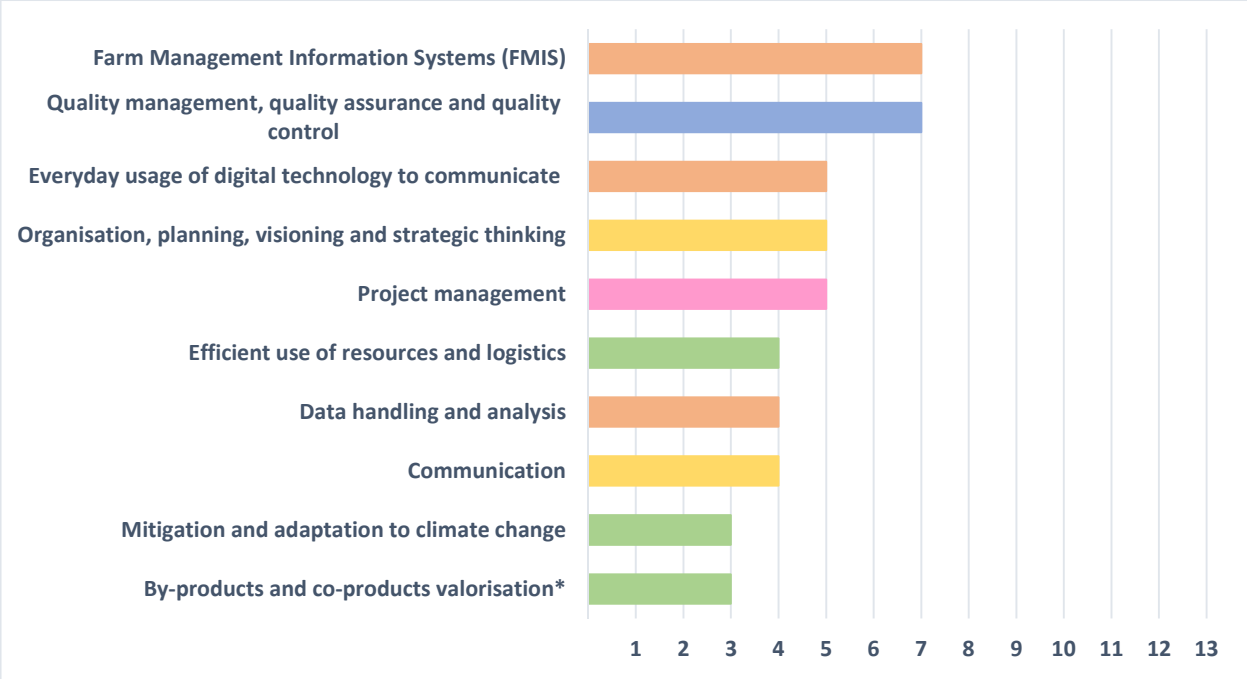

Figure A7.4: Most selected skills in the focus group rankings, Focus Group Italy [n=13]
(*there are six more skills that were chosen 3 times)

Within these skills, *data handling analysis* was selected first by two participants, whereas *efficient use of resources and logistics*, *by-products and co-products valorisation*, *everyday use of digital technology to communicate*, *farm management innovation systems* and quality management, *quality assurance and quality control* were selected first by one participant.

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Relevant quotations were included where applicable.

Table A7.1: Top sustainability skills, Focus Group Italy.

Efficient use of resources and logistics (4)
Mitigation and adaptation to climate change incl. (3)
By-products and co-products valorisation (3)
Active management of natural resources (2)

Table A7.2: Top digital skills, Focus Group Italy.

Farm Management Information Systems (7)
Everyday usage of digital technology to communicate (5)
Data handling and analysis (4)
Warehouse management systems (2)
Digital food traceability systems (2)
Field operations management systems (2)

Table A7.3: Top bioeconomy skills, Focus Group Italy.

Quality management, quality assurance and quality control (7)
Logistics and storage (3)
Sustainable forest management practices and planning (3)
Performing farming operations (2)
Genetically Modified Crops (2)
New industrial crops and bioproducts for the bioeconomy (2)
Traceability (2)

Table A7.4: Top soft skills, Focus Group Italy.

Organisation, planning, visioning and strategic thinking (5)
Communication (4)
Problem-solving (3)
Learning continuously (3)

Table A7.5: Top business-entrepreneurship skills, Focus Group Italy.

Project management (5)
Business planning/model and strategic management (3)
New value chains / new business models (3)
Sales and marketing (2)
Collaboration/cooperation across all sectors in the food chain (2)
Social expectations/Consumers science & behaviour (2)

Question 2.2: Would you add any skill you find missing in the lists? Why is this/are these important?	
• Communication (cooperative, 12051) • Food Technology (cooperative, 12051) • Soft Skills (cooperative, 12051) • Innovation (cooperative, 12051) • Innovation (farmer, 11042) • Marketing (forester, 16151) • E-commerce (forester, 16151) • Soft skill (forester, 16151) • Food Technology (forester, 16151)	• *[…] we have understood how important a figure within our organizations is, which we have defined as Innovation Broker, to support the farmer on everything related to innovation*" (forester, 16151) • *"If we widen too much the field between soft and hard skills, we risk to generate all-rounders that are not what we need. We need great specialists who are able to work as a team. The future is to make teams work, not to teach the soloist to play the whole orchestra, we need orchestras that know well together. This is perhaps lacking in training in Italy today*" (cooperative, 12051)

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
Italian Farmers need to invest on improving their e-commerce and marketing channels. More attention on Teamwork. Specific skills that create specific professionals who will work together. There will be more attention on Data Management. Transversal skills will be the key to a more sustainable and productive market Clusters of competence. Nowadays even Food Technologist Training are based on soft skills, but it can be detrimental.
• *"During the lockdown, my employee created an online product sale of 10-15 young farmers, but we not only had a department that knew how to use the platform but also moved on to marketing because you know it's not like you make a site and two minutes later you sell your products. With this, there's still some work to be done because logistics costs are not easy for farms, so I think in the future there will be some young people who will create the ability to help more companies to move in this very new world. In Italy we always run into problems of logistics not so much with large-scale distribution but with private individuals."* (farmer, 11042)

- *"There's a lot of space in digitization, but there's a lot of space in digitization that's specific to the company. We need to reinvent a bit the business model of those who want to deal with digitization for example"* (education provider, 14071)
- *"Transversal skills will be the key to a more sustainable and productive market. The transversality of knowledge, therefore, the network with more knowledge in different areas is essential." (education provider, 14092)*

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?
Experts and specialists need constant training to stay updated whereas different occupational profiles need that on a smaller scale. Farmers need a professional figure that can help them with bringing Innovation and with developing e-commerce.
● *"As a medium sized farm, I am interested in themes such as Sustainability, natural resource manager, food safety…and I need a professional figure that can help me with bringing Innovation and with developing e-commerce"* (farmer, 11042)

A7.4 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?	
Question summary (what was agreed, what was disagreed and what was just commented without discussion	
● Digitalization (Cooperative, 12051) ● Innovation (Cooperative, 12051) ● Soft skill (Cooperative, 12051) ● Food Technology (agri-food company, 13061) ● Language (agri-food company, 13061) ● Sustainability (agri-food company, 13061) ● Marketing (education provider, 14092) ● E-commerce (education provider, 14092) ● Communication (education provider, 14092) ● Digitalization (education provider, 14092)	● *"In Italy we have either Technologists or Farm workers. We need professional who have the skills 'in the middle' and can help the CEO develop Innovation and digitalization and who are able to work well in a Team"* ● *"We need to develop training on Food Production even for Salesmen and Businessmen. English training is also crucial for Italian workers. So, the precondition for Italian companies is that they know English because the quality products of small, medium, and large companies are sold better abroad than in Italy"* (Agri-food company, 13061) ● *"It is clear that for product innovation technical skills are necessary, but it is also essential that those who deal with product innovation have knowledge of what is, for example, business and market interests etc. etc. ... it is easy to say but difficult to do. From the training point of view, it is important that organizations develop a transversal training by connecting different professionals who teach more skills."* (education provider, 14092)

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)	
• Innovation (education provider, 14081) • Food Technology (other, 18121) • Lifelong Learning (other, 18121)	• "*Food Companies need to invest a lot more on Training and Education, creating stable and trustworthy relationship with Vet Providers and Institutes*" (education provider, 14081) • *"We need to push youngsters to choose Professional Education and then provide for them Apprenticeship opportunities and Lifelong Learning*." (other, 18121)

Q3.3. Do you think skills need to be trained in different ways, depending on the people to be trained? (Group question)
There was agreement that farmers, even the oldest ones, are very receptive when it comes to new knowledge. They all possess the basic skills but there is room for improvement. And that young people need technical training paired with some work.
• *"I can tell you that farmers, even the oldest one, are very receptive when it comes to new knowledge. They all possess the basic skills but there is room for improvement. We see from the sample surveys that the old generation-skill combination with new technologies is not always true. I did not indicate the Use of basic technologies' as a priority skill because, actually, this is already there"* (education provider, 14092) • *"Italy has a huge problem with the fact that most of our farmers are older. t's true that the generation change is slow, but I don't despair, I've seen 80-year-old people use the iPad very well. The problem is that I hear a lot of talk about 4G, 5G, 6G but if I didn't have companies that take my internet by air, I could shoot myself. There's also a digitization problem in rural areas"* (forester, 16151)

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)	
Question summary (what was agreed, what was disagreed and what was just commented without discussion	
• Public School (other, 18121) • Apprenticeship (other, 18121) • Lifelong learning (other, 18121)	• *"a flywheel subject must be guaranteed and should be done by public training, in particular the professional institutes, those that train the so-called intermediate workers. And within this can be grafted the continuous training which is a tool that maintains and develops existing skills and innovates them, and then the combination of public training and continuous training should be able to achieve the result."* (other, 18121)

Q3.5. Is it important for you to receive a professional certification for your training? Why?
• *"Certification for Training is a great way for employee to research their future talent. I don't think is mandatory though, students should definitely look to improve their cv with degrees and lifelong learning"* (education provider, 14071)

A7.5 – Final remarks

Q4.1. Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, facing the current and future market/social needs?
No final remarks.

Annex VIII: Focus Group Ireland

A8.1 – Executive Summary

All participants actively engaged to a high level with the process. The investment of time by the Irish Co-operative Organisation, the Main Responsible Organisation (MRO) in identifying and winning the participation of representative 'experts' from the agricultural, forestry and bioeconomy sectors resulted in a productive exchange with all of the members of the Data Focus Group (DFG). Also, the persistency with which the MRO ensured that each participant in the DFG had read and responded to the 'ground rules' added to the quality of the productive exchange.

It was evident in advance of the DFG teleconference, that re-enforcing with the participants the importance of being precise and brief in their answers to the specific questions the DFG were being asked to address was critical. It helped to ensure that the 16 or so questions posed could, whether addressed to all thirteen Experts individually or as group questions, were each answered appropriately.

I also saw value in the relatively frequent interaction, in advance of the teleconference between the Facilitator and the MRO. This resulted in a removal of the introductory question and a refinement of some of the others. The sharing by the Facilitator of early drafts of his Preparatory Notes helped to refine approaches to certain questions and introductory comments. While these refinements saved time, they may, in some instances, have limited the insight each Expert could contribute. (See for example when dealing with 'Skills Needs', where the Facilitator had to confine the discussion as to the reasons for prioritising certain skills to the 'top 3 skills' only.

Notwithstanding this preparatory work, the teleconference over-ran its scheduled two-hour time slot by half an hour. It is perhaps a measure of the engagement by all the Experts that this time over-run did not pose for any of them, with all participating until the formal conclusion of the session. However, it may also point to a need to consider if (i) the number of questions could be reduced or (ii) more 'group questions' could be introduced.

Other than the Facilitator advising two of the Experts in advance that he would ask them to be the first to give answers to Question One, thereafter the sequence in which the Experts were asked questions was randomised. This approach had a number of consequences both positive and negative. The positive consequences were (i) the two initial answers were concise and to the point and established a template for answers that was mostly followed in the ensuing discussions and (ii) the random nature as to who was going to be asked next resulted in a greater alertness on the part of all Experts! The succinct manner in which each Expert provided their perspectives on the questions being asked, had, if anything, a positive impact on the quality of the insight offered, On the negative side, had each question been asked of the Experts in precisely the same order, the task of the Rapporteurs in recording answers would have been made easier!!

A8.2 – Composition of the Focus Group

The Irish Focus Group was comprised of 13 participants, 1 moderator and 4 rapporteurs.

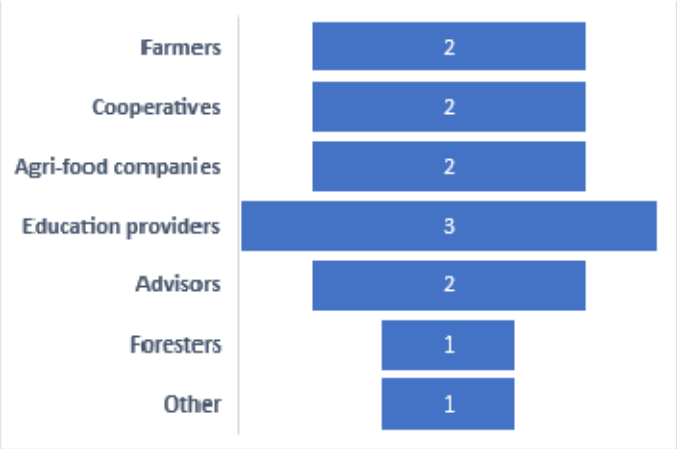

Figure A8.1. Composition of the Irish focus group

A8.3 – Participants' networks

Question 1.1 Considering the whole food/forestry sector in which you are involved, who would you like describe as being your most important collaboration partner in your daily work?
Farmers
• "[…] *As a farmer I am the sole person on the farm who works and makes all of the decisions. My go to people are people who would provide me with labour, which are the farm service, and my relationship with them is very important, and also for technical advice I suppose my Teagasc advisor is one of the most important people as well who keeps me up to date on technical issues. I suppose the other people, I have a lot of people who come in and out, but they are the two most important people"* (farmer, 21111) • *"Okay so I'm going to answer this with my farmer hat on. And I suppose the big one for me now is the whole area of sustainability, and you know being able to manage our business forward in line with what may or may not come down the tracks in terms of legislation and I supposed to and be ahead of that, and try and be as efficient as we can, and I suppose from my point of view on the farm we would actually value the relationship we have at our bank believe it or not, it's a very important because any development we have, you know, that project has to be presented to them and we would also value our accountants and would have the money quick dial, speed dial on the phone. I suppose one of the biggest challenges for us is that we have four full-time employees on the farm and managing that and that relationship, you know, is the Soft Skills and that would be one of the biggest challenges I suppose for us as a family on a day-to-day basis."* (farmer, 21122)
Cooperatives
• *"So, I think our key Stakeholders would be our Shareholders, our farmer shareholders on our Board and also we are driven by our customers and what their needs and expectations are. And again, in terms of advice, Teagasc and IBEC and the universities as well."* (22212) • *[…] "I suppose the question was who would we refer to for advice and, you know, getting a steer, and so for us number one would be customers, what do they want, what their customers want. Secondly, I would*

say we would have a very close relationship obviously with the West Cork Co-ops and I think, you know, that that obviously includes the farmers. And I suppose the third one I would say is academia across the board, you know certainly all the institutions that are close to us in Cork but even further afield as well. So, they would be our three that's precise into the point or not please sorry order followed by Patrick and Tom and again in terms of the four advices that true jackets and I bet and maybe the universities well okay" (cooperative, 22221)

Agri-food companies

- *"Yes, we would liaise with a number of external stakeholders ranging from Ibec for any legislative and training requirements, and we would liaise with the DII, dairy industry Ireland, for lobbying and communication and they would also help us to facilitate peer group sessions as well both from a HR and an Agri perspective. And ICOS are worthy of mention here as well, they keep us up to date with any updates on legislative frameworks and are key partners for us from a learning needs analysis perspective and we find that very useful. We liaise with the DPTC which is the Dairy Processing and Technology Centre in Limerick for any R&D related matters. And from a general education perspective we liaise with external partners such as UCC and UL for that"* (agri-food company, 23191)
- *"Externally I mean recruitment agencies is a key one for us to find out what the markets like on a day to day basis. I also use peer groups, like groups like these and Skillnet groups, when people meet up, they sort of understand what's happening, a best practice. Internally then it's management and staff finding out what's actually happening on the ground, they'd be the main ones that I would use"* (agri-food company, 23201)

Education providers

- *"Our external partners would be primarily our customers who are companies in the agri-food industry, others would be Teagasc, ICOS, Skillnet Ireland and the Department of Agriculture Food in the marine, and internally and we rely on our UCC colleagues, not only in the school of food nutritional sciences but in the wider University including the Environmental Research Institute and so on" (education provider, 24132)*
- *"Okay first group I'd say would be within Teagasc, I mean there are different sections within Teagasc, so certainly within education Teagasc research and Teagasc advisory would be one of our, so within our own organization. Then people like the Department of Agriculture in terms of maybe policy and other government departments, and then you're into stakeholder groups, we have stakeholder groups in terms of people who give us feedback on courses maybe some of the farmers that take students on placement or host farmers and then there's our graduates and our farm family. So those would be the three, Teagasc maybe government departments and our stakeholders. The other then would be into the other providers like WIT, UCD, UCC all the Institutes of technology and other education providers." (education provider, 24141)*
- *"Hi, I suppose from and IT Tralee perspective, our three main pillars of activity are around education, research and innovation, and enterprise engagement and enterprise development. So, in that context I suppose our other key stakeholders would be other universities nationally and internationally, the funders for the research, and so SFI, EI and I suppose European funding instruments, and funding that will come through the Department of Agriculture for example from an education perspective the HEA would be a key stakeholder around the provision of funds for the rollout of programs. Engaging with agencies like Enterprise Ireland, IBEC, the Leos, the County Councils as well would be significant. I suppose stakeholders*

are key parts of our network, the regional skills forum as well would be another agency that we would engage with, and we would have a lot of connectivity in with Teagasc as well, and then the IFA would be another stakeholder." (education provider, 24232)
Advisors
• *"Yeah, our main port of call, inquiry, would be with fellow agricultural consultants and the Agricultural Science Association, but also interact with the department of agriculture for stuff and Teagasc, but I also provide a lot of the technical data"* (advisor, 25151) • *"yeah and I'll leave room for Frank to talk from the education perspective, but from kind of broader knowledge transfer context I think we would see that our major stakeholders are our clients, and farmers generally and their organisations, but we would also have strong interactions with stakeholders on all of these areas, and through the consultative groups that we have set up and run for the last 12 or 15 years, and these are I think really important to us in terms of giving us direction and particularly identifying areas where there are skills deficits and maybe knowledge deficits within the industry"* (advisor, 25161)
Foresters
• *"Okay so our stakeholders, our clients, would be our first one, then our main one would be the farmers, we work with all farmers and private landowners in forestry. We would also work a lot with the Department Agriculture Food and Marine in particular the Forestry Division of that who set all the policy, the regulations, and the legislation. FII, forest industries Ireland, would be our industry body under Ibec, and Icos would also give us advice. I's have to include there the general public, now the stakeholder, because forestry activities are licensed activities now and they're subject to public consultation, so there's a lot more interaction with the general public on activities that we do."* (forester, 26172)
Forest industries
• *"alright so specifically on sustainability, say for example academia would be Teagasc and Johnstown Castle, or UCD Food & Agri. On digitalization, the likes of TSSG in Waterford Institute of Technology, Enterprise Ireland and Science Foundation Ireland, and on the Bioeconomy, the Biorbic Research Centre and the Irish Bioeconomy Foundation. On the soft skills side the likes of Maeve Henchion in Teagasc and the people in the rural economy team who deal with the sort of the social science development, so they would be my first points."* (forest industry, 28181)

A.8.4 – Skills

In the Irish Focus Group, participants' overall selection and ranking of their top 10 skills, figure A8.2, shows that most respondents selected most often sustainability skills followed by bioeconomy skills; followed by soft skills and business-entrepreneurship skills. Digitalisation was selected least often.

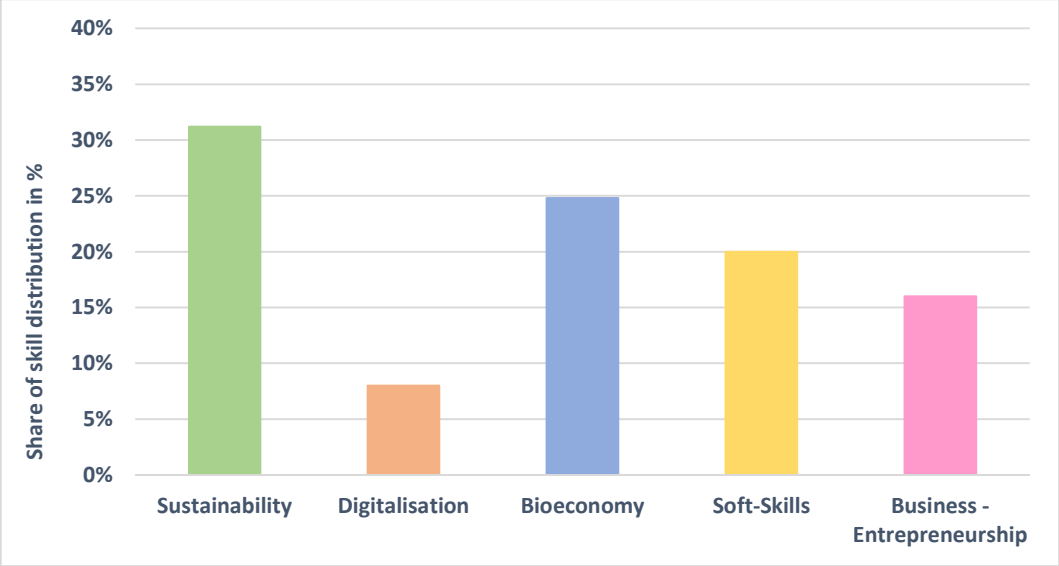

Figure A8.2: Share of selected skills in the top 10 rankings by skill category, Focus Group Ireland

When looking at the position of the skills in the rankings (Figure A8.3), 8 participants selected and ranked sustainability skills as the most important skills; 4 participants selected soft skills as the most important and one participant selected bioeconomy skills.

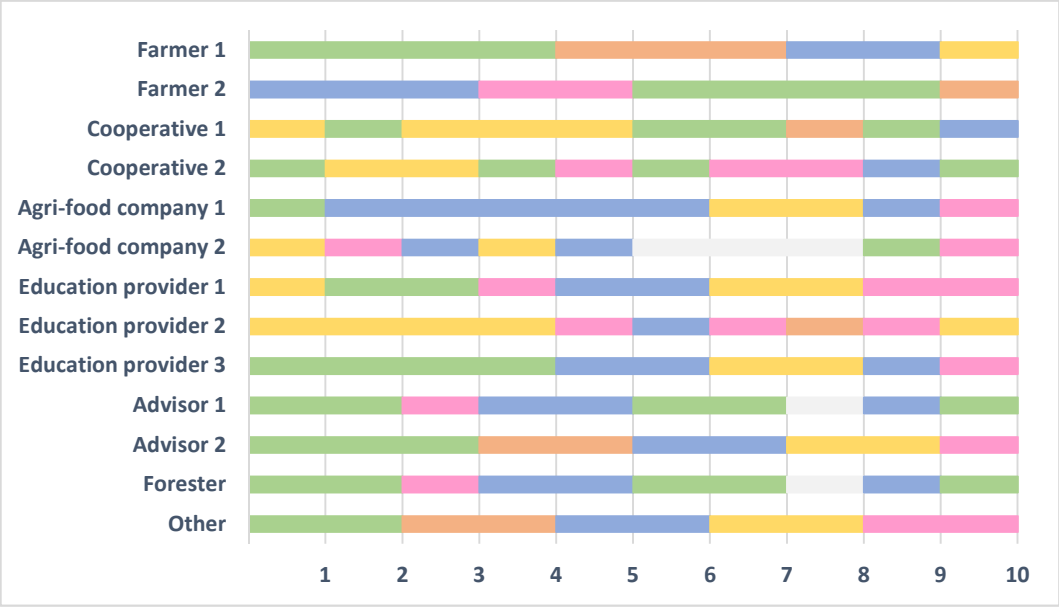

Figure A8.3: Stacked bar for the top 10 skills in the Irish focus group

Figure A8.4 shows the ten most selected skills overall for the Irish focus group:

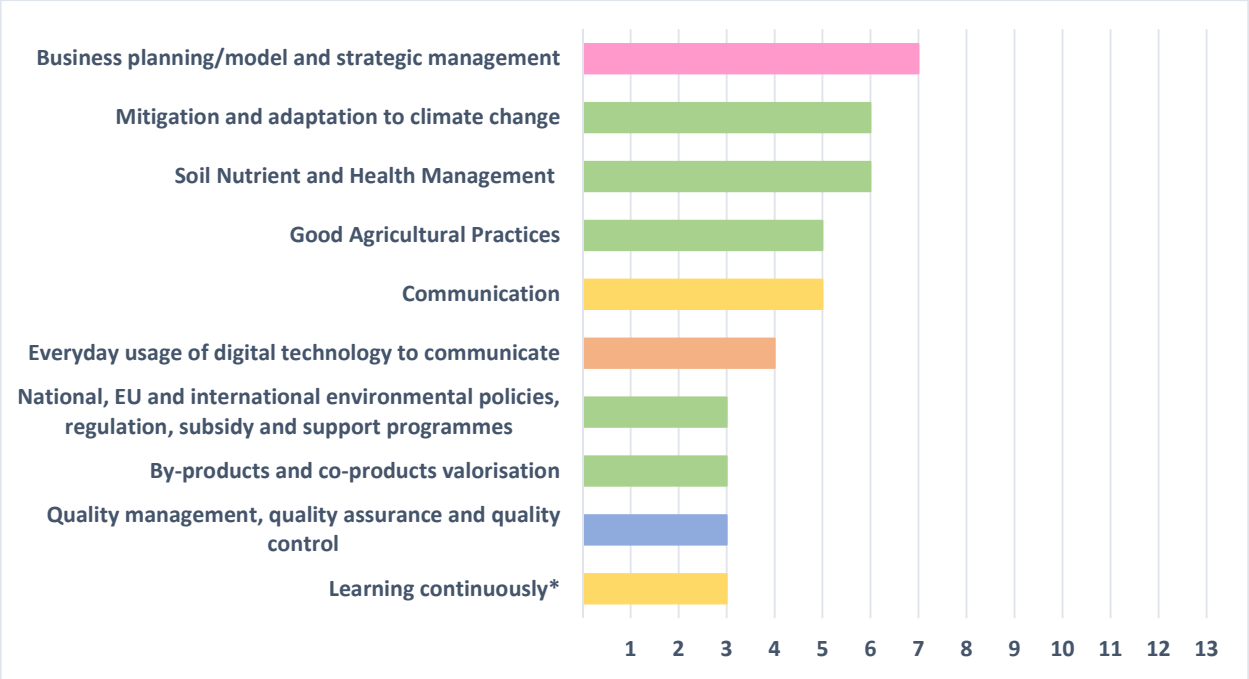

Figure A8.4: Most selected skills in the focus group rankings, Focus Group Ireland [n=13] (*there are three more skills that were chosen 3 times)

Within these skills, *mitigation and adaptation to climate change* was selected first by four participants: *communication* by three participants and *soil nutrient and health management* by two participants. Interesting to note that the most selected skill, *business planning/model and strategic management* is not the first priority for any of the Irish focus group participants.

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Relevant quotations were included where applicable.

Table A8.1: Top sustainability skills, Focus Group Ireland.

Mitigation and adaptation to climate change incl. (6)
• *"[…] my first one was mitigation and adaption to climate change, I think it's absolutely critical that we will be employing people that know this, that are able to talk about this and who can basically go one-to-one with de NGOs and others that are attacking our sector"* (cooperative, 22221) • *"The other in my top three as well I have mitigation and adaptation to climate change and identification of renewable energy systems suitable for the farm and so on and I suppose a lot of this is based on my interaction through ICOS with the farmers through the Diploma in corporate direction and through the school of food and the School of Biological art and environmental sciences and the environmental Institute in UCC, and I think we need to increase and let's say the 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 you know looking at making changes to current and future climate change effects" (cooperative, 24132)* • *"I think that there's a key need in that whole area of industrial crops and bioproducts in creating awareness around the different opportunities and that Ireland and agriculture in Ireland can access in*

that area and I think the whole area of LCA and the mitigation and adaptation to climate change as well our areas that I suppose really are key knowledge needs with the companies that I would have interaction with" (education provider, 24232)
• *"the whole area of climate change and I suppose the challenge that's there in terms of I see it as a really big challenge and the need to have and to get really simple practices out there into practice on farms to try and give people the confidence, and I suppose an attitude change to how they can do an awful lot to contribute towards those challenges in terms of climate." (advisor, 25161)*
Soil Nutrient and Health Management (6)
• *"[…] as an Agri consultant I picked number one as soil nutrient and management, our life comes from six inches of topsoil, so I feel as an advisor is very important to have that right for farmers to be able to advise them correctly and the proper management of our soils, issues with our soils that need to be corrected and it's a very important section"* (advisor, 25151)
Good Agricultural Practices (5)
• *"The second one has to be being able to deal with people who come onto the farm and really care for them"* (farmer, 21111)
• *The good agricultural practices, again like James I mean fundamentally we are farmers you know"* (farmer, 21122)
National, EU and international environmental policies, regulation, subsidy, and support programmes (3)
• *"The second one I went with was national, EU international, environmental policies, regulations and subsidies and support programs, and as an advisor to farmers again it's a big part of my job is to make sure they're compliant in every way to collect their payments and get their maximum payments from Europe. I said my second choice there was national EU international environmental policies, regulations, and subsidy support programs. A big part of my job is basically payment applications, loss applications like whatever in terms of all the different schemes. So very important being able to stay up to date with all those schemes for me as an adviser."* (advisor, 25151)
• *"My second one is around national and EU policies in regulation I think this is very much going to frame how we operate and how we live so we need to know what's coming down the tracks and how to respond to that."* (cooperative, 22212)
By-products and co-products valorisation (3)
Generation, storage and use of renewable energies (3)
Efficient use of resources and logistics (2)
Active management of natural resources (2)
Sustainable metrics and certification (2)
Environmental Management Systems (2)
• *"so again, based on the nature of the industry we're in, at Arrabawn we have a zero-tolerance approach to any breaches of our environmental and obligations, and we're as conscious of our impact on climate as well as energy"* (agri-food company, 23191)
Corporate social responsibility associated with sustainability reporting/press releases (2)
• *"I think corporate and social responsibility for me is huge as well because if we don't have that our customers who ultimately eat the food that we produce would have an issue" (farmer, 21122)*

Table A8.2: Top digital skills, Focus Group Ireland.

Everyday usage of digital technology to communicate (4)
• *"The second one is in the area of the digital area and I think we have made huge progress in digital technologies but we have left an awful lot of people behind and I firmly believe in this issue this concept of just transition and in ensuring that everybody has the same opportunity to avail of digital technologies, I shouldn't have to pay through the nose for it and just because they don't have high-speed*

connectivity in their areas and it's a surprise I think particularly to farmers and certainly is something that I think in terms of skills training it's something that certainly I think that can be helped a good bit by or in all of Industry approach to getting solutions there and but huge benefits for the whole industry" (advisor, 25161)
Farm Management Information Systems (2)

Table A8.3: Top bioeconomy skills, Focus Group Ireland.

Performing farming operations (3)
Livestock efficiency/ management/ biosecurity (3)
● *"[…] from a farmer perspective the efficient management of our farm, so livestock and animal care and welfare in health and safety are all paramount"* (farmer, 21122)
Quality management, quality assurance and quality control (3)
Planning and coordinating production (2)
Health and safety management and operations (2)
● "[…] the physical and psychological well-being of our staff is becoming more and more important, and our focus is on ensuring that everybody is aware of the role that they play in that regardless of what level of the organization they're in, and at the moment as well was not only in the food industry but in general there is high litigation culture out there so it's apart from risk management perspective as well that we are compliant" (agri-food company, 23191)
Conventional versus /and Organic farming (2)
New industrial crops and bioproducts for the bioeconomy (2)
Animal care and animal welfare during transport and production (2)
Food safety management, food hygiene and food safety control (2)
● *"[…] again, we are in food business so again the highest standards for that from a Food safety perspective will always be one of our priority areas and especially when we're looking at that continuous improvement from a stat training perspective"* (agri-food company, 23191)
Production operations and management (2)

Table A8.4: Top soft skills, Focus Group Ireland.

Communication (5)
● *"so, my top three skills are the first one is communication, there's a vast amount of stakeholders that we need to engage with whether that's our own shareholders, board employees, customers, there's a vast amount so I think communication skills are critical in terms of creating a rationale for change and making sustainability or some of the complex concepts much more accessible and putting them into more laypersons terms"* (cooperative, 22212)
● *"I think that ability to communicate is going to be critical and you know that's very important"* (cooperative, 22221)
Learning continuously (3)
● *"The third area is in terms of lifelong learning and I think it's something that we see more and more a challenge around people coming into agriculture or second careers, but apart from that even farmers who are well educated in agriculture and have kept themselves up to date not getting any recognition for example their ongoing learning on the job and learning and experience that they've gained, I think there is an opening there for certainly recognizing that skill and may be incentivizing training programs by having that recognition in the existence."* (advisor, 25161)
● *"The last one is interdisciplinary knowledge to assess the whole value chain, so we're talking about a new Agri knowledge, new needs for forestry management building up to food feed and Bioeconomy*

activities integrating digitalization. I think this sort of knowledge-based approach and talk on lifelong learning will be important" (other, 28181)
Analytical, critical, and creative thinking (2)
• *"analytical, critical and creative thinking and again I just see it with us new graduates, I see it what kind of you know cousins and people of that age group that are graduating, at the moment the there is an inability to kind of decipher between facts and fiction, so I think critical thinking is very important and I also think we probably need some more creative thinkers in our industry as well"* (cooperative, 22221)
Being resilient, adaptable, and proactive (2)
• *"Yes, so mine were being resilient, adaptable and proactive is number one and that's based on obviously we have quite a lot of people working for us in the organization, but being resilient and adaptable and proactive are for sort of management of people, management of the teams etc Having the ability to be able to deal with day-to-day life and to keep themselves going strong, being adaptable and being able to see changes and you know make the right decisions on a day-to-day basis because we depend on them to make those decisions"* (agri-food industry, 23201)
Organisation, planning, visioning, and strategic thinking (2)
Providing leadership (2)
• *"I feel that that's so important in terms of setting direction and standards and I suppose even when things don't go perfectly to plan to continue to push through with what needs to be done and what's right."* (cooperative, 22212) • *"Number two would come in with Leadership so again in terms of leadership to within colleagues, within education in Teagasc and then leadership to our students and people who do our courses, so you're trying to lead them technically in terms of ways of running their business, but also we'll be dealing with a lot of school leavers so you're leading them from childhood into adulthood so there's another element of leadership to try get people to mature and to grow up as part of the course. And then in terms of the overall industry in terms of change management maybe trying to introduce new policy, so leadership was my number two."* (education provider, 24141)

Table A8.5: Top business-entrepreneurship skills, Focus Group Ireland.

Business planning/model and strategic management (7)
• *"And number two is business planning model and strategic management, I think this is just probably you know having organizations especially in today's sort of environment with low margins etc that we need to sort of reassess what we do on a day-to-day basis, we can't push additional costs onto the customer, so we need to look internally to try and reduce waste etc and understand where it's going and be prepared for what's happening in the future. And that follows then planning and coordination, production is just resetting how things are done internally, so you know making sure that when we have a flow within the organization that we have a map so everybody understands and that it's done properly."* (agri-food-industry, 23201)
Customers service (2)
New value chains/new business models (2)
Project management (2)
Specific sector legislation (2)

The moderator continued the discussion displaying on the screen a table showing in an anonymized format each of the participants' rankings of the top 10 skills and asking for participants' thoughts as to why the aggregate weighting of their rankings primarily show that skills are listed under the category sustainability skills:

Question 2.1 continued
Farmers
● *"I suppose just from the point of view of anything unless it's sustainable it won't be profitable and it won't survive, so sustainability is fundamental. Whereas I would argue digital, I would say I didn't put digital down at the bottom, there is an awful lot of digital stuff on our farm that helps us manage better now, like measuring and managing. The whole digitalization has been hugely beneficial for that, like we have on the day value for milk and what contents of it is. It really helps us to be better at what we do. So, I'm actually in agreement with the way it is, except I would have expected digitization to be higher up on the ranking"* (farmer, 21122)
Cooperatives
● *"[…] fact that we had the Green Deal last week and the 'farm to fork', look it's in the press every day I think, everyone can see I suppose 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, so I suspect that's why it's so high."* (cooperative, 22221)
Agri-food Company
● *"yeah, I think it's our decisions are based on where we are and even listening to people over the last 20 minutes and their choices. I suppose I am sort of basing mine on current challenges that we have here and where we need to grow. Sustainability is huge or us as well as and I mean everything we're doing we're doing it online to true groups etc. but I suppose it's all important." (agri-food-company, 23201)*
Education provider
● *"like the feedback from the industry to us and from farmers that we interact with, is that sustainability is the number one issue that is out there and it's really huge and we have to take obviously a long-term approach and it will require a lot of managing and resources, financial resources as well. I think the digital issue is we've seen how fast this country has reacted in the past three months and we're all operating, and you know as effectively as possible and using digital tools, but you know it's amazing how quick we can, it's easy to embrace you can do it in the short term and so on. Just as regards from an educational point of view we'd see digital tools as supporting learning and distance learning, but it's a support mechanism and there's going to be lots of innovative developments arising you know be it blended learning, flipped learning, personalized learning and so on. And you know there's going to be lots of new software coming on board now and I've no doubt that education is going to change, there's absolutely no doubt about it. I can see why it's lower down the rankings and that sustainability is just it's a far bigger overarching issue, and like digital is an easier and let's say area for us to implement change, it's not just the universities I'm talking about, but human beings. You know, we've seen how we've embraced it so quickly."* (education provider, 24132) ● *"Yeah, I think that the high ranking of the sustainability piece is because 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. So that's why probably sustainability as a broad theme has bubbled up to the top. But just I've been reflecting on the whole digitization piece and you know sometimes it's seen as a way of making things more efficient or easier to do or you know but like there are things like soil sensors, robotics, industry 4.0, blockchain around traceability and you know solutions for logistics that sometimes are a little bit harder as well to get your head around in terms of the optimization that they can bring. So, I think maybe you know in addition to the sustainability been high in the agenda that some of the digitization solutions are as of yet unknown and potentially that's keeping them suppressed a little bit just in terms of their ranking in that matrix" (education provider, 24232)*
Advisors
● *"yeah and I suppose look, digitization has been... people have found their own solutions I mean it's very rare now to find a farmer who hasn't adapted to the mobile phone but yet while an awful lot of people*

have got smartphones and you use them for certain purposes you see the uses in agricultural purposes has been shown to be quite low, so we still get a bigger response from text message going out to farmers than we do from emails for example, so you know we do have to think that we just kind of accept a tool to be used if you look at it that way, and you can be trained up in it or train yourself up in it over time. Whereas I think some of the more stuff around sustainability requires more, what will I call it, more study and certainly more application of effort on the part of farmers to get to grips with to know what's happening and to keep in touch with it." (advisor, 25161)
Forester
• *"I just want to make one comment about sustainability that I think was left out, which is social expectations. I think consumer behaviour and especially in consumer wants is driving a lot of sustainability and that's a good thing, but people care an awful lot more about where their wood comes from, where their food comes from, how that company produces that food and how they look after it and I think the Bioeconomy would track number two if the engine behind that makes a lot of that happen. And then just finally on digitalization I think it's important but sometimes it's further down the food chain because it can be quite expensive and it's often a luxury that some companies can't afford"* (forester, 26172)

Question 2.2: Would you add any skill you find missing in the lists? Why is/are important?	
• Healthy and safe working ways (farmer, 21111) • Time management (farmer, 21111) • Better doing (farmer, 21111)	• *"I think the skills that we have forgotten abilities are the skills to help the farmer on the ground, there's a lot of farmers out there who haven't, shall we say who are very busy and they forget about health and safety, they forget about like what Maire said time management and how to do things better. I think those skills have been left out* (farmer, 21111)
• Lean practices (farmer, 21122) • Time management (farmer, 21122)	• *[…] bringing in down to the basics and getting it right. And time management I think is something, we can be very busy fools and that's something that I suppose I think technology supports, around time management that's the only thing I would add"* (farmer, 21122)
• concept of influencing (cooperative, 22212)	• *"I would just talk about the concept of influencing but perhaps it's under communication. I think that's important still in this arena as well"* (cooperative, 22212)
• circular economy concepts (cooperative, 22221) • carbon markets + trading (cooperative, 22221)	• *"I was just a bit surprised there was no mention of circular economy and circular economy concepts. I think that's you know a big space and very much fits into the Bioeconomy piece. And another one which is maybe a little bit futuristic but it's going to become in my eyes very big is the whole area of carbon, carbon trading, carbon markets and I think it employs probably the most sectors here as well so"* (cooperative, 22221)
• process engineering (agri-food company, 23191) • continuous Lean improvement (agri-food company, 23191)	• *"yeah, process engineering I think is a very important skill especially in our industry where you're dealing with very complex and technical equipment, so the process engineering settings is a huge opportunity and probably a gap as well"* (agri-food company, 23191)

• coaching (agri-food company, 23191)	• *"Lean is all about you know continuous improvement and the losses, it could be linked into that"* (agri-food company, 23191) • *"[…] if you are to be serious about lean and continuous improvement it means a particular style of leadership is required, which is all around enabling people on the ground to identify the problems and to come up with the solutions as opposed to the historical directive management said which may have been more common in the past. So, process engineering, coaching and lean […]"* (agri-food company, 23191)
• business planning (agri-food company, 23201) • Lean management (agri-food company, 23201) • Coaching (agri-food company, 23201)	• "[…] also, I'm all about people management, but coaching I think is a big one as well" (agri-food company, 23201)
• Lean practices (education provider, 24132)	• *"the whole area of lean practices, in other words ways of creating more effective businesses by eliminating wasteful practices and increasing efficiency at the end of the day. Obviously, my relationship with regards to training is more with the industry and that is a big issue, and you know we're providing a lot of training and increasing amount of training in that area. So, it's something that I think warrants a mentioned"* (education provider, 24132)
• motivational skills (education provider, 24141)	• *"The one that I thinking about was in the area of motivational skills that in terms of a lot of times a lot of the stuff that's in the chart, there's a lot about knowledge, there's a lot about the tools and the skills, but in terms of trying to get people to actually take those on board and do something […]" (*education provider, 24141)
• bio process engineering (education provider, 24232) • refinery technologies (education provider, 24232) • circularity (education provider, 24232)	• *"I mean the one that jumped out for me as well was the whole area of the bio process engineering and those kind of I suppose skills for bio refinery technologies and those types of advances"* (education provider, 24232)
• Network running and participating skills in EU operational groups (advisor, 25161)	• *"I'm not so sure we have the skills certainly within the professional among the advisors to have the skills to properly facilitate these types of groups, and I would also question if the farmers really have, our farmers or other actors participating in them, have got the skills to run a network or to be part of a network and understand really what it's about"* (advisor, 25161)

• carbon trading (forester, 26172)	• *[…] "just one of the speaker's brought up there about carbon trading and actually I think that that's something that would be very important "*[…] (forester, 26172)
• Agri tech engineering (other, 28181)	• *[…] "you know I was trying to reflect a little bit on some of the equipment or some of the technical practices that might be required around drying or for example the grass biorefinery piece of machinery that was used in the biorefinery GOS project that Carberry are involved in, I was just thinking that maybe I didn't really pick up on that sort of Agri tech engineering technology skills base that maybe could complement some of the work that we were considering"* […] (other, 28181)

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
There is a balance between soft and technical skills foreseen. Whilst with the soft skills, people did not see these specifically changing but rather the way they learnt, via changes in content and also the methodology in which they are learnt / delivered. Soft skills included things like communications, leadership, team building, organization planning, quality management, customer service, data handling, project management and change management. However, to the fore were some core hard skills requirements, such as succession planning, mental wellbeing (due to rural isolation issues) and people management (from a labour perspective at farm level). These were seen as being fundamental to the future of farming and across the food industries. Further to this the area of the environment and sustainability was also highlighted as core future skills needs. It was felt that sustainability would primarily be driven by legislation and EU and International environmental policy requirements, including the whole area of climate change and the need for new forms of packaging. As sustainability practices advance the circular economy and the area of regenerative agriculture and ecosystem service-based approaches was also seen as a future-skills need, in terms of sustainability and understanding the broader value chain. Areas such as renewable energies, such as solar, wind, water and biomass and carbon sequestration and on farm efficiencies and the understanding of the efficient use of resources were also deemed necessary skills for the future. Elements such as water quality and biodiversity and the carbon profile were also mentioned, the new for farmers and foresters to align themselves with new industries, beyond food and feed to areas such as chemicals and materials industries and how to deal with new industries and dealing with this data-driven approach. Digitalisation was also highlighted as a key future skill need. Specific emphasis was placed on the areas such as Precision Agriculture (precision animal health, precision soil and nutrient control), Lean, Mechanical Operations and both Electronic and Robotic Automation, as well as Artificial Intelligence. There was a belief that as the digitisation piece advances it'll be the progression of industry 4.0 approach potentially to the Bioeconomy, not just the Agri tech aspect but more around the optimization of the biomass production, of the bio processing, of the harvesting timeline so that whole area and the bio-based alternatives start to come on stream, this whole transition to bio-based will become more of an issue, so potentially skills around new product development and the replacement of petrochemical and unsustainable ingredients.

Additionally, as more and more data is being collected on farms every day and more sensors and automation becoming available, there was a need to be able to analyse that data at a practical level and make more use of it going forward.

There was a feeling that there was a greater need for more co-operation, collaboration and looking at new organizational models such as industrial symbiosis so people (companies and primary producers) will start to look within their region for more opportunities for collaboration and value creation.

- *"I think the management of people and how they survive the change process, not meeting somebody if you're in an isolated job which is what farming is, so I know it's a very basic fundamental thing, but I think it's something to look at"* (farmer, 21122)
- *"I think we'll see more focus on precision animal health, precision soil and nutrient control, they're in my top 10 but they would go up higher on the list"* (cooperative, 22212)
- *"Yeah, I think the sustainability agenda will continue to grow, so I think that will remain as number one but maybe in a more dominant fashion. Yeah digitalization, smarter and better ways of doing things will also become important. As will new and better ways of leadership and innovative ways of moving motivating and engaging with staff" (agri-food company, 23191)*
- *"I think the environmental and sustainability issues would still be top of the agenda and I think another area that in relation to the industry is very important is new forms of packaging in the food industry. I think that digitalization will increase in the listing, I think there are things going to happen that we haven't even touched on yet in that respect. Maybe in other skills, looking at mechanical operations, I'm back to lean again, I think there's an increase in lean practices"* (education provider, 24132)
- *"okay I'm just looking at my top ten, most of them are around the soft skills so things like communications, leadership, team building, organization planning, quality management, customer service, data handling, project management, change management. I don't think the skills will change, what will change is what we're communicating about and what we're leading about, so I think the content of what we'll talk about will change dramatically but the actual top 10 skills that I've written down I don't see them changing, but I think the actual content and what we talk about and how we talk about it will change dramatically"* (education provider, 24141)
- *"I consider sustainability would be a huge issue going forward, for as far as you'd like to go forward, other issues would be renewable energies from the likes of solar, wind, water, biomass, all that area would be huge potential further going forward"* (advisor, 25151)
- *"I would say this yeah I would see a bigger emphasis coming on the digital stuff, but I think it's going to be much more around smarter farming and smarter technologies and more sensors, more automation, more information being gathered on farms to make better decisions, but the degree to which this is going to be black box type stuff that the farmer doesn't really need to know about I think it's very much the way it's going and ultimately yeah the learning curve for farmers mightn't be very long on this because it's not something that they need to understand, they only need to know the result."* (advisor, 25161)
- *"I think that the whole environmental sustainability ones will continue to remain quite high up. I think that there will be technological advances that will come on to that and lift that, that we don't even know about at the moment. But definitely digitalization and technology will go further up the list and safety, health and welfare" (forester, 26172)*

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?

A consistent message came across from industry on what they deemed to be the top 5 skills.
For Farmers the skills highlighted were:
Farmer Owner Level:

Strategic Management	Business Integrity	Managing People	Innovation	Biodiversity
Corporate Responsibility	Resilience	Corporate Governance and Transparency	Analytical Critical and Creative Thinking.
Communication	Sustainability Knowledge	Environmental Management	Empathy/Care
Health and Safety	Food Safety Management	Business Management Compliance	Education and Continuous Professional Development
Business Skills	Horizon Scanning	Identifying and Prioritizing the Opportunities	Looking at the Regulatory Landscape

Farm Manager Level:

Livestock Efficiency	Plant and Animal Breeding	The use of Antibiotics
Herd Management	Food Safety and Traceability	Continuous Improvement
Breeding	Feeding	Plant Production
Grassland Management	Good Agricultural Practices	Biosecurity
Efficient Use of Resources	Integrated Management Approaches (Tillage Farming or Animal Farming)	A Combination of Productivity and Sustainability Combined Approaches to Farming

Operative Level:
There was a discussion specifically about operative level and the general consensus was the operative should be able to do what the farmer has shown him, mainly basis around manual labour. Skills in this regard were not specifically touched on.

It should be noted that in many cases there is no differentiation between levels as not all farms are structured with various levels. Many farmers are sole traders and are the only persons responsible for the farm operations and the farm business.

Food Industry Skills Requirements: There was a broad discussion on the skills requirements at food industry level, but it did not delve into the individual levels required based on differing job profiles.

Core Skills identified for the food industry included:

Soft Skills	Managing People	Corporate Responsibility

Corporate Governance and Transparency	Analytical Critical and Creative Thinking	Communication
Team building	Conflict Management	Delegation
Resilience	Decision-Making	Performance Management
Transversal Skills	Critical Thinking	Problem-Solving
Innovative Thinking	Self-Motivation	
<u>Technical Skills</u>		
Innovation	Sustainability Knowledge	Environmental Management
Health and Safety	Continuous Improvement	Lean Management
Production Operations and Management	Food Safety Management Skills and Traceability	Quality Assurance
Quality Food	Mechanical Production Skills	Process Optimisation
The Ability to Adopt New Technologies	Technology and Data Analytics	
<u>For Foresters the skills highlighted were:</u>		
Technical Skills	Planting and Replanting	Forest Management
Harvesting	Forest Design	Ecosystem Services
Carbon Sequestration	Designing the Whole Forest Area	Environmental Management
Forest Disease Control	Technical Knowledge	Legislation - Regulations Around Forestry
Efficiency	IT / Digital Skills	
<u>Soft Skills:</u>		
Sales	Customer Service	Communications

- *"[…] the most important skill for farmers at the moment is to be able to manage his business with a high degree of integrity, seen as the demand for food and the need for food traceability is getting more important all the time"* (farmer, 21111)
- *"yeah, from the food industry perspective I'd say that the five most important skills are food safety management, your food hygiene, the whole safety control side of things. Health and safety becoming more and more so, continuous improvement continuing looking for newer and better ways of doing things. The whole area of team building and conflict management it's more and more important that people can work together to achieve results and to remove any barriers to that as we go along. Finally, an environmental management, I think we have obligations on that front and that all employees it should be all in on that" (agri-food company, 23191)*

A8.5 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?
Question summary (what was agreed, what was disagreed and what was just commented without discussion

• Leadership (agri-food company, 23191 and 23201) • People management (agri-food company, 23191) • People understanding (agri-food company 23201))	• *"From a food industry perspective, I would say leadership skills. In this industry people typically come up through the ranks. Our main capacity of promotion is based on technical competence and we fit in leadership management and training along the way. So, I would say that there are gaps there on that front, so there are people management and leadership training sessions to help people as they move through the pipeline"* (agri-food company, 23191) • *"Normally a manager's ability is being based on, promotability is being based on their ability to look a level beneath. But then again you have a very small core people at the very top making decisions based on what they understand of the business, but down on the floor where the professionals are actually working and doing the job on a day-to-day basis, there's little interaction, there's too many layers. So yeah, leadership is a huge one there, just to be able to understand if you're being a leader, to understand who you're leading. And that then goes back to I suppose a comment that was made earlier on about farmers and understanding farmer, it's right through the chain, understanding who it is you are dealing with."* (agri-food company 23201)
• Food technology (education provider, 24132) • Food science (education provider, 24132)	• *"Yeah just a final comment is just based on again working with the industry, in the whole area of production supervisors, like we're currently working with ICOS Skillnet on a program there, but that's an area where people are just crying out for training really, not only on the soft strokes transversal skills side of things but also on the technical side because sometimes people are going into the industry and they're not, you know they've an induction program or whatever, but they're not all coming in with the same qualifications and so on and the basics of food technology, food science and so on. And there's a gap there and it is being addressed to a certain extent by ICOS Skillnet in let's say for duty every sector, but in the general food industry I think that's very important."* (education provider, 24132)
• Facilitation for farmers (advisor, 25151) • Knowledge transfer (advisor, 25151) • Facilitation skills (advisor, 25161) • Interactive innovation (advisor, 25161)	• *"the whole idea of facilitation for farmers, and also knowledge transfer and the adoption, farmers who adopt these new technologies, there's new technologies are coming at an enormous rate and we need to get farmers to adopt these new technologies and the skills of getting farmers to do that is a highly skilled profession"* (advisor, 25151) • *"I suppose I would always think that the area of facilitation skills, particularly among the professionals that are dealing with farmers are vitally important. And often times the issues that are arising in discussion groups, for example they're very much more effective when they're teased out in a properly facilitated environment than they are in a one-to-one with farmers. So, I think as a professional I think advisors certainly need to embrace those skills, but equally other professionals that are working*

	with farmers as I said before on kind of areas of interactive innovation, I think there are lots of new stuff coming there that we, certainly as it as a community, need more training in." (advisor, 25161)

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)	
Question summary (what was agreed, what was disagreed and what was just commented without discussion	
• Safe working ways (farmer, 21111) • Train the operatives on farm (farmer, 21111)	• *"[…] there's a big need for training of operatives and also with the health and safety area in farming. There's a big need to train people to see how they work and make sure that they work safely."* (farmer, 21111)
• Health and safety skills (cooperative, 22221) • Environmental management (cooperative, 22221)	• *"yeah, I totally agree with Marina's point on the environmental management, I think that applies to our sector as well. And I suppose the other point that I'd make would be health and safety, I think especially post COVID we're looking at a different landscape and I think again health and safety skills and training are required across all the sectors, so I think that's one maybe where there's a bit of a spot going on"* (cooperative, 22221)
• Learning transfer (agri-food company, 23201) • Language skills (agri-food company, 23201)	• *"I think there's a lot of training out there, but I think what's missing is the adaptability of the individual when they come back on site and try and transfer that learning on site, I think there's more thought process that needs to be put in there, so for instance a supervisor may have many tasks and structurally quite a busy day and then they're expected to come in and try and explain new leadership skills to a team of people who don't have an understanding of what they're talking about, they might try explain Lean management and then that training, a large part of that training, then isn't transferred and is forgotten about afterwards, and then there's an expectation on them to know everything. But the environment that they are coming into is important, so systems is important too, you know. Sorry can I just add, can I just jump in there. So, I think there's a lot of skills out there, there's skills and there's courses for almost anything that I would need for in the industry. The problem is that it's the adaptability of the learner and the transfer of learning afterwards, and so you learn it from the book, you go in and you have to try and transfer learning. But I think more has to be done on the actual learner themselves, there's confidence issues because people moving up, some people in the industry mightn't have a great education and then they're having to become academics. Then there's language skills, there's age skills, there's a lot of different skills there that aren't looked at, so if I was putting a group of people on a course, I have many different factors to look at, even if they're coming from the same type*

	of environment or department, and I think a lot of focus needs to be put on that." (agri-food company, 23201)
• Team building (education provider, 24132) • Conflict management (education provider, 24132) • Transversal skills (education provider, 24132) • Sustainability (education provider, 2141) • Management skills (education provider, 2141) • Circular economy (education provider, 24232) • Business models of the Bioeconomy (education provider, 24232)	• *"I think more training could be provided in general in the industry in the general area of performance management, team building, conflict management, some companies are very good at it and are very aware of it, and they're aware as well of the transversal skills, so there there's a bit of a gap there. I think that we all have to look, the training providers as well, have to look, and the industry, will have to look at the whole digital side of things and how we can help each other in that respect, and some more research needs to be done on that"* (education provider, 24132) • *"just in terms of the operator skills that at farm level, like they would have a lot of the management skills but we'll say that what's happening is that there's difficulty in terms of getting people that will act as operators, tractor drivers, milkers at that level, so that in terms of where the future is going to be in terms of the operators at a farm level is an area that needs to be addressed, and not sure what's going to happen there in terms of a lot of families are getting educated, getting degrees and moving away from the business. So that whole area of operator training in terms of we'll call it the livestock carers, the tractor drivers and the milkers in the industry is something that may need to be addressed. What I mean is sustainability is now becoming core. It's being integrated in with production, and if you take something in terms of things like sufficient grass management is being covered as a technical production of how to produce grass, but the whole area sustainability and the EBI and breeding and lower mortality, all of those issues being integrated into the programs. And it's being done in such a way to try and integrate them into the technical subjects, rather than having it as purely stand-alone modules on the sustainability. Now we'd have reviewed a number of higher education programs too, like there is a lot of modules now being developed on sustainability at degree level and at level 7 and level 8, so I think there is quite a strong emphasis on sustainability. It probably takes a while for that to filter through the system, that the people that are currently in college probably won't be I suppose in effected roles for four or five years, so it takes time for it to impact. But I think the programs have adopted quickly, both in terms of Teagasc programs and further education programs, and the higher education degree problems as well."* (education provider, 2141) • *"yeah so, I think in my interpretation that a lot of the skills areas that you've identified that there are significant gaps, there isn't a huge amount of provision, in particularly the whole area the circular economy isn't addressed really in the Irish education system in a proper way. I think a lot of these the skills and the technology areas and the opportunity scoping and even the business models of the Bioeconomy and the collaboration piece,*

	that's not addressed. I personally feel that there is a big gap. In terms of the ability to access education, I think the higher education sector through springboards, through the professional development programs and through the skills met, that there is good access to training, but I just think that potentially the issue is that the right types of programs haven't yet been developed for some of these areas" (education provider, 24232)
• Environmental management with regards to forestry (forester, 26172) • Ecological assessment (forester, 26172)	• *"So my overall comment and based on my experience is that training to cover what's going on in forestry and in particular at the moment it wouldn't be suitable, there would be very little training and the little forestry sector has transitioned quite recently through its licensing system that we must undertake very strict environmental screening on all activities that we do, and this has happened in the short space of time and it's left a lot of people, foresters young and old and everyone in between, trying to tackle. And I think the whole area around environmental management with regards to forestry, its more the process than the actual managing on the ground, I think foresters technically would have always generally did manage to the best of their ability. But it's the process and it's presenting that information, we have to know about habitats directives, we have to know do we do ecological assessments, there's so much more that we have to know. And just finally when I look at the top 10 that I put down on the list, I would say like all of them, that we would need training in all of them. From the forestry perspective really once you leave the universities or the ITs that's it, the only training really you access after that is through field days, through professional field days, there would be very little. We have recently in the last couple of years DAFM would start doing training on some of the requirements that they have with regard to land classification and habitats directive and that than but up until that no, and there's very little places you can go for it. Yeah, I was just going to say, I suppose that I would notice a difference you know based on what Barry said about how prepared graduates are for coming out to work in the industry in the private sector, I should clarify within forestry not public sector. That within the two main higher education bodies there's a different approach to it, and that one of them is very much tailored to coming out and working in the industry, and then the other one is very much tailored toward academia."* **(forester, 26172)**

Q3.3. Do you think skills need to be trained in different ways, depending on the people to be trained? (Group question)
There was largely an agreement among all participants that skills can be trained in different ways. A discussion took place around the best way to teach someone a new skill and the point was raised about the level an individual might be at. It was felt that people in education or early career development phase of their lives

are more susceptible to a college and formal learning approach than someone who is learning throughout their working life and that the approached for teaching these two cohorts of people were totally different.

Consideration was given to a variety of methodologies to deliver learning, including face-to-face, virtual classrooms, online learning, and a blended approach and how these may be delivered. There were mixed views on the specific delivery methodology, but all participants agreed that a blended approach (a mix of all methodologies) was the best approach for lifelong learners (adult learners).

When discussing what the learning should look like, it was clear that learning had changed from traditional learning to a more blended bite sized solution. There was a feeling that a lot more flexibility was required within the education system and across professional development programs.

There was agreement that a lot of the modules in the undergraduate programs were progressing in terms of advancing the whole sustainability agenda, but too many modules were buried within undergraduate curricula. Participants felt that if these could be pulled out and made available to lifelong learners and in a CPD context it would add a lot of value.

It was also agreed that lot of people in practice, like practitioners, foresters, farmers, and those in industry have a lot of knowledge acquired to the work that they're doing in the workplace and this brought about a discussion on the importance of recognition of prior learning (RPL) and rewarding people for the learning that they're doing actively in the workplace was something that participants felt should be embraced further to reward people for the day-to-day learning that they do. This then highlighted the concept of work-based learning, which enables people to learn in the workplace so that they get recognition for this. this was seen as important.

Education providers

- *"In relation to the nature of skills they can be…people can be trained in different ways. If you were let's say in the food industry now and you have a course on that's dealing with the fundamentals of food chemistry or food technology or whatever and something like that can even be delivered online, but where you have a course where there's people development involved interaction is really important"* (education provider, 24132)
- *"I suppose a lot of the learners that we will be dealing with through the conversation that we've been having today are lifelong learners. So a lot of these people will be in the workplace looking to go back and upskill, so you know they may not have been in education for a long time or they may be pressured with the amount of time that they can have to dedicate to their studies, so there's a need to be sensitive to that, so I think it's all around the packaging of the learning and special purpose of awards or these kind of smaller micro type courses and more manageable pieces of learning that can be built over time to create a larger qualification. So, I think there's a need for a you know a lot more flexibility in the system, I think things like springboard and the professional development programs are introducing that. I think potentially as well it was mentioned that a lot of the modules in the undergraduate programs are progressing in terms of advancing the whole sustainability agenda, but a lot of those modules are buried within an undergraduate curricula, so if they could be pulled out and made available I suppose to lifelong learners and in a CPD context that would that would add a lot of value. And somebody mentioned at the outset that a lot of people in practice, so practitioners, farmers and those in industry have a lot of knowledge acquired to the work that they're doing in the workplace. So, this whole area of recognition of prior learning and rewarding people for the learning that they're doing actively in the workplace is*

something that I think could be embraced further to kind of reward people for the day-to-day learning that they do. And then the whole area of kind of work-based learning, so enabling people to learn in the workplace so that they kind of get this double bubble effect really for their time is something that's important. And then the final piece I just want to add is the whole area of best practice and accessing I suppose industry experts to provide training and to bring in that kind of Industrial edge into some of the programs that are being rolled out, that would be of benefit as well." (education provider, 24232)
Advisors
• *"I think the area what we're talking about here, actually training is the wrong word it's continuous professional development that we're talking about, and we assume that people have basic skills or have learned on the job a certain amount, but how do they advance to the next level, so how does somebody who's an operative at a particular level see themselves in terms of advancing through training or through development of their own skills. And this is very important, and Frank referred to this previously around the area of motivation, I mean I see it even people who come to me, I had an email today from a former student of who, you know, after spending four years milking cows and managing a big dairy herd wants to advance, to go back and advance to do a professional degree, and to me the system should really encourage that, but it doesn't, it blocks it actually. So, we have to we have to start looking at ways where we can see people maybe advance to achieve their potential."* (advisor, 25161)

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)	
Question summary (what was agreed, what was disagreed and what was just commented without discussion	
• Learning on the job - experiential learning (agri-food company, 23191) • Mentor (agri-food company, 23191) • Coaching (agri-food company, 23201) • Mentoring (agri-food company, 23201) • Best practices (agri-food company, 23201)	• *"yeah, I think that 70 % of all learning takes place on the job, so I think a key challenge is to help people with their experiential learning, even practices like keeping learning logs be able to transfer your knowledge from one experience to another. And then for managers who are working alongside individuals who are on learning pathways the challenge is finding ways to equip them with the skills and knowledge to enable learning, and again in the type of industry we're in where there's probably a lot of busyness and a lot of busy fools, the space for reflective learning day to day doesn't always apply, and even though there's a lot of learnings through experience we're not able to assimilate it properly, I don't think. So, it's a matter of giving our managers maybe a different mandate but also giving them the skills, they need to mentor and coach, but also for the actual learners, to help them to capture their day-to-day learnings on the job, and that's not a not an easy ask"* (agri-food company, 23191) • *"I think just thinking outwardly Billy and listening to you, like classroom etc and where you get a pre-packaged course and bring it in, a lot of the managers that I would deal with supervisors etc are grown from within an industry, grown from within this business, I think a large part of what's missing is probably coaching, mentoring which I'm a great believer of, but also understanding what other companies do. So, learning from what else is out there, best*

	practice, somebody out there is probably doing something similar to us and came up with a fantastic idea, we should be able to share those ideas as well and learn from other people. Because it's very hard for me to explain to somebody "this is how you do it" when they are professionals in their own heads, they feel that they are the best at what they're doing, but they're only doing what they've seen done before." (agri-food company, 23201)
• Coaching/mentoring (education provider, 24132) • Learning from others (colleagues, team) in well facilitated discussions (education provider, 24141) • Best practices (education provider, 24232) • Challenged based learning and collaborative learning (education provider, 24232)	• *"Just a recent experienced with us in the foundation skills and management course, what we did was a bespoke one just for one company and just to ensure that the attendees translated their learnings into practice. There was an assignment given to the different people on the course and there was an academic mentor and then there was an industrial mentor, so it could have been their line manager or whatever and would have mentored them over a couple of months in actually doing this very practical assignment with them. So, it transferred the learning into something real life on the floor in the factory. So, and I just wanted to mention that in regard to the coaching/mentoring side of things."* (education provider, 24132) • *"As far as training, well first of all I like to be interactive if it's something that is literally an expert comes in whatever area it is that all the information been broadcast to, like group work, when you get to maybe work with a group of other fellow learners and you get to know them, so I think you can learn a lot from other members in a group, but it is something that is…allows discussion and group work that is well facilitated, and I think one the big difficulties we have with training is we tend to probably put too much into training days, that we're probably sometimes better maybe just to look at the agenda and then get rid of 30 % of it and gave what we need to a bit of time like so. That's the type training that I personally would prefer or enjoy."* (education provider, 24141) • *"Yeah, I just want to come in on the best practice piece, I mean we've experienced true knowledge transfer programs and doing these kinds of missions, where you bring people to models of best practice whether it's a farm or a processing facility, so that they can actually network with their peers and learn from actually being in situated in a particular environment. We've found that to be hugely effective and really appreciated by people who are coming from working environments into those places to learn, so that has worked really well. And then I think another point to consider is in the context of sustainability and this kind of regional approach that we're promoting, I think you know looking at challenged based learning and collaborative learning and this kind of work networking and working together around particular sustainability challenges, I think is something as well that's worth considering as an alternative way to the kind of traditional learning as well."* (education provider, 24232)

A8.6 – Final remarks

Q4.1: Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, facing the current and future market/social needs?
• *"Yeah, just in relation to self-awareness. I think it's important from the point of view of learner or anybody else in any type of industry, understanding themselves is very important to their own well-being, their resilience how they deal with things, I think the use of psychometrics could be very good at that as well."* (agri-food company, 23201) • *"Somebody mentioned earlier on about succession planning, that in terms of the next generation that are going to take over, particularly whether it's farming or forestry or the food industry, just in terms of an ascending happens with small could be retailers or small independent shopkeepers and self-employed businesses that in terms of trying to where was the business going to go in terms of the next generation. So, I don't know what the answers are but there is an issue there around succession planning and passing their business on to the next generation "(education provider, 24141)* • *"One of the things that certainly we believe in Teagasc is that the learning process is very much partly achieved in, with young students particularly, true a placement system and through work experience. I think it has to be mentioned in terms of formal training the importance of work placements and work experience, and I think that this is something that maybe we should be working into programs, and the idea of having exchange programs where from one organization undergoing a training program would participate in training in another, or work experience in another environment, to achieve that that skill of training, and you know this applies to Lean and lots of other systems and those help with the motivation of learnings among the people."* (advisor, 25161) • *"[…] Even the international element, exchange programs given that this as Erasmus, you know that there can be quite different outlooks in terms of markets and social needs in different countries, and I think Tom's point is well made on exchange between companies but also between countries. And all be it expensive but there is European funding to back this up, to build up this element, and I think this can be very interesting. Just one final point from me as well Seamus, Patrick Barrett again. Just I was involved in an Innovation review across the Agri food sector over the last 18 months and one of the things that had been pointed out to us by several agri-food companies that were interviewed for this process, was the difficulty in managing different types of innovation. So, there can be short term innovation that's required and maybe medium and more radical innovation. And keeping a space for all these types of innovation given the different matters that come up and that the management have to deal with in the agri-food sector and bio-based sector can be significant. And maybe some of the people in those positions might want to comment on that, but that was certainly a point that was made to us being able to manage four different types of innovation and keeping them all on the agenda when there can be different situations arising." (other 29181)*

Annex IX: Focus Group Spain-Portugal

A9.1 – Executive summary

Main results, conclusions, and recommendations of the Iberian Focus Group:

- Adequate legislation, planning and water management (1.18) as well as good agricultural practices (1.17) are essential to guarantee 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.
- Specific and continuous training is recommended for each job, combining different methodologies, both online and face-to-face, but always dynamic and participatory, accompanied by technical visits to learn about other realities and technologies of success stories.
- It is necessary be aware of National and EU environmental policies, regulation, subsidy, and support programs (1.10) as they condition the approach and management of the agricultural enterprise.
- For the agri-food industry, and especially for agriculture, it is essential to promote the use of renewable energies (1.12 and 1.13), and especially photovoltaics, both in small isolated systems and in large systems that allow the discharge of excess energy generated into the electricity grid.
- Digital systems to support production and production management (2.15 and 2.16) and digital farming (1.17; 2.19; 2.20 and 2.23) are essential for the present and future of the agri-food system, making it necessary to increase training in digitization, as well as data management and analysis, within an ethical framework of information confidentiality, to improve work organization and professionalization.
- Establishing a good financial and business planning base (Business planning / model and strategic management 5.7) is essential to generate value and profit. This must go together with proper planning and coordination of agricultural production, always adapted to market demands, always trying to find new business models.
- Communication (4.1) is essential to, among other things, explain to society the role of the agricultural sector in ensuring the production of safe and healthy food.
- The organization, planning, visioning, and strategic thinking (4.6), as well as the analytical, critical and creative thinking (4.3) are essential to meet the challenges of training, creativity and environmental, economic and social sustainability of the company.
- Innovation management and its deployment on-site (5.19), as well as business planning/model and strategic management (5.7), including the collaborative value chains provided by the competitive ones (5.10), to meet the challenges and technological changes to ensure the sustainability of the company, adapting to economy and market evolution.
- Logistics and supply chain skills, mainly for transportation (modalities and planning) & logistics management (3c.12) to improve profitability, reduce pollution and make it more sustainable.
- To influence issues such as food waste, packaging management, pollution, and the circular economy

A9.2 – Composition of the Focus Group

The Iberian focus group was comprised of 10 participants, 1 moderator and 2 rapporteurs.

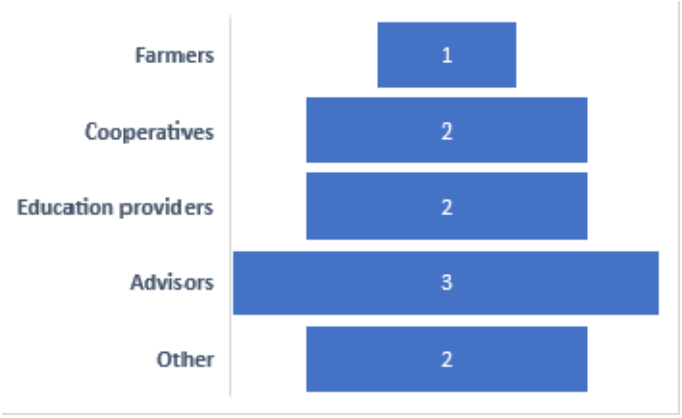

Figure A9.1. Composition of the Iberian focus group

A9.3 – Participants' networks

Question 1.1: Considering the whole food/forestry sector in which you are involved, who would you describe as being your most important collaboration partners in your daily work?
Farmer 31181
• Regional, National and European administrations: technicians and politicians
"In the end they are the ones who set the playing field for us, they are the ones who set the rules that we have to follow to carry out our activity. And they are getting more complicated every time, those environmental policies that are decided in Brussels, the electricity tariffs that are imposed here and which I think increasingly complicates the profitability of farms"
Cooperative 32151
• Our SAT cooperatives and their technicians • Ministry of Agriculture and Agriculture Council of Castilla la Mancha (training activities and competitiveness improvement services) • Confederations of cooperatives • Cooperatives • Financial institutions (sponsoring of transfer and dissemination events • Partners in national and European projects
Cooperative 32201
• Cooperative
"The most important partner is the cooperative, to which I belong. As I am from a region where small land predominates, the cooperative allows me to position myself in the market, which is essential for small and medium farmers. Then, through the cooperative, I have access to innovation, research and everything that represent technological news in my sector (in plant health, irrigation). The cooperative has important members as research organizations, universities and through them we get in touch with all the legislation that farmers must comply with. It is the aggregating element of small and medium farms"
Education 34141
• Food industry • Agriculture sector, mainly the industrial part

"We carry out projects of product life cycle studies from the farm to the table from the beginning of production to the end. In other words, we see ourselves at the business level of the company as a more integral thing within the whole value chain, from agrarian or agricultural part to the final product use."
Education 34172
● Companies from the agriculture, forestry, and livestock sectors ● Ministry of Agriculture ● Universities ● Other public entities
Advisor 35111
● Irrigators mainly ● Administration, mainly the Hydrographic Confederation ● Other administrations: agrarian administrations of the Regional Agriculture Council ● Universities through research projects ● Financial organisations (banks, public financing)
Advisor 35121
● Irrigators ● General Directorate of Agriculture, with competences in irrigation issues
Advisor 35161
● Bosses, members of the Governing Council of the Board of directors of the association ● Co-workers in the association: technicians in different fields: agri-food sector, urban-planning, environmental issues, projects, communication ● Partner entities: cooperatives and their companies
Govern. agency 38132
● Food industry ● Agricultural cooperatives and their transformation part
Govern. agency 38192
● Agricultural organizations, in vocational training projects, and projects of knowledge transfer and preparation of different technical guides

A9.4 – Skills

In the Iberian Focus Group, participants' overall selection and ranking of their top 10 skills, figure A9.2 shows that respondents selected most often sustainability skills followed by digitalisation, bioeconomy, and business/entrepreneurship skills (similar percentages). Soft skills were selected least often.

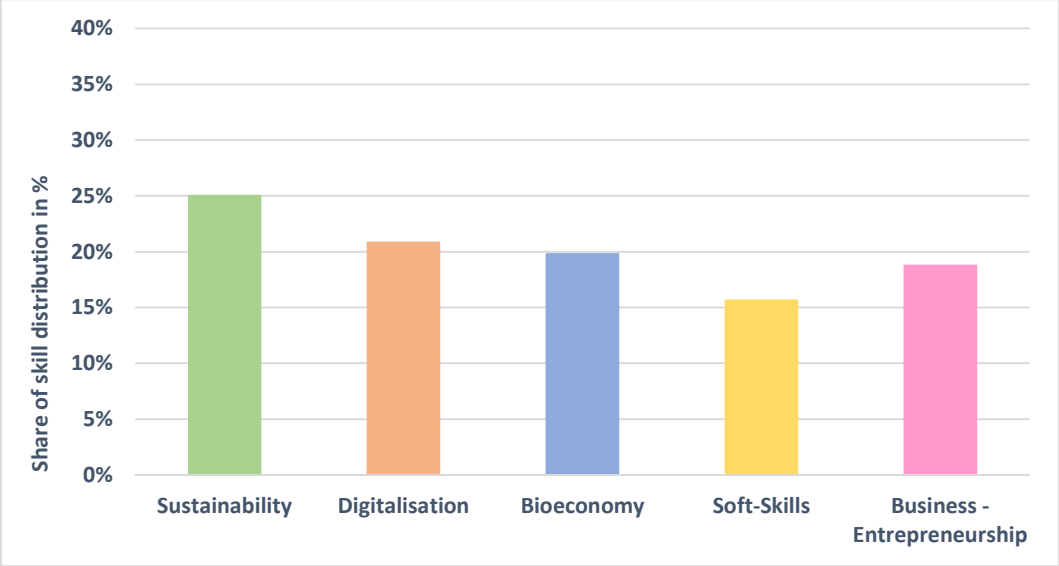

Figure A9.2: Share of selected skills in the top 10 rankings by skill category, Focus Group Spain-Portugal

In more detail, the graph below shows that not only sustainability skills are the most selected but also are in higher positions in the rankings, suggesting in general that these skills are more important to the participants.

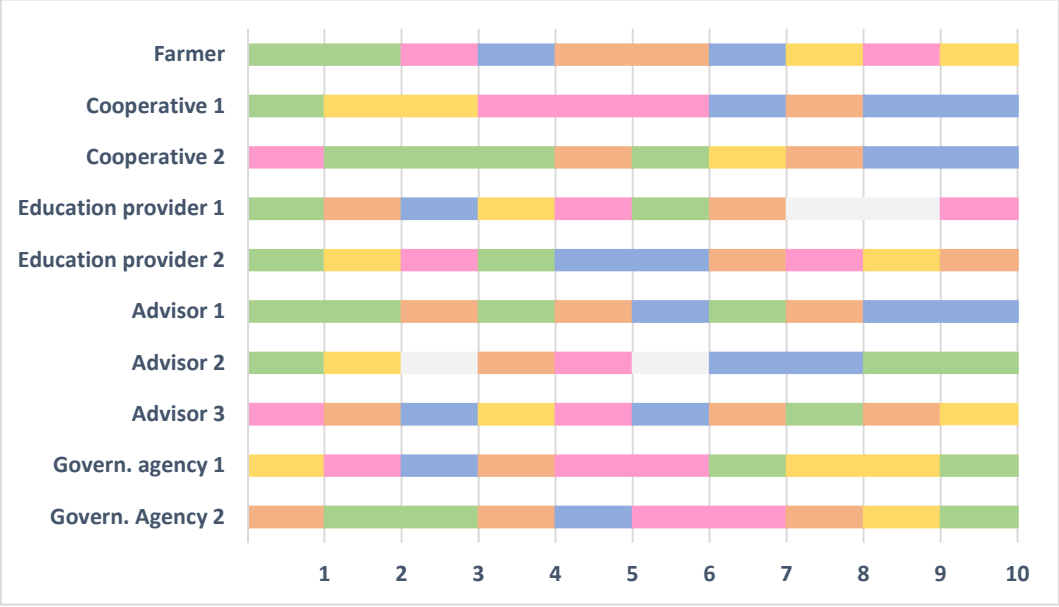

Figure A9.3: Stacked bar for the top 10 skills in the Iberian focus group

In view of figure A9.3, 9 participants selected and ranked sustainability skills among the top 3 skills and 8 selected a sustainability skill as the first in importance. Digital skills were in the top three positions for 5

participants, and business skills for 4 participants. Soft skills were ranked as the 3 most important only for 3 participants.

When looking at which specific skills were selected and ranked, the ten most selected skills are presented in figure A9.4.

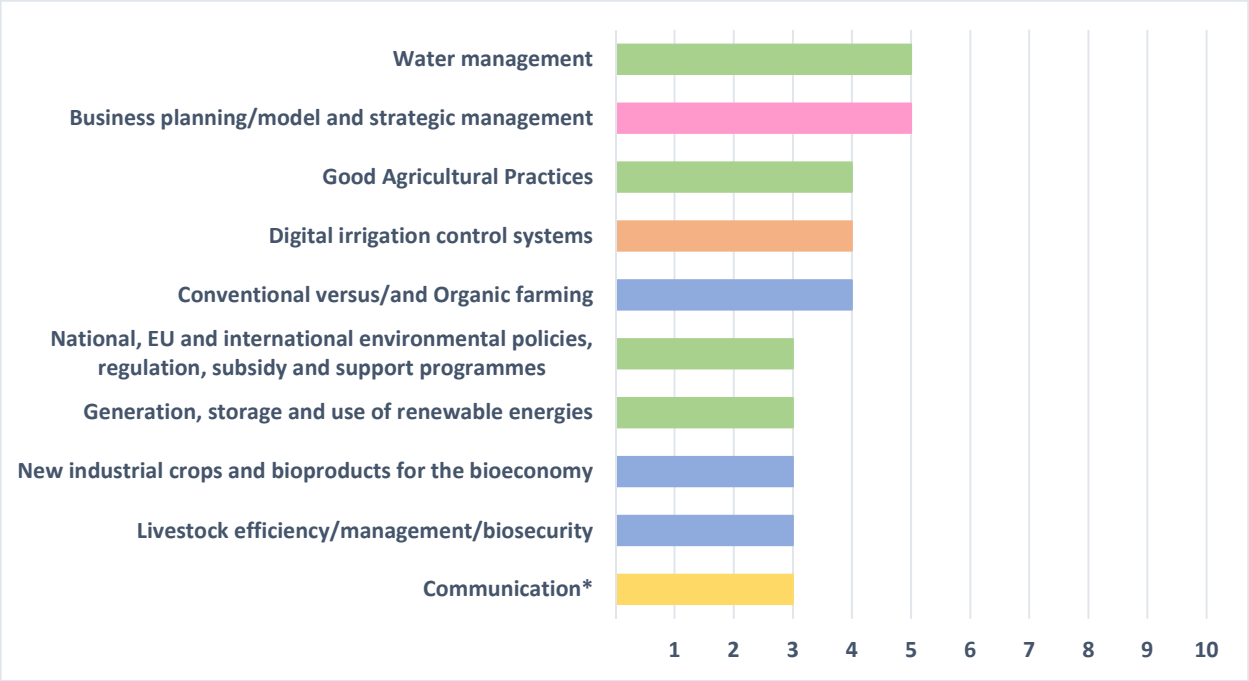

Figure A9.4: Most selected skills in the focus group rankings, Focus Group Spain-Portugal [n=10] (*there is one more skill that was chosen 3 times)

Within these skills, *water management* was ranked the first for two participants, the same happened with *national, EU and international environmental policies and regulations*. *Generation, storage and use of renewable energies was ranked first for one participant* and also *business planning/model and strategic management*.

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Relevant quotations were included where applicable.

Table A9.1: Top sustainability skills, Focus Group Spain-Portugal.

Water management (5)
● *"There are many advances in technology to do good water management, both at the user and parcel le have to deep into planning and management, at the level of the state of the European policies; this is th Spanish agriculture to maintain its profitability. Either we learn to manage properly in this climate chang increases conflicts, or we will do a disservice to the next generations"* (farmer, 31181)
● *"Water management for a community of irrigators, an irrigation technology centre is the basics. We must know how it is watered, how much, when and improve. Since there is a lot of talks about efficient management, we must transmit that knowledge to agriculture so that it is very present in the daily life of the community"* (advisor, 35121)

Good agricultural practices (4)
• *"It is essential to train farmers to know how to manage problems with good agricultural practices "* (govern. agency, 38192)
National, EU and international environmental policies, regulation, subsidy, and support programmes (3)
• *"We are in a situation, especially from this new century, where administrative regulation has been put in place above science, so if we want to focus on making farms profitable, we have to combine the two aspects [...] regulation, subsidies and support programs. In the end this is what marks the path that we are going to follow as farmers, it absolutely conditions the agricultural approach of a farm; we must to observe the decisions that Europe makes regarding the globalization of markets, we owe ourselves to those policies that we are now living in hydrological planning, where they want to change the course of how water resources are used in Spain"* (farmer, 31181) • "*I believe that we mainly depend on it [environmental policy] for any matter. It is better to prevent than to correct all those things that have happened, such as environmental disasters, it has been shown over time that they could have been avoided with good legislation, for me it is fundamental, the basis of everything is legislation"* (education provider, 34172)
Generation, storage and use of renewable energies (3)
• *"[...] because energy is essential. In this field, sustainable communities and energy communities are not being discussed, and I believe that one of the possible solutions is to make the production and use of energy social, given that it is ultimately a basic good for all, for agriculture, for businesses and for families"* (education provider, 34141) • *"Generation of storage and use of renewable energies because it is the short-term and the issue of renewables with photovoltaics at the forefront, although it may also be other technologies, such as hydro; but the cost of energy today is one of the most important costs of pumping water"* (cooperative, 35111)
By-products and co-products valorisation (2)
• *"It also addresses issues of livestock and good, as all that would be by-products of the agri-food industry. Looking for a valuation or even also to collect items of degradable or compostable packaging, I believe that all the issues that have to do with circularity and the valuation of by-products is an important topic"* (cooperative, 32151)
Soil and nutrient management (2)

Table A9.2: Top digital skills, Focus Group Spain-Portugal.

Digital irrigation control systems (4)
• *"All the Irrigation communities that are technified, obviously must have an irrigation control system to be able to run"* (advisor, 35111)
Data handling and analysis (2)
• *"This is not only the matter of analysing the information at a technical level, but it also has many things associated with it. For example, using our personal data and privacy issues, ethical issues…that is, using the information well"* (education provider, 34141)
Everyday usage of digital technology to communicate (2)
Digital information and services (2)

Table A9.3: Top bioeconomy skills, Focus Group Spain-Portugal.

Conventional versus /and Organic farming incl. (4)
New industrial crops and bioproducts for the bioeconomy incl. (3)
Livestock efficiency/ management/ biosecurity (3)
Planning and coordinating production (2)

● *"I believe that is important to understand a little how the money is generated, to have a certain concern for the new marketing channels, obviously also to have a basic knowledge of production planning and coordination, because there we began to have an agricultural entrepreneur or an agro-industry"* (cooperative, 35161)

Table A9.4: Top soft skills, Focus Group Spain-Portugal.

Communication (3)
● *"I think that everywhere we have attacks on agriculture because it does it wrong because it spends this, because it spends that…. And I believe that agriculture is very important for everyone. And that agriculture does not know how to communicate what it does, what it does every day, the food it produces daily for everyone and in the times, we are living, is important the skill to communicate and learn to publish what we do"* (advisor, 35121)
Organisation, planning, visioning, and strategic thinking (2)
● *"Because in the end, if you plan, if you do a strategic planning, your digitization needs, your logistics needs, your training of personnel according to the sector in which they will come out in your strategic plan you are going to get innovation issues. Not in all agri-food companies, much less has the culture of strategic planning been acquired and it is fundamental"* (cooperative, 32151)
Providing leadership (2)
● *"[...]It is also essential working on having leaders, who are the ones who lead initiatives and projects. Two of the 3 priorities are social skills, because in the end we are the people who have to develop and carry out the work"* (cooperative, 32151)
Problem solving (2)
Analytical, critical and creative thinking (2)

Table A9.5: Top business-entrepreneurship skills, Focus Group Spain-Portugal.

Business planning/model and strategic management (5)
● *"[…] to have a good financial base, a good basis for business planning. All our farmers, ranchers, forest producers, small industry, big industry, everything being primary sector is a sector of economic development and it must be very clear what its role is, how value is generated, how profit is generated. For this, it must have a foundation as solid as possible. I have seen how farmers and ranchers have been successful, even as entrepreneurs, many times in businesses that they did not know […] But I think they started from a base of understanding the business, I think it is the first thing that a person in our sector should keep in mind"* (advisor, 35161)
Innovation management and its deployment on-site (3)
Cooperatives (values, legal framework, and management) (2)
● *"[...] the objective of the farmer is to obtain a sustainable production and translate that production into an appropriate income for his work and risk. This objective must be contextualized in terms of the problems of the existing sectoral organization, the positioning of farmers in the value chain and in relation to the context of climate change and the use of natural resources, food security and globalization"* (cooperative, 32201)
Collaboration/cooperation across all sectors in the food chain (2)

Question 2.2: Would you add any skill you find missing in the lists? Why is this/are these important?

• Include legislation in skill 1018 (farmer, 31181) • Groundwater management (farmer, 31181)	• *"legislation regarding the issue of water, I think that a technician must also be informed of that vision specifically, not leave it as a separate point"* (farmer, 31181) • *"In Spain, we have a serious conflict when we talk about water use because the Hydrographic Confederation has fundamentally focused on managing surface water, but groundwater, on which a significant number of already depend hectares in our country, require specific treatment, they are the great unknown"* (farmer, 31181)
• Farm advisory service as a job (cooperative, 32151)	• *"[…] the agrarian advisor, agrarian promoter, the technician who would help, not only in the part of pests and diseases or the most part of agronomic advice, but the person to join the farm in this new era, since innovation applied to agriculture and livestock is constantly evolving, and will also guide these farms in the needs of the agri-food industries and consumers […] the person who dynamize or agricultural adviser with a very broad vision"* (cooperative, 32151)
• Safety at work and work insurance (cooperative, 32201)	
• Control of pandemics (education, 34172) • Farming impact on public health (education, 34172)	• *"Agriculture, livestock how they are influencing the use of antibiotics, fertilizers etc., certain diseases develop or not"* (education, 34172)
• Ability to listen (advisor, 35121)	• *"At least here in Portugal, the ability to listen, we speak a lot in conferences in the field, everywhere, we all try to send a message, but sometimes we have the difficulty of hearing what that the other says, what the Ministry says, what some tutor says, what the leader says"* (advisor, 35121)
• Industry 4.0 (advisor, 35161) • More about water, air, erosion, fertilization of soils, pollination…in the forestry skills list (advisor, 35161) • Agro-forestry (advisor, 35161)	• *"combining forestry with agricultural production or livestock (so-called agroforestry)"* (advisor, 35161) • *"industry 4.0 in broad terms of integration of new computer systems with new innovation systems with everything that is the production chain"* (advisor, 35161)
• Food waste reduction in 1.11 (govern. agency, 38132) • Add info in 1.25 sustainable packaging: returnable, reusable, recyclable, compostable, with recycled	

content from lower weight renewable materials, with low energy consumption (govern. agency, 38132) • Industrial biotechnology (govern. agency, 38132) • Novel technologies for the food industry (microelectronics, nanoelectronics, nanotechnology, which has a lot to do with food packaging, photonics, advanced materials) (govern. agency, 38132) • Industry 4.0 (govern. agency, 38132)	

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
Most participants agreed that sustainability of the food system, climate change mitigation and efficient use of resources will be emerging topics in the near future. Digitalization will play an important role in facilitating the improvement of the before mentioned skills/topics. Other topics were pointed individually and are described below.
31181, farmer
Changes oriented to favour science and technology and not so much regulation
"I believe that European policies should shift towards a model of less demands on national agricultural productions, since in globalized markets it will be impossible to maintain competitiveness" […] "a productivism approach, where we generate and added value, should be returned with all the guarantees of course for the food issue and the environment" […] "What I think will change our ranking, my priorities defined in favour, obviously science again and not so much regulation"
32151, cooperative
Cooperative values
"I do not know if perhaps within 4 or 5 years, the issue of cooperative values will take on more relevance because within these cooperative values is work, the joint project, joining efforts, all together, I think that also They will be in this new era in which we have to live with such rapid and rapid changes"
32201, cooperative
Digitalization, bioeconomy and the efficient use of resources will become more important
"[…] considering climate change and the profile and habits of consumption, the classification of skills may change, mostly the question of digitization, the bioeconomy and the efficient use of resources"
34141, education
Environmental and energy aspects, sustainable communities, social/consumer aspects
"this issue of sustainable communities, this to generate our own energy locally" "[…] it will advance to involve more the whole social part and society, let's say social aspects, what is called this consumer entity, that the

client, the consumer, people have a voice, their opinion and more social studies will be done in this part, which also has to do with the part of agriculture in relation to very diverse topics, from how they think that energy must be generated for agriculture, if water is used well, if they would like to receive product information, for example, knowing that it is produced in a more sustainable way, more ecological, the labelling of products in a clearer way, the production life cycle…"
34172, education
Sustainability, circularity, efficient use of resources, adapt production to new consumer habits and population growth
35111, advisor
Everything related to climate change will become more important, climate change mitigation. Drone technology.
35121, advisor
Efficient use of resources (water management), digital control systems, irrigation, precision agriculture, communication
35161, advisor
Sustainability and digitalization skills, sensors, robotics, digitalization applied to traceability, skills related to the industry integrated with technology.
"The new policies that mark us from Brussels in the new strategy of the green pact and biodiversity will mark everything that is the chain. Digitization will no longer be so much as a concept of a new channel that we have now and that, therefore, it is a priority that we start managing it, but some sections of it will be a priority: everything that has to do with sensors, with robotics, possibly also with the whole issue of drone application, everything related to blockchain, for example, the whole issue of traceability, there will have to be more or less specialized within the already agrarian field"
38132, govern. agency
Sustainability of the food industry (and the whole food system), people's (and companies') resilience, proactiveness, intellectual curiosity
"I do not know what it will be like, but most of the community and Spanish policies are geared towards the year 2030." "[…]it turns out that in the European strategy from farm to table what is talked about is food systems and the usual thing is to talk about sustainable food systems"" Within this environment of uncertainty that we are having, I believe that it is necessary to highlight the capacity of people's (and companies') resilience, to adapt and to maintain a proactive attitude permanently as an intellectual curiosity to be able to identify the challenges that the situation poses to us and then look for solutions and adapt to these new situation"
38192, govern. agency
The importance of selected 10 will increase

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?
It was not a highly successful question; in some cases, participants did not understand well what the aim of the question was, or the answers were not the expected (31181, 32201, 34141, 34172, 35111, 38192) whereas other suggested different skill needs for different job responsibility levels, but they did not enter into detail (32151, 35121). Only two respondents provided some relevant input, agreeing on different skill needs for different positions, but indicating the need of sharing some knowledge and skills among positions of different responsibility level.
"at the moment there are no, I do not see those big differences, apart from the technical knowledge that the technician must have and the more general knowledge that the manager must have. But I do believe that in

the future, there will be a change and the change is the data, when everyone has to analyse this data, I believe that the levels of sharing knowledge will be more and more similar, the technician will be forced to understand management issues and the manager will be obliged to understand the most technical issues" (35161, advisor)
"even if they are different, it seems logical to me that the manager of the company, those who have the big decisions, must also have technical knowledge to be able to assess, they do not have to do a quality control, but they need knowledge to buy new equipment to do the quality control, the advances that it can mean for the company, the market in which they are going to move with these new technologies" (38132, govern. agency)

A9.5 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?	
Most respondents agreed on needs for business/entrepreneurship skills and soft skills in general.	
• Business planning/model and strategic management (farmer 31181)	• *"an entrepreneur is not born, an entrepreneur is made and if we do not have trained personnel looking for a company with good profitability, it is difficult for agriculture to maintain what we are looking for, profitability"* (farmer 31181)
• Tutoring and mentoring (cooperative 32151)	
• Sustainability and business/entrepreneurship skills (cooperative 32201)	
• Life cycle issues (education 34141) • Energy (education 34141) • Train all skills (education 34141)	• *"things change, although we know one thing about photovoltaic energy from 5 years ago, nowadays photovoltaic energy costs half as much as 5 years ago"* (education 34141) • *"It is very important that the training be on all subjects at least a little on all subjects, including marketing, so that the consumer understands things"* (education 34141)
• Efficient use of resources (education 34172) • Problem solving (education 34172) • Innovative thinking (education 34172)	
• Soft skills in general (advisor 35111) • Communication (advisor 35111) • Business skills (advisor 35111)	• *"Today all careers in agronomic engineering, have training in renewable energy, sustainability, and very good training. However, perhaps more in the social aspects and as commented before, needs on communication should be highlighted"* (advisor 35111)
• Business skills (advisor 35121) • Communication (advisor 35121)	• *"because it [communication] must be innovative, it has to add farmers"* (advisor 35121)

• Organisation, planning, visioning, and strategic thinking (advisor 35121)	
• Business skills in general (advisor 35161) • Soft skills in general (advisor 35161)	
• Social expectations/Consumers science & behaviour (govern. agency 38132)	
• Digitalisation skills (govern. Agency 38192)	

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)	
There is a general agreement on the need of more practical training, a more realistic approach, especially for university students. University must get closer to farms and companies. By the other hand, there is an abundant offer of very good courses, but a lack of information and adequate dissemination of the training.	
• Practical training in farms/companies for university students (farmer 31181)	• *"New recruits (technicians) really lack real experiences throughout the education process. Education should be complemented with internships in some way that help in the tasks, that are formed not only in knowledge, but also in the practical matters*" (farmer 31181)
• Practical training in farms/companies for university students (cooperative 32151)	
• More interaction with farms/companies for university students: visits, share of experiences, successful projects (cooperative 32151)	
• University needs more proximity to agricultural sector (cooperative 32201) • Vocational training lacks innovation (cooperative 32201)	
• Lack of information and adequate dissemination of the training offer (education 34172)	• *"There is a lack of general information at the daily level, which somewhere, even at the regional level, on regional television may report on these [training] cycles, give a bit of publicity, say that is worth it for this, job opportunities. There are many, many things that people are unaware of that exist"* (education 34172)
• Practical training in farms/companies for university students (advisor 35111) • Lack of information and adequate dissemination of the training offer (advisor 35111)	

• Dual training university-company (advisor 35161)	• *"[…] training in general is good in universities, in centres, but connection with the company, with reality, doesn't exist […]in general the company will always be required to train previously for a time the person who receives in his workplace, because with the hyper specialization in general that exists, we are obliged to do such training at the time the person is received*" (advisor 35161)
• Training must anticipate the evolution of skills (govern. agency 38192) • Improve training cycles/programmes (govern. agency 38192)	• *"Training must anticipate the evolution of skills, what we want farmers to be able to do, not only what they already do, but what they should be able to do in the future*" (governmental agency, 38192)

Q3.3. Do you think skills need to be trained in different ways, depending on the people to be trained? (Group question)
Only two participants provided input to this question. Both agreed on age and level of education as important factors for training format and content. One of them (govern. agency 38192) also suggested an evolution to online training and to exchanges with demonstration visits and innovation in agribusiness.
• *"age and level of education of the recipients require to adapt training that must be different, students with an older age should be more practical. For recipients with more academic qualifications, the level will be higher"* (cooperative 32201*)*
• *"I wanted to say that they have to be adapted to the group, but the trend will be the evolution for online training and for exchanges with demonstration visits and innovation in agribusiness"* (govern. agency 38192)

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)	
From the comments of the participants online training is here to stay, but it cannot be the only one because we need face-to-face, we need to see reality, we need to hear experiences. If online training is to be used as a single format it needs to be more interactive.	
• Online training (31181 farmer)	• *"[…] it is important that we focus on this tool [online training] for everything that is continuous recycling courses that I believe It is necessary for all of us who are in contact with technology and science and it is a phenomenal and fundamental tool because if we have to combine our activities and make our time profitable, I believe that this is the best option to combine them."* (31131 farmer)
• Mixed online-f2f with practice or tutored part (advisor 35111)	•
• Mixed online-f2f (35161 advisor) • Virtual classroom training (35161 advisor)	• *"I do believe more in the part of what I would call virtual classroom training, with interaction, dynamism and effective collaboration [compared with non-interactive online training]*" (35161 advisor)

• Interactive online training (38132 govern. agency)	

Q3.5. Is it important for you to receive a professional certification for your training? Why?
Only two participants provided input to this question. They agreed on the importance of certification as a tool for recognising acquired skills. Moderator's comments about the importance of a certified training are also included as a quote.
• *"certification in general is very important, even many times for the farmer himself or the person who is in a totally stable situation, not only for the initial student, for the young person, but also already for veterans* (35161 advisor) • *"Certification is very important for a recognition of acquired skills because many times it is related to other supports of the production itself, training is very important if it is certified and if there is a certification system of acquired skills"* (govern. agency 38192) • *"It is evident that if you are in a curriculum training process you need certification, but if you want to apply the knowledge to your daily work does not matter to you as long as it helps you to improve, it is assumed that what counts is an official certification from a centre that guarantees that it is serious training because the first certificate you find out there that has done you I do not know who, will have a different value"* (moderator 30011)

A9.6 – Final remarks

Q4.1. Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, facing the current and future market/social needs?
Two additional aspects were commented. The first one, the importance of maintaining a learning attitude in our professional and personal life. The second, more specific for this Iberian Focus Group, was the competitive and strategic advantages that online training offers to Spain and Portugal to deliver training to Latin America.
• *"Learning is an attitude that is a personal disposition that cannot be certified, but that is a proactive position and a disposition of curiosity and interest in the sector in which you are working" (govern. agency 38132)* • *"I think that in the Iberian field, since we are the Iberian Focus Group, the online issue gives us the ability to take advantage of the common language, sensitivity and connections with Latin America, which I frankly believe that until now we were under-utilizing and also, as you have said José María, the possibility of having trainers from other countries even if we speak in our own language. It is a truly relevant competitive advantage"* (moderator, 30061)

Annex X: Focus Group Netherlands

A10.1 – Executive summary

Selection of skills on skills lists (by participants)

In the ranking of the 5 most important skills, skills that were mentioned by four or more FGD participants:

- Sustainability: 2. Efficient use of resources and logistics, 9. Corporate social responsibility associated with sustainability reporting/press releases, 11. Valorisation of co- and by-products, 13. Identification of renewable energy systems suitable for the farm/business enterprise, 19. Soil nutrient and health management.
- Digitalisation: 2. Data handling and analysis, 18. Precision animal health and productivity management systems, 19. Field operation management systems, 24 Robot and drone technology in agriculture.
- Bioeconomy/agriculture: 1. Planning and coordination of production, 5. Calculating, handling, and managing risk
- Bioeconomy/forestry: 2. Sustainable forest management practices and planning, 3. Reforestation, afforestation, and restoration of forest ecosystems, 7. Products of forestry, 13. Prevention and management of natural disturbances.
- Bioeconomy/food industry: 1. Quality management, quality assurance and quality control, 17. Emerging technologies
- Soft skills: 1. Communication, 3. Analytical, critical, and creative thinking, 6. Organisation, planning, visioning, and strategic thinking, 10. Team building
- Entrepreneurship/business model: 7. Business planning and strategic management, 8. Basics of financial issues, 11. New value chains/new business models, 14. Interdisciplinary knowledge to assess the whole value chain.

Skills missing

- Soil management, adaptability of farmers related to water management.
- Valorisation of forestry products (also small quantities) - agroforestry, e.g., plant-based proteins (nuts); agro-products like Hop and broad assortment of (''forgotten'') vegetables
- Integration of competences/skills, system thinking e.g., related to circularity, Collaboration, and teambuilding between farmers to decrease waste and promote circular production.
- Risk management/ safety and security/ awareness of Global perspective food system
- CSR in broad sense, Communication with business/farm environment,
- Operationalisation of high-level skills to day-to-day practices
- Introduction new technology in farms and consequences (e.g., ethical - for labour), Capabilities to understand the applicability of technologies for the business and choose the right mix of technologies (many are available), CO2 footprint assessment.
- Connecting with consumers (clients) and market; value proposition development and marketing (of new concepts) and image building skills, Telling the story to the consumer. Creating product awareness at the consumer, Social media (e.g., for local sales), Collaboration between farmers, e.g., for marketing joined product packaging, setting up farmer shops, ...
- Awareness of business environment, collaboration with relevant stakeholders (within and outside the value chain), Open communication in value chain and pursuing win-win situations.

- Responsible innovation, jointly with stakeholders and inclusive

Changes in skills needs in the next 5-10 years

- There will be a growing need for farmers and horticulturalists, people with green fingers. It is both important that people/students focus on developing their talents as well as have a broader knowledge as to oversee the broader picture and e.g., estimate the quality of an advice given.
- There will be a change from the focus of up-scaling and globalization to a focus on awareness on sustainability and environment.
- New business models will be developed. An entrepreneur needs to be able to ask critical questions, needs to be aware of why to do a certain business, the story needs to be strong.
- Craftsmanship has to be valued more.
- Frozen mindsets have to be loosened up.

Skills in relation to the level of responsibility

- There obviously is a difference in responsibility, but all people, at different levels or at different positions in the chain, have to understand the necessity of skills in other levels of responsibility.

Which skills need more training and why, and which training is missing

- Sales training for agricultural entrepreneurs, as to gain more from the local market and be more independent. Connecting with consumers and market; telling the story to the consumer. Creating product awareness at the consumer; value proposition development and marketing (of new concepts) and communication and image building skills. Use of social media for that purpose. Collaboration between farmers, e.g., for marketing joined product packages, setting up farmer shops.
- Communication and collaboration between farmers and industry & stakeholders from the farm environment (within and outside the value chain), pursuing win-win situation.
- Soil management, Awareness on how to use land, new ways of fertilization
- Water management, irrigation in efficient ways. Construction of water reservoirs, efficient use of water. Due to climate change.
- Valorisation of forestry products (also small quantities) - agroforestry, e.g., plant-based proteins (nuts); agro-products like Hop and broad assortment of (''forgotten'') vegetables
- System-thinking in relation to circularity, integration of skills/competences
- CSR in broad sense
- Assessment of CO2 footprint, collaboration, and teambuilding between farmers to decrease waste and promote circular production.
- Risk management/ safety and security/ awareness of Global perspective food system
- Operationalisation of high-level skills to day-to-day practices
- Introduction of new technology in farms and its consequences (e.g., ethical - for labour). Capabilities to understand the applicability of technologies for the business and choose the right mix of technologies (many are available) and how to implement.
- Responsible innovation, jointly with stakeholders and inclusive

Training methodology and target group

- Responsibility training for farmers. Farmers could be trained in taking more responsibility themselves (and take more risks) in managing their environment, especially water management.
- Many actual issues that a farmer or entrepreneur needs to be trained in are not suitable to learn from a book. Methods such as internship, doing projects. Trainers need to be in actively involved in the topics of training. This applies for every target group at any level.
- Internships are also a good approach when training is about multidimensional issues. Because trainees are confronted with a reality situation.
- Fictional cases designed for training are a good tool too.

Type of training available and preferred methodologies

Learning from books and PowerPoints has a low value, low efficiency. Other options:

- As a team of trainers offering a variety of approaches
- Taylor-made training.
- Personalized learning, by which the trainer functions as a one-to-one coach. This gives the possibility to speed up and encourage trainees better.
- Farmer to farmer approach (through workshops in the field) gives efficient knowledge transfer and change of attitude. Accept an incubation period of a few years.
- For young people, take them out into the field, then they understand.
- Blended learning system, e.g., theory lessons in the morning and practice in the afternoon.
- Innovative systems, such as training-, coaching-, buddy- systems that support the whole sector. For example: a kind of buddy system so people or groups help each other to cross sector lines or cross sections of the chain.

Certification for training

- It is not clear what is meant by certification. Is it about a quality mark for a training offered or about a person getting a certificate after completing the training? We discuss on the basis that this is about the training being certified.
- If a certified training offers an advantage for the trainees (e.g., a discount on a bank loan) then it has a value.
- Certification can be obtained for a training or a training institute if evaluated positively. But it is no guarantee for good quality training.
- Most important for quality of training is the way training courses are set up, by whom they are set up and delivered, what ideas (content) are put forward and what motivation there is. Important is the spirit of the training and the passion and knowledge of the organizers and trainers. The risk of certification is that – by meeting standards - it creates a rigid training which has lost room for flexibility and creativity. It has lost its spirit.
- Certification of training might have more value internationally than in the Netherlands. Different countries might think differently about this. In the Netherlands the opinion is more like: "It costs money, so what do we get out of it".

Other

- Training for skills that create an open mind are important to prepare people to be open towards finding solutions to problems. In the agriculture sector there is a tendency to be defensive about how things are done. That is not the way to be able to look past the borders of the own farm or the own sector and work towards solutions in a wider setting.
- Training for organisation: Farmers' organisations at regional and local level are important. Small cooperatives have proven to do better than larger intranational cooperatives. Farmers need to learn to organise themselves again, around their themes, interests, market, business, area. Organisation helps farmers be heard and to position themselves.

A10.2 – Composition of the Focus Group

The Dutch Focus Group was comprised of 8 participants, 1 moderator and 1 rapporteur. Due to the missing input from one participant, only 7 were included in the data processing.

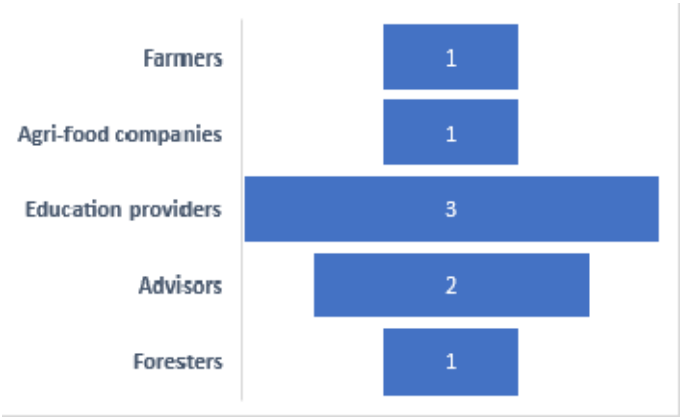

Figure A10.1: Composition of the Dutch Focus Group

A10.3 – Skills

In the Dutch Focus Group, participants' overall selection and ranking of their top 10 skills, figure A10.2 shows that respondents selected most often bioeconomy skills (37,1%) followed by far by soft skills (21.4%) and business-entrepreneurship skills (18.6%). Sustainability (14.3%) and digitalisation skills (8.6%) were the least selected skills.

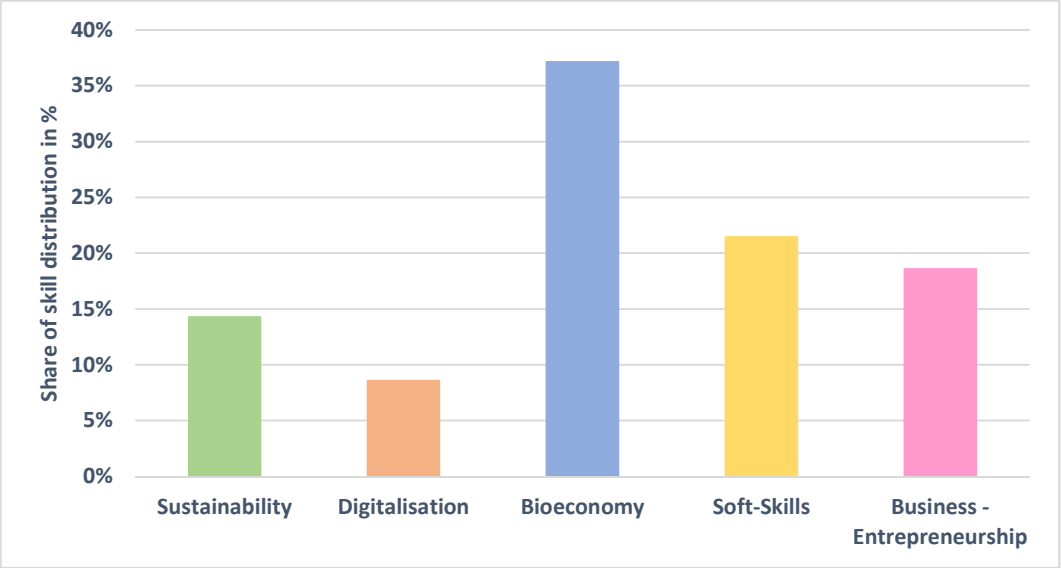

Figure A10.2: Share of selected skills in the top 10 rankings by skill category, Focus Group Netherlands

In more detail, the graph below shows that although sustainability skills are the most selected, they do not attain very high positions in the rankings, suggesting in general that the other categories are also important for the participants.

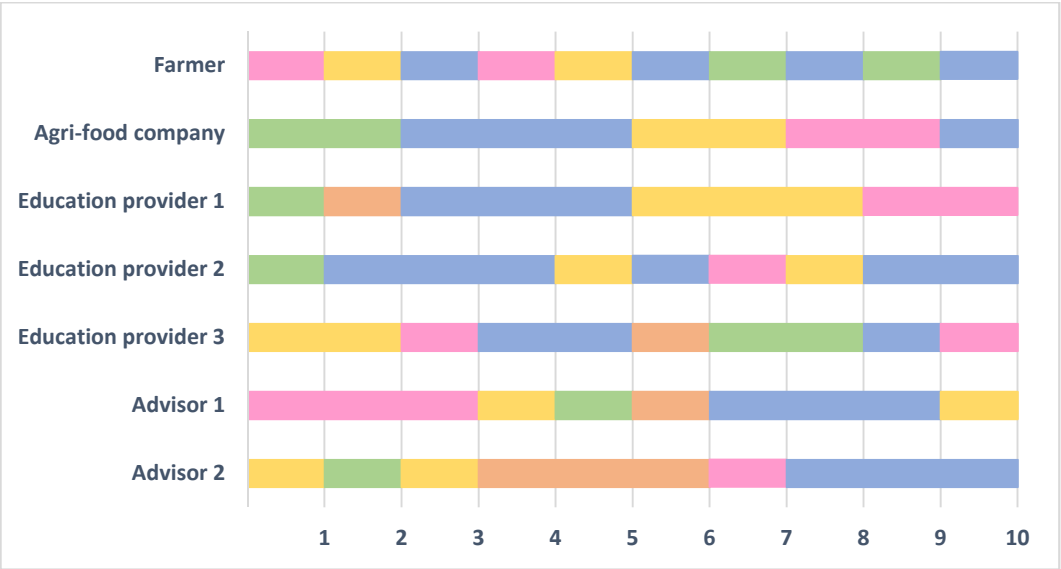

Figure A10.3: Stacked bar for the top 10 skills in the Dutch focus group

In view of the graph, 4 participants ranked sustainability skills and bioeconomy skills among the top 3 skills, 3 participants ranked business-entrepreneurship skills and soft skills in the top 3 skills, and only one participant ranked digital skills in the 3 highest positions.

When looking at which specific skills were selected and ranked, the ten most cited skills are presented in Table A10.4:

Figure A10.4: Most selected skills in the focus group rankings, Focus Group Netherlands [n=7]
(*there are six more skills that were chosen 2 times)

Within these skills, *business planning/model and strategic management* was ranked the first for two participants (41152 and 45171); the same happened with *soil nutrient and health management* (44111 and 44142). *Organisation, planning, visioning, and strategic thinking* was ranked first for one participant (45121).

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Relevant quotations were included where applicable.

Table A10.1: Top sustainability skills, Focus Group Netherlands.

Soil nutrient and health management (3)
National, EU and international environmental policies, regulation, subsidy, and support programmes (2)

Table A10.2: Top digitalisation skills, Focus Group Netherlands.

Data handling and analysis (2)

Table A10.3: Top bioeconomy skills, Focus Group Netherlands.

Sustainable forest management practices and planning (4)
Planning and coordinating production (3)
Ethics for food (3)
Performing farming operations (2) ● *"[..] And I think that's also an aspect that can come back in education much more, just like sustainability. For example, if you look at fertilization, there is still teaching how much can I fertilize, how many kilograms of fertilizer can I add. You could also give it a completely different twist with the aspect of sustainability more included."* (cooperative, 41152)
Calculating, handling, and managing risk (2)

Product traceability (2)
Food security (2)

Table A10.4: Top soft skills, Focus Group Netherlands.

Organisation, planning, visioning, and strategic thinking (3)
Analytical, critical, and creative thinking (2)
Communication (2)

Table A10.5: Top business-entrepreneurship skills, Focus Group Netherlands.

Business planning/model and strategic management (4)
● *"We've always been a little focused on up-scaling. But I think it's just becoming much more important now to broaden and build up a bit of security within your company and not be focused on one thing but look what else can I do besides that and turn it off locally and do business with a focus on the environment"* (farmer, 41152)
Basics of financial issues (3)
New value chains / new business models (3) ● *"What the actually new business models are that are important for the future farmer, organic or not organic and so on"* (advisor, 45171)

Question 2.2: Would you add any skill you find missing in the lists? Why is this/are these important?	
● Lifelong learning (farmer, 41152) ● (Awareness of) soil management (farmer, 41152) ● Social media (farmer, 41152) ● Connecting /communication with consumers and market (farmer, 41152)	● *"Social media (e.g., for local sales)."* (farmer, 41152) ● *"Telling the story to the consumer. Creating product awareness at the consumer"* (farmer, 41152)
● Connecting /communication with consumers and market (agri-food industry, 43181) ● Value proposition development (agri-food industry, 43181) ● Marketing - new concepts (agri-food industry, 43181) ● Marketing – collaboration (agri-food industry, 43181) ● CO_2 footprint assessment ● (agri-food industry, 43181)	● *"Collaboration between farmers, e.g., for marketing joined product packages, setting up farmer shops, etc."* (agri-food industry, 43181) ● *"Collaboration between farmers to decrease waste and promote circular production"* (agri-food industry, 43181)

• Sustainability- collaboration (agri-food industry, 43181)	
• Lifelong learning (education provider, 44111) • Soil management-awareness (education provider, 44111)	
• Integration of competences/skills (education provider, 44141) • System thinking (education provider, 44141) • CSR (education provider, 44141) • Communication with business/farm environment (education provider, 44141) • Consequences of new technologies (education provider, 44141) • Responsible innovation	• *"CSR in broad sense, not only related to reporting"* (education provider, 44141) • *"Introduction new technology in farms and consequences (e.g., ethical - for labor)"* (education provider, 44141) • *"Responsible innovation, jointly with stakeholders and inclusive"* (education provider, 44141)
• Water management (education provider, 44161) • Connecting /communication with consumers and market (education provider, 44161) • Value proposition development (education provider, 44161) • Marketing-new concepts (education provider, 44161) • Understanding the applicability of technologies (education provider, 44161) • Valorisation of forestry products (also small quantities) (education provider, 44161) • Agroforestry (education provider, 44161) • Forgotten vegetables (education provider, 44161)	• *"Adaptability of farmers, related to water management"* (education provider, 44161) • *"Capabilities to understand the applicability of technologies for the business and choose the right mix of technologies (many are available)"* (education provider, 44161) • *"[…] agroforestry, e.g., plant-based proteins (nuts)"* (education provider, 44161) • *"[…] agro-products like Hop and broad assortment of (''forgotten'') vegetables"* (education provider, 44161)

• Integration of competences/skills (advisor, 45121) • System thinking (advisor, 45121 • Understanding the applicability of technologies (advisor, 45121	
• Operationalisation of high-level skills to day-to-day practices (advisor, 45171) • Risk management/ safety (advisor, 45171) • Awareness of Global perspective food system (advisor, 45171) • Marketing – collaboration (advisor, 45171)	
• Integration of competences/skills (forester, 46131) • System thinking (forester, 46131) • Connecting /communication with consumers and market (forester, 46131) • Marketing – new concepts (forester, 46131) • Value proposition development (forester, 46131)	• *"System thinking e.g., related to circularity"* (forester, 46131) • *"Open communication in value chain and pursuing win-win situation* (forester, 46131)

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
There is a tendency that students need to learn a high variety of skills. It is important that producers know about a lot of skills so they can make the right choices and steer consultants. On the other hand, there is a need for specialized professionals with 'green fingers' (practical growing skills) and a revaluation of craftmanship. Students should learn on self-reflection, so they can decide what to do themselves and what to leave to others. There should be a focus on open mindsets, as solutions to problems can be found by listening to each other, looking over borders and collaboration. There will be a need for change managers, and even for crisis managers, because we expect crises to happen. Time for up-scaling and focussing on global marketing might be passed, by now it becomes more important to build security in companies and broaden

activities for that. Sustainability issues are part of that and should be integrated in education more. New business models for future farmers need attention."
41152, farmer
Time for up-scaling and focussing on global marketing might be passed, by now it becomes more important to build security in companies and broaden activities for that. Sustainability issues are part of it and should be integrated in education more.
"We've always been a little focused on up-scaling. But I think it's just becoming much more important now to broaden and build up a bit of security within your company and not be focused on one thing but look what else can I do besides that and turn it off locally and do business with a focus on the environment"
44111, education provider
"Green fingers" (practical farming operations skills) Make good use of advisors Self-knowledge and reflection,
"There's a very tricky skill. When I walk around at the organic fair, I get all kinds of supplying companies saying: "we are looking for people with green fingers and they are nowhere to be found"". The question then arises as to what those green fingers are… And what skill that is, I don't know yet."
"It's not the intention to surrender to the advisors, but to be able to estimate the quality of an advice, so you don't need to have all that technical knowledge. In the fruit growing sector, I also advise people to take two advisors and set those considerations against each other. This is highly specialised knowledge with enormous financial consequences. So, making good use of advisors is definitely something you have to do."
"The subject of self-knowledge and reflection is very important. That you know what your strengths are, where you want to be in society. We pay a lot of attention to that at school and have something to do with it. And if you don't have anything to do with technique, please don't spend a lot of time on technique but spend it"
44142, education provider
Change manager should become more crisis manager
"Of course, we're not in the middle of it anymore but we're in the middle of a corona crisis and there's going to be a, is a nitrogen crisis […] You try to explain what you do and why you do business and that you have that very clear to yourself as an entrepreneur. And that you are able to come up with critical questions in response to any crisis and that you have a good story to tell"
44161, education provider
Craftmanship
"Maybe we have to revalue the craftsmanship, especially at vocational training level. Where I think it's still quite a bit loose and all kinds of frozen mindsets need to be loosened up. Also, in the young people who now go to school"
45121, advisor
Self-knowledge and reflection
45171, advisor
Make good use of advisors
"It's about that complementary knowledge and that an entrepreneur can't do everything, but surrendering to advisors as a farmer or as an entrepreneur and having no knowledge or at least not the ability to judge whether what they do for you or that is appropriate and so that seems to me a terrible thing because your wallet is being emptied and you have nothing yet"

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?

There is a consensus that it is not too important to distinguish skills according to job level. There obviously is a difference in responsibility, but all people, at different levels or at different positions in the chain, have to understand the necessity of skills in other levels of responsibility in order to create a mutual support for people at different job level."
"Ivory tower needs to be graduated a little bit. Why aren't the people who do the harvesting work asked for suggestions? Why is their opinion hardly appreciated? While it is here that knowledge can be gained, and improvements can be made. If you work more from a "together we are strong", "together we have something to achieve" and "together we have something to lose" perspective, then you must understand each other's position. Then you don't have to do everything with everyone, but to learn to understand each other and you can stand for something together" (44161, education provider)
"All these aspects of when you are an entrepreneur these days and you make a separation between what is purely for the manager and what you do as a manager is not supported in the execution by executives and such things then you have a problem. So, I have a very strong feeling myself and also from experience it is clear that there is of course a difference in responsibility, but that in the execution people have to understand on an executive level why you should and should not do certain things." […] "You go see how certain vegetables are abused somewhere in the chain. If you're a farmer and you've made a beautiful product, you've made it, and then you see it, so to speak, wilted and rundown, you see it arriving somewhere but that's partly due to the conditions, of course, but sometimes it's also due to people who aren't aware of what they're doing with those products. So, there is also an executive responsibility attached to this. And a motivation why you do that" advisor, 45171)

A10.4 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?	
Summary Q 3.1 & 3.2 Skills that need more training or for which training is missing are discussed as the following: • Marketing & Sales training for agricultural entrepreneurs, as to gain more from the local market and be more independent; connecting with consumers and market; creating product awareness; value proposition development (incl. new concepts) and image building skills. Use of social media for that purpose. Collaboration between farmers, e.g., for marketing joined product packages, setting up farmer shops. • Communication and collaboration between farmers, industry, and stakeholders from the farm environment (within and outside the value chain), for example, to decrease waste and promote circular production. • Soil management, awareness on how to use land (sustainably), new ways of fertilization. • Water management, irrigation in efficient ways, due to climate change. • Agroforestry and valorisation of forestry products, e.g., plant-based proteins (nuts); AF-products like Hop and broad assortment of (''forgotten'') vegetables. • System-thinking in relation to circularity, integration of skills/competences. • CSR in broad sense. • Assessment of CO2 footprint. • Risk management/ safety and security/ awareness of Global perspective food system. • Operationalisation of high-level skills to day-to-day practices. • Introduction of new technology in farms and its consequences (e.g., ethical - for labour): Responsible innovation. Capabilities to understand the applicability of technologies for the business and choose the right mix of technologies.	
• Marketing (farmer, 41152)	• *"The positioning of the entrepreneur: How do I sell my product? I think that the Dutch agricultural entrepreneur*

• Awareness of land (sustainability) (farmer, 41152) • Soil fertilization (farmer, 41152)	*is quite modest, and that training is needed on how to sell my products?"* (farmer, 41152)
• Communication skills ('from farm to plate') (agri-food company, 43181) • Water management (agri-food company, 43181) • Heat extraction from manure (agri-food company, 43181)	• *"The communication from "Farmer to Plate" is very essential, to develop communication skills, to support the farmers in this. The modesty of the farmers is a nonsense slogan. The question is whether people see enough of what the farmers are doing, it is sometimes a forgotten child, while the farmer is so essential"* (agro-food company, 43181) • *"Water management is very important, extracting heat from manure, constructing water reservoirs, and not letting the water drain away, but actually doing something with it. Filtering water, a good streamlining in the water network, bringing the water back to the land in a controlled way"* (agri-food company, 43181)
• Water management (education provider, 44111)	
• Awareness about asking help (education provider, 44142)	• *"[…] That you realise that you don't know everything and that it's not a disgrace and that you know you can ask for help. I found that myself in the nitrogen crises, it must have had something to do with my background, but I don't think agricultural entrepreneurs do this enough"* (education provider, 44141)
• Management of complementary skills (advisor, 45171) • Water management (advisor, 45171) • Energy management (e.g., Heat extraction from manure) (advisor, 45171) • Managing the farm's environment (advisor, 45171) • Soil management (advisor, 45171)	• *[…] the whole management of complementary skills is becoming more and more important. It's just that you can't do everything yourself and to judge that you've brought in the right people?* (advisor, 45171) • *"I live in West-Brabant (Southern part of Netherlands) where soil types are clayish and when you see how complex the problem of water is, it is of no small size"* (advisor, 45171) • *"A kind of micromanagement, which will also play a major role within the business operations of the farmer, whether it's about water or energy or about soil quality (soil quality is already there anyway), this will be important to deal with consciously"* (advisor, 45171)
• Managing the farm's environment (forester, 46131) • Water management (forester, 46131) • Taking responsibility (forester, 46131)	• *"A sense of responsibility and responsibility training on themes such as water management would be very good"* (forester, 46131)

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)	
See summary in 3.1	
• Soil management (farmer, 41152) • Social media (farmer, 41152) • Connecting /communication with consumers and market (farmer, 41152)	
• CO2 footprint assessment (agri-food company, 43181) • Marketing-cooperation (agri-food company, 43181) • Sustainability -cooperation (agri-food company, 43181)	• *"Collaboration and teambuilding between farmers to decrease waste and promote circular production"* (agri-food company, 43181)
• Soil management (education provider, 44111)	
• Integration of competences/skills (education provider, 44142) • CSR (education provider, 44142) • Communication with business/farm environment (education provider, 44142) • New technologies and their consequences (education provider, 44142) • Responsible innovation (education provider, 44142)	
• Water management (education provider, 44161) • Connecting /communication with consumers and market (education provider, 44161) • Value proposition development (education provider, 44161) • Marketing - new concepts (education provider, 44161) • Understanding the applicability of technologies (education provider, 44161) • Valorisation of forestry products (education provider, 44161) • Agroforestry (education provider, 44161) • Forgotten vegetables (education provider, 44161)	
• Operationalisation of high-level skills to day-to-day practices (advisor, 45171) • Understanding the applicability of technologies (advisor, 45171)	

• Risk management/ safety (advisor, 45171) • Marketing-cooperation (advisor, 45171)	
• Integration of competences/skills (forester, 46131) • System thinking (forester, 46131) • Connecting /communication with consumers and market (forester, 46131) • Value proposition development (forester, 46131) • Marketing-new concepts (forester, 46131) • Communication with business/farm environment (forester, 46131) • Collaboration with stakeholders (forester, 46131) • Communication in value chain (forester, 46131)	

Q3.3. Do you think skills need to be trained in different ways, depending on the people to be trained? (Group question)
Many current topics that a farmer or entrepreneur needs to be trained in are not suitable to learn from a book. Better methods are e.g.: Internships (especially when training is about multidimensional issues), doing projects or fictional cases designed for training. Internships are good because trainees are confronted with a reality situation. Trainers need to be in actively involved in the topics of training. This applies for every target group at any level.
• *"I think the problems that the current entrepreneur or farmer gets today, are very complex, the solutions cannot be found in a book. Knowledge and skills are to be found in books, but subjects like water, energy, biodiversity you can only process by experiencing it, so by either offering an internship or something like that or working on projects at school. I think that's how to approach it, of course you have to prepare well, but you can only develop this kind of themes well if you are in the middle of it. By the way, I think this is the same for every target group at his or her level. So, it applies to every target group, everyone with his or her complexity, there is not something right or wrong, that they have to make it."* (education provider, 44142*)*
• *"What you often see are multidimensional issues, and how should you convey that? In that case internships are a very good tool, they are confronted with a piece of reality, at least if that reality is made accessible and the second thing, I have always found is that designed case studies that you can adapt to the level of the people is also a good tool."* (advisor, 45171)

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)
There is consensus that learning from books and PowerPoints has a low efficiency. Other options suggested: • Trainers operating as a team and offering a variety of approaches. • Taylor-made training. • Personalized learning, by which the trainer functions as a one-to-one coach.

• Farmer to farmer approach (through workshops in the field) gives efficient knowledge transfer and change of attitude. • For young people, take them out into the field, then they understand. • Blended learning system, e.g., theory lessons in the morning and practice in the afternoon. • Innovative systems, such as training-, coaching-, buddy- systems that support the whole sector. For example: a kind of buddy system so people or groups help each other to cross sector lines or cross sections of the chain.	
• Blended learning (farmer, 41152)	• *"You could set up a blended learning system. For example, do theory lessons in the morning and apply them in practice in the afternoon. So that it sticks extra well.* (farmer, 41152)
• Trainers work as a team (education provider, 44111) • Offer variety of approaches (education provider, 44111) • Need for customization (education provider, 44111) • Coaching (education provider, 44111) • Reduce learning from books & ppt (education provider, 44111)	• *"[…] In the meantime, I have become a 1 on 1 coach instead of a teacher. It's effective, you can make speed and encourage people to take action (education provider, 44111)* •
• Coaching (education provider, 44142) • Buddy system (also in groups) (education provider, 44142) • Cross sector borders (education provider, 44142) • Cross section lines and chains (education provider, 44142)	• *"We shouldn't just think in terms of training but also in terms of coaching, maybe a kind of buddy system that helps you help each other that we cross sector borders ... or go across sections of the chain - anyway, that you create groups that help each other* (education provider, 44142) • *"Training sounds a bit old-fashioned to me and it may have a connotation you wouldn't want, but that you are thinking of other systems that help the whole sector"* (education provider, 44142)
• Blended learning (advisor, 45171)	
• Farmer-to-farmer training (forester, 46131) • Workshops in the field (forester, 46131) • Take young people out into the field (forester, 46131)	• *"I've been working on Agroforestry a lot - that's quite a switch for the farmers to go from cutting trees to planting trees within the company. And then I notice that it goes a lot from farmer to farmer. Look, it takes an incubation period of a few years if I copy corona language. Workshops in the field and then farmer to farmer, that works best"* (forester, 46131) • *Once you take young people out into the field and show them what it's really about, then it sinks in. That's because it's such a different farming system. Once they see it, they see its benefits and then exchange them from farmer to farmer* (forester, 46131)

Q3.5. Is it important for you to receive a professional certification for your training? Why?
At first it is not clear if certification. Is it about a quality mark for a training offered or about a person getting a certificate after completing the training? We discuss on the basis that this is about the training being certified. If a certified training offers an advantage for the trainees (e.g., a discount on a bank loan) then it has a value. Certification can be obtained for a training or a training institute if evaluated positively. But it is no guarantee for good quality training. Most important for quality of training is the way training courses are set up, by whom they are set up and delivered, what ideas (content) are put forward and what motivation there is. Important is the spirit of the training and the passion and knowledge of the organizers and trainers. The risk of certification is that – by meeting standards - it creates a rigid training which has lost room for flexibility and creativity. It has lost its spirit. Certification of training might have more value internationally than in the Netherlands. Different countries might think differently about this. In the Netherlands, the opinion is more like: ""It costs money, so what do we get out of it".
• *"I don't know to what extent that has a value in the sector, but if that gives Rabobank a discount on your loan, for example, then it has value for entrepreneurs. I can't cite any research that shows that certification has value, unless it has value in another link in the chain then it makes sense, but I don't think we are running any faster for a training course that is or is not certified."* (education provider, 44142) • *"Because I think what you're also seeing is that it's becoming some kind of straitjacket. That you beat the flexibility out of it. So, it shouldn't become a goal in itself, so ... I think it has more value internationally than you can expect in the Netherlands. That's another thing: you can expect other countries to think differently"* (education provider, 44142) • *"Internationally, certification is often an element to tick off on the list of criteria. We Dutch think about it as: 'That all costs money, what do we get out of it'. You have to make sure that you don't create inertia with it"* (education provider, 44161) • *"Yes, look on the one hand - if your training is given by a reputable institute, it helps, so to speak. On the other hand, I have participated in evaluation committees in the past, and then a training is certified, and it meets a number of rules that you have to put on it, but there is no soul or bliss in that training. Then I don't like it either. Then it is certified but it has nothing. The quality of the training depends on the content and on the methods and techniques you use and the materials, but it also depends on the passion and knowledge of the people who give it"* (advisor, 45171)

A10.5 – Final remarks

Q4.1. Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, facing the current and future market/social needs?
• Training focussing at approaching problems with open mind are important to prepare people to be more capable in finding solutions to problems. • Solutions are found by listening to others, looking cross borders and collaboration. • Training for organisation: Farmers' organisations at regional and local level are important. Small cooperatives have proven to do better than larger intranational cooperatives. Farmers need to learn to organise themselves again, around their themes, interests, market, business, area. Organisation helps farmers be heard and to position themselves.
• *"Being open to ask and wanting to step across the farm border if things don't go well. I often see that with students who come in from the hbo or directly from the farm, they sometimes have a closed mindset. I see that in 'they have to' and 'I'm doing my best anyway'. That is very defensive, but not much in the direction of: 'Hey which way can we go'. I can explain that I understand a lot, but I find it difficult to see how we can*

strengthen the sector with that. If there is such a closed mindset there, who doesn't want to ask, like ""hey guys, what can we do, together in the group"". In the meat sector this is more so than in the vegetable sector. I think that's a sad lot. That autonomy on the farm is actually becoming a prison if they don't watch out." (education provider, 44161*)*

- *"What's important is... we see fragmentation, of course, and also the positioning of the sector itself. I think farmers' organisations at regional and local level are important. I think farmers need to learn to organise themselves again, around their themes, their interests, their market, their business, their area. They need to learn to organise themselves again in that sense, to be heard and to position themselves. And that is a profession in itself."* (forester, 46131)

Annex XI: Focus Group Austria

A11.1 – Executive summary

The Austrian focus group meeting in the framework of the EU project FIELDS was held on the 18th of May 2020 with a broad diversity of members regarding background, current position, age and working experience. All members had high education background, holding leading or managing positions and were professionals in their fields of expertise, with long working experience (except 1 participant, who recently left university). All group members participated with enthusiasm in the meeting.

From the experience of the Austrian Focus group the following conclusions can be drawn:

- As feedback to the skills lists, we received from the participants that they were partly confused and found a ranking difficult to do, due to complexity/cross-linkages and the dependence on the point of view from which job position it is considered.
- There was an underlying sentiment reflecting that communication – independent of the job position - comes first. This is also reflected in the results shown below.
- There were interesting comments on knowledge and value chains, i.e., the overall understanding of value chains: It is of utmost importance to understand and to know, what the others are doing, due to increasing specialization. It is impossible to know and do everything by oneself, this explains, why importance should be given to stronger cooperation and organisation, and teambuilding gets increasingly important. Knowledge and cooperation along the value chains also enables the people involved to take critical and well considered decisions, because they better understand the impact of their decisions.
- Regarding value chains and sustainability: Sustainability should not only be important for managing resources and efficiency, but the thought of sustainability should be integrated everywhere: business models, financing, and energy systems – also on institutional level, meaning that sustainability should be the basic element of the professional training in all areas.
- Awareness for life-long learning should be created and is the basis for a continuous adaption to actual developments.
- In regard to the adaptation of the skills lists in the future, focus group participants agreed on a two-parted list: soft skills and skills regarding economic efficiency, analysis and strategic thinking will be equally important in the future, specialist know-how in contrast will be under constant change.
- In regard to certification it was highlighted, that what matters in the end is that a student dominates the taught content. It will therefore be increasingly important in the future, to also have information about the quality of the training institutes.

A11.2 – Composition of the Focus Group

The Austrian Focus Group was comprised of 12 participants, 1 moderator and 3 rapporteurs, of which education providers were over-represented and cooperatives too, otherwise all stakeholder profiles were represented (see figure A11.1). Initially, there were 14 participants, however two participants (one education provider and the representative of the foresters) left just after the introduction due to technical problems and appointment issues. Furthermore, four participants did not provide clear input on their skill selection, thus they were not included in the data processing.

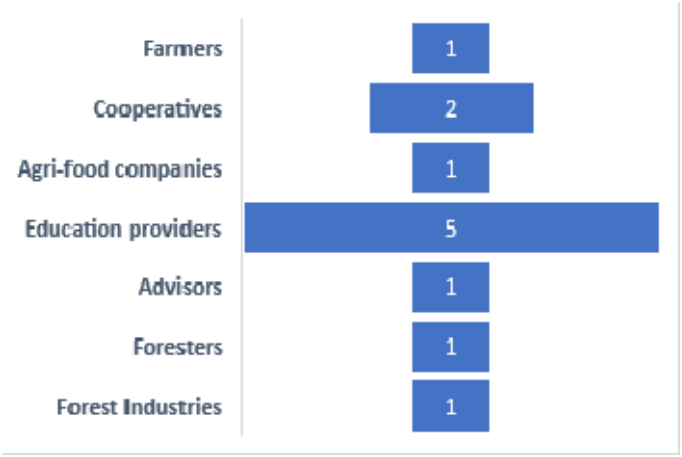

Figure A11.1: Composition of the Austrian Focus Group

After a short presentation of the organisers and the FIELDS project, each of the participants were asked to present themselves and describe the tasks they carry out in their daily job. This short presentation round was followed by question 2.1 referring to the skills list, participants received beforehand.

A11.3 – Skills

In the Austrian Focus Group, participants' overall selection and ranking of their top 10 skills, figure A11.2 shows that most respondents selected most often soft skills followed by business-entrepreneurship skills. Bioeconomy was selected least often, followed by digitalisation and sustainability.

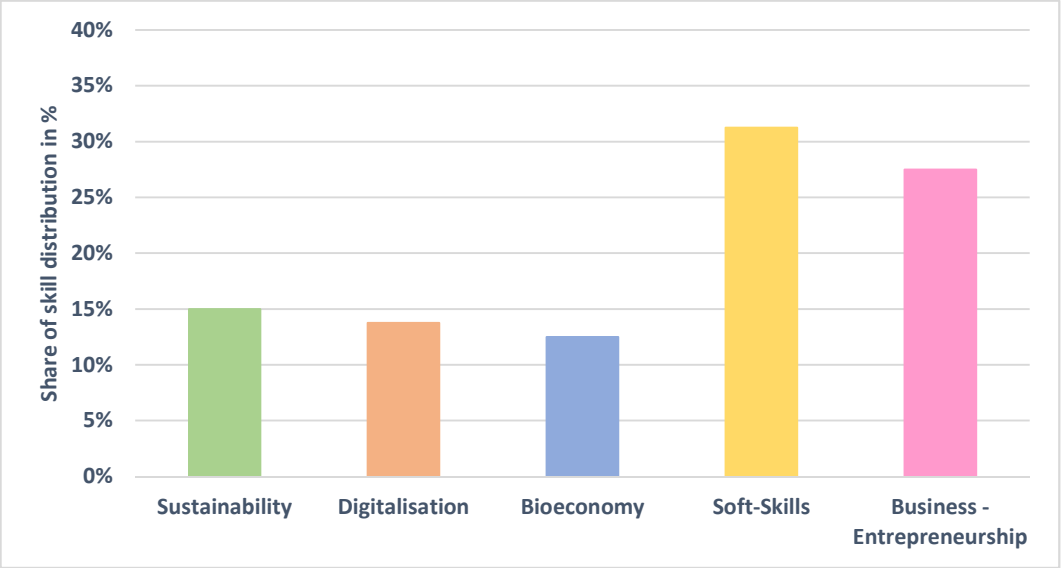

Figure A11.2: Share of selected skills in the top 10 rankings by skill category, Focus Group Austria

In more detail, the stacked bar below shows that 5 participants selected and ranked soft skills among the top 3 skills. Only for the representative from the forest industry, bioeconomy skills were ranked among the top three most important skills. And for two participants, digital skills were ranked as the most important skills. Sustainability skills were ranked as less important in the middle and towards the least important.

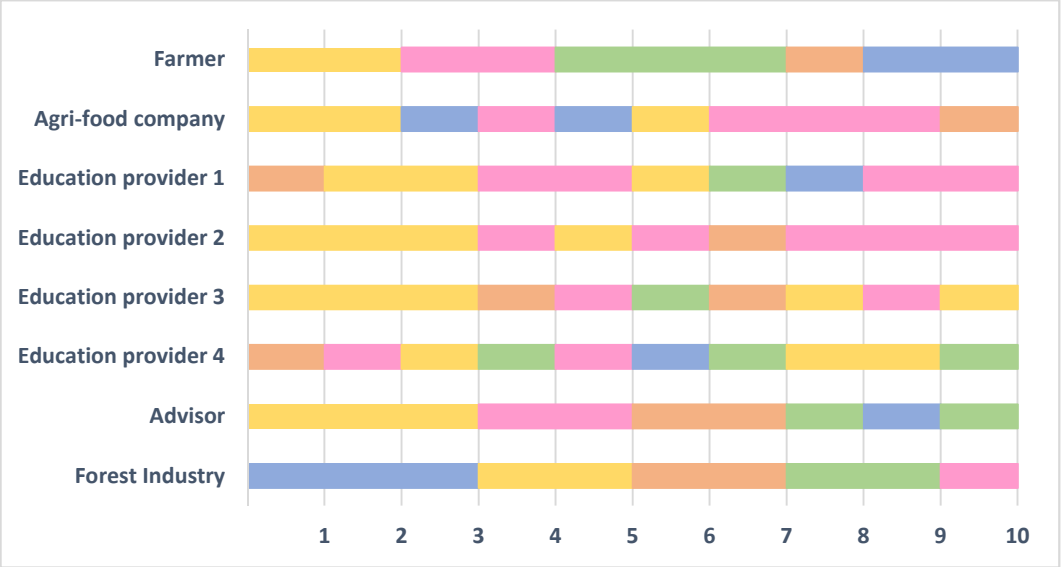

Figure A11.3: Stacked bar for the top 10 skills in the Austrian focus group

When looking at which specific skills were selected and ranked, the ten most cited skills are presented in figure A11.4.

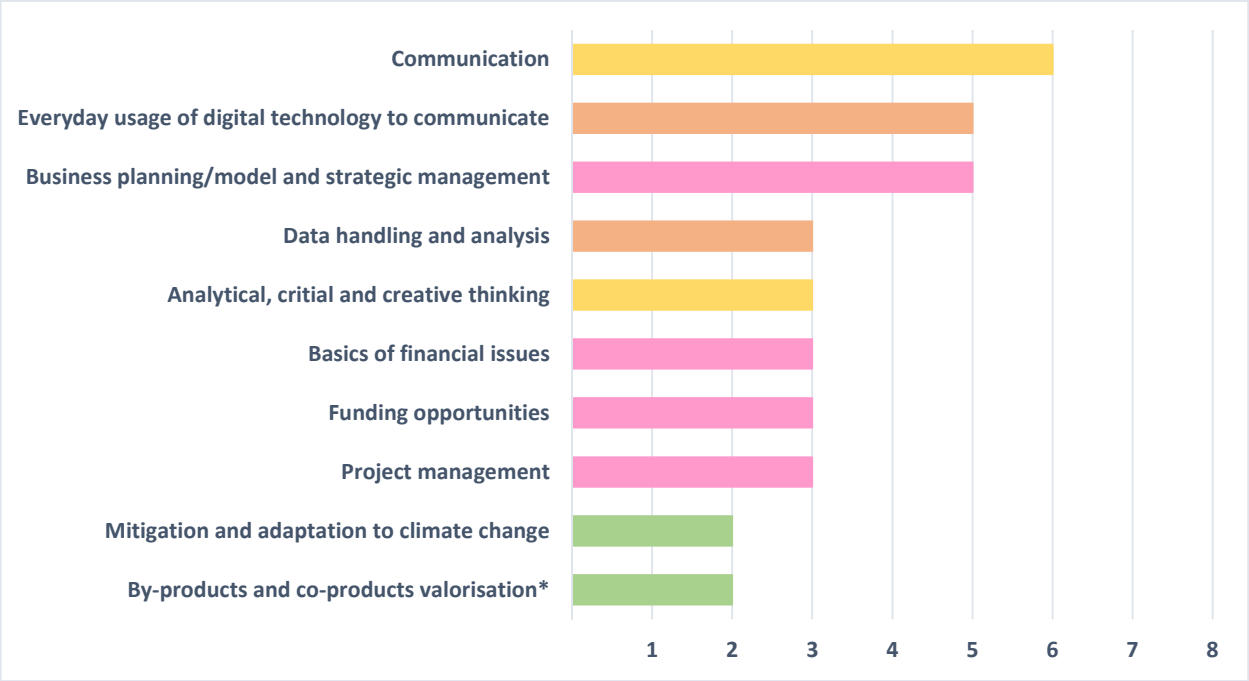

Figure A11.4: Most selected skills in the focus group rankings, Focus Group Austria [n=8]
(*there are 12 more skills that were chosen 2 times)

Within these skills, *communication,* and *everyday usage of digital technology to communicate* were ranked the first by two participants.

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Relevant quotations were included where applicable.

Table A11.1: Top sustainability skills, Focus Group Austria.

Mitigation and adaptation to climate change incl. (2)
• *"The last few years in particular have shown us that the weather and the climate are constantly changing and that extreme weather events must be taken into account, and we must find solutions to this and make adjustments, especially in the producing sector of agriculture*." (farmer, 51111) • *"And climate change is omnipresent. Only with a broad product chain from sustainable forestry and forest management can we combat or mitigate climate change*. " (forest industry, 57221)
Efficient use of resources and logistics (2)
• *"Companies often say that this efficient use of resources is also a massive cost factor. This is not necessarily due to any sustainability considerations, but to business calculations, where company representatives tell us that it is something very, very essential"* (education provider, 57171) • *"I think the topic of efficiency, use of resources, is very important, and the logistics of efficiency is a topic of profitability from my point of view. But it is also a topic with regard to the conservation of resources"* (advisor, 55201)
Integrated pest management (2)
• *" really from the professional side, starting from the farm, integrated pest and disease management*" (education provider, 45191)
By-products and co-products valorisation (2)

• *" I have by-product use and by-product use and economic usability, is again connected with the bioeconomy, that new value-added chains can open up, and if you have something innovative that you can bring to market*" (farmer, 51111)
Water management (2)
• *"I am quite convinced that water management is the next point and will accompany us more and more*" (education provider, 54191) • *"water management, especially in the eastern part of our country in the agricultural regions where the extreme drought is being fought very hard, so there will certainly be a need, on the one hand, to manage the available water better or to use it in a more coordinated way, and on the other hand, I will have to know what all this has to do with it, and I will also have to adapt the framework conditions accordingly and build the necessary infrastructure. It was also the case last year in the West that we had to fight with the drought, especially in the Tyrolean and Salzburg areas, but here in the Ennstal it was too dry, there is not yet the pressure of suffering, so at least in the Ennstal it is not yet the case that people are really thinking about irrigation, I would say."* (farmer, 51111)

Table A11.2: Top digital skills, Focus Group Austria.

Everyday usage of digital technology to communicate (5)
• *"Basically point 1 is for me simply the classical everyday life with very general simple things: computer, tablet and so on. If that doesn't work, people go for coffee, because then they don't know what to do at the moment. So, I think that's one of the most essential things we need at the moment, need in the meantime, simply the quite natural handling of these very simple classical media. If you can do that, you can also deal with many other digital things in the future"* (education provider, 54152) • *"What we have also seen in the last two months, I can only agree with the previous speaker, is the use of digital media, of computers, tablets and mobile phones. So, we had already changed a lot of things in the master trainings and technical trainings before, but of course now we have changed a lot of things much faster up to the exams and then we will continue. So, this must simply be a component or is simply a component of this training, education."*
Data handling and analysis (3)
• *"I only studied forestry, and I know that many of my fellow students still prefer to simply put on a green skirt and hide in the forest. But I believe that we have to get out of there, we need an international network, we have to deal with digitalisation and the processing of data."* (forest industry, 57221) • "I can imagine that the handling of data, data analysis will also become an increasing challenge in agriculture. When I look at the farm from my parents-in-law, there is simply more and more data that needs to be understood and analysed" (education provider, 54171)
E-commerce and e-marketing (2)
• *"the next item I would like to address is marketing, the use of digital possibilities in marketing and marketing. The presentation of the business, the presentation of the own idea, the presentation of what I want to communicate, where I want to earn my income is crucial and I also see no way around digital possibilities for consumers*" (advisor, 55201) • "*especially a little bit of influence from the current situation, e-commerce, e-marketing, but nevertheless I believe that there is quite a bit of future potential in this field, the market on the Internet, online orders, online trade, and especially agriculture and forestry in the area of direct marketing will be able or should be able to or should be able to get involved in this field*" (farmer, 51111)

Table A11.3: Top bioeconomy skills, Focus Group Austria.

Product traceability (2)

• *"product traceability, which I understood to mean product traceability, is becoming an ever greater issue, having started in the energy industry or in energy production beyond the sustainability criteria, but is now spilling over into other areas, and I think that this will certainly be a major challenge if it then becomes, as it were, a requirement that the most diverse criteria must be complied with, but which must be documented and must demonstrate to consumers in a credible manner that the products have been complied with, that the requirements have been met and that they have been produced in accordance with certain standards" (farmer, 51111)* • *"And as the penultimate point, point 9 under bioeconomy, this product traceability is addressed here, and I would like to link it to the second topic that I have not found, namely product labelling of origin. For me, traceability and origin are two essential prerequisites for ensuring that this issue of regional, origin, short distances and sustainability can really be strengthened here. So, the issue of regionalism must be mentioned here in any case"* (advisor, 52201)
Sustainable forest management practices and planning (2)
• *"products from sustainable forestry or from forestry in general, because I think there are some products that you can still discover here, what you can or cannot make out of wood, so there is also the term non-timber forest products. I believe that a great deal of knowledge can and should still be created here" (forest industry, 57221)* • *"And point 10 is sustainable forestry or forest management, is also anchored in it from history, sustainability criteria and, current discussion, the biodiversity strategy at European level, because I believe that this is becoming increasingly, how shall I put it, important and, above all, is perhaps not so well known to the general public as forestry is already regulated or already has many regulations on sustainability, and yet there is still more pressure coming from the NGOs in the direction of more and stricter sustainability requirements in the forestry sector" (farmer, 51111)*

Table A11.4: Top soft skills, Focus Group Austria.

Communication (6)
● "From my point of view, it is a common problem that you are not understood what you say or what is meant. That would be the top 1 for me, communication" (farmer, 51111) ● "In many areas, there are skills that are now very specific, you can learn them very, very well, you can learn them in many areas, but basic skills like communication, networking, problem solving, these are the things that you need a little bit more, where a lot of personality is involved, and therefore I would like to focus on them."" (education provider, 54161)
Analytical, critical and creative thinking (3)
● "From my professional background I think very strongly, analytically and critically" (Education provider, 54152)
Being resilient, adaptable, and proactive (2)
● "The second point is about flexibility, proactive action, resilience" (advisor, 55201)
Managing personnel (2)
● "Personal management plays an important role, that if I see it now for my job, it depends of course in which area you are, it is not equally important for everyone but, I think that it is a very important topic, to be able to deal with people easily, also for the teachers I think it is a factor if you think about it, to be able to motivate people, to delegate" (education provider, 54152)
Networking (2)
● "Then networking, networking especially on a national level but also, very importantly, on an international level, exchange of students, exchange semesters in Europe, in Africa" (forest industry, 57221)
Organisation, planning, visioning, and strategic thinking (2)

• "The first, the first point is the area of soft skills point 6, namely strategic thinking, having visions, being able to organize, planning in a structured way" (advisor, 55291)

Table A11.5: Top business-entrepreneurship skills, Focus Group Austria.

Business planning/model and strategic management (5)
• *"structured thinking, drawing up business plans, thinking about which strategy to choose for my business"* (advisor, 55201). • *"And let's be honest with each other, in the end it's all about the fact that the things we do, no matter what area we come from, are affordable. That means I can have the greatest ideas, I can have the greatest other skills, but if the company or myself can't afford it, I won't do it. And you see this very often, that people come with great ideas, with their concepts, but it is just not financially feasible, and, in the end, it is really about money. That's why I think that this business modelling, business planning and so on is extremely important"* (education provider, 54161).
Basics of financial issues (3)
• "*it is very important to find financing, basic financial skills and also possibilities to find financing*" (education provider, 54161)
Funding opportunities (3)
• *"What is important for our field is simply funding, the whole funding system is now a very essential point, where you have to know your way around at least in our field*" (education provider, 54152)
Project management (3)
• *"Project management is a very essential skill, the basis of economic knowledge, I think, is something that almost everyone needs by now, and then, of course, for universities, all that has to do with teaching, teaching, training, these things come along"* (education provider, 54152) • *"Because projects are a closed short-term environment in which I can actually implement almost everything. And when it comes to change and so on, I can do something in the context of a project, I can implement a change, I can implement a new product, I can implement a new service, I can change a company, and that usually happens in projects. So, I think project management skills are just extremely important"* (education provider, 54161)
New value chains / new business models (2)
• *"In my view, the top 4 would then be, and this is somewhat related to the top 2, new value-added chains, new business models, and, particularly in the context of the bioeconomy, the use of by-products and new products and the further processing of residual materials is a major issue, which is why I believe it will be very important and why I have placed it in the top 4"* (farmer, 51111)
Collaboration/cooperation across all sectors in the food chain (2)
• "*Cooperation across the entire value chain [...] That means it becomes more and more important to be able to work together in teams if you don't know everything anymore. Which wasn't the case in the past, because nobody always knew everything. But that is already increasing, so this ability to work in a team becomes more and more important in order to be able to use the mutual know-how efficiently*" (education provider, 54171)

Question 2.2: Would you add any skill you find missing in the lists? Why is/are important?	
• Use of digital products and GIS data in forestry (forest industry, ID57221).	• *"the use of digital products, such as GIS, ArcGis. This is an extremely important point, because you can simply manage up to 4000 or 5000 hectares on your own, or you can take charge of them, and it is*

• Product labelling of origin (Advisor, 55201) • Media competence (education provider, 54171)	*impossible without digitalisation and digital maps, and many models are derived from them*" (forest industry, ID57221).

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
Respondents agreed with the representative of the agri-food industry and it was added that while social skills are important today, they were equally important 10 years ago, but that technical skills will change depending on external factors
• "*this can never be a fixed list, but rather it will change all the time. Depending on the area of responsibility, the requirements are simply different, or the needs are different, the necessities. So, I think a list like this is a list that is constantly evolving*" (education provider, 54152). • "*This means that these social skills, such as communication skills, teamwork skills, generally speaking, that 10 years ago this was demanded by company representatives just as much as it is demanded today*" (education provider, 54171).

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?
"*sustainable forestry I think is point number one, that, without that it is not possible, furthermore the knowledge of forestry products, the forestry economic chain, so the value chain, is also extremely important. And then I would add the soft, I would use GIS, that is to say data processing, geodata acquisition, geodata processing and geodata analysis, and the conclusions that can be drawn from them, and [...] simply networking and communication. But that is, as soft skills [...] I cannot prioritize what is more important, communication or networking"* (forest industry, 57221).

A11.4 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?	
• Basics of Financial Issues (education provider, 54152). • Networking (forest industry, 57221). • knowledge of the entire value chain (forest industry, 57221). • Communication (forest industry, 57221).	• "*Well, as far as I can see in my work environment, I think that's Basics of Financial Issues. I think that there are a lot of people who don't care much about it. And especially people who have a very strong professional education or training and don't necessarily have to worry about how things are accounted for or how to set up money and things like that, they forget it a little bit or don't perceive it accordingly or underestimate it. So, I think there would be quite a bit necessary, from my point of view"* (education provider, 54152). • "*I would place greater emphasis on the area of networking, communication and knowledge of the entire value chain due to my current activities"* (forest industry, 57221).

• Understanding research funds (53142)	

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)
• *"Thinking in terms of entire value chains, if we only stay in this area, I still miss this a lot. Not so much training content, but background information that can be taught or informed about. Because many a decision that is made at one point somewhere in a business plan suddenly has a crazy effect on the entire value chain. And I have to say not everyone is always aware of what is triggered"* (cooperative, ID52131).

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)
The moderator gave the example of the strength of an online event to reach several hundred participants, namely no travel time, that it is a powerful tool that can be used not only during the present crisis but also because you can reach many people. This view was shared by one participant who also mentioned that certain types of knowledge transfer will prove to be very practical and more efficient in the future, especially in the area of digital knowledge transfer, even on the farm or in the forest it is possible to carry out training online.
• *"certain ways of communicating knowledge, which we did not focus on very much just a short time ago, that they will be practicable and efficient in the future, and I think that the area of digital knowledge transfer, we call it in our Chamber of Agriculture "Webinar" or "Farminar", such a "webinar" is more or less a training online and a "Farminar" is directly on the farm or in the forest or elsewhere"* (advisor, ID 55201).

Q3.5. Is it important for you to receive a professional certification for your training? Why?
One of the participants raised the question where we will be going if we certify and evaluate everything, and that there are so many certifications that the question arises what such a certificate is worth? This argument was not shared by another participant who emphasised the importance of being able to demonstrate the possession of certain skills. This participant gave the example of the differences between project management certification in Europe and in the US.
• [In Europe], "*in order to get a certificate, you actually have to plan a project and defend yourself before a commission and get thrown into the situation; the American model is a multiple-choice test. I will be a project manager after both certifications. In one case I took a multiple-choice test, while on the other a commission assessed me and bombarded me with questions, trying to assess halfway objectively, as objectively as possible, whether I can actually apply these skills in such a situation. And I see it again and again, people who come with project management certifications have no communication skills, which means that they would fail at the first project meeting"* (education provider, ID 54161).

A11.5 – Final remarks

Q4.1. Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, facing the current and future market/social needs?

No final remarks

Annex XII: Focus Group Germany

A12.1 – Executive Summary

List of emerging positive issues

- A cultural change in companies can already be seen to implement more skills aiming at interdisciplinary work and lower hierarchies.
- Awareness of the need for digital knowledge arises throughout all companies and sectors.
- Universities also start teaching a more holistic approach in terms of food chains.
- Cooperation from point A to Z extremely important because one often sees that there are problems in communication and cooperation but simply because there is no interest or no time or no know-how and how to see through such a supply chain from beginning to end. This cooperation is being fostered more and more.
- Most participants are more or less satisfied with the qualification standards from German educational systems, may it be higher education (universities) or vocational training (dual education).
- The German state is very ambitious implementing solid Bioeconomy strategies.
- There is also a move towards flatter hierarchies and a policy of more open doors in the future, so that superiors will always approach their employees and talk to them.
- If an employee or applicant comes along who can provide any proof of a certificate, even on paper, that is always better.

List of emerging critical issues

- There is still a critical lack of digital knowledge and skills, throughout all educational levels, including universities' graduates.
- Unfortunately, it can also be realized that many of the students who come to a company, very often only rudimentary knowledge is available, even when it comes to the installation of programs, systems, or data transfer from one program to the next.
- A lack of knowledge in the usage of simple field data files or farm management information systems, so that in the end there is also the possibility of merging, transferring, and sharing data with others and generating added value for the agricultural enterprise.
- It can be observed that the issue of product traceability is very important, and it is also increasingly a topic of concern to the food industry. From the point of view of trade and customers, there is certainly a desire to ensure clear traceability.
- Especially with regard to new products, they should be more sustainable.
- Agriculture for the future within the limits that our planet allows - in this respect, the most important thing would be the ability to deal with climate change, a big topic also for young people at the moment, so that connections are made clear and are recognized.
- Food security against the background of world peace, very important that everyone has enough to eat.
- A great deal of basic knowledge on digital skills is still lacking and, as a result, many farmers are afraid to use new technologies.

- There are 5 to 10% of farmers who certainly do not need digitization courses, and who are now using the available technologies, field maps, sub-area-specific farming options, plant sensors and so on. They are already using them. They also know how it works. But the question is, do we want these digital tools to be made available to the vast majority of farmers in future, so that they can also generate added value from them? If that is the goal and not just to reach the tip of the iceberg, but the iceberg itself, then we must try to lay a better foundation.
- In addition to structured further education offers, mentoring on the job, an understanding that one also exchanges and learns through exchange in companies, authorities, wherever one works.
- Requirements for skills will certainly change. We can see that now. The issues that are relevant for us, that we are working on, they change every year. Therefore, requirements for these skills will change in the same way, so that we will actually be given a system to adapt to these changes.
- In Germany, people do not take advantage of the opportunities offered by digital technologies. Many people don't see the opportunities, but rather the risks and disadvantages.
- Topics like problem solving methods, project management, and communication are actually quite important abilities, which one should place much more strongly in the foreground.
- Offer internships to students who are fresh out of university and have studied nutritional science, to do an internship in the area of supply chain and sustainability. Although that's not really their focus, they do offer an insight into the sectors.

A12.2 – Composition of the Focus Group

The German Focus Group was comprised of 7 participants, 1 moderator and 2 rapporteurs. Stakeholders' profiles represented were cooperatives (1 participant), agri-food companies (1 participant), advisors (1 participant), education providers (1 participant), governmental agencies (1 participant) and researchers (2 participants).

Figure A12.1: Composition of the German Focus Group

A12.3 – Skills

After a short presentation of the organisers and the FIELDS project, each of the participants were asked to present themselves and describe the tasks they carry out in their daily job. This short presentation round was followed by question 2.1 referring to the skills list, participants received beforehand.

In the German Focus Group, participants' overall selection and ranking of their top 10 skills, figure A12.2 shows that most respondents selected most often sustainability and business-entrepreneurship skills (same percentages, 27.1%), followed by bioeconomy and soft skills (same percentages, 18.6%) and the least often selected were digitalisation skills (8.6%).

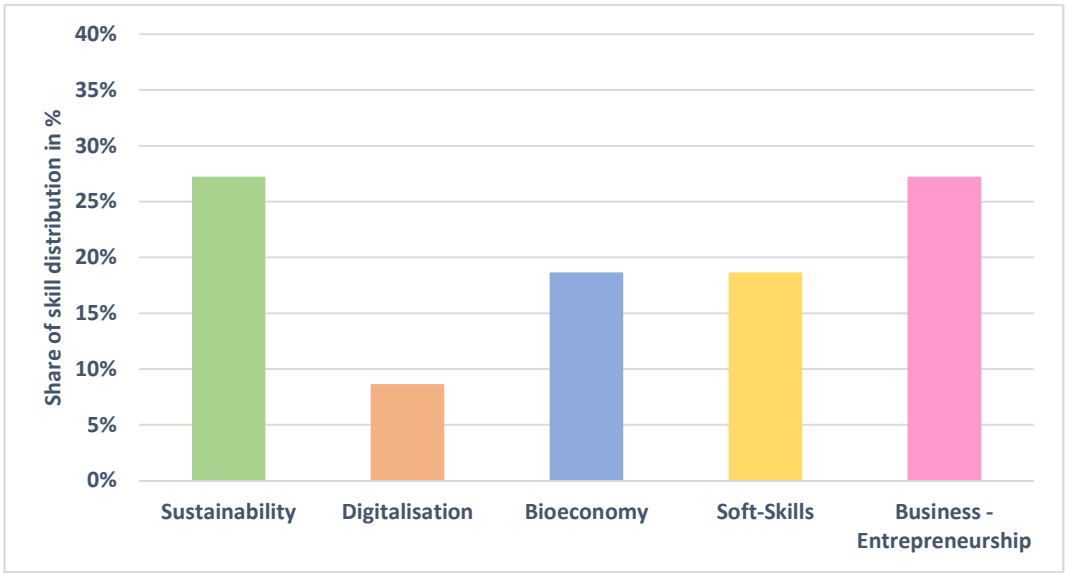

Figure A12.2: Share of selected skills in the top 10 rankings by skill category, Focus Group Germany

In more detail, the graph below shows that 6 participants selected and ranked sustainability skills among the top 3 skills. Business-entrepreneurship and bioeconomy skills were ranked among the top three for 4 participants, whereas digitalisation and soft skills were in the top three positions only for one participant.

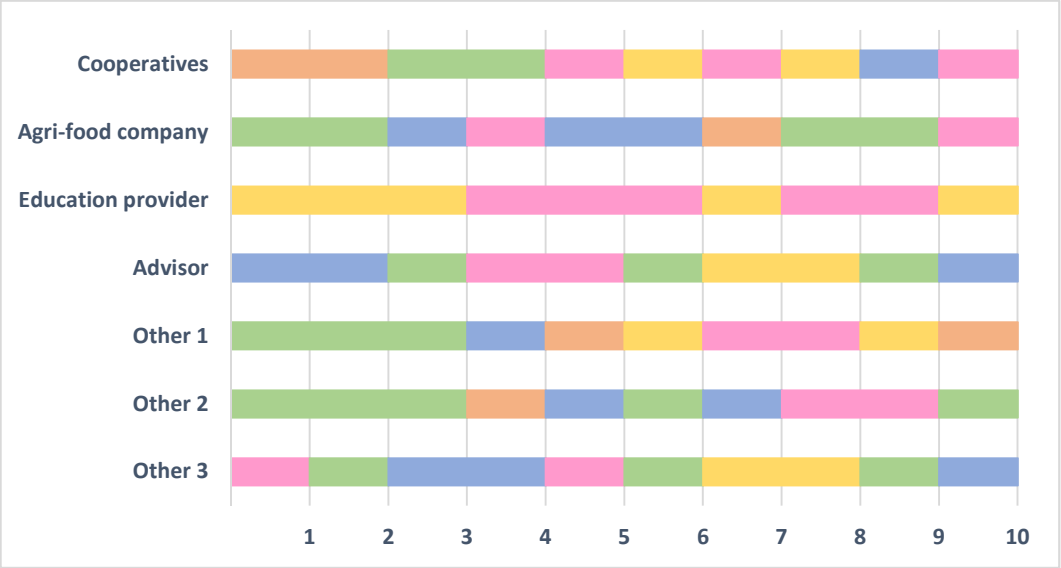

Figure A12.3: Stacked bar for the top 10 skills in the German focus group

When looking at which specific skills were selected and ranked, figure A12.4 shows the ten most selected skills overall for the German focus group.

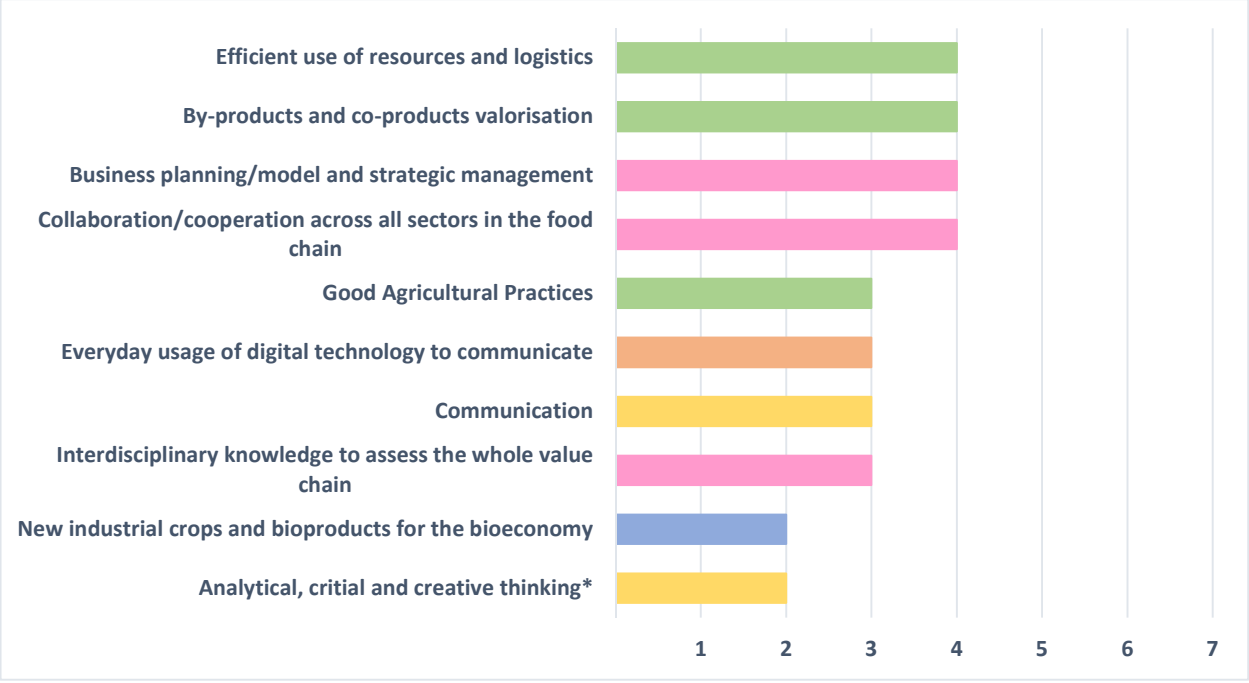

Figure A12.4: Most selected skills in the focus group rankings, Focus Group Germany [n=7]
(*there are 7 more skills that were chosen 2 times)

Within these skills, *collaboration/cooperation across all sectors in the food chain* was ranked first for two participants (65152 and 68132), and *by-products and co-products valorisation* (68112) and *everyday usage of digital technology to communicate* (62141) were ranked the first for one participant.

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Relevant quotations were included where applicable.

Table A12.1: Top sustainability skills, Focus Group Germany.

Efficient use of resources and logistics (4)
● *" I think that also management positions have to decide and look where all their resources come from for all the products and for energy. Also, with the farmers, for example, or with the producers of energy […] To think about a better logistics "* (advisor, 65152)
By-products and co-products valorisation (4)
● *"It is of course the topic we are currently working on in the bioeconomy strategy. This could also be an important topic because of resource efficiency and resource conservation"* (govern. agency, 68112)
Good Agricultural Practices (3)
Sustainable metrics and certification (2)
● *"I'm just speaking strongly from the trade perspective, which is important to us, on the one hand, certificates and certifications and quality management. I think this plays an important role and will also play an increasingly important role "* (agri-food company, 63172) ● *"I also found the point certification and quality management systems very interesting because it summarizes all the different aspects of sustainability and it is an important question how to achieve this. Especially with regard to new products that are or should be more sustainable"* (govern. agency, 68112)
Soil nutrient and health management (2)
● *"Since resources are becoming scarce, water also the nutrients in the form of regulation of the amount of fertilizer and so on, it is actually becoming much more important to operate more circular management and to look at the end how one can produce more sustainably. Unfortunately, I have found that today many production methods that were used 20-30 years ago when I started my apprenticeship. I did an agricultural apprenticeship before I studied, there was still a lot of work to be done with harmful debts and so on. A large part of this knowledge has unfortunately been lost today and that is why this is an important topic for me"* (cooperative, 62141)

Table A12.2: Top digitalisation skills, Focus Group Germany.

Everyday usage of digital technology to communicate (3)
● *" We also offer various services and apps for our members and customers already today. When customers have to download field impact data from their Fiona application system, most of our customers already have a problem […] Many of the students who come to my house when we have applicants, very often only rudimentary knowledge is available, even when it comes to the installation of programs, systems or data transfer from one program to the next. The standard is much worse than is commonly thought"* (cooperative, 62141)
Farm Management Information Systems (2)
● *"Simple field data files or farm management information systems, so that in the end there is also the possibility of merging, transferring and sharing data with others and generating added value for the agricultural enterprise"* (cooperative, 62141)

Table A12.3: Top bioeconomy skills, Focus Group Germany.

New industrial crops and bioproducts for the bioeconomy (2)
● *" Although I believe that we have to strive worldwide to use fewer resources, we will always need packaging or resources for energy or for other vital items, i.e., products. Therefore, I think this production of organic products is very important."* (advisor, 65152)

Urban, peri urban and rural area agriculture (2)
Controlled environment agriculture (2)
Traceability (1)
● *"I also consider the issue of product traceability to be very important and it is also increasingly a topic of concern to the food industry. From the point of view of trade and customers, there is certainly a desire to ensure clear traceability"* (agri-food company, 63172)
Plant new breeding techniques (1)
● *" I find new plant breeding techniques very important also against the background of adaptation to climate change."* (researcher, 68121)
Food security (1)
● *"Food security against the background of world peace, very important that everyone has enough to eat. Of course, also against the background of the planetary boundaries, i.e., if you intensify agriculture, increasing productivity was also a point somewhere. Of course, we must also ensure that the rules of sustainability are applied"* (researcher, 68121)

Table A12.4: Top soft skills, Focus Group Germany.

Communication (3)
Problem solving (2)
Analytical, critical, and creative thinking (2)
Teamwork character (2)

Table A12.5: Top business-entrepreneurship skills, Focus Group Germany.

Collaboration/cooperation across all sectors in the food chain (4)
● *" Because it leads to all the other aspects that I consider to be very important […] I find this cooperation from point A to Z extremely important because I often see that there are problems in communication and cooperation but simply because there is no interest or no time or no know-how and how to see through such a supply chain from beginning to end"* (advisor, 65152)
Business planning/model and strategic management (4)
Interdisciplinary knowledge to assess the whole value chain (3)

Question 2.2: Would you add any skill you find missing in the lists? Why is/are important?	
● New technologies (cooperative, 62141)	● *"[…] field maps, sub-area-specific farming options, plant sensors, RTK precision farming and so on […] do we want these digital tools to be made available to the vast majority of farmers in future, so that they can also generate added value from them? If that is the goal and not just to reach the tip of the iceberg, but the iceberg itself, then we must try to lay a better foundation. That is completely lacking at the moment and for me it is missing in all areas of education and training"* (cooperative, 22212).
● Quality management (food industry, 63172)	● *"That depends, of course, if it is for our QS department, it is of course a prerequisite that they have a qualification in this area. They are very specialized in this area. But I think that is not quite the case for the entire purchasing department and for the person who comes into*

	contact with the goods. We would certainly like to see greater understanding of this in general" (food industry, 63172)
• Further education (governmental agency, 68112) • Continuous training through mentoring (governmental agency, 68112) • Continuous training through job exchange (governmental agency, 68112)	• *"[Further education is important] because processes and technologies are constantly changing and people's areas of responsibility can also change"* (governmental agency, 68112) • *"[…] understanding that one also exchanges and learns through exchange in companies, authorities, wherever one works. On the one hand, this can also be very important for interfaces between important sectors in the value chain. On the other hand, it is also important for the continuous training of employees"* (governmental agency, 68112)
• Knowledge about the entire food system (researcher, 68121)	• *"Lately there are always discussions about the Food System and the system as such is very complex and if you change something at one corner and give input or get something out, it can have some effects at another corner that you don't see at first sight and the whole Food System from the field to the plate and the trade can be taught the complex connections"* (researcher, 68121)

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
All participants are on the same page that skills and their priority will change over time. In fact, constant change is already happening now quite obviously and therefore it is pivotal for the priority list of skills to adapt to these changes. It is pointed out that especially in the fields of technology/digitalization and interdisciplinary working massive change will take place.
• *"It is absolutely necessary to keep up to date and follow the trends. Especially in the area of sustainability I see an absolute necessity"* (63172, agri-food company) • *"I see how young people, or people who are still studying, are always thinking more about how they can cooperate with other areas in the food chain, resources, energy sectors and are so much more creative and come up with new ideas. I think this sector will still need further training"* (65152, advisor) • *"I think in the area of technology, IT-usage I think there will be a lot more to do and maybe it will be more important to develop this area"* (65152, advisor) • *"At universities it is very important that professors have to inform themselves much more about what is happening in the whole area of innovation and sustainability"* (65152, advisor)

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?
It is mentioned by the participants that on the one hand, that the differences within a sector also strongly depend on the type of enterprise. Is it a large multinational company, or a small SME, or start-up? This might

play a bigger role that the actual responsibility of a position. However, it is also pointed out, that management skills need to change in a way to an open-door policy and flatter hierarchies.
• *"It is the case when people have a higher level of school education, when they also have a university degree, when they normally have the same perspective, and the basic knowledge is often better than when it is just a classic vocational training. In this respect one could deduce something. When I look at my company, the different hierarchies, I can't see any differences"* (62141, cooperative) • "*I think the management level has surely something to do with it. But it also has a lot to do with what kind of company structure the person is embedded in. Is that a person who goes into a company that is very hierarchically structured? Is it a person who goes into a company that is more like SME or is very large? I think that actually has more of an impact on the skill set than the hierarchical level. Smaller companies are more likely to need an all-rounder with more skills and competencies than larger companies, who perhaps have their own in-house consultancy and where the expert knowledge is bundled"* (63172, agri-food company)

A12.4 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?	
• Communication (cooperative, 62141) • Problem solving (cooperative, 62141) • Project management (cooperative, 62141) • Basic digital skills (cooperative, 62141) • Digital technologies (cooperative, 62141)	• *"Communication, I am now always referring to the customers, our farmers, our members; the topic of communication, that they can communicate to the outside world, that they also dare to stand up and join in the discussion"* (cooperative 62141) • *"The topic of problem solving; the conflicts, let's say when we talk to our customers, to our farmers, we realize that there is also a strong potential for conflict"* (cooperative 62141) • *"A great deal of basic knowledge [on digital skills] is still lacking and, as a result, many farmers are afraid to use new technologies. Just to give you an example I am constantly confronted with the discussion of farmers why data must be in a cloud, why they can't keep it on their computers at home" (cooperative 62141)* • *"What I very often miss in Germany is that people do not take advantage of the opportunities offered by digital technologies, rather the risks and disadvantages. And I think that's a big difference if you go to North America, where digital technologies also come into the market much faster and are used faster" (cooperative 62141)*
• Soft skills and leadership (governmental agency, 68112)	• *"Certification and quality management, which is also a point that is constantly evolving, and which I believe*

• Lifelong learning (governmental agency, 68112) • Certification (governmental agency, 68112) • Combining knowledge from different sectors (governmental agency, 68112) • Food value chains (governmental agency, 68112) • Quality management (governmental agency, 68112) • Valorisation of by- and co-products (governmental agency, 68112) • Soil/nutrient/health management (governmental agency, 68112)	*would be important for further training"* (governmental agency, 68112)

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)	
• Training can only be shouldered together (62141, cooperative) • Special training programs tailored for different sectors and job positions (62141, cooperative)	• *"we have a special training system, we take all our trainees together to a special vocational school where we teach our businesspeople this agricultural background and we also have a trainee programme, which is mostly available for graduates, i.e., Bachelor and Master, who join us and then go through a trainee programme before they can take over a management position if possible."* (62141, cooperative)
• More internal training (63172, agri-food company) • Move towards more technical expertise in training (63172, agri-food company)	• *"We have our own internal training for certain topics, but we are also developing more and more towards technical expertise, which means that we hire very specialised people with very specific qualifications to fulfil the functions in our company. You can see this, for example, in the area of sustainability"* (63172, agri-food company)
• Combine professional training & soft skills (governmental agency, 68112) • Training specific for sectors (governmental agency, 68112) • Linking knowledge from different sectors/areas (governmental agency, 68112)	• "*Offer soft skills courses more specifically for certain sectors, or to examine further training in specialist forums to see whether aspects such as cooperation or leadership understanding can be promoted and incorporated* (governmental agency, 68112) • *"In principle, linking knowledge is already what will be more important in the future than knowledge itself*." (governmental agency, 68112)

Q3.3. Do you think skills need to be trained in different ways, depending on the people to be trained? (Group question)
A unanimous opinion prevailed, that skills always need to be trained individual and situational. It was mentioned that general trainings can, if at all, only be made to a certain extend. However, a one-size-fits-all approach in skill training does and cannot exist.
• *"I think it is always so situational and dependent on the person, background and also the function they are supposed to fulfil in our company that it would be difficult to make any arrangements […] It has to depend on the content of the training, which skills I want to teach…"* (63172, agri-food company)

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)	
• Tailored to the topic training (62141, cooperative) • Practical approach (62141, cooperative) • Working in group methodologies (62141, cooperative)	• *"The possibility of group work, where the young people work together on some kind of project and work out and implement it using an example is very popular"* (62141, cooperative)
• Formalized induction training for new employees (63172, agri-food company)	• *"what we have certainly been doing systematically for a long time, is an induction that everyone gets to know the company and the different functions in the company in a very detailed way, so that there is a very formalized system, so that when it is better to assess the interaction between the different departments, it is easier to understand. It ensures that everyone has a certain basic framework."* (63172, agri-food company)
• Soft skills through practical activities (65152, advisor) • Internal training in other working areas (65152, advisor)	• *"Some examples of practical activities: workshops including group work, student clubs for networking activities, participate in conferences…"; "maybe once a month, or once six months, (the trainee) is active in a different area and, or even just for a short sniff and see how other areas work and can help other areas with ideas"* (65152, advisor)
• Induction trainings for new employees (68112, governmental agency) • Online tutorials (68112, governmental agency)	• *"there are also trainings for new employees, and I think that is very important and, I mean, something like that is very difficult to transfer to small companies in the end, but I think that induction and further training play a role"* (68112, governmental agency) • *"I observe, that especially for young people, online tutorials to get skills in the use of computer programs are totally helpful, so I think there are not one size fits all, but simply certain things that you need now and then, these*

	are definitely online tutorials and training courses that make sense" (68112, governmental agency)
• Sponsorship procedure (682121, researcher)	• *"we have a sponsorship procedure, always one person, we call it the chick school, then takes care of a new employee and is then a little bit of a sponsor, for all questions that are available to BLE, both organizationally and technically, for the new area of responsibility"* (68121, researcher)

Q3.5. Is it important for you to receive a professional certification for your training? Why?

From the discussion it became obvious that larger companies do more internal training compared to e.g., the public service. In start-ups less attention is paid on certificates on paper but rather the impression during face-to-face meetings. In general, certifications are less important in Germany due to the dual training (vocational training) where people are granted certificates. Post educational certificates do not play a major role in Germany.

- *"We do not issue certificates ourselves. But of course, yes, if an employee or applicant comes along who can provide any proof, even on paper, that is always better […] we also offer seminars for customers in general; they get a certificate for the farmers, a confirmation of participation where the content is described, but that's not something you can peddle on the open market, I'd say"* (62141, cooperative)
- *"Well, it always depends on the field of expertise, typically there are further training courses that we offer internally at LIDL, which are linked to a certificate, for example KIE training courses, which are simply necessary to ensure that people have the necessary qualifications to carry out the position, but theoretically it is also conceivable without"* (63172, agri-food company)
- *"For companies I can understand that they can't talk to every person to see how much a person knows or what they have actually done, and a professional certification is more appropriate, maybe it's a bit different in start-ups where you see it all a bit without certification, or, or you look at the practical experiences, internships…"* (65152, advisor)
- *"In the public service, training is of course very strictly regulated. Of course, it will then be less necessary to get a certification or to further qualify according to certain rules"* (68112, governmental agency)
- *"In the public sector everyone is entitled to further training and at the end of such training, there are also the certificates, but my certificates, they end up in the personnel file and I, as a civil servant, will relatively unlikely apply away again. If you then apply away, then for the curriculum vitae, certificates in the application folder may still be quite good, but I myself would have no need for it now" (68121, researcher)*

A12.5 – Final remarks

Q4.1. Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, facing the current and future market/social needs?

Additional comments and suggestions were: i) consider digitalisation in the top of the agenda; ii) take into account the younger generation in the sector needs and iii) the creation of a framework to assess current and future training and training implementation needs.

- *"[…] as one of the participants here has already pointed out, identify, and adapt to challenges and take along a kind of framework that enables to cope with these different tasks, which will change permanently"* (food industry, 63172)
- *"[…] considering current and future needs, and I think for companies and universities, in general, simply include the perspectives of the youth, also much more of the children, even if they are still so small, in order to get creative ideas and simply work much more with those who will really be in such leading positions in the future"* (advisor, 65152)
- *"[…] actually, also with regard to the strategies of the ministry, digitalisation is now at the top of the agenda. That we must do something in this direction, including the agricultural sector" (governmental agency, 68121)*

Annex XIII: Focus Group Greece

A13.1 – Executive Summary

- The Focus Group meeting was attended by professionals and experts in the fields of agriculture and food industry. The six participants were initially asked to present their specialties. Specifically, there were a farmer, two education providers, a member of an agricultural cooperative, an advisor, and a representative from the agri-food industry. The conversation was organized by the facilitator and the two rapporteurs.
- Each participant explained her/his choices regarding the skills she/he considers as the most important. The advisor emphasized the importance of the business skills of the modern farmer but also of the soft skills, such as a positive attitude towards the problems and the willingness for innovation. From the farmer's point of view, the problem of water quality and proper utilization was emphasized as of particular importance. He referred to the need for expertise in water management. He also pointed out the need for farmers and experts with the digital skills needed to take advantage of new technological solutions. The education provider initially pointed out the need for sustainability in all parts of the agricultural process. The agri-food industry representative spoke about the need to incorporate modern marketing techniques to promote the products in Greece and abroad. He also referred to the need for specialization, by dividing responsibilities into different specialties. He also referred to the need for young people to get into the agriculture business.
- The difficulty of digitalizing the cultivation process due to the combination of several different types of cultivation in the same fields and due to land distribution was then discussed.
- It was noted that different skills are required for different tasks, also based on the different types of crops. Lower responsibilities require more technical skills, while soft skills, such as business and leadership skills, are required for the accomplishment of more advanced tasks. It was also mentioned that critical soft skills, such as responsibility, should be required throughout all employment levels.
- The education provider referred to the need for collaboration among different specialties and people profiles because a farmer or a producer cannot have all necessary skills to utilize the new technologies. In any case, as the other education provider mentioned, a key skill that everyone should have is the ability to manage the uncertainty conditions (economic, environmental, etc.) that exist in the industry.
- The conversation was then focused on the need for education for all professionals that take part in the agricultural sector and agri-food industry. The education provider stressed the lack of an organized life-long learning system. Education is limited to young farmers, but even this is incomplete and not well-organized. The problem is observed on both low-qualified trainers/instructors and participants who are not willing to be educated. It was commonly accepted that the lack of education and cooperative culture has created a problematic situation in the country's agricultural sector.
- The importance of a general type of education for anyone that plans to get involved in the agriculture sector was discussed, as well as the need of lifelong training to upgrade the skills of professionals in the field. Nowadays, there is a lack of trainers who are directly related to the processes of agriculture so that they can understand the contemporary educational needs. This leads to the devaluation of educational programs.
- Regarding the best educational procedures, it was mentioned that there should be a combination of theoretical sessions in classrooms and practical/technical sessions on site (fields, etc.). Online education is also a good option for the case of theoretical courses. It is also necessary to separate the instructors according to the subject of their specialization as there are cases where some of them

undertake the teaching of a subject that is beyond their knowledge. The educational process in Greece should be re-designed through a bottom-up approach to provide an advanced general education before any specialization. Finally, it is important to link the agricultural sector with the country's universities and research centres to strengthen the cooperation in education and enable the exchange of the necessary know-how.

A13.2 – Composition of the Focus Group

The Greek Focus Group was comprised of 6 participants, 1 moderator and 2 rapporteurs.

Figure A13.1: Composition of the Greek Focus Group

A13.3 – Skills

In the Greek Focus Group, participants' overall selection and ranking of their top 10 skills, figure A13.2 shows that respondents selected most often bioeconomy skills (28.3% answers), followed by business-entrepreneurship skills (26.7%) and sustainability skills (23.3%). Soft and digitalisation skills were selected quite less frequently compared with the other skill categories (13.3% and 8.3% respectively).

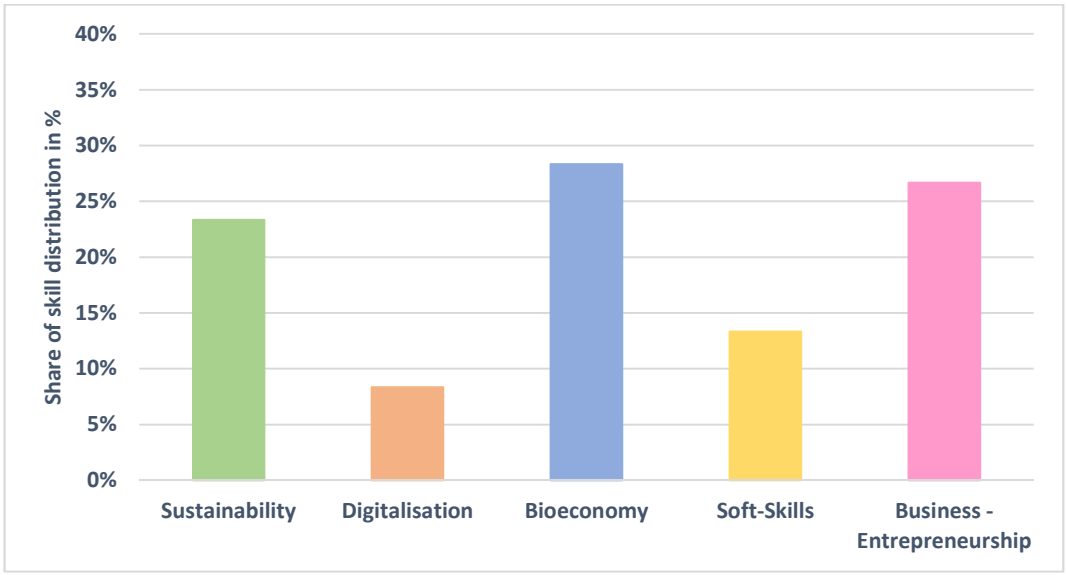

Figure A13.2: Share of selected skills in the top 10 rankings by skill category, Focus Group Greece

Figure A13.3 shows that, although the most frequently selected, bioeconomy skills are only in the highest positions for one participant (education provider, 74152). Furthermore, it can be concluded that there is not a predominant category in terms of ranking positions: 4 participants ranked bioeconomy skills among the top 3 skills; 3 participants ranked sustainability and business-entrepreneurship skills in top three positions, and only one participant ranked digital and soft skills as the 3 most important.

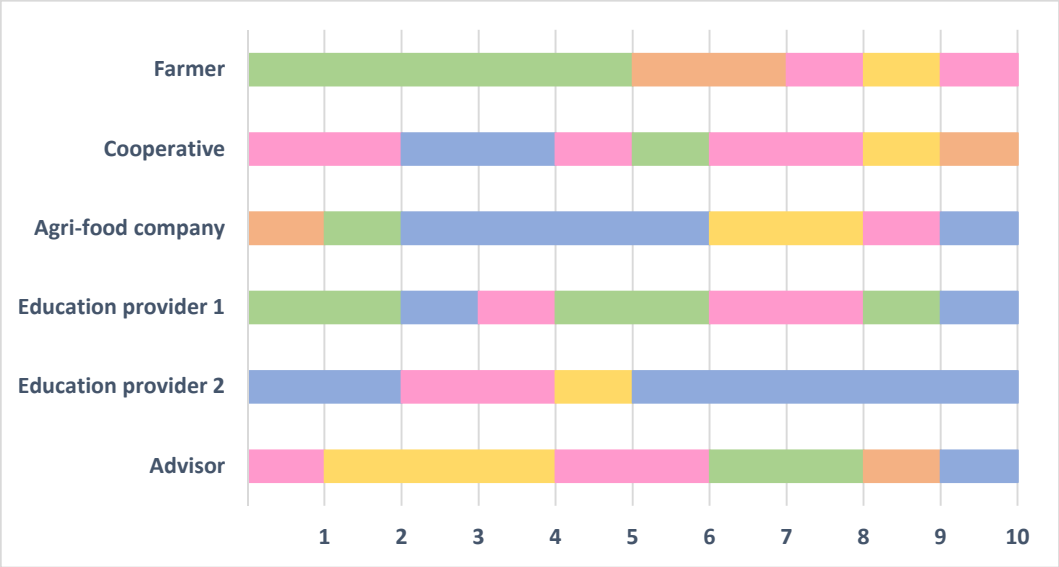

Figure A13.3: Stacked bar for the top 10 skills in the Greek focus group

When looking at which specific skills were selected and ranked, Figure A13.4 shows the most selected skills independently of their category. Compared with other Focus Groups, the number of nominations is not high, but it is quite reasonable in view of the number of participants.

Figure A13.4: Most selected skills in the focus group rankings, Focus Group Greece [n=6]

(*there are two more skills that were chosen 2 times)

Within these skills, *water management*, *Cooperatives (values, legal framework, and management)* and *business planning/model and strategic management* were ranked first for three participants.

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Relevant quotations were included where applicable. Due to the low number of participants, skills with only one nomination were also included.

Table A13.1: Top sustainability skills, Focus Group Greece.

Efficient use of resources and logistics (2)
● "We had about 40 thousand acres of corn, while at the moment we have 10 thousand acres. The producers saw that they could not irrigate, they had high costs, they could not support their families. And there has been a big shift in arboriculture. I believe that the strong point of Greek agriculture is no longer in these extensive crops, in wasteful crops, in energy-intensive crops. We have a fantastic climate, we have soil to cultivate, while abroad, in the Netherlands, the plants grow in water and hydroponics. And we can do such serious things in all areas " (agri-food company, 73131)
Water management (2)
● "It all starts with the water. If there is water, everything can be accomplished. For example, my area is the highest productive area in cotton. We reached a limit, however, because the water was very low. We had unsuitable water, there was salinization, the drillings had to have 9500 conductivity, which means that it is unsuitable for all crops. So that's why we have to start with water" (farmer, 71111)
Good Agricultural Practices (2)
● As a cooperative, at least in terms of sustainability, I have noted here that the number one essentially concerns good agricultural practices. The standards that our customers ask of us so that we can sell any product, GLOBALG.A.P., ISO and various other standards that exist in agriculture and in any other sector are essentially the standards that we give priority for our producers. […] To keep what the certification says, that is, to set a standard so that we can have a good relationship with our customers. It is not enough just to harvest and transport to the premises of the cooperative, the product must also meet all these characteristics required by the market (cooperative, 72121)
National, EU and international environmental policies, regulation, subsidy, and support programmes (2)

Table A13.2: Top digitalisation skills, Focus Group Greece.

Digital irrigation control systems (1)
Everyday usage of digital technology to communicate (1)
Data handling and analysis (1)
E-commerce and e-marketing (1)
Digital warehouse management systems (1)

Table A13.3: Top bioeconomy skills, Focus Group Greece.

Conventional versus /and Organic farming incl. (2)
Planning and coordinating production (1)
Genetically Modified Crops (1)
Product traceability (1)
Calculating, handling and managing risk (1)

Table A13.4: Top soft skills, Focus Group Greece.

Learning continuously (lifelong learning) (2)
Demonstrating positive attitudes & behaviours (1)
● "For me, it is something very important because when someone does not stay in the negative side and has a positive attitude towards changes, he will succeed" (advisor, 75161)
Innovative thinking (1)
● "The modern farmer must innovate not only in the crops and in new techniques to monitor developments. He needs to keep innovation in mind" (advisor, 75161)

Table A13.5: Top business-entrepreneurship skills, Focus Group Greece.

Business planning/model and strategic management (3)
● "I had in mind the skills that not just a consultant, but a producer and a modern farmer need. The skills that an entrepreneur farmer should have. We demonize the word "entrepreneur" in Greece, but in my opinion, it has to do with the professional farmer. The entrepreneur is essentially a professional who is equipped with various skills (professional, business and leadership) and aims to get a profit out of it"(advisor, 75161)
Cooperatives (values, legal framework, and management) (2)
● "In terms of sustainability, I am going to speak from the perspective of the cooperative. Of course, what we face in our daily lives is very important, not only to receive the products from the producers, but also to be able to promote them in the markets, to our customers" (cooperative, 72121)
Food Labelling/Certifications (2)
● "[...] That is, adherence to the standards we must have from global certification companies. There is no longer a customer who buys a product from a cooperative and does not ask for GLOBALG.A.P. or ISO or any other certification that may exist that concerns our producers. Consider that now we have about 250 producers and we have managed to have these certificates for all 250 producers. For us, this part is very important " (cooperative, 72121)
Collaboration/cooperation across all sectors in the food chain (2)
Funding opportunities (2)
Project management (2)

Question 2.2: Would you add any skill you find missing in the lists? Why is this/are these important?	
● Cooperation (agri-food industry, 73131)	● *"I clearly believe that the Greek producers want an education, a socialization, for us all to grow up together. No one is competitive alone. There is nothing that you can do on your own. Get organized to do serious work now. With young professionals, and the older farmers behind to help the situation with their experience."* (agri-food industry, 73131)
● Ability to work under conditions of uncertainty (education provider, 74141)	● *"I do not know which of those who work in the agri-food sector, does not work under conditions of uncertainty. Even researchers work under conditions of uncertainty. It is climate uncertainty. It is the uncertainty of the mood. There are many different uncertainties, and you have to work and manage them all at the same time. Manage yourself and your emotions at the same time"* (education provider, 74141)

• Learning through cooperation (education provider, 74152)	• *"Since we talk about digitization, we have to work together, because not everyone can do all this on their own. We should emphasize the issue of cooperation"* (education provider 74152)

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
We have idealized digitalization, and this may change. There are other priorities in Greece. We need to find out how the skills are depending on the time, region, and the problems that we face. The required skills will certainly change over time. It is also indicated more cooperation to overcome land distribution obstacles for a digitalized agriculture.
Farmer, 71111
The change in target products will affect skill needs
"Yes, definitely, it will change. Depending on the products we want, as mentioned before, you know vine, cotton, corn, almond, walnut"
Education provider, 74141
They will, but there are other priorities rather than digitalisation
"I think we have idealized digitalization a bit and that is also an issue. We are in Greece. We have some very strong problems, stronger than getting digitalized. With 40 acres it is practically very difficult."
Education provider, 74152
Not only depend on time, but also on the sector, the region, the job profile…
"The point is to find out how specific they are depending on the time, depending on where we are, and the problems that everyone has. So, we cannot generalize. The farmer has a different point of view because he faces daily problems. It has to do with his survival. We say that it is all good and we talk about digital skills that are very important, but for example water is a daily issue that we face"
Advisor, 75161
More cooperation to overcome land distribution obstacles for a digitalized agriculture
"Okay, everyone on their own may not be digitized. It is difficult for 40 acres. But through cooperation if we make these 40 acres 2000 acres then we can be digitized.

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?
Different skills must be developed according to the level of job and responsibilities. In the lower responsible positions, we need more technical skills, while in the higher ones we need softer skills, such as entrepreneurial and leadership skills. Soft skills are for everyone regardless of responsibility position. Skills to be trained are also dependent on the educational background of the trainee, and this happens in all job responsibility levels.
"From the cooperative perspective, it is very difficult to be able to organize the training of 250-300 different people, which have a completely different social, educational, and spiritual level. Furthermore, I do not know how it is in other areas, but here a large part of our producers, although they have farms, this is not basically their main profession. Or at least it is not their only profession" (cooperative, 72121)
"First, I do not like the term, everyone has a responsibility. I think soft skills are for everyone regardless of positions or responsibility" (education provider, 74141)
"In general, however, it is not something that we can put in moulds. Depending on what we are addressing, in which area, in which position, let's say the employee, the skills he must have are different. I would say that in the lower positions of responsibility we want more technical skills. While in the higher ones we have softer skills, more entrepreneurial, rather skills that are more entrepreneurial and leadership skills" (advisor, 75161)

A13.4 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?
A general upgrade of the education quality is necessary

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)	
In view of participants' comments, there is a serious lack of a good education system oriented to agriculture. From the secondary school (VET colleges) to lifelong learning for farmers. This situation leads to poorly motivated trainers and trainees.	
• Oriented education from high school (cooperative, 72121) • Lifelong learning (cooperative, 72121)	• "I agree with the idea that there should be courses and directions for the farmer from high school, so that this culture of education and lifelong learning can be built. I'm not a producer but seeing the lack of education for the older generations of farmers, the sad thing is that I think the new generation of farmers will be lost…" (cooperative 72121)
• Deficit on trainers (agri-food company, 73131) • Lack of motivation to be trained (agri-food company, 73131) • More education (agri-food company, 73131)	• *"There is a deficit on both sides: both by trainers and by trainees. That is, from good trainers who know the situation well to train someone, but also from the will of the trainees to be trained"* (agri-food company, 73131) • *"We clearly need more education, but we need to lay the foundations of education. So right now, we are so far behind that we do not even have the foundations of education. The foundations of education are collaboration and the way of thinking*" (agri-food company, 73131)
• Lack of a motivating education system (education provider, 74141)	• *"We have not push farmers in the culture of education. We ask farmers to come to the training programs for young farmers and they are willing to learn. But the lesson turns out to be a loss of time! I have studied forestry, but I will teach marketing. We disappoint them. It is our fault that we do not improve this culture"* (education provider, 74141)
• Lack of a lifelong learning system and vocational education (education provider, 74152)	• *"There is nothing organized by the state. That is, the farmer does not know where to ask for education. A common direction, a common line does not exist from anyone. There are only mandatory training programs for young farmers. It is really tragic that agricultural education is not considered vocational education"* (education provider, 74152)

● Lack of trainees and motivated trainers (advisor, 75161)	● *"The trainers are not all willing to do the right job, but the trainees are not willing because they send representatives instead of them coming"* (advisor, 75161)

Q3.3. Do you think skills need to be trained in different ways, depending on the people to be trained? (Group question)
Only one participant provided input to the question (advisor, 75161), and his comments are more oriented to the previous question about missing training. He points out that education of future agriculture professionals should start in high school, as occurs in other European countries.
● *"This education, the professional agriculture, should be done like a technical education in high school. The basic education, as in some professions. In some foreign countries this education exists. In other words, they become professional farmers, by starting from the high school"* (advisor, 75161*)*

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)	
One participant (agri-food company, 73131) suggests a combination of online and practical training as a good methodology to train farmers.	
● Combination of online and practical training (73131, farmer)	● *"In the agricultural sector, it is very difficult to have online training. That is, you want to show a pruning, you want to show some cultivation technique. The theoretical part can be done online. As I usually do with my own producers. We first have a discussion theoretically where we discuss what we are going to learn and then we go and see it in the field practically. Otherwise, it is very difficult due to the nature of the sector"* (31131 farmer)

Q3.5. Is it important for you to receive a professional certification for your training? Why?
One participant mentions a "green certificate" for farms that was compulsory in the past (education provider, 74141), but it was abolished.
● *"The green certificate that everyone is supposed to pass. But all this never went on. It would make you a certified farmer"* (education provider, 74141).

A13.5 – Final remarks

Q4.1. Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, facing the current and future market/social needs?
No final remarks

Annex XIV: Focus Group France

A14.1 – Executive Summary

We can retain the following key elements of the focus group:

- Fluency in English emerged as a key skill for all participants, although it was not mentioned anywhere in the skill sheets
- Beyond the technical skills, the participants insisted on the importance of the soft skills which are key in any type of job, while the technical skills can be acquired more easily throughout the career
- Lack of distinction between continuing education and initial training: one of the difficulties mentioned by the participants in responding adequately to the questions in the focus group concerned the lack of distinction made between initial training and continuing education.
- For instance, the importance of transversal skills, of reasoning in a global manner and of showing adaptability were mentioned as fundamental skills to be acquired at the end of initial training, whereas with continuing education, farmers and other actors could concentrate more on the acquisition of technical skills.
- On the training offer in general, the training linked to all the skills mentioned in the competences sheets exists. The whole difficulty consists rather in having access to it: how to find the training I need? How to finance it? The question of the funding of vocational training is key. The question of the quality of the training also occurred, both for the trained person as well as for the company. For instance, food companies regularly finance training for their employees, but do not necessarily know what the training is worth upstream and can only rely on feedback from other employees to evaluate the training. However, in France, all training offers need to be register and validated by the French national authority for funding and regulating vocational training and apprenticeship (France Competences).
- The French reform of the professional training law for farmers, which was passed in 2018, was mentioned several times by professional training organizations. Indeed, it defines several key points which were discussed during the focus group:
    - ✔ Farmers' right to a personal training account (CPF), which allows them to acquire training rights throughout their careers, as well as to CEP (Professional Development Consulting)
    - ✔ Development of training actions in the workplace (AFEST), which are defined as an educational path to achieve a professional objective. This route can be carried out in whole or in part remotely and also be carried out in a work situation. Not back yet because the tool is recent, but it looks promising.
- Participants also stressed that there has been a significant development in recent years of training using different types of support. In addition to formal training, much more interactive formulas have been developed: training actions in the workplace (AFEST), mixed training alternating face-to-face and online training, educational games (serious games), etc.
- Participants also pointed out that nothing was mentioned about the management of risk taking by farmers. Agriculture being a work of the living, it is necessary to know to adapt to the case by case on the ground, vis-a-vis the imponderables.

- The participants all contributed to the discussion with enthusiasm. We were not able to ask each question to each person as it would have created some clutter, but we followed the FIELDS Guidelines as much as we could. We definitely collected sufficient data on skills and training, and we hope that our work will be beneficial to the research.

A14.2 – Composition of the Focus Group

The French Focus Group was comprised of 9 participants, 1 moderator and 3 rapporteurs.

Figure A14.1: Composition of the Greek Focus Group

A14.3 – Skills

In the French Focus Group, participants' overall selection and ranking of their top 10 skills, figure A14.2 shows that most respondents selected most often sustainability skills (31.7%) followed by far by soft skills (19.5%), digitalisation skills (18.3%), bioeconomy skills (18.3%) and business-entrepreneurship skills (12.2%).

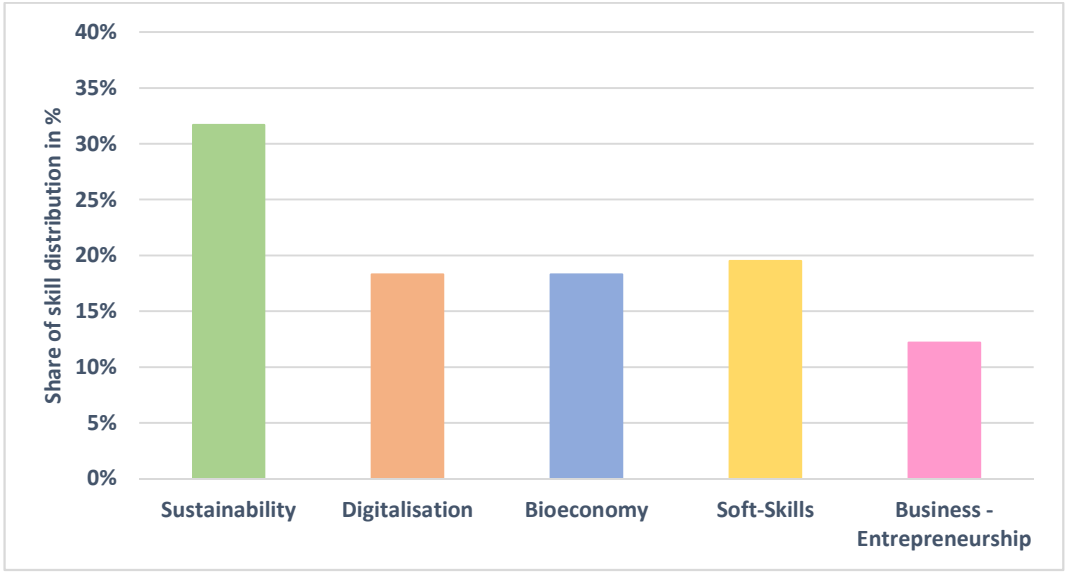

Figure A14.2: Share of selected skills in the top 10 rankings by skill category, Focus Group France

In more detail, the stacked bar below shows that 7 participants ranked sustainability skills among the top 3 skills. Digital skills were ranked within the top 3 for 5 participants. Soft skills and business entrepreneurship skills were ranked within the top 3 just for 2 and 1 participant, respectively. There are no bioeconomy skills within the top 3 ranking positions.

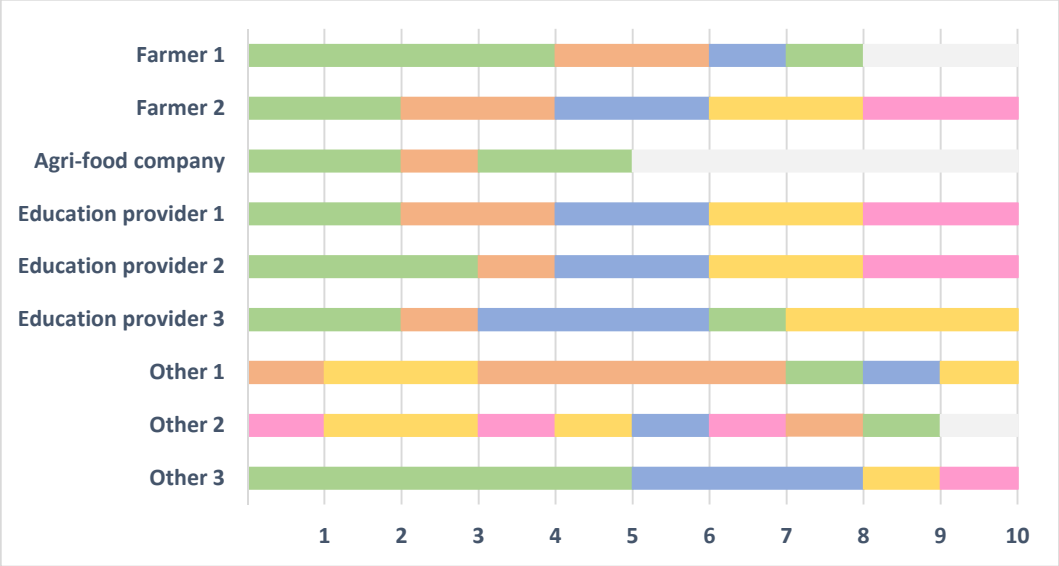

Figure A14.3: Stacked bar for the top 10 skills in the French focus group

When looking at which specific skills were selected and ranked, the ten most selected skills overall are presented in figure A14.4:

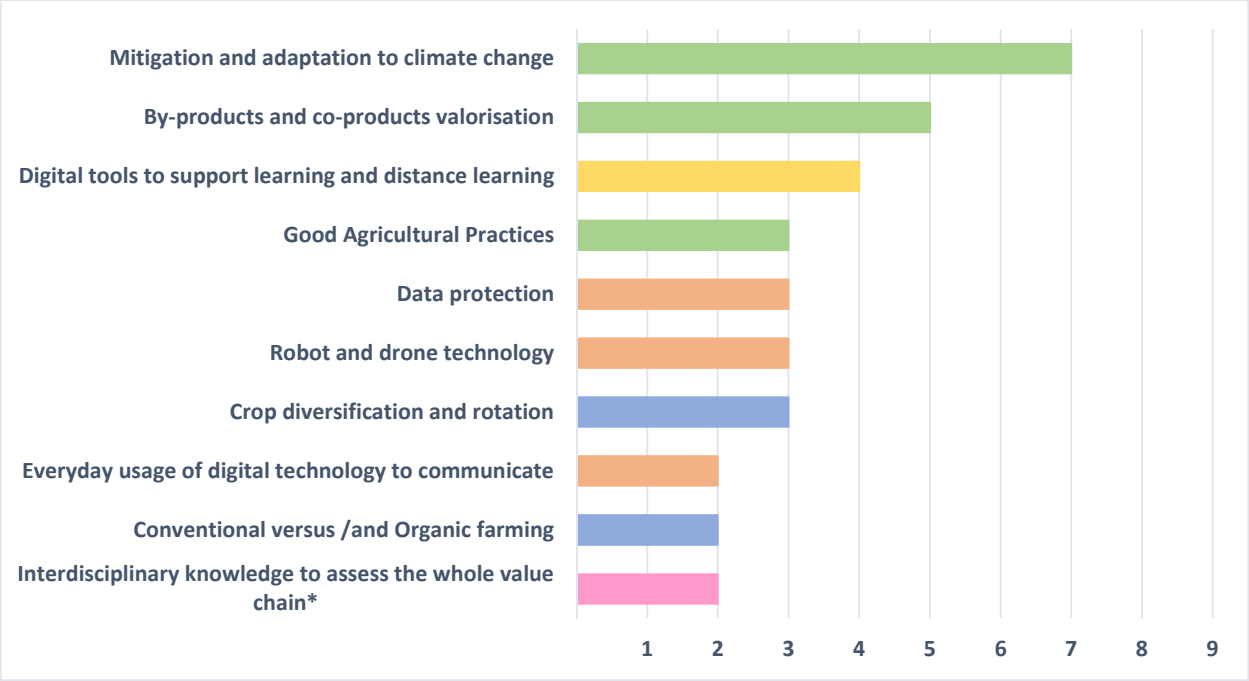

Figure A14.4: Most selected skills in the focus group rankings, Focus Group France [n=9]
(*there are 12 more skills that were chosen 2 times)

Within these skills, *mitigation and adaptation to climate change* was ranked the first for 6 participants and *good agricultural practices* for one participant.

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Relevant quotations were included where applicable.

Table A14.1: Top sustainability skills, Focus Group France.

Mitigation and adaptation to climate change (7)
● *"I had indeed noted adaptation to climate change, which seems to me to be one of the priorities for the coming decades. I would, however, raise the word mitigation, on which we still have little room for progress, few levers, but rather on adaptation"* (farmer, 81151) ● *"Mitigation and adaptation to climate change, so obviously it's very broad, since it includes both technology and research on farms"* (farmer, 81172) ● *"I think there's something to be done in terms of adaptation to climate change. I have the impression that in terms of mitigation, some things already exist, in terms of adaptation, at my level, I have the impression that we are somewhat in the unknown and there is a sense of urgency in this regard"* (agri-food company, 83131) ● *"Climate change mitigation and adaptation, for me, it's also related to forest issues. I have not highlighted forest issues, but in this case, I consider that it is also addressed to the forest"* (education provider, 84181)
By-products and co-products valorisation (5)
● *"Because in fact on farms, we already have, for example, I take the example of liquid manure or manure, that's what we do with it, and the whole part of hedge management. There are a lot of things to see around that. And agriculture also recycles by-products* (farmer, 81172) ● *"I think that a fundamental element for the bioeconomy is also the knowledge of potential resources. So maybe it is also related to what is in the circularity, in the valorisation of co-products or waste, but it seems important to me, there is a whole field in the biomass field that is not well known. And I think that there is enormous potential and I think that there is training to be done in this area"* (agri-food company, 83131) ● *"When you need jobs that cannot be relocated, in the territories, well, the bioeconomy is one of the major sectors that allows that, so I put a lot of things in connection with that. The valorisation of co-products is one of them"* (education provider, 84181) ● *"Valorisation of by-products and co-products, always with the objective of circular economy, to be as self-sufficient in inputs as possible, to have the least dependence on the outside world"* (researcher, 88141)
Good Agricultural Practices (3)
● *"The aspect of good agricultural practices is something we want to emphasize. It is not necessarily the normative aspect that interests us, that interests me, but rather the recognition of two practices, what we call good practices"* (farmer, 81151)
Improved agri-food system productivity (2)
Biodiversity (2)
Soil Nutrient and Health (2)
● *"[…] management and soil management, but here I preferred to put it in a global way and by also looking at production, the production behind it. Just looking at the resources, but also at the life cycle"* (farmer, 81151) ● *"On the question of soil nutrient management and health, it was quite a bit about carbon sequestration, something that is also worked on a lot in the research units we contribute to in Clermont and also because*

*I worked on the issue of non-ploughing and this subject is quite interesting (plant cover, non-ploughing) " (*education provider, 84191)

Table A14.2: Top digitalisation skills, Focus Group France.

Data protection (3)
● *"[Learning digital skills] is a preamble, before any adoption of digital tools and then, once this understanding is acquired, to be able to make choices on the digital strategy of an operation. And so that is why the data protection aspect is part of it because it is also in the lists, it is one of the criteria for selecting certain tools or which will be decisive in the adoption of a technology or not*" (researcher, 88112)
Robot and drone technology (3)
● *"Robotic technology and drones are something that is here and will be of prime importance in agriculture, especially with the technical improvements that are here"* (farmer, 81151)
Everyday usage of digital technology to communicate (2)
● *"The daily use of digital technology to communicate is something that is of fundamental importance today and we realize that codes and instructions for use are not necessarily mastered by everyone"* (education provider, 84191)
Data handling and analysis (2)
● *"Data processing and analysis aspect is only in its infancy. Farmers are big producers when it comes to the information they are given, but it is not fully exploited because of a lack of effective and competent treatment, certainly on the part of farmers, who do not always provide it in the best way. There is also a lack of visualization of the interest that this can have, particularly in pooling and massifying data"* (farmer, 81151)
E-commerce and e-marketing (2)
● *"The whole digitalization part has already been discussed, it's very important, we need it both for our crops, for farm management, and if we want to sell our products for direct sales. That's something that's come back to us from the working groups we've had during containment, because in fact, if the farmers who are selling directly are not professional enough in managing their site, then there's certainly something to work on that side of it"* (farmer, 81172)

Table A14.3: Top bioeconomy skills, Focus Group France.

Crop diversification and rotation (3)
● *"The crop diversification and rotation aspect are something we're actively working on, something we still have to make progress on. It's part of the solutions for saving resources, keeping efficient inputs, having diversity and biodiversity and better resistance and resilience of farms also in the face of climatic hazards or pest damage"* (farmer, 81151)
Urban, peri urban and rural area agriculture (2)
● *"Today there is not only agriculture in rural areas, but also peri-urban and urban agriculture, and we certainly have things to work on in terms of the approach and the vision we have"* (farmer, 81172)
Conventional versus /and Organic farming (2)
● *"Conventional agriculture, organic agriculture, hybridization of systems, mixing around specifications, but also what ideas can be found in these systems and what contributions the diversity of existing systems can make in terms of innovation"* (education provider, 84191) ● *"[…] to have an organic entry (I preach for my parish) and also to have an organic agriculture which is rather centred on autonomy, self-sufficiency by combining polyculture and livestock farming systems, to valorise the co-products of livestock farming in plant production and to have a rather global health of the soil and the products that we can have in food"* (researcher, 88141)
Livestock efficiency/ management/ biosecurity (2)

Table A14.4: Top soft skills, Focus Group France.

Digital tools to support learning and distance learning (4)
Managing personnel (2)
Learning at work (2)
• *"[…] Being able to already acquire these skills along the way, is for the "learning on the job" part or I think it was associated with the Peer Learning part, or in any case, you could be able to learn alongside your peers because it's important enough for farmers and even all the players in the agricultural sector to be able to adopt technologies by watching what's also happening at the neighbour's, by learning collaboratively*" (researcher, 88112)
Training others (2)
• *"[…] The skills you need to have if you are a tutor or an apprentice master. Also, according to the form of exploitation, if we are in a group, having these relational competences of delegation, motivation, evaluation, it also emerges each time*" (education provider, 84162)

Table A14.5: Top business-entrepreneurship skills, Focus Group France.

Sales and marketing (2)
Social expectations/Consumers science & behaviour (2)
Farm environmental management plan (2)

Question 2.2: Would you add any skill you find missing in the lists? Why is this/are these important?	
• Risk management (farmer, 81151) • Farmer's communication towards civil society (farmer, 81151)	• *"It's a skill that's a bit particular for agriculture. We are on a long-time scale, with actions that are subject to hazards, but all interventions and practices can have effects over several years. And investments and equipment are generally quite heavy. Sometimes it is difficult to adapt to changes. We talk about the climate, but we talk about pests with the disappearance of certain means of control. Does risk management appear anywhere? In order to have an informed choice"* (farmer, 81151) • *"There are social networks, neighbours, local residents and I think that today, what we lack a little in agriculture is the ability to exchange and to be confronted with civil society, which is not necessarily very familiar with our practices and can misinterpret or misunderstand them"* (farmer, 81151)
• Spanish language (farmer, 81172) • Relational skills (farmer, 81172)	• *""Earlier you talked about the importance of English. We are in New Aquitaine, it is important to speak with our neighbours, so there is also Spanish"* (farmer, 81172) • *"I think that the relational part is cross-cutting: when we talk about CSR, when we talk about relationship management, whether it be with employees or neighbours.... as I said earlier that it can also cause failures when it is something that is not well controlled"* (farmer, 81172)

• Urban agriculture (education provider, 84181) • Territorial ecology (education provider, 84181) • General engineering skills (education provider, 84181)	• *"[…] something that has not really been talked about that goes with the ecosystem, and that is territorial ecology. The territories are very different, especially when we talk about the bioeconomy with varying strengths and weaknesses. And, as a result, to be able to reason on this scale. And from the point of view of territorial ecology, industrial metabolism, this is super important, in my opinion"* (education provider, 84141) • *"[…] they have to be good at hard sciences, they have to be good at economic and social sciences, they have to be good at regulation, they have to be good at intellectual property. In fact, it's a whole baggage of skills, very hard to acquire in order to be good everywhere, and that's what makes general engineers"* (education provider, 84181)
• Engineers specialisation (education provider, 84191) • Change in specialisation (education provider, 84191) • Adaptability (education provider, 84191)	• *"What is important is that after training, and at least after initial training, engineers should be able to specialise afterwards and be able to change their specialisation during their career if necessary" (education provider, 84191)* • *[…] Being able to build up a background of specialisation and to develop their knowledge according to the context in which they are"* (education provider, 84191)
• Global understanding of the systems (researcher, 88112) • Analysis of digital technologies (researcher, 88112)	• *"[…] a set of skills to analyse the available technologies, make choices and understand the issues and impacts of the decision to use one technique over another. And in this case, we would integrate data protection, data processing and data analysis at the same time, in this set of skills, it would be something a little more global in terms of understanding the digital ecosystem and the ability to make choices and take a critical look at the available technologies" (researcher, 88112)*

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
Digital skills should have new targets which will make trainings change. According to one participant, general training will become less relevant than specialised trainings, whereas another participant said that specialisation will become less relevant than general knowledge, or what we could call " interconnected knowledge". One participant insisted on the importance of training people on digital science bases. Data treatment, such as sharing, protection and access to data was also highlighted as something that is going to gain more importance as more data is being generated. There's a need to emphasize on adaptability. Open innovation.
Education provider, 84181
Protection, sharing and access to data. Adaptability to climate change. Integrate knowledge.
"We all have a lot of data, but in fact, when it comes to sharing it with others, we don't know how to do it, or we don't want to. And there is a lot more at stake in sharing this data. I've already talked to cooperatives on certain subjects and they have huge databases, and They don't want to share them with us, even though we are a public institute"

"The aspect of decompartmentalizing discipline is going to be very important. We no longer need specialists, but more people who are able to integrate a lot of different knowledge in order to respond to a wide variety of problems that will evolve"
Education provider, 84191
Open innovation
"In the open science dimensions, there is also the question of open innovation, which means that everybody can participate in and contribute to innovation and be a driving force for innovation, including a set of stakeholders who are not necessarily the actual targets of innovation, but who can also contribute to these mechanisms and also play a role in the acceptability we were talking about earlier"
Researcher, 88112
Greater specialisation in certain technologies. Train people in a digital scientific base.

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?
No remarks.

A14.4 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?
Just a comment: We have different degrees and that these different degrees already refer to this question. After that, it may not be enough, but it is already a first level answer (education provider, 84191)

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)	
● Lifelong training (farmer, 81172) ● Hard to interest farmers (farmer, 81172) ●	● *"I would like to say that the difficulty always lies in being able to showcase farmers and get them to come. Today, there is what is known as mixed digital training, i.e., a face-to-face part and a digital part. So, perhaps through these new forms of training, we could perhaps, I don't know, with films, with video clips, start to interest farmers, but I think that this also applies to forestry"* (farmer, 81172) ● *"[…] That is what we are saying to each other for agricultural training, from primary school to the baccalaureate, let us give young people the skills to go and find their needs, to be able to initiate them and to say to each other, there you go, I need this, where am I going to find it and I need this basic skill. We cannot put everything into initial training, and we must trust lifelong learning"* (farmer, 81172)

• Insufficient formation levels (education provider, 84181) • Difficulty for the researchers to transfer their findings (education provider, 84181)	• *"[…] for new technicians and engineers, the level at which they are made to work in terms of technological maturity, which is still that of the bench, etc., is not sufficient when they enter the industry. Much more work should be done in industrial environments, in techno halls. It's the same in the field, you would really have to work in the field, work in the open field, etc. Because in the end, we don't go far enough on that scale for them to be fully operational when they arrive in industry"* (education provider, 84181) • "We, *on the public research side, are unable to transfer what we do. It is part of training in the sense that we must be able to share it. And at the moment, we're doing it very badly"* (education provider, 84181)
• Evolution will occur (education provider, 84191)	*"Depending on a number of things, there are times when some skills will be strengthened and others when they will be dealt with a little less intensity. And that will evolve"* (education provider, 84181)

Q3.3. Do you think skills need to be trained in different ways, depending on the people to be trained? (Group question)
Establish more networks of workers (farmers, educators, etc) would be something interesting. According to one participant, the question concerning the training sufficiency depends on different factors. There are a lot of lifelong training possibilities already in place, what should be done is to develop better ways to find them when needed.
Farmer, 81172
Hard to get in contact with farmers: they do not come to events. Necessary to use new communication means.
• *"Maybe we need to imagine them perhaps more in terms of the network? I know that there are nowadays groups on social networks, for exchanging practices, and that these groups are helping to build up skills. Perhaps we should also imagine groups like that, which are a bit mixed, with a face-to-face part, a social network part, and that is precisely the importance of working on what we have said, on the digital part"* (farmer, 81172*)*
Education provider, 84162
Progresses to be made in the following years. Farmers in France have access to formation.
• *"For farmers in France, they are now also entitled to a personal training account, accessible even through their smartphones, they also have access to advice on professional development"* (education provider, 84162)
Education provider, 84191
Lifelong learning. Access to many options.
• *"The issue of the capacity for lifelong training, of being able to go and find bits of knowledge that you need and to be able to add it to answer a question"* (education provider, 84191) • *"when we talk about lifelong training, after initial training, there is a plethora of training players, and therefore a plethora of training opportunities. After that, it's how you find your way through all that, especially"* (education provider, 84191)

Researcher, 88112
Training on digital skills is too fragmented.
• "We realize that all the companies that offer services also offer training to farmers or to any user in the sector. What is missing is training that presents this systemic vision as well. There is not a pooling of skills and knowledge available at several levels of expertise" (researcher, 88112)

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)	
• Action of training in work situations (AFEST) (education provider, 84162) • Serious games (education provider, 84162) • Tool to learn how to run a farm (education provider, 84162)	• *"There was a tool, I don't remember what it's called, to learn how to run a farm, about global management. There is a serious game that has been around for a while now"* (84162, education provider)
• Serious games (education provider, 84181) • Educational games (education provider, 84181) • More readability on existing tools: compiling (education provider, 84181)	• *"On forest management, there is also a game called Foster's Forest that we developed, and which is really geared towards forestry professionals, to find out how to manage a forest under the constraints of climate change, etc."* (education provider, 84181) • *"We also need more readability to know what exists. I think there is a challenge in referencing all these tools"* (education provider, 84181)
• no miracle recipe (education provider, 84191) • digital technology (education provider, 84191) • adaptation to the training context (education provider, 84191)	• *"There is the whole question of digital technology, tools that we are going to use more and more with the discovery of tools, the creation of new tools, new training systems. This is something that is evolving systematically.]"* (education provider, 84191) • *"For me, there is not one tool that is relevant or one methodology that is relevant. It is in relation to the training context in which we are working, in relation to the learners, in relation to the objectives that we are going to aim for, that we are going to mobilise, that we are going to build a pedagogical system that is going to be adapted"* (education provider, 84191)
• Serious game (researcher, 88122) • Playful approach (researcher, 88122)	• *"there has been a development of serious games that also allow to approach the questioning to have and begins on a given subject that allows perhaps to approach things in a rather playful way and in a way to accompany the questioning of the learner"* (researcher, 88122)

Q3.5. Is it important for you to receive a professional certification for your training? Why?
There's a difference between diplomas and certified training. It is however still important for some participants to get some sort of certification in order to have some sort of recognition for the training accomplished. One participant shared the idea of a digital badge that was put in place at the Chamber of

Agriculture of Normandy. They also shared this idea of a ""skills passport"" rather than a diploma. One participant said that there's not always a need for a professional certification. They gave the example of "open badges", which is some kind of recognized European and digital résumé. Sometimes transversality of skills allow training for several job profiles.

- *"It is a system that we have implemented with the Normandy region […] when faced with a training course or a recognized activity, there is a digital badge that can be proposed and recognized afterwards in the list of acquired skills"* (farmer, 81151)
- *"[...] In skills, there is not always a need for professional certification. Today, there are, I think you know, open badges. In fact, it's the possibility of having some kind of recognized resumé […] And that is digitalized, there's a site where you can go and look at the skills of each person. It's a bit of a mix between on-the-job training and skills that are active and recognized in the work that's been done, or an internship* (farmer, 81172)
- *"In continuing education, it's the idea of a skills passport, which we carry with us throughout our lives, which certifies the course and the fact that we have been trained*" (education provider, 84162)
- *"[…] the training organisation that offers this training course has registered it with the national operator France Competences and that it is certified. In any case, we are more and more in an idea of competence or after that forms blocks, and we assemble these blocks according to our needs. So, today, any training that appears in your CPF account is certified by France Competences"* (education provider, 84162)
- *"More than a job, we are really talking about the notion of skills, and skills can be transversal to several jobs: relational and digital skills, for example. They will be valid whether you are an employee, a farmer or a farm advisor"* (education provider, 84162)

A14.5 – Final remarks

Q4.1. Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, facing the current and future market/social needs?

One participant remarked that there are some particular skills to deal when farming with living things and the living cycle: adaptability, reality, pragmatism and flexibility.

- *"We are faced with nature, with climatic hazards, with imponderables. And this is both the strength, but also the great difficulty that we encounter, is having to adapt. Finally, which is not apparent in the work we did this morning. It's the exercise of reality, pragmatism, the flexibility that you need to be able to deal with precisely this living cycle, which is indomitable."* (farmer, 81151)

Annex XV: Focus Group Slovenia

A15.1 – Executive summary

List of emerging positive and critical issues

- Slovenia is organised quite well in the field of structure of NGOs within the agri-food sector. The issue is appropriately regulated, at least in terms of status. Things are slightly worse when it comes to knowledge transfer. But what is then missing is knowledge transfer, understanding or empathy between links in the chain, both upstream as well as downstream. In other words, links between the processing chain and all the participants or the participants in both chains in fact. Forest-timber and agri-food. This is precisely why we in fact have problems with the operation of these chains.
- But there is still a lot of untapped potential, primarily in the sense of better system arrangement.
- In the segment of the knowledge transfer chain, things have to be sorted out better so that ultimately end users will not be confused when they get a great deal of information.
- There is a lack of soft skills and that they need to be especially enhanced.
- Sustainability is very well indicating the direction that Slovenia to a large extent is very much fond of nature friendly sustainable agriculture as we are trying to practise farming along these lines. We also endeavour to sustainably manage forest resources.
- Slovenia will have to achieve major breakthroughs to arrive at the point to master bioeconomy more. The same goes for the principle of circular economy. So, the latter will be more instilled in subconscious and that specific and practical solutions will be launched in the field.
- Too little emphasis is given to strategic thinking, which means we focus too much on the present or on some short-term survival decision-making.
- It is about overlapping skills. In two direction, this means strengthening professionalism, in the technical and technological sense, and then on the other hand adding soft part.
- There is a big need for change in formal education.
- Transition to project work is needed within a formal education process.

A15.2 – Composition of the Focus Group

The Slovenian Focus Group was comprised of 8 participants, 1 moderator and 2 rapporteurs.

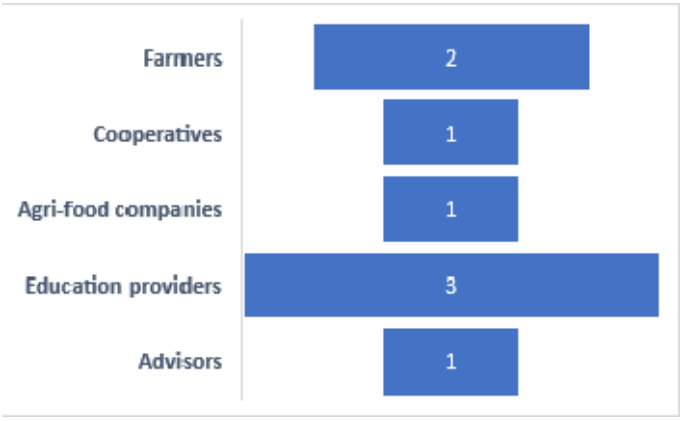

Figure A15.1: Composition of the Slovenian Focus Group

Question 1.1: Considering the whole food/forestry sector in which you are involved, who would you describe as being your most important collaboration partners in your daily work?
Farmer, 91171
• Farmers • Governmental institutions • NGOs
"[…] NGOs in other words: from the Chamber of Agricultural and Food Enterprises, to the Cooperative Union, rural youth, the Chamber of Agriculture, all of them. The umbrella of all these organisations"
Farmer, 91182
• Farmers (especially young farmers) • Other stakeholders that co-create
Cooperative, 92141
• Farmers • Chamber of Agriculture and Forestry • Governmental institutions
"I will put it this way: depending on interests, depending on what we are dealing with, what is our goal, what is the project at stake, and we then network or cooperate with this partner."

A15.3 – Participants' networks

Agri-food company 93152
• Customers • Inspection services • Other agri-food companies
"For us the buyer is the most important. Be it a company or an end consumer. I believe that on one side we basically get most feedback from them and they are somehow those who also dictate our operations and the way we move. On the other side also regulations as well as agri-food companies, also inspections services that regulate the situation on the market"
Education provider, 94112
• Knowledge transfer institutions • Professional organisations from different sectors
"If I now put our institution GRM in the context of knowledge transfer or as a knowledge-transfer institution, which is our primary task, all the partners at all levels that pursue this and enrich us in a way they also transfer knowledge to us or connect us with knowledge seekers are welcome. I can say these are knowledge transfer institutions as well as professional organisations within agriculture, the agri-food sector, nature protection, catering, that is the activities we are pursuing"
Education provider, 94121
• Students
As far as the structure of NGOs within the agri-food sector goes, I believe that Slovenia is organised quite well. Things are slightly worse when it comes to knowledge transfer. Slovenia has the farm advisory service, which transfers knowledge to agricultural holdings. A similar role is played by the Forestry Institute. What is missing, at least in my own personal view or judging from my experience, is knowledge transfer, understanding or empathy between links in the chain, both upstream as well as downstream. In other words, links between the processing chain and all the participants or the participants in both chains in fact. Forest-timber and agri-food"

Education provider, 94132
• Governmental institutions • Trainees
"For all these years, I have been in fact trying really hard to cooperate with the Ministry of Agriculture, especially with the rural development sector. Training activities that I coordinate and are my responsibility are in the overwhelming majority, i.e., more than 90%, conducted in rural areas. This cooperation has never succeeded. In all these 20 years, it happened only occasionally, individually and then it was always excellent and very successful"
Advisor, 95161
• Farmers • Network of public farm advisory services
"The farmer comes first. Together with the farmer, also the entire network of public farm advisory services comes top. That is to say, primarily with a view that relevant contents and relevant skills are brought to the farm itself in a usable form in the applied way. The second important thing is in fact the role this service plays in the knowledge transfer chain: to cooperate with scientific and research institutes, such as universities, institutes and essentially translate these novelties, findings from the language of science and research into the operational language"

A15.4 – Skills

In the Slovenian Focus Group, participants' overall selection and ranking of their top 10 skills, figure A15.2 shows that respondents selected most often soft skills (27.5%) followed by business/entrepreneurship (21.3%), sustainability (18.8%), digitalisation (17.5%) and bioeconomy (15%) skills by this order.

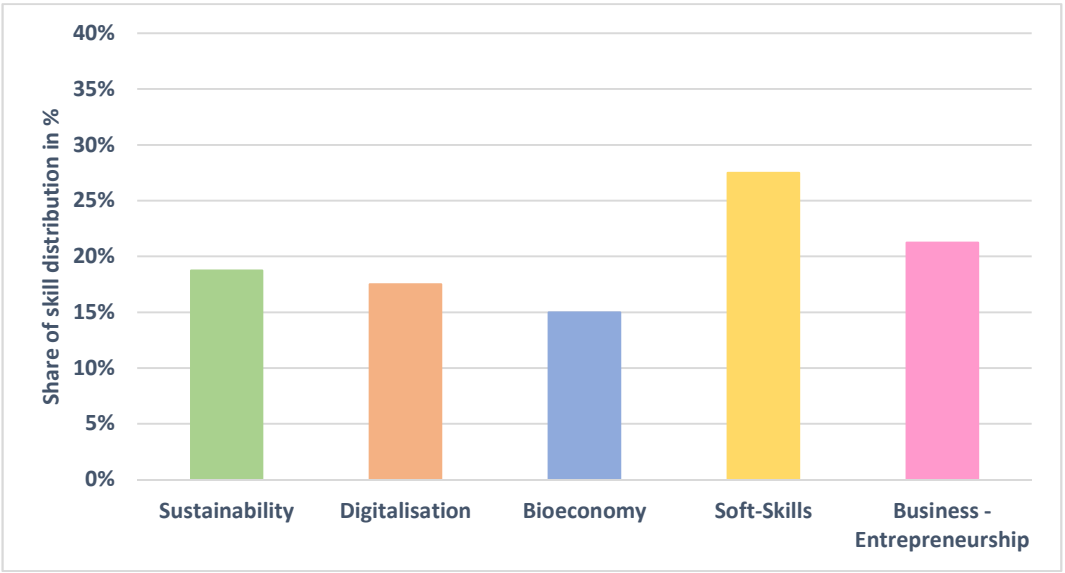

Figure A15.2: Share of selected skills in the top 10 rankings by skill category, Focus Group Slovenia

In more detail, the graph below shows that not only soft skills are the most selected but also are in higher positions in the rankings, suggesting in general that these skills are more important for the participants.

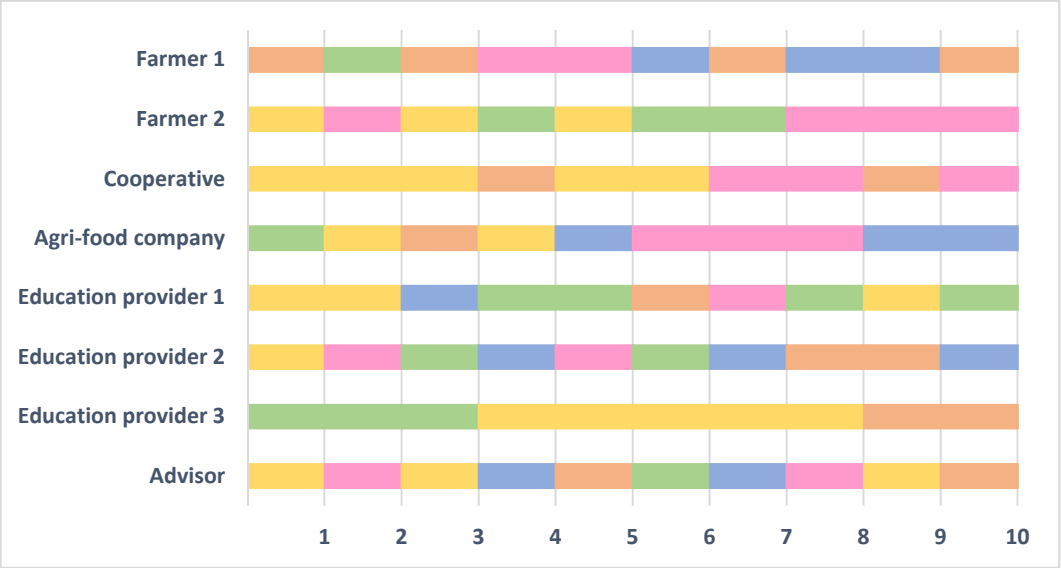

Figure A15.3: Stacked bar for the top 10 skills in the Slovenian focus group

In view of the figure A15.3, 6 participants selected and ranked soft skills among the top 3 skills and 5 selected a soft skill as the first in importance. Sustainability skills were in the top three positions for 4 participants, and business skills for 3 participants. Business-entrepreneurship skills were ranked as the 3 most important only for 3 participants, and bioeconomy skills only for one participant.

Figure A15.4 shows the ten most selected skills overall for the Slovenian focus group:

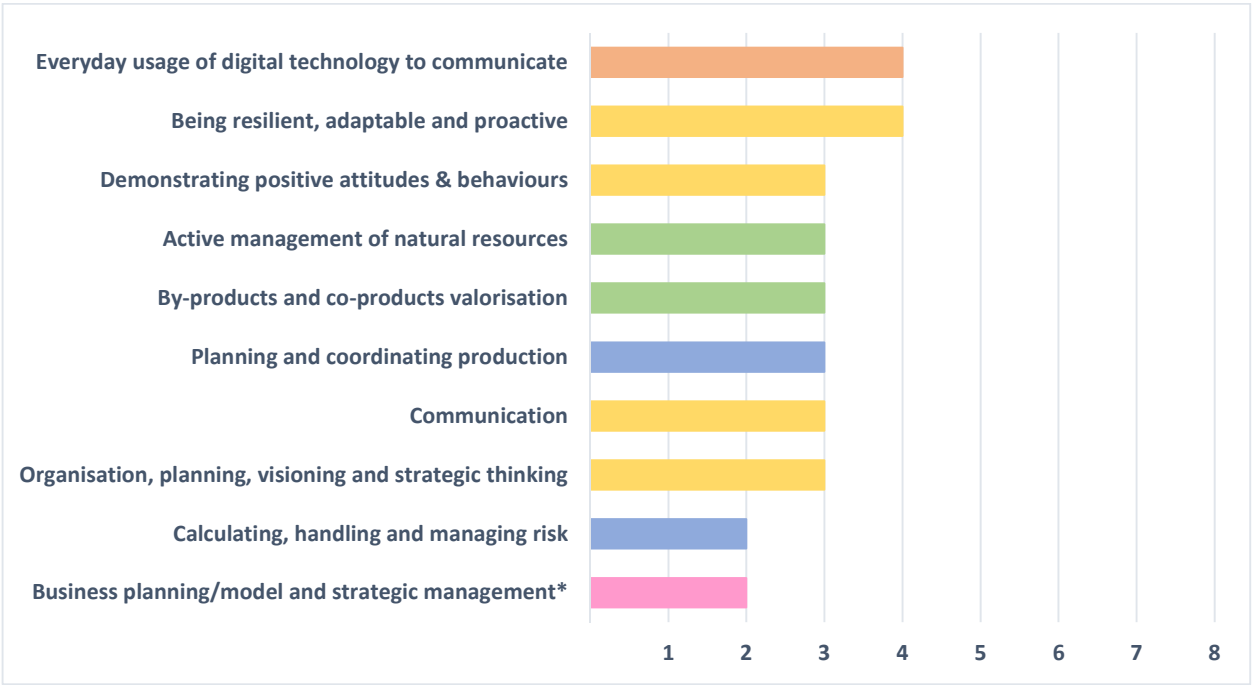

Figure A15.4: Most selected skills in the focus group rankings, Focus Group Slovenia [n=8]
(*there are 10 more skills that were chosen 2 times)

Within these skills, *being resilient, adaptable, and proactive* was ranked the first for two participants (94112 and 94121). *Everyday usage of digital technology to communicate*, *communication* and *active management of natural resources* were ranked first for participants 91171, 92141 and 94132, respectively.

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Relevant quotations were included where applicable.

Table A15.1: Top sustainability skills, Focus Group Slovenia.

Mitigation and adaptation to climate change (3)
● *"Adaptability is essential in agriculture and also climate change mitigation as this is now a reality and if the farm lacks this aspect, it is very difficult to practice farming* (farmer, 91182)
Active management of natural resources (3)
By-products and co-products valorisation (3)
● *In other words, this is the segment where we underexploit biomass in terms of material and energy, which is bad, from the perspective of the environment, but also energy and the economy. And it represents a significant part of added value and we are in fact not able to capture it. Both from the perspective of every individual as well as from the perspective of companies, I will take the example of dairy proteins"* (education provider, 94121)

Table A15.2: Top digitalisation skills, Focus Group Slovenia.

Everyday usage of digital technology to communicate (4)
E-commerce and e-marketing (2)
Field operations management systems (2)

Table A15.3: Top bioeconomy skills, Focus Group Slovenia.

Planning and coordinating production (3)
Calculating, handling, and managing risk (2)
Agricultural biodiversity (2)

Table A15.4: Top soft skills, Focus Group Slovenia.

Being resilient, adaptable, and proactive (4)
● *"You sometimes need to push a bit in agriculture to move people. You have to know how to exercise your will or bang your fist on the table"* (cooperative, 92141) ● *"[…] Especially in the sense that you are able to adapt to change rapidly and that you are proactive when tackling challenges."* (agri-food company, 93152) ● *"I put on top number 1, that you are active. Not that you keep quiet or do everything over a garden fence, others are bad, and you are brilliant. But that you are active, and you know to put in words what you find good and what you find wrong and that you are willing to present your thoughts very clearly. We are trying to train people in this skill. "* (education provider, 94121)
Communication (3)
● *"What is essential in cooperatives is communication as you need to know how to communicate with the members, to coordinate with them, also in the transaction itself, the purchase, such as for example why is it so, why not otherwise, why such price? If this works well, the cooperative has much less problems then if issues are handled without any discussions"* (cooperative, 92141)

• *"This is the main tool that we use at our work. I see communication as the one tool to deliver technological, professional, financial, and other topics the farmers are interested in. The topics must be delivered impartially and professionally in an understandable way"* (advisor, 95161)
Organisation, planning, visioning, and strategic thinking (3)
• *"I think that in general we have a problem with I would say collective intelligence. Along chains. Strategic thinking, which means we focus too much on the present or on some short-term survival decision-making. Too little emphasis is given to strategic thinking. "* (education provider, 94121)

Table A15.5: Top business-entrepreneurship skills, Focus Group Slovenia.

Business planning/model and strategic management (2)
• *" […] our decision-making is weak. We do not use data enough when taking decisions. In general, this is a big problem alongside additional activities in agriculture and forestry. And that we would then take decisions on the basis of the qualitative monitoring of operations, which is standard practice in companies. In fact. this is underused by primary production companies"* (education provider, 94121)
Specific sector legislation (2)
• *"Our service has to know all legislation practically not only the part referring to agricultural policy involving all demands, laws, secondary legislation so that the farmer follows all regulations. They need to also follow other regulations, i.e., nature protection, spatial planning, taxation policy. This is a very important element that we need to know well. "* (advisor, 95161)
Direct marketing in agriculture, food industry and forestry (2)
New value chains / new business models (2)

Question 2.2: Would you add any skill you find missing in the lists? Why is this/are these important?	
• Wider, rural biodiversity (farmer, 91171)	
• Biodiversity and synergies in the environment (farmer, 91182) • Sustainable agriculture (farmer, 91182)	• *"I would focus more on sustainable agriculture rather than organic farming. Because we know that sustainable agriculture can give good results even if it is not organic and does not have that certificate"* (farmer, 91182)
• Connecting skills (education provider, 94132) • Co-creation of knowledge (education provider, 94132) • Social diversity (education provider, 94132) • Ground and the ecosystems (education provider, 94132)	• *"It is about connecting all of these skills. For example, she said:" If there is no sustainability along with business skills digitalization cannot work." This means that the main thing is the relationship between these things that are methodologically defined"* (education provider, 94132) • *"The diversity or respect for variety is a precondition for us to arrive at some common objectives"* (education provider, 94132)
• Time management (advisor, 95161)	• *"How to distribute tasks within working hours, how to set priorities…" (advisor, 95161)*

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
Sustainability and digitalisation are trends that will influence in the skills and training needs. Business will also have to adapt because of the beforementioned trends. It will be necessary more cooperation among farmers. Cooperation between generations, heritage, tradition identity and cultural diversity coexisting with globalisation. For agri-food companies food fraud and food ethics will become more important. The work on agricultural counselling will also need to adapt.
Farmer, 91171
Circularity and digitalisation will progress. Both supported by soft skills.
"Many changes are to be expected in the field of digitalization and on bio circular economy. These changes in digitalization will not be very big. But changes in bio circular economy can be really big. It will depend on how much the state, the people will be willing to invest in multiple uses of a natural resource. All of it will have to be supported by soft skills that will have to follow."
Cooperative, 92141
Sustainability and business-entrepreneurship skills will go up in the rankings.
"The environmental aspect, climate conditions, this will be addressed via sustainability. And there is adapting to the market and its volatility. This should be emphasized from the very onset"
Agri-food company, 93152
Food fraud and food ethics will become more important.
"There are more and more cases of food fraud and I think this will be a big problem in the future. And then food ethics maybe. But this still depends on how businesses focus on sustainable development and how smart we are going to be when using natural resources. In 10 years, this might change completely"
Education provider, 94112
Strengthen professionalism. Cooperation among farmers.
"Strengthening professionalism, in the technical sense, and then this soft part on the other hand […] I am not visionary, but I do believe if I am talking about agriculture, that in Slovenia some local folk approach to farming will remain on some of the farms. A big share of farms along with other elements in the agricultural chain will have to raise their professional level in all segments"
Education provider, 94121
Climate change, risk management will be important topics.
"Management mainly depends on climate change on one hand and it influences climate change on the other" *"Production risks, market risks as we have huge price volatility of raw materials on Slovenian markets. There are practically no effective chain management mechanisms in Europe. Where the chains are strong this risk gets distributed among individual links of the chain. The chains do not function where everyone is solving their problems individually, this is not optimal which is the case for example in Slovenia"*
Education provider, 94132
Intergenerational cooperation. Heritage, identity, tradition. Cultural diversity.
"[…] The need for a revival of transfer that used to be self-evident within a family. It is not enough for three people of different ages to come together but much more is needed. Not only intergenerational symbiosis but the very identity. Therefore heritage, identity, tradition will gain in importance in five to ten years. There are different identities, and it seems to me that this cohabitation of identities is already coming to the forefront and will be very topical for sure in five to ten years"
Advisor, 95161
Communication, legislation, new social demands, digitalization in a broad sense (its application in agriculture and in communication), agricultural counselling.
"It is actually about new demands in the sense of environment protection, climate change, and so on"

"Since agriculture is going in the direction of being more economical and its structure will change maybe not in five, ten years but long term for sure, we shall have different farms from what we have now. So, the work in agricultural counselling will just need to adapt"

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?
Only two significant contributions to this question. Both participants agreed that there are clear differences, but also remark that any member of the organisation (no matters the level of responsibility), must be aware of the objective of the company: where we wish to go, what our objectives are, what our guidance is. And here is where communication is a very important skill. As one participant said: "yes, definitely there are differences, but I wish there were none"
"I think there are differences and there should not be. Because I think it is very important that everyone from the top level to the lowest level agree on the objective of the company. So, we are constantly striving to make sure everyone is informed about where we wish to go, what our objectives are, what our guidance is. And this is where communication is a very important skill. It is about how something is communicated because we know that a lot gets lost in information flow. A short answer: yes, definitely there are differences, but I wish there were none" (advisor, 93152)
"I think that there are definitely some differences within sectors because here we are talking about the sector which co-ordinates individual sectors in agriculture be it fruit cultivation, livestock production, plant production, and also these soft skills. It is important that everyone is aware of their responsibility for the field they cover. This means that the content, the way of work, the program, objectives are truly shared by those who work on them as well as their supervisors and last but not least the chamber management itself, to be specific" (advisor, 95161)

A15.5 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?	
Most of respondents agreed: more on everything. Specific inputs below.	
• Bioeconomy skills (farmer, 91182) • Digitalisation (farmer, 91182)	• *"Digitalization and bioeconomy represent the future, although we need to lay foundations first. I think this is the responsibility of all of us, so that farmers develop all these skills."* (farmer, 91182)
• Soft skills (cooperative, 92141) • Digitalisation (cooperative, 92141) • Jointly connecting to the market (cooperative, 92141)	• *"digitalization will need to be accelerated in co-operatives. According to my experience with certain co-operatives, it is sometimes quite a problem even to send an email. And for example, they do not have a president or a manager and then communication is done via some accountant or things are so obsolete that everything is really strange"* (cooperative, 92141)
• Safety and quality standards (agri-food company, 93152) • Mentorship (agri-food company, 93152)	*"[…] definitely mentorship, to transfer knowledge as the population is aging. People, especially our elder employees are an incredible knowledge treasury, and it*

• Communication (agri-food company, 93152)	*seems to me that sometimes we do not use their knowledge enough"* (agri-food company, 93152)
• Strategic thinking (education provider, 94121) • Decision making (education provider, 94121)	• *"Strategic thinking, which means we focus too much on the present or on some short-term survival decision-making"* (education provider, 94121) • *"[…] Our decision-making is weak. We do not use data enough when taking decisions. In general, this is a big problem alongside additional activities in agriculture and forestry"* (education 34141)
• Soft skills (education provider, 94132)	
• Soft skills with the support of digitalisation (advisor, 95161) • Innovation (advisor 95161)	

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)	
• Peer to peer learning (farmer, 91171)	• *"Peer to peer learning. Especially referring to mutual understanding and transfer of these knowledge.*" (farmer 91171)
• Study circles (education provider, 94112) • Team project work (education provider, 94112)	
• Team project work (education provider, 94121) • Knowledge exchange (education provider, 94121) • Study circles (education provider, 94121)	• *"If we include also other players in the chain, we will maybe understand each other better and would work better together at the business level. Then I understand the mindset and challenges of another within the chain"* (education provider, 94121)
• Study circles (education provider, 94132) • Take into account intermediate institutions in the training process (education provider, 94132) • Build trust on the training system (education provider, 94132)	• *"Top-down training is mainly organized for individuals who are artificially put into some target groups and that is an obsolete approach. Of course, it is an appropriate approach but what is missing is taking intermediate institutions into account. These intermediate institutions are important because an individual is too distant from the state"* (education provider, 94132)

Q3.3. Do you think skills need to be trained in different ways, depending on the people to be trained? (Group question)
No available time for this question

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)
No available time for this question

Q3.5. Is it important for you to receive a professional certification for your training? Why?
Two participants provided input on this question and both agreed that certification is important, as a formal way to show evidence on training activities. For some people it even means something personal (especially when it goes along with some kind of award ceremony), they feel rewarded and stimulated for future training activities. For long training activities it makes vey sense to have it.
● *"I have been thinking about it as also some kind of evidence that you can carry forward with you and it has some importance. You have it in case you need to show it to anyone as many people, e.g., inspectors still ask for some certificates"* (93152 advisor) ● *"Many people desire some certificate, some recognition for their training and it means something to them. The usual institutions hold ceremonies to present these certificates at some appropriate level"* (education provider, 94112) ● *"There are examples where at least 700 hours of training offers no document. And I do not know who will be willing to attend such training unless they really need it and are sent to attend by their employer. Apart from that, who will decide to enrol in such specialization if no certificate or document is issued at the end?* (education provider, 92141)

A15.6 – Final remarks

Q4.1. Is there anything we have not discussed that you find important to update farmers, foresters and food industry employees' skills, facing the current and future market/social needs?
No final remarks

Annex XVI: Focus Group Forestry

A16.1 – Executive summary

- The composition of participants was very diverse in age, gender, and professional background, adding different perspectives to the high-level discussion.
- It was found that the proposed list of skills was too long, at the same time some skills were very specific while others seemed very broad: a little bit more specificity was required, as for example with lifelong learning. It is a very important skill, but also a very general one because it can include other type of skills that one wants to learn.
- In the future, a pressing number of skills will become increasingly relevant, for instance:
    - Risk Management skills, such as Prevention of Natural Disturbances, Forest Disease Control and Prevention.
    - Sustainability skills, such as the Efficient Use of Resources, Sustainable Planning, Water Management, Development of New Resource-Efficient Products, and Improved Waste Management.
- There was general agreement about the assumption according to which, as the position of a forest worker increases, the approach must be more holistic. Low skilled workers only need some technical skills, medium level workers need organizational skills and high-level workers need decision-making skills.
- However, it was noticed that further technological development will reduce the number of low-level jobs and the forest workers will have to be able to perform a more advanced job in the future. Especially digitalisation and decision-making will become part of the work of on-the-ground for forest operators, not necessarily at the manager level, meaning that there will be a high need of skills along all the line.
- The majority of the group agreed that the use of drone technology will be useful in several fields, such as in the chain of custody, in looking at high-resolution land use, land cover change, forest management and planning. The use of drones and of different kinds of cameras in operating machines can support the practical transfer of knowledge, so students should be educated to interact more with technology.
- Communication abilities will become much more important because the general interest by the public in what the forest sector is doing is rapidly increasing. For the purpose of making a better narrative of what the industry is doing a communication training program customized for forestry people should be developed. Communication with society and stakeholders, with politicians and other decision-makers is becoming increasingly crucial, giving forestry a position in every day's life of the public, not only the forest or agricultural society.
- Soft skills were judged to be necessary for all workers at all level of their jobs, especially the following:
    - Understanding the big picture, how the whole production chain works, and developing product life-cycle management or thinking.
    - Understanding the question about forests' ownership.
    - Understanding stakeholder interactions.
    - Developing analytical, critical, and creative thinking.
    - Teamwork, interpersonal skills, and business soft skills.

- Based on the views of most participants, digital training and online courses will expand further in the near future, as online platforms are very distance-efficient and time-efficient. However, it was stressed the fact that experience on the ground is absolutely important as there are some practical things can't be taught online.
- Combining company efforts with academic institutions is a priority as learning-by-working through trainee positions with Universities is an easy way to get new ideas or up to date ideas from students or trainees. Also, strategic mentorship programs within big companies and on-the-job training have been proved very valuable tools to ensure knowledge transfer.
- Certifications were positively considered, as they represent reasoned standardisations. Especially for graduating students or young job seeker, it is quite important to have something to prove their skills. However, it was raised the point about the validity of different authorities that issue a certificate.
- Another important point was raised on the discussion about Multifunction Forests, as in the near future there will be more and more conflict of interest between different stakeholders.

A16.2 – Composition of the Focus Group

The Forestry Focus Group was comprised of 14 participants, 1 moderator and 2 rapporteurs. All participants were related to the Forestry sector.

Figure A16.1: Composition of the Forestry Focus Group

A16.3 – Participants' networks

Question 1.1: Considering the whole food/forestry sector in which you are involved, who would you describe as being your most important collaboration partners in your daily work?
All parts of the sector are very well represented. Participants reported to collaborate especially with forest owners' managers, scientists, universities, research institutes, governments, different ministries, policymakers, forest workers, machinery providers, hunters, farmers.
Cooperative, 102121
• State forest agency • Citizens, society in general • Contractors working in the forest

"The main contacts in my work would be the state forest agency, who keeps the law of Forestry in order, also to be in communication with the citizens that are interested in in our activities, and also the third would be contractors that make the actual work in the forest."
Education provider, 104131
• Italian Ministry of Agricultural and Forestry Policies • Council for Research in Agriculture • Constructors of machineries • Italian and International Research Centres
"I work mainly with the Italian Ministry of Agricultural and Forestry Policies and the Council for Research in Agriculture, the name is CREA, and with a lot of constructors of machineries and with Italian and International Research Centres. I am a bio-system engineer and so I work in the field of forestry mechanization"
Education provider, 104141
• Students • Student associations • Forestry industry • Research centres
"We are the students cooperative, we are associated with a range of collaborators as we offer our services to kind of all of the forestry industry companies and research centres, and for example Natural Resource Institute Finland and large forestry companies. Maybe the most important collaboration partner is the student associations that we try to help and offer the employment opportunities"
Education provider, 104152
• International Forestry Students' Association (IFSA) • International Union of Forest Research Organizations (IUFRO) • Food and Agriculture Organization of the United Nations (FAO)
Education provider, 104161
• Forest science institutions (research and universities) • Ministry of forestry and national and local level • Forest owners • Forest association • Forest entrepreneurs
"Our work has a role to transform knowledge, that means we are working very close to different forest science institutions, universities and also forest policies, that means the Ministry of Forestry both at national and local level, and so forest scientists and forest ministries, trying to reach out or transfer that knowledge to the forest owners, forest association, forest entrepreneurs and so on… so we are in the middle of that triangle trying to transform theoretical knowledge to practical activities"
Advisor, 105172
• Forest and timber industries • Universities • Research institutes • Biology and geography teachers • Ministry of Forestry • Forest associations
Advisor, 105192
• Student associations (IFSA)

• European Forest Institute • Researchers • International organisations (FAO, IFI)
"With ISFA we work with students as well and we work on capacity-building activities and events. Then I also work for the European Forest Institute, Bonn office, in this global project, it's called Global Student Networking and Green Jobs in the Forest Sector, so we interact with eight experts and researchers on the topics of employment and green jobs and forest education"
Advisor, 105211
• Foresters
"I am a representative of the Federal Research and Forestry Training Centre of Austria, and we are dealing with training for all people who are actively working in the chain of custody of wood and forest industry and our main part of cooperation is all the forest owners who are actively involved in forest management, in sustainable forest management"
Forester, 106221
• Scientists • World Agroforestry Centre • Governmental institutions, National and International
Forester, 106231
• Local farmer associations • Local hunters' associations • Local forestry authorities
"South Tirol is a small mountain region, so we have a really small-scale agriculture work and forestry, and most of the property is in the hand of farmers and forests have really a small-scale structure. So, the farmers' associations and hunters are our most important partners"
Forest Industry, 107242
• Other industry sectors • Forest Associations • Education providers
"I mainly work these days with other Finnish export industries, meaning chemical industry and technology industry, as we all know maybe forest industry is more and more related to chemical industry each year. Other collaborations, for example I work a lot with different associations in Finland, Finnish forest Association, we have Sirpa here today, and also education providers from VETs to Universities"
Forest Industry, 107252
• Forest management associations • Wood and pulp and paper associations • Woodworking industry associations • Forester associations • Landlord owners 'associations • Governmental institutions and EU level

A16.4 – Skills

In the Forestry Focus Group, participants' overall selection and ranking of their top 10 skills, figure A16.2 shows that respondents selected most often bioeconomy skills (26.4%) followed with similar percentages by sustainability skills (25.0%), and then soft skills (20.7%), business-entrepreneurship skills (16.4%) and digitalisation skills (11.4%).

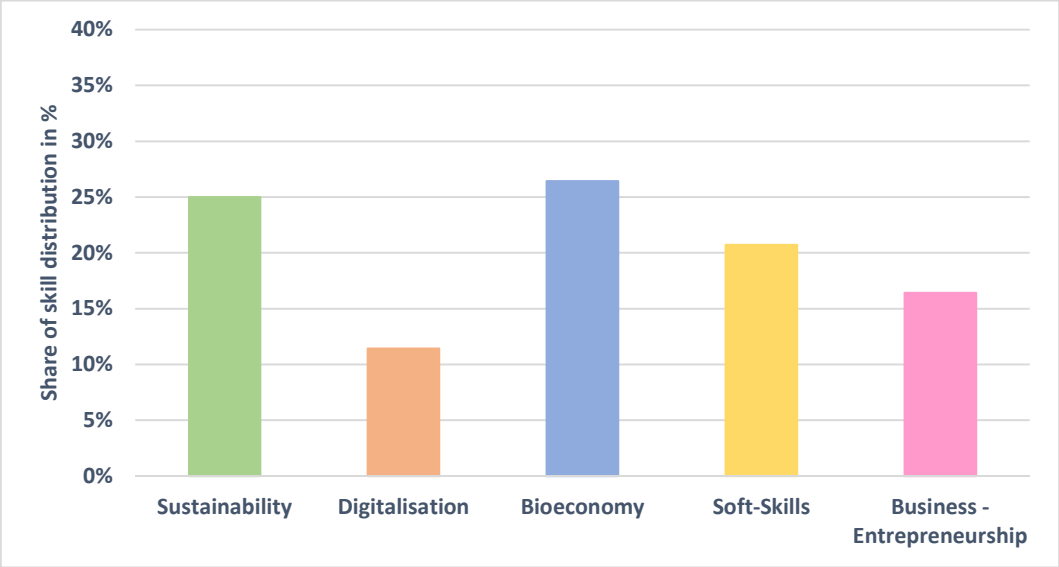

Figure A16.2: Share of selected skills in the top 10 rankings by skill category, Focus Group Forestry

The graph below shows that 10 participants selected sustainability skills in the top 3 of the rankings, 7 participants bioeconomy skills, 6 participants soft skills and 3 participants business-entrepreneurship skills. Digital skills were not selected in the top 3 positions of the rankings for any participant.

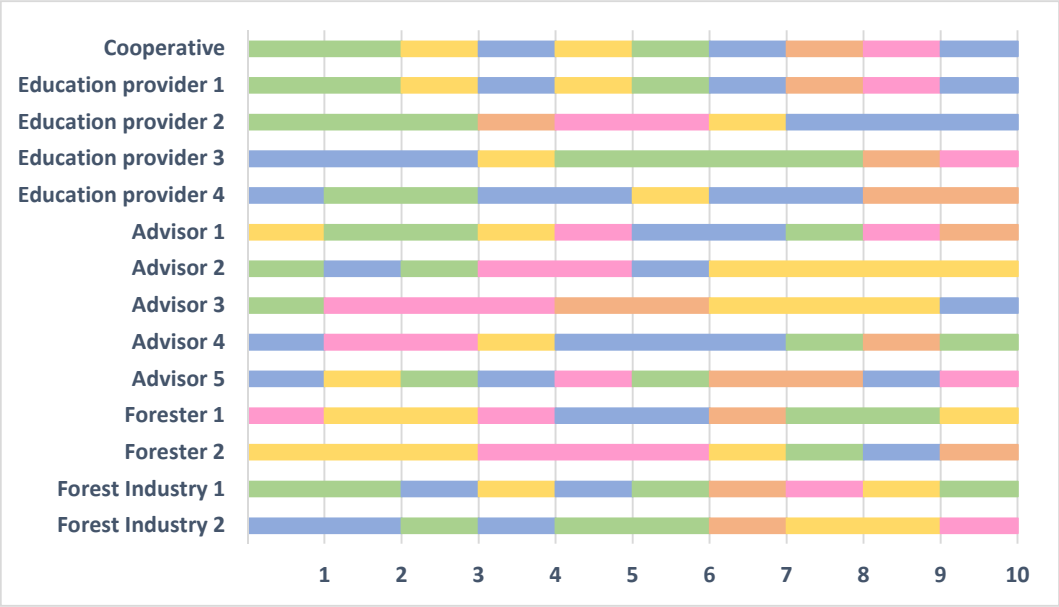

Figure A16.3: Stacked bar for the top 10 skills in the Forestry focus group

Figure A16.4 shows the ten most selected skills overall for the Forestry focus group:

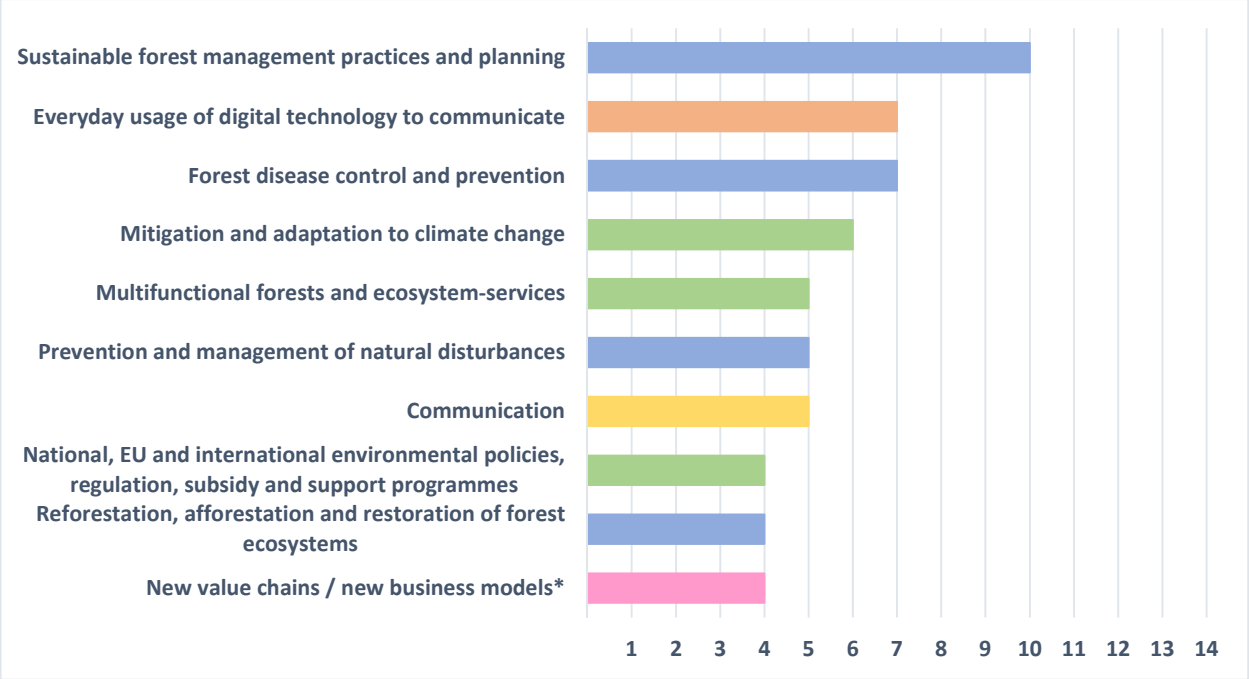

Figure A16.4: Most selected skills in the focus group rankings, Focus Group Forestry [n=14] (*there is one more skill that was chosen 4 times)

Within these skills, *sustainable forest management practices and planning* and *mitigation and adaptation to climate change* were ranked the first by three participants. *National, EU and international environmental policies, regulation, subsidy and support programmes* and *multifunctional forests and ecosystem-services* were ranked first by one participant.

The following tables present the most selected skills by skill category, listing in the brackets the number of times each skill was selected. Due to the lack of time to go through all the planned questions, no comments on the skill choices are available.

Table A16.1: Top sustainability skills, Focus Group Forestry.

Mitigation and adaptation to climate change (6)
Multifunctional forests and ecosystem-services (5)
National, EU and international environmental policies, regulation, subsidy, and support programmes (4)
Water management (4)
Efficient use of resources and logistics (3)
Biodiversity (3)
Generation, storage and use of renewable energies (3)

Table A16.2: Top digitalisation skills, Focus Group Forestry.

Everyday usage of digital technology to communicate (7)
Data handling and analysis (3)

Table A16.3: Top bioeconomy skills, Focus Group Forestry.

Sustainable forest management practices and planning (10)
Forest disease control and prevention (7)
Prevention and management of natural disturbances (5)
Reforestation, afforestation, and restoration of forest ecosystems (4)
Safety and health in the pulp, paper, timber, and cork industry (3)

Table A16.4: Top soft skills, Focus Group Forestry.

Communication (5)
Being resilient, adaptable, and proactive (3)
Safety awareness (3)

Table A16.5: Top business-entrepreneurship skills, Focus Group Forestry.

New value chains / new business models (4)
Specific sector legislation (3)

Question 2.2: Would you add any skill you find missing in the lists? Why is this/are these important?	
Lifelong learning is seen as being crucial for all type of workers. A balance between applied science and theoretical skills is needed in the sector. On one side scientific knowledge and development are necessary; on the other side the implementation of these findings is vital. For this reason, technological skills such as digitalisation and drone technology are the future of forest management, but also useful in knowledge transfer. On a different level, social and soft skills, such as governing stakeholder interaction, project management, tax system understanding, value chain and global forests approach cannot be left aside.	
• Lifelong learning (cooperative, 102121)	• *"I think that some of the people need an education with applied science and lifelong learning and some students are used as scientists that have very theoretical skills. I don't think that you can mix them all together to one group"* (cooperative, 102121)
• Technology skills (education provider, 104131)	• *"Sometimes our graduated have an education that is about nature, about environment, but not about technologies and so they find a lot of troubles to find a world without technology and so they remain in research centres or in institutions, but they don't improve the level of forestry, in Italy"* (education provider, 104131)
• Robot and drone technology (education provider, 104141)	• *[…] There's also their use in the forest management planning as in laser scanning for example, it can be done with drones and it is a rising subject between the students in the University and also with the forest companies* (education provider, 104141)
• Education supported by technology (education, 104161)	• *"the use of drones and of different kind of cameras in operating machines can absolutely support the practical transfer of knowledge. It's very easy to use technology to support the education processes in practice, so that is one of the issues that absolutely might be a part of this"* (education provider, 104161)

• Stakeholder interaction (advisor, 105182)	• *"I was thinking that maybe you're missing this whole point of stakeholder interaction, and in the in the future this will be one of the crucial skills that will be required within a company or organization, because there will be many issues that need to be handled on the outside or explained or somehow facilitated through the process"* (advisor, 105182)
• Robot and drone technology in Forestry (advisor, 105211) • Product life-cycle management and thinking (advisor, 105211) • Project management (advisor, 105211)	• *"[…] product life-cycle management or thinking. I think that's very crucial to come closer to the circular economy and that kind of things, also in order to know what we're going to do with our products* (advisor, 105211) • *"Project management. I miss management skill that I think is required regardless if you work in the forestry or industry, or textile. Anywhere project management is a crucial skill today"* (advisor, 105211)
• Facilitation skills (forester, 106221) • Jurisprudential and Fiscal systems understanding (forester, 106221)	• *"One thing that we see in our work in many of the countries we're working in foresters might have very good technical training and qualifications, but they are not usually very well qualified in terms of facilitation and understanding what problems many small holders in developing countries are facing, this is a chronic deficit in some basic forestry education"* (forester, 106221) • *"In most countries of the world particularly in Latin America, sub-Saharan Africa, and Southeast Asia, most of the origins of forestry departments have their roots somehow in European forestry whether that's Italian, French, German or British traditions of State managed forestry. Those have all been transposed through institutional and jurisprudential frameworks that were established under colonial rule in many parts of the world, and one gap that we see in our work is this very limited historical knowledge of many of the countries that people are working in"* (forester, 106221) • *"I didn't see a single mention in terms of skills and understanding of tax systems in any of the countries in any of the questions"* (forester, 106211)
• Understanding the whole production chain (forest industry, 107242)	• *"[…] if you work in silvicultural forest management or in the manufacturing plant, for everyone working in this industry, it is important to understand where the raw material comes from and how it is manufactured into the products that are ready for use*" (forest industry, 107242)

Q2.3: How do you think your current top ten list will change within the next 5-10 years? Will there be other skills in the list? Or will the ranking have changed?
Overall, the set of skills to be enhanced in the future might be categorized by three pillars.

• Technological skills: Digitalization of processes and data management, application of IoT and distance working. • Sustainability skills: Efficient use of resource (especially water), risk management (including disease prevention), but also the ability to restore forests. • Social Skills: Effective communication in a view of conflict management and the building of interlinks with the communities. On a broader scale, the understanding of global trade dynamics and the Chinese language.
Cooperative, 102111
Digital tools for simulation and predictive purposes.
"I think in the dimension of digitalization, when it comes to both technology but more maybe within simulations where, with compiling big data and using artificial intelligence, will be able to simulate things that we today are trying to figure out, and just see the impacts and stuff like that"
Cooperative, 102121
Efficient use of Resources. Restoring forest.
Education provider, 104131
Sustainability and water management. Digitalisation, IoT technologies robotics and automation.
"The applications of IoT technologies, robotics and automation will be increasingly widespread. This is valid for Europe, but I think that there are more and more problems in Africa and other developing countries in which forestry management is more important that in our continent. I think to Africa but also South America"
Education provider, 104141
Digital data management. Climate change. Forest Disease control and prevention.
"Forest Disease Control and Prevention is going to be rising at least here in Finland. As for climate change, there's not that much of pests or diseases yet, so we're going to need new skills on that"
Education provider, 104152
Communication with society
"I also think that a certain level of communication abilities will become much more important because the general interest by the public in what the forest sector is doing is ever increasing. I think, while there's been a lot of progress in getting better at making a narrative out of what the industry is doing, there's still a lot of room for improvement"
Education provider, 104161
Risk management. Technology management.
"[…] the question of the management of technology, a lot of different technologies coming up. How can we use this and educate people to put that into the practice"
Advisor, 105172
Analytical and critical and creative thinking. Communication. Equality skills. Conflict management.
Advisor, 105182
Communication and distance working at midterm. Digitalisation at long term.
"[…] how these skills sets of being able to communicate in distance and work in the forestry field from a distance and the related fields, of course maybe that could be one thing that could be happening in five to ten years. But in the next twenty to thirty years, I really expect the digitalization will be taking over everything, all the skills you need to be adjusted to that"
Advisor, 105192
Skills for green jobs in the forestry sector.
"There's a discussion that we're having at the moment about greening forestry sector jobs, so this is an important thing, and it is gaining momentum […] skills in producing new products that are resource-efficient, and then has been certified, will be needed highly."

Advisor, 105201
Water management
"Everything related with water (efficiency use and other topics) will increase in importance, at least in Mediterranean context"
Advisor, 105211
Climate change. Prevention and management of natural disturbances.
"Here in the open range regions of Austria we will have to deal much more with Prevention and Management of Natural Disturbances. First, climate change also damages forests and so people have to be more assertive in these strategies and in the interaction between the forest owners and the wood processing industry"
Forester, 106221
Chinese language. Global trade in timber products. Waste management.
"Chinese language skills in the next five to ten years, given the importance of China in the global, particularly top tropical timber trade but also in terms of the trade and transformation of a lot of timber coming out of Russia" *"The whole issue of global trade in timber products and particularly countries like Brazil, Uruguay and Chile are becoming increasingly important producers to compete with some of the traditional big producers in Scandinavia"*

Q2.4: You were asked to rank your 10 most important skills in the sector you represent, do you see differences within your sector depending on the job level of responsibility?
The shared idea is that the general level will have to increase, regardless of the role in the company. Especially communication will be more important at all levels, due to higher societal awareness. (Low level = technical approach; medium level = organisation, high level = decision making). Adding granularity, at a field work level skill such as digitalisation, automation and STEMS will be more and more important. At a top level, soft skills and conflicting interest management will be crucial.
"I think in general that the general forest worker will have to be able to perform a more advanced job in the future. So, the bar will go up a little bit and the university graduated employees will have to become even more specialists, because people are asking for more answers today and will ask even more answers tomorrow to the problems that we are trying to solve" (cooperative, 102111)
"From a forester point of view, not everyone needs to have the full knowledge of climate change, for example. But we have as a general interest that a greater number of people in forestry need to be better on communication with public, even the low level." (cooperative, 102121)
"As the level increases, the approach must be more holistic (Low level = technical approach; medium level = organization, high level = decision making)" (education provider, 104131)
"The operators on the ground and what they ought to see is that the digitalization and the decision-making related to forest management often also starts with who is planting new trees, for instance what tree species should be plotted here and there. Many of these decisions are taken by the operator who is doing the work, not necessarily from a manager, in our systems at least, so there is a high need of skills in all line here […] It is also about communication and the understanding of how to work with conflict of interest to get that down to the ground" (education provider, 104161)
"It will change if you change level in responsibility. So, I choose as the most important topic health, generally it involves other parts of the sector as safety and health for the staff most important thing because our main productive factor is the staff. So, if safety and health is respected in all the parts of production, then we will probably have a better chance to be productive and successful also in the future. But if you have to charge the profile of the top manager, it looks differently in the whole rankings" (advisor, 105211)

"Digitalisation (data analysis, management and protection) is linked to some communication skills. As we have more and more data, medias, and research on our topics, we need updated skills in science communication and critical thinking […] The message I get from our companies is that, especially in the basic level so-called blue-collar workers, the STEM skills are not in the level where they should be" (forest industry, 107242)

A16.5 – Training

Q3.1: Based on your identified 10 most important skills in the sector you represent, which of these skills need more training? Why?	
On the one hand skills such as the understanding of global forests functioning, the interdisciplinary knowledge to assess the whole value chain and the communication with the society, need more training compared to others. On the other hand, occupational safety for field workers.	
• Interdisciplinary knowledge to assess the whole value chain (education provider, 104161) • Analytical, critical and creative thinking (education provider, 104161)	• *"I think interdisciplinary knowledge to assess the whole value chain. So that all people know the value chain and so that we have different kind of opinions and angles of thinking and sciences involved, because forestry and forest industry have to deal with many kind of sciences"* (education provider, 104161)
• Safety at work (advisor, 105211)	*"It makes a difference if this question applies to a forest worker to the question applied to a manager. For forestry workers we do training in occupational safety because accidents cause a lot of financial damage for the whole society and so to prevent accidents is the most efficient way of being successful in this sense. But also training for managers is really necessary for the future, but in a very different way compared to this"* (advisor, 105211)
• Complex systems associated with agroforestry parklands (forest industry, 107242) • Understanding forest property rights (forest industry, 107242)	*"We frequently see young foresters who are extremely knowledgeable about the management of mono specific plantations but have very limited knowledge of the much more complex and complexities of tropical forest systems, particularly in the humid tropics and even less, very often, the complex systems associated with agroforestry parklands"* (forest industry. 107242) *"There are weaknesses in our own training, in our European institutions, which still tend to focus on what exists in our own countries and very little on what exists outside of those normative frameworks we are familiar with. There are much very different and much more complex land and pre-tenure arrangements than those that actually exists in your own countries, where very often property rights are very clearly defined"* (forest industry, 107242)

• Soft skills (forest industry, 107252) • National and international environmental policy regulation, subsidies… (forest industry, 107152) • Organization, planning, visioning, and strategic thinking is (forest industry, 107152) • Communication (forest industry,	• *"Additionally, I think the soft skills are important in the way of that for a person who look at a lower level at this moment, it also will provide them some preparation of skills for them to move up on their career to a next level"* (forest industry, 107252) • *"Communication to also represent and to provide more information about the sector to the general public or to the European policymakers, in order to have a more relevant policy for the development of the sector in the future"* (forest industry, 107152)

Q3.2: Based on your experience, is the available training suitable to cover the previously identified training needs? Which is the missing training? (Group question)	
Provided that companies already take over an important part of workers training, it would be beneficial to build bridges between the industry and academies. This link would allow students to gain early on-the-field and teamwork experience, regarded as a crucial part of training. Moreover, soft skills and ad-hoc communication training are needed to enhance the sector's positioning in society.	
• On-the job training (cooperative, 102111) • Connecting the industry with the academia (cooperative, 102111)	• *"Maybe connecting the industry with the academia together and building something beautiful going forward, because one thing is the basic training to become some sort of engineer or whatever, but then it's a continuous learning, the continuous training, which I think is at least as important or even more important, to be relevant for the company that you're employed in, the team that you're working in, the customers, the products, so on and so on*" (cooperative, 102111)
• Real life communication (cooperative, 102121)	*"I see a lot of students coming with talent in social media communication but in in real life communication are not that good, so training in good real-life communication would be amazing"* (cooperative, 102122)
• Education to provide practical experiences to acquire work-related soft skills (education provider, 104152)	*"A focus in education to provide practical experiences early on, because you can only learn teamwork if you've actually had to work in a team, and this accounts for a lot of other of those type of soft skills, that it's quite valuable to get as early as possible some practical experience and get some field experience"* (education provider, 104152)
• Knowledge and understanding of the total value chain (education provider, 104161)	*"Example from the harvester to the saw miller and so on, there's a lot of broken exchange over the value chain here, the changes are really small steps here and small steps there, but they are not connected so data is not used and put into a structure or at least not good enough. So, for us*

	it's really important to see that these values are taken care of and used in the production" (education provider, 104161)
• Communication (advisor, 105211)	• *"Especially communication with the society, with politicians, and other decision-makers, so to give our work or activity a position in everyday life of the general society, not only the forest society or the agricultural society, but the whole society"* (advisor, 105211)
• Internal/external communication (forest industry, 107252)	*"There are many available platforms now for general communication skills that you can find. I think what it means now, either communication training program or other soft skills training program, that it is customized for forestry people, how to communicate the information from the forestry to our target audiences or to the European policymakers"* (forest industry, 107252)

Q3.3. Do you think skills need to be trained in different ways, depending on the people to be trained? (Group question)
This question was skipped due to the available time and because this topic was discussed in previous questions.

Q3.4. What type of training is available to support learning and knowledge transfer? Base your answers on the preferred methodologies that meet the overall sector needs. (Group question)	
There is a general agreement on the idea that online learning is a great tool for approaching new topics and broad things, but at the same time the practical approach is still important because some things cannot be learned online. Beside a cautionary note about the actual efficiency of digital courses, it is however believed that online platforms are more ideal for long distance workers. Learning by working and mentorship by companies are also regarded as important methods to transfer knowledge to students and to enrich employers with fresh inputs.	
• Digital training and online courses (cooperative, 102111)	• *"I think digital training, online courses, will just even expand further, as Covid-19 has taught us lots of things, so how to do things and we have to get used to a new normality"* (cooperative, 102111)
• Learning by work (education provider, 104141) • Trainee positions with university funding (education provider, 104141)	
• Balance between digital learning and practical approach (education provider, 104152) • Mentoring (education provider, 104152)	• *"I think balance is needed, you will have an increase in digital or online learning. That's good for approaching new topics and broad things, but I also think this practical approach is super important because some things you just can't learn online and you never will"* (education provider, 104152)

	• *"A lot of times this [mentoring] just happens by chance but I think an effort to have more strategic mentorship programs within the sector or at least within bigger companies is a very valuable tool to ensure knowledge transfer within, but also to help younger people to actually find their way into the sector, into an organization"* (education provider, 104152)
• Balance between digital learning and practical approach (education provider, 104161)	*"We are using a number of online courses these days that shall be physical courses, but one of the issues that is combining for people that are out working in the field, driving harvester for instance or whatever, using some lectures online combined with discussions with people that have practical reference"* (education provider, 104161)
• Mentorship of young people (advisor, 105192)	
• Cautionary note before we think that online teaching is going to solve all the problems (forester, 106221)	*There are extremely high dropout rates and one of the great challenges with online courses is trying to reduce that. So, I just wanted to express that as a cautionary note before we think that online teaching is going to solve all the problems"* (forester, 106221)

Q3.5. Is it important for you to receive a professional certification for your training? Why?
The main question behind certificates is about who has the authority to actually issue a certificate. Once this point is solved, certifications are positively welcomed both by students and employers as a necessary standardisation of knowledge requisites. For students it is useful to have something to show to prove their training, while for the employers it is important to identify those students who have proven skills, but not necessarily the experience.
• *"I think that if one gets some professional certification, if you go in some training, there's something to show for when you're trying to employ yourself and it's easier for the employer, for the forest companies, to identify the young students that have the skills but not necessarily the experience"* (education provider, 104141) • *"In our situation documentation is necessary, some certificate or whatever, when you need documented skills to perform this or that job. In other situations, there is not necessarily needed"* (education provider, 104161) • *"I think a certification means that there is a discussion and a specification process preceding, so it's standardisation. More or less and that's good for some topics, as for example if you speak in the western part of Austria about harvester driver and the eastern part of Austria about a harvester driver and the formation of it, you speak about the same thing because it's standardized"* (advisor, 105211) • *"I think there's a question that comes before this question, and that is: who has the authority to actually issue a certificate? I think that has to be answered first and foremost. I've seen over many years certificates which are dished out left, right and centre, but they have little authority other than that. I've seen many non-governmental organisations issuing certificates because they run a two-day training course in northern Ghana, but do they have any authority to issue a certificate? Not that I know of, so I think we have to be very careful" (forester, 106221)* • *"I think that to receive a professional certification for a certain training program it's also important and it is useful in some cases. Of course, it also depends on the type of skills or knowledge of these courses and*

who delivers this certification, but I think it's useful especially when you need that certificate for certain kind of job or for the future opportunity of your career" (forest industry, 107252)

A16.6 – Final remarks

Q4.1. Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, facing the current and future market/social needs?
No final remarks

Annex XVII: Focus Group EU-Policy Issues

A17.1 – Aims of the Focus Group

As indicated in the project description, Task 1.3: "*One focus group will also be organised in Brussels with a more policy-oriented focus with the involvement of EU umbrellas organisations: LLL-P, EfVET, ISEKI, FDE, CEPI, COPA – COGECA RES WP and EIP-AGRI focus groups members*". Plant-ETP also joined the organising team.

Focus Group organizers, led by FoodDrinkEurope (FDE), discussed (e-mail, meetings) how to identify the aims of the Focus Group, topics for discussion and how to target participants.

From the start of the organisation of this Focus Group (FG) it was agreed that a different setup was needed in comparison with the other Focus Groups run nationally. The main rationale for this was that at national level, the focus groups directly involved farmers, industries, universities, national policy makers and national representatives from associations, while the focus group in Brussels involved partners that represent entire sectors (FoodDrinkEurope, Copa-Cogeca, CEPI, EFFAT, Plant ETP) and education (ISEKI, LLL-P, EfVET) at the EU level. The knowledge and experience of the participants was therefore EU policy based. Moreover, if the main outcome at national level was to obtain the training needs in response to identified skills and the best training methods, the Brussels Focus Group aimed to identify the policies needed at the European level to support appropriate training. Therefore, there was a revision of the Terms of Reference and questions to be raised during Focus Group activity.

The Terms of Reference were established as follows:

- Identify skills needed in agriculture, forestry, and food industry.
- Need to adapt, extend, or modify existing skill framework or develop national (and EU) legislation to support knowledge transfer and skill creation - technological development and training needs.
- Flexible training for professionals and certified training for VET trainees.
- Harmonised standards and quality in training in agriculture, forestry, and food industry.
- Specific apprenticeship schemes/stages for agriculture, food, and forestry value chain.
- Dissemination/exploitation of existing results and exchange of best practices.
- Business models to overcome the skill barriers to promote further the collaboration among actors in the food supply chain, namely workers, training centres, farmers, other producers, and industries.
- Raise awareness on available innovative skills for agriculture, food, and forestry.

A17.2 – Methodology

Focus group preparation was carried out as described in Deliverable 1.5 "*Focus Group Guideline"* except for the participants' profile. As explained in the previous section, the focus group on EU-Policy issues had a different objective when compared to the others, more focussed on the current policy framework in skills and training for the agri-food sector and a set of recommendations on how to improve it (assuming that there is a skills gap between the education and training frame and the sectorial needs). To achieve this setting, participants representing relevant stakeholders were selected for the discussion. These were made up of representatives from the agriculture, food industry and forestry sectors, as well as from education EU

platforms. All organisations were FIELDS partners, associated partners or members of the Advisory Group. Table A17.1 shows a list of the participants and their profiles:

Table A17.1: Participant organisations in the EU-Policy focus group.

Participant organisation	Representation	Role
FoodDrinkEurope	Food industry	Coordinator/participant
ETP Plants for the Future	Plant sector	Rapporteur/participant
CEPI	Forestry	Participant
EfVET	Vocational education and training	Participant
LLL-P	Lifelong learning	Participant
Copa-Cogeca*	Agriculture: farms and cooperatives	Participant
EFFAT*	Trade unions in agriculture, food, and tourism	Participant
ISEKI	Research, education, and training in the food sector	Participant
Confagricultura/Copa-Cogeca R&D WG	Agriculture	Participant
UniTo/Project coordinator	Education	Participant
Swedish Federation of farmers/Bioeconomy panel Copa-Cogeca**	Agriculture and forestry	Participant
FoodDrinkEurope R&D WP / Campden BRI**	Food industry	Participant
ASERSA / UPC**	Agriculture/Education	Participant

All organisations are FIELDS partners, associated partners* or members of the Advisory Group**

To set up the particular goals of this focus group, the guiding questions were also different from those described in D 1.5 for national focus groups. Setting the scene was divided into three main areas of questions:

- The first area was intended to link with the work of the National Focus Groups from an EU perspective on skills needs. The aim here was to give the participants the opportunity to share their opinion on the skills lists developed by the FIELDS project partners. This was done by highlighting the needs at EU levels of the respective sectors and comparisons were drawn to some tools that have already been developed, such as the European Commission ESCO list (European Skills/Competences, qualifications, and Occupations).

  1. Section Skill Lists

  Q1: Would you add any skill you find missing in the lists? If so, where would you rank it/them?

- The second section of questions assumed some knowledge of the EU policies towards education and training and presented the outcome results of the International Labour Office Policy Brief 'Formulating

a national policy on skills development'[3]. The main findings of this document related to the general challenges and recommendations were summarised for inspiration:

2. Challenges, recommendations, and training needs

2. General challenges

- Skills mismatch.
- Limited involvement of social partners.
- Poor quality and relevance of training.
- Limited access to training opportunities.
- Weak coordination in the system.

2. General recommendations

- To bring coherence to the system.
- To facilitate coordinated and planned actions and reforms.
- To facilitate policy coordination and coherence.
- To clarify institutional arrangements.
- To anchor existing good practices.
- To pledge political and collective will and commitment.

The questions around these statements were set in two further blocks, one setting the scene for agreement on the presented set of recommendations and how they apply to the specific sectors (i.e., agriculture, food industry, and forestry). The second question was oriented to training needs at EU level:

Q2.1: Would you agree with the previously stated challenges and recommendations? Are there anymore? How does it apply to your sector?

Q2.2: What is the training needed? How to improve the existing framework? What is missing?

- The third round of questions had the objective to review the participant's opinions regarding the current legislative framework: how EU policies are set in training and education and how they adapt to the sectorial needs, particularly to the sectors specified. These questions had the intended outcome to have some recommendations on the next steps regarding EU policy.

Section 3. Policy at EU level

Q3: Does the current framework satisfy the demand? How to improve the European policy landscape?

Q3: Are skills properly recognised at EU level? Are any improvements needed regarding certification and validation?

[3] International Labour Office (2011). Policy Brief: Formulating a national policy on skills development.

- Finally, some time was left for additional comments and remarks.

  QF: Is there anything we have not discussed that you find important to update farmers, foresters, and food industry employees' skills, considering the current and future market/social needs?

The Focus Group took place virtually in a two-hour session, by using the *GoToMeeting* conference call web service. Half an hour was dedicated to the introduction of the FIELDS project and the aims of the event. Pre-reads had already been shared by the coordination team (project partners involved in this FG). The remaining time was divided into 30 min for each of the sections (1, 2 and 3) with the pertinent questions.
The overall activity was recorded directly using the *GoToMeeting* video recording option. From this recording a literal transcript was extracted, which was compared with the notes taken by the rapporteur. A first draft of the overall discussion was obtained from this preliminary work.
The reviewed transcription of the session was then summarised into an executive summary report, which was shared with the participants of the Focus Group for comments. From this work, the text was adapted to the deliverable format and presented in A17.3.1.

A17.3 – Focus group report

A17.3.1 – FIELDS skill lists for the focus groups and for future project activities

The starting point of the discussion is the skills lists previously sent by email: if any skill is missing and eventually how to rank it.

Taxonomy of skills is a hot issue: the more exhaustive the skill description is, the better it is to manage the expectations of the labour market. Generally speaking, the skills list presented is exhaustive[4]. Nevertheless, on the one hand it is perhaps too specific/detailed, and still very specific skills might be missing, linked to very detailed contexts (e.g., temperature measurement in a milk farm, or in the forestry sector in general). On the other hand, the list mainly mentions top skills, acquired/developed in higher education, and it does not include intermediate and basic skills, related to different levels of knowledge/education. Although ESCO's classification was considered in developing the skill lists, additional effort is needed to balance basic, intermediate, and top skills, considering ESCO's occupational levels and sectors (i.e., ISCO groups) as a reference. In a few cases, some skills are embedded and do not exist in silos, they should be combined: categorisation should consider this aspect. Another element to be considered is the difference between hard and soft skills: they should be more balanced. The skills list would benefit from prioritisation and being organised in hierarchy, on three levels: basic and technical skills needed for the job specifications; general skills needed in the different sectors; and specific skills that are not essential for all employees but are needed in the different sectors. Basic skills are needed for all, including highly educated workers, therefore basic skills must be preserved.

[4] Perhaps too exhaustive for task 1.4 "Bottom-up surveys"

In the EU, there are so many agriculture and food options that consumers have started to question their quality, safety and particularly sustainability. New skills and competences should be developed to inform the public on those aspects. Due to the current COVID-19 pandemic, public concern has increased towards agriculture and food as a vector of disease. More awareness regarding food waste faces two issues: the need to avoid food waste, for example by providing better knowledge regarding the best before date information; and better consumer knowledge on how to properly dispose of unwanted food. It is of paramount importance to increase consumers trust in the agri-food sector through better communication (environmental and social sustainability, risk management).

In the agri-food sector there is a lack of understanding of the current skill challenges faced by employers and employees: the challenges facing current workers and the challenges facing future workers should be addressed in a different way, with specific measures related to skills gaps existing in the farmer's workforce in different countries. There is a clear need for a lifelong learning approach[5] to update the current workforce: there has been a continuous decline of labour force[6] in the last ten years, especially due to the fact that the sector is no longer attractive for youth.

A17.3.2 – Training needs, challenges, and recommendations

First of all, education should be understood in a wider, more holistic way; if we only focus on the skills needed in the job market, we reduce the scope of education. In this sense it would be better to speak about competences rather than mere skills, where the concept of competence includes knowledge, skills, values, and attitudes.

When it comes to trainings, they are too often not equally recognised in different EU countries; there is a clear discrepancy between national and international level trainings. The EU established a framework to include all skills, ESCO; also, in this EU framework challenges related to the differences from country to country or regions are highlighted. Sometimes these discrepancies are due to the fact that it is not easy to understand the names of the job positions and the skills needed because of the language barrier; in other cases, the definition of a job position and related skills are different among EU countries. Further dialogue is needed to overcome these differences. In order to achieve the training needs in the agri-food and forestry sectors, approaches such as "blended" learning should be properly implemented, and new methodologies and tools should be developed for education (e.g., COVID-19 pandemic obliging distance/online learning).

Regarding consumers trust and the demand for more transparency, more skills are needed on the commercial side to (re)gain consumer trust: in a certain way, commercial skills are more important than technological ones nowadays.

In the agri-food sector there are no skills and professions that cover all the needs; then, education should focus on the specific needs for each profession. One of the main reasons for this situation is that agriculture, forestry, and related sectors are an EU competence, education is not. Further harmonisation between EU and national

[5] Augère-Granier, M. (2017). European Parliamentary Research Service: Agricultural education and lifelong training in the EU

[6] Policy Department for Structural and Cohesion Policies, European Parliament (2019). The EU farming employment: current challenges and future prospects

policies regarding education for farmers is recommended: skills and trainings might differ between national and international policies, but needs do not.

A17.3.3 – Improvement of the European policy landscape

One of the main issues identified is the recognition and validation of prior learning, especially in the informal and non-formal sectors, that lack official certification. This is also a key element for the food industry and for the forestry industry, where the experience is inherited from small family businesses. Therefore, general education is important, including validation of "on the spot" learning, compared to formal learning. Specific key competences, such as "learning to learn" should be boosted, thus helping to shape the learning processes in different situations (e.g., COVID-19 and online learning). These aspects should also be considered as training needs.

Social partners must provide evidence-based practices for policy makers. Good examples in this field are the recognition of universities as capacity building entities, or projects that bring together a community of different organisations and experts around a specific topic; another best practice could be to ensure access to lifelong learning for the entire workforce. In the end, the exchange of best practices is a powerful tool to improve EU policy. The "Social Dialogue" should be strengthened, fostering dialogue between the employers and employees, at both EU and member states level, on relevant topics such as how to train the current workforce.

A17.3.4 – Recommendations / Key messages

- There should be a balanced approach to the needed skills, considering basic skills, specialised skills, and soft skills. The skills gap should be explored and even forecasted to design the training of the future.
- Knowledge transfer: it is important to provide the right knowledge to the relevant workers in the sector. Responsible research and innovation should be considered to follow an ethical approach.
- Curricula at universities and training centres must be adapted to the sector needs, adjusting homologation and recognition of skills and experience.
- The European strategies on education and training for farmers and workers of the agri-food sector should take into consideration a holistic approach for coherence of the skills and training provided at EU level in the agri-food sector.
- The agri-food sector is the biggest in Europe; there is a need to establish bigger alliances to reshape the scenario in order to support farmers and the food industry.
- There must be an evidence-based approach to provide guidelines to policy makers in the field of education in the agri-food sector. These recommendations should be given by sectorial and educational representatives in collaboration with policy makers.
- The Social Dialogue should be reinforced to promoter the interaction between the employers and employees, in order to set the basis for the needed training and skills.
- There is a need to increase the attractiveness of the sector for the younger generation[7].

[7] The SUREFARM project has proposed some initiatives on this topic: increase the attractiveness of farming as an occupation and lifestyle, revitalize rural areas, increase the mobility of land and labour, facilitate the provision of personal and farm-specific advice and coaching and increase the offer of long-term prospect farming systems (https://surefarmproject.eu/deliverables/publications/). Education can also play an active role by providing youngsters with farming and food processing experiences, including them in basic and secondary education programmes.