

D3.6

Report on Future skills for Bioeconomy workshops – Update

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DELIVERABLE TYPE

Report

MONTH AND DATE OF DELIVERY

Month 23,
December 2022

WORK PACKAGE WP3

LEADER

UNIBO

DISSEMINATION LEVEL

Public

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Programme H2020

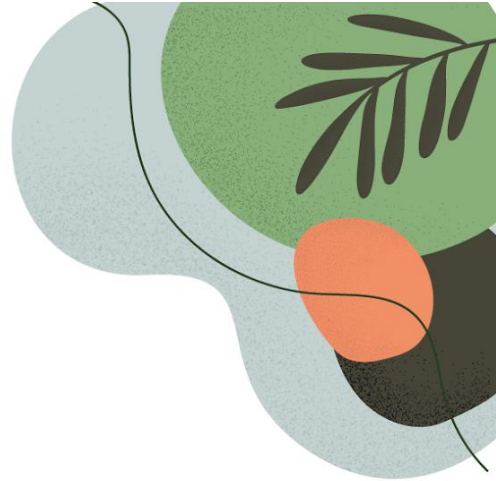
**Contract Number
101000539**

**Duration
24 Months**

**Start
January 2021**

D3.6

Report on Future skills for Bioeconomy workshops –Update



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Revision History

VERSION	DATE	REVIEWER	MODIFICATIONS
1.0	20/12/2022	Parthena Chatzinikolaou, Davide Viaggi	Initial Version of the Deliverable
2.0	23/12/202	Christina Balla, Jana Bielikova, Selenia Marinelli, Pietro Rigonat, Lily Teitelbaum, Jana Bieliková, Andrej Gemes	Updated version incorporating partners' input
3.0	24/12/2022	Parthena Chatzinikolaou, Davide Viaggi	Final Version

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Report on Future skills for Bioeconomy
workshops – Update





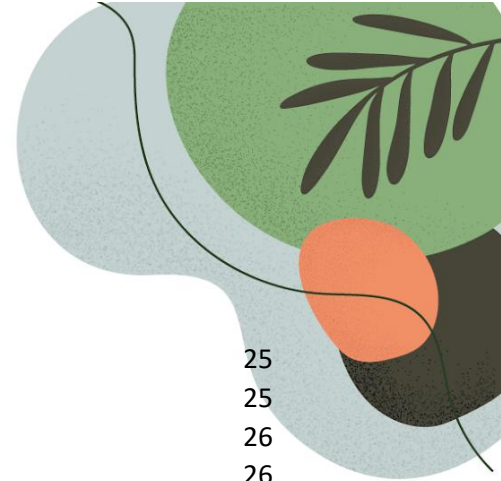
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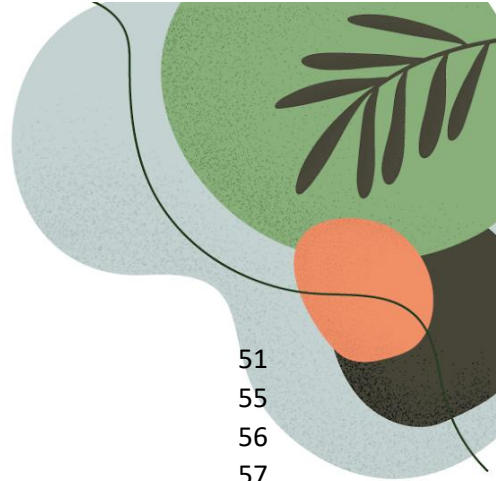


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1. Executive Summary

This report represents deliverable 3.6 “Report on Future Skills for Bioeconomy workshops – Updated version” of the 24-month Horizon 2020 Coordination and Support Action project Transition BIO (GA 101000539).

Transition2BIO has built upon the most relevant communication and education EU funded projects and initiatives to contribute to the implementation of the updated 2018 EU Bioeconomy Strategy and promote the transition towards a more sustainable production, consumption, and lifestyle.

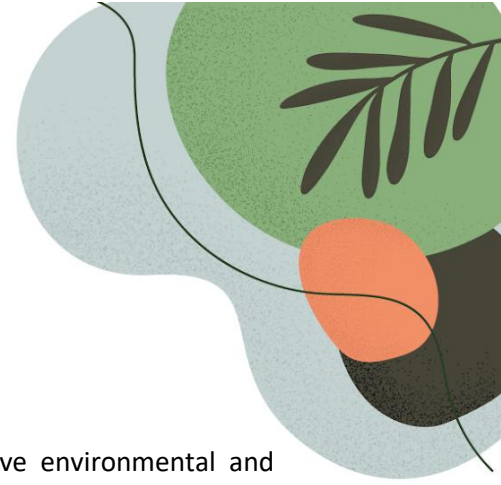
The aim of the project was to implement an integrated package of communication, awareness-raising and educational activities addressing a wide range of target stakeholders, representing demand side, supply side, multipliers, and supportive environment.

In the frame of the Work Package 3, Transition2BIO has contributed to the deployment of the regional bioeconomy strategies by providing Member States and Regions support to implement their bioeconomy raising awareness.

This report corresponds to the 3rd objective of the Work Package, the development of five co-creation workshops on identification of future skills and educational needs in the bioeconomy, hosted in selected European educational institutions. It documents the organisation and the results of the 5 co-creation workshops foreseen in task 3.3, which were held during the second year of the project for the identification of the educational and skills needed for the transition towards a sustainable bioeconomy.

As general remarks and common points, participants were satisfied with their participation and have reported that such interactive workshops can contribute to collecting input on bioeconomy and to help bring human resources into the bioeconomy and its different macro sectors. A common issue that has been reported in all the workshops is that different sectors of the bioeconomy are still divided into different disciplinary fields, and so transdisciplinary thinking needs to be further developed. As regards the educational need to develop critical thinking, which has been considered necessary for creating the new tools of the future, it is important to start early with children and integrate critical thinking in the strategies of all education levels and policymakers.





2. Introduction and objective

The transition towards a sustainable bioeconomy can lead to positive environmental and socio-economic impacts. Providing the necessary skills and meeting the educational needs in the European bioeconomy are key challenges (European Commission, 2018).

According to the Updated Bioeconomy Strategy of the European Commission (2018), “The systemic and cross-cutting nature of new and emerging bioeconomy approaches and new value chains will need new education and skills”. Education needs could be fulfilled by different educational institutions, such as schools and universities courses, vocational training, and life-long learning programmes, with the need to increase the offer of the programmes, covering all the sectors and skills related to the bioeconomy (European Commission, 2018; LIFT, 2020a).

Among its objectives, Transition2BIO has attempted to facilitate the identification of the educational and training needs towards the creation of an innovation ecosystem for the bioeconomy (contributing to action 2.4 of the updated EU Bioeconomy Strategy). Addressing this objective, the WP3 through its dedicated task 3.3 organised five co-creation workshops focusing on the “Future skills for Bioeconomy”.

The LIFT project pointed out (LIFT, 2020b) that *“Co-creation [...] is a process which ensures that all stakeholders are involved in the design of future industrial and policy agendas, integrating their ideas and concerns to jointly identify and address opportunities, challenges, and risks. This approach contributes to responsible policy making and strategic agenda setting, which takes into consideration mutual perspectives, including citizens’ views of the challenges and opportunities.”*

The objective of the Task 3.3 – “Future skills for Bioeconomy” was to develop these co-creation workshops, involving a target of at least 300 participants in total, to identify future skills and related educational needs in the bioeconomy. UNIBO has coordinated the design and implementation of the co-creation workshops, in collaboration with hosting institutions, aiming at involving Quadruple Helix stakeholders to identify what are the future skills needed for five different bioeconomy sectors.

This deliverable reports the activities for the organisation of five co-creation workshops on identification of future skills in the bioeconomy, hosted in selected European educational institutions. The results from the workshop for each of the five sectors of the bioeconomy are presented, as well as some final remarks and conclusions regarding the identification of the educational and skills needed for the transition towards a sustainable bioeconomy. The preparatory activities and planning, instructions and guidelines of the workshops are provided in sections 3 and 4, the results of each one of the workshops in different bioeconomy sectors are provided in section 5, the final remarks, discussion of the results of all co-creation workshops and the conclusions are provided in the sections 6 and 7.

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3. Methodology

3.1 Planning of the workshops

The hosting institutions for the 5 co-creation workshops were selected based on their expertise in different bioeconomy sectors, namely:

- University of Bologna: Agriculture, food, and feed
- EurOcean: Blue bioeconomy
- University of Eastern Finland: Forestry
- Cluster Spring: Bio-based products
- AgroParisTech: Bioenergy/biofuels

AgroParisTech, University of Bologna and University of Eastern Finland are also members of the European Bioeconomy University (EBU), an international alliance composed of six leading European Universities in the field of bioeconomy that focus on three essential pillars for the transition to bioeconomy: research, excellent teaching, and innovation.

For the promotion of the co-creation workshops, EBU and the European Bioeconomy Network (EuBioNet), an alliance of 130 projects and initiatives¹ promoting, communicating, and supporting the European bioeconomy, were involved by FVA since they are the main initiators of EuBioNet and the contact point of the initiative.

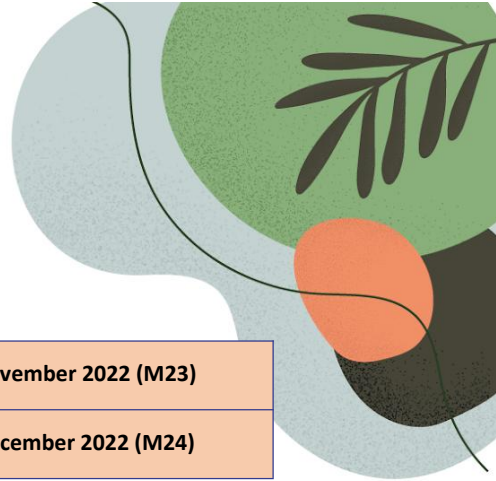
During September 2021, UNIBO sent an invitation email to the other hosting institutions (EurOcean, University of Eastern Finland, the Italian Technology Cluster on Circular Bioeconomy - Cluster Spring, AgroParisTech) to arrange a coordination meeting for the implementation of the co-creation workshops. Thanks to the responses of the foreseen hosting institutions, bilateral meetings were scheduled during M10- M12 by UNIBO, which resulted in the agreements shown in the table below. The workshop hosted by UNIBO was organised first as a pilot, to test the guidelines provided to the hosting institutions and identify possible issues to be fine-tuned before the organisation of the rest of the workshops.

Table 1. Hosting institutions of the 5 co-creation workshops

Hosting institution	Bioeconomy sector	Month
University of Bologna www.unibo.it	Agriculture, food, and feed	April 2022 (M16)
University of Eastern Finland www.uef.fi	Forestry	June 2022 (M18)
EurOcean www.eurocean.org	Blue bioeconomy	September 2022 (M21)

¹ Number updated at 20/12/2022





AgroParisTech www2.agroparistech.fr	Bioenergy/biofuels	November 2022 (M23)
Cluster SPRING www.clusterspring.it	Bio-based products	December 2022 (M24)

3.2 Guidelines

The information outlined in this Section describes the goals and the guidelines for the workshops and the hosting institutions. A total of five co-creation workshops were organised, involving Quadruple Helix Stakeholders.

The workshops were held in English. It was possible for the hosting institutions to hold the workshops in their local languages, but in that case the main findings of the workshops would have been translated in English for the reporting activity outlined.

The workshops were held online due to Covid – 19 restrictions, through a web platform that allowed the use of microphone and camera for the participants and a collaborative platform where participants could write down their opinions and exchange on the requested topics. The only exception was the last one that was organised in hybrid mode.

The hosting institutions agreed with UNIBO on the date on which the event was held.

The organisation of the event followed the guidelines described in the Deliverable 7.1 – H - Requirement No. 1, where the following elements are indicated:

- Details on the procedures and criteria to identify and recruit participants
- Detailed information on the informed consent procedures for the participation at the events
- The informed consent form and information sheet.

The objective of the co-creation workshops was to identify what are the future skills and related educational needs for each of the five bioeconomy sectors (see below) and European bioeconomy at large.

Below, the following information was provided for each workshop:

- the hosting institution that has organised the workshop;
- the bioeconomy sector on which the participants were focus during each workshop;
- the projects and initiatives that expressed their interest in collaborating with the organisation of the workshop and were possible participants as well.

The workshop hosted by UNIBO was organised first as a pilot, to test the guidelines provided to the hosting institutions and identify possible flaws and strengths.

1. Bologna
 Hosting institution: Report on Future skills for Bioeconomy workshops – Update UNIBO





Bioeconomy sector: Agriculture, food, and feed

In collaboration with: H2020 Projects: Sherpa, Be Rural, NextFOOD, FIT4FOOD2030, European Bioeconomy University, Erasmus Project: BoostEDU, Master BIOCIRCE, FOODforce Network, ACTIA - The French Network for Food Technology Institutes, EAAP - European Federation of Animal Science, Slovak University of Agriculture, AgroBioFood platform, Lazio Innova, Lombardy Green Chemistry Association, Slovak Bioeconomy Cluster, BioEAST Initiative, Agro Camera, Innova Camera

2. Joensuu

Hosting institution: University of Eastern Finland

Bioeconomy sector: Forestry

In collaboration with: European Bioeconomy University, Lazio Innova Biofuel Region

3. Lisbon

Hosting institution: FUNDAÇÃO EUROCEAN (EurOcean)

Bioeconomy sector: blue bioeconomy

In collaboration with: European Bioeconomy University, Lazio Innova, CNR (Italy) Blue Bioeconomy Forum, Aquimer, Particula Group, Fórum Oceano

4. Paris

Hosting institution: AgroParisTech

Bioeconomy sector: Bioenergy/biofuels

5. Roma

Hosting institution: Cluster SPRING

Bioeconomy sector: Bio-based products

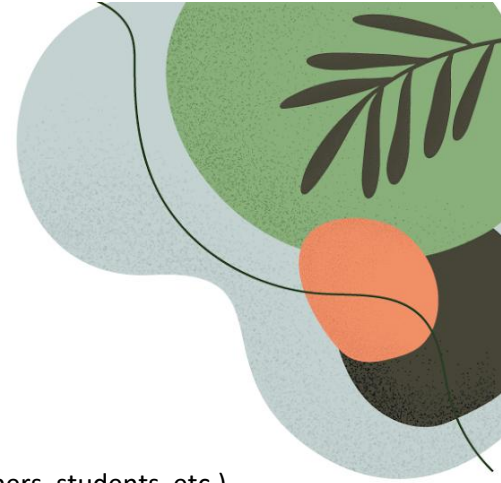
In collaboration with H2020 Projects: LIFT, Biobridges, Bio Voices, Master BIOCIRCE – Bioeconomy in the Circular Economy, UNITELMA Sapienza, Lombardy Green Chemistry Association, Innova Camera

In collaboration with: European Bioeconomy University, Biofuel Region Cluster of Bioenergy and Environment of Western Macedonia, Lombardy Green Chemistry Association.

Each hosting institution invited possible participants from the Quadruple Helix stakeholders. It was recommended to pursue a balanced distribution of participants with regards to the focus of each workshop, inviting people from different kinds of stakeholders, such as:

- Government administrations
 - and public
- Report on Future skills for Bioeconomy workshops – Update





- Academia
- Industries
- Networks and associations (projects, industries, academia, teachers, students, etc.)

Each hosting institution tried to involve every possible stakeholder related to the bioeconomy sector, especially those who are usually under-represented and less engaged (LIFT, 2020b). Along the same lines, it was helpful to involve both “problem owners” and “solution providers” (BIOBRIDGES, 2020) related to educational and skills needs in the bioeconomy sector.

The hosting institution promoted the event both locally and on a large scale, in collaboration with UNIBO, the consortium of Transition 2BIO and the projects and initiatives that expressed their interest in collaborating with the organisation of the workshop. Different channels were used for the promotion of the events, for example the project webpage, newsletters, social media and through EuBioNet. Ad-hoc materials were created according to the hosting organisation’s needs. The promotion and dissemination of the events was performed in alignment and collaboration with LOBA and FVA.

A platform for the registration of participants to the workshop was identified and provided well before the workshop.

To participate in the event, participants had also to sign the informed consent, following the procedures indicated in D7.1 and in compliance with the hosting institution's GDPR and privacy policies.

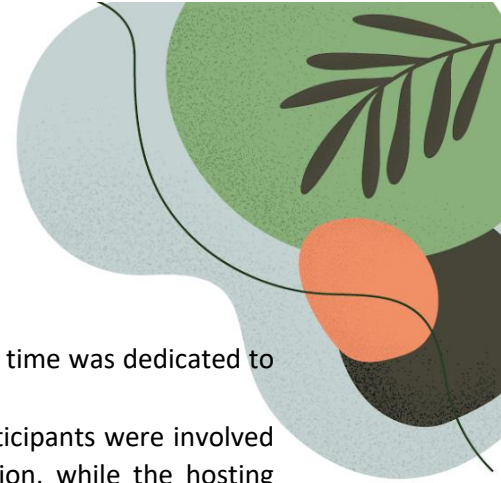
Specific sentences have been indicated in the registration form, such as:

- “For the purposes of communicating and disseminating the Workshop, I give my consent for the production of various screenshots throughout the sessions”
- “Would you like to be invited again in the future to participate in similar events of the Transition BIO project? By confirming this question, you give your consent to [name of the hosting institution] and the University of Bologna to keep your email address for this purpose.

As regards the agenda, each workshop was organised in a half day format (BIOBRIDGES, 2020) (~3 hours):

- At the beginning of the workshop, the hosting institution welcomed and greeted the participants while illustrating the agenda and the format of the event.
- As project coordinator, the Italian Agency for the Promotion of European Research (APRE) presented the main objectives and outputs of Transition BIO, and how the project could affect participants.
- UNIBO presented task 3.3 – Future skills for Bioeconomy and the scope of the workshop. Results from previous projects and initiatives on bioeconomy education were presented too.
- The online Report on Future skills for Bioeconomy survey was afterwards opened, and enough time workshops – Update was allocated to





the participants to fill in; after the closing of the survey, a short time was dedicated to a preliminary discussion of the results.

- The collaborative platform (MIRO board) was opened. The participants were involved by writing down their thoughts and opinions for each question, while the hosting institution moderated the debate and facilitated the discussion.
- Final remarks were given by the hosting institution and UNIBO.

After the workshop, a message of thanks was sent to the participants after the event, including the webpage of the project to keep them engaged in our activities and offer them the opportunity to learn more about Transition BIO. The participants were informed about the results of the workshop after the implementation of all the workshops. As soon as possible after the end of the workshop, the hosting institution reported to UNIBO the main findings of the event.

The online survey was provided by UNIBO, while the collaborative platform was managed by the hosting institution. The survey was encoded online to facilitate its implementation. The questionnaire designed for the survey is provided in the annex of the present document. The results of the activity in the collaborative platform were shared with UNIBO, as well as detailed notes on the discussion.

Supplementary inputs to identify educational and skills needs

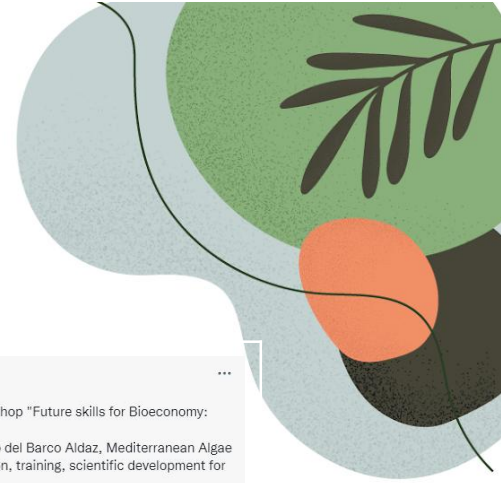
To gather further inputs on the educational and skills needed in the European bioeconomy and integrate the information collected through the co-creation workshops, it was proposed to plan additional activities. These were defined and agreed upon with the consortium on M13, consistently with the definition of the timing and organisational details of the co-creation workshops.

In particular, taking the opportunity of the co-creation workshops, it was planned that the partners in charge of task 2.3 – Social media awareness and public engagement activities interviewed (with the support of the other partners) some experts and entrepreneurs regarding the skills and careers in different fields of Bioeconomy (e.g. what is your job? What is a typical working day?, challenges, your advice to younger generations) and use these recorded videos for a dedicated communication campaign on the social media channels of the project, in order to share some additional information with the wider public. In essence, each interview was a testimonial on a current job within the bioeconomy and the campaign was organised in collaboration with the BIONic project and the support of the Circular Bio-Based Europe Joint Undertaking (CBE JU), see D2.7 for more details. Where practical, it also shed some light on the envisaged content of future bioeconomy jobs and careers.

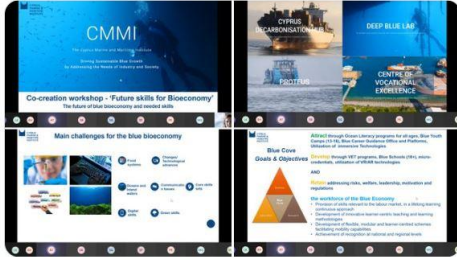
Additionally, the co-creation workshops were also supported by live tweets in the Transition2BIO Twitter page, with the aim of highlighting the key points and relevant messages emerged during the discussion, therefore maximising the overall impact of the event and raise awareness on the ones who couldn't attend the workshops live (see Figures below).

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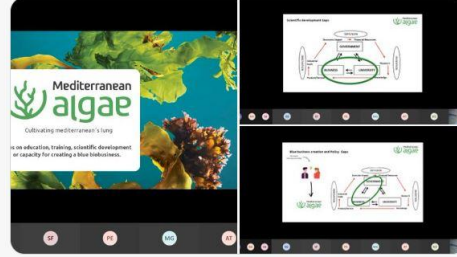




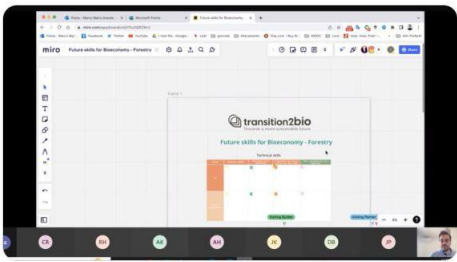
BIOVOICES @biovoices · Sep 27
#OnAir
● Transition2BIO co-creation workshop "Future skills for Bioeconomy: Blue #Bioeconomy"
👤 Antri Theodorou from @cmmicyprus is now explaining challenges of blue bioeconomy, also showing the goals reached within the Cyprus Marine and Maritime Institute.



BIOVOICES @biovoices · Sep 27
#OnAir
● Transition2BIO co-creation workshop "Future skills for Bioeconomy: Blue #Bioeconomy"
👤 Interesting insights from Guillermo del Barco Aldaz, Mediterranean Algae Co-Founder, on the gaps on education, training, scientific development for creating a blue #biobusiness



BIOVOICES @biovoices · Jun 14
👤 #Transition2Bio Co-creation workshop "Future skills for #Bioeconomy: #Forestry"
🌟 Time for the interactive session!
We are now asking the participants to provide insights and recommendations on technical skills, interaction with people, business and management, green skills.

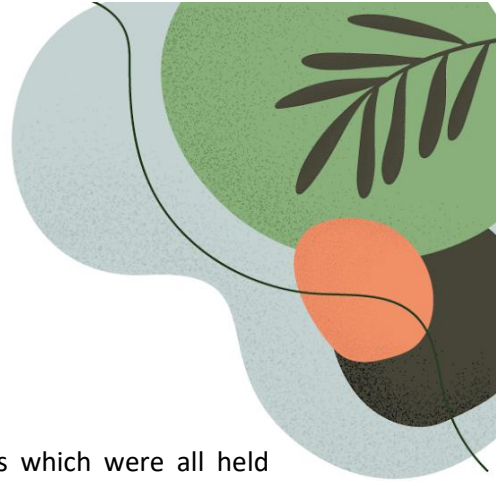


BIOVOICES @biovoices · Dec 2
👤 #Transition2BIO final event
● Workshop 'Future skills for Bioeconomy' - #Biobased products
👤 We asked the participants to prioritize the group of skills needed: we received answers from 6 different EU Countries underlining transversal and green skills as the most relevant ones.



Eventually, the information collected through the co-creation workshops and the social media activities were integrated, framed, and validated through an additional public event in collaboration with external initiatives and networks to be identified in the second period of the project, such as EBU and EuBioNet. This event presented and summarised the results of task 3.3, also comparing and contextualising them with the results of other analogous projects and initiatives.





4. Results of the Workshops

This section documents the results of the five co-creation workshops which were all held during the second year of the project, hosted in selected European educational institutions, and were addressed to identify the skills and educational needs for the transition towards a sustainable bioeconomy.

In the Table 2 below, some information on each workshop is provided, such as the hosting institution that organised the workshop and the bioeconomy sector on which the participants were focused during each workshop. The initial goal was to reach at least 300 participants in total (~60 participants for each workshop). Given that due to the COVID-19 restrictions, it has not been possible to reach this number of participants. In addition, after the first workshop, it became clear that 60 participants was too high a number to foster good exchange and discussion, so efforts for the following workshops were devoted more to achieve a balanced composition rather than the target number.

In total, 162 participants participated in the five co-creation workshops, 30% focused on the blue bioeconomy, 27% in biobased products, 22% in agriculture, food, and feed, 12% in forestry, and 9% in bioenergy and biofuels.

Although the survey was encoded online to facilitate its implementation, only 55,6% of the participants filled in the questionnaire. As observed in the table below, from the participants that filled the questionnaire, 37% were from the blue bioeconomy sector, 22% from agriculture, food, and feed, 19% from the sector of biobased products, 14% from forestry and finally, 8% the sector of biofuels and bioenergy.

Table 2. Participants and questionnaires from each bioeconomy sector

Bioeconomy sector	Hosting institution	Participants	Questionnaires
Agriculture, food, and feed	University of Bologna	36	20
Forestry	University of Eastern Finland	21	13
Blue bioeconomy	EurOcean	48	33
Bioenergy/biofuels	AgroParisTech	14	7
Bio-based products	Cluster SPRING	43	17
Total (5 workshops)		162	90

1.1 Agriculture Food and Feed

Hosting institution:

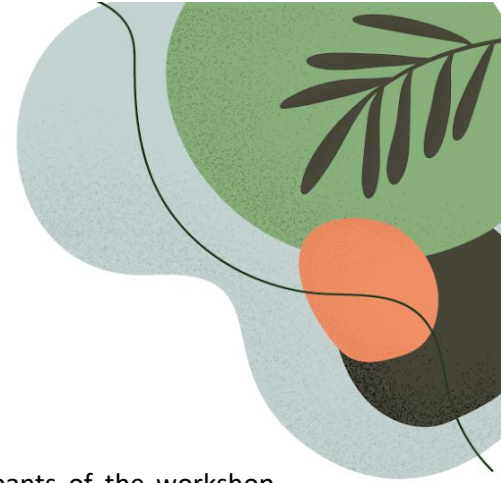
University of Bologna

Bioeconomy sector on focused: Agriculture,

Report on Future skills for Bioeconomy workshops – Update

which the event
Food and Feed





Date of the event: 06/04/2022

Number of participants: 36

As observed in the two figures below (figures 1 and 2), the participants of the workshop focused on agriculture, food and feed were mainly representatives of academia, also including students as stakeholders, industry, and public authorities. Most of the participants had experience mainly in the field of research, but also education, communication production, policy, and procurement.

Figure 1. Type(s) of stakeholders

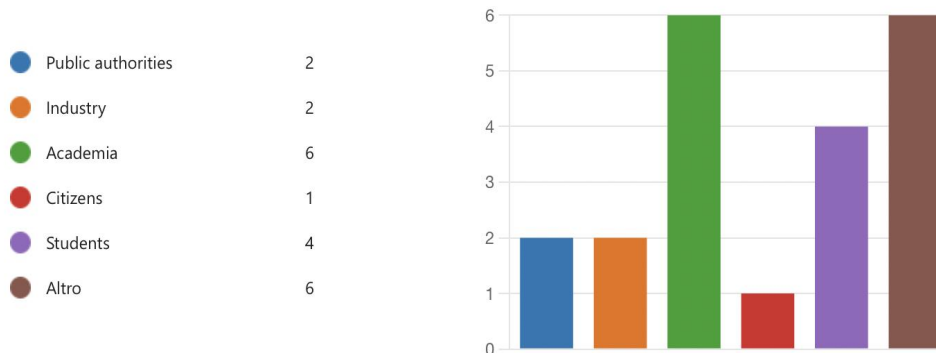
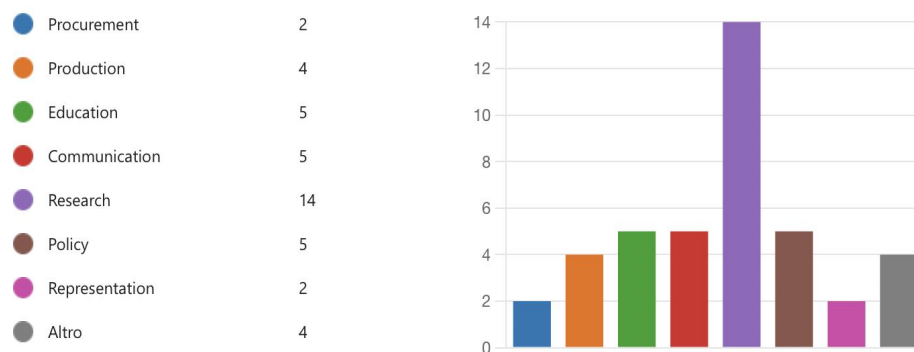


Figure 2. Field(s) of experience and expertise

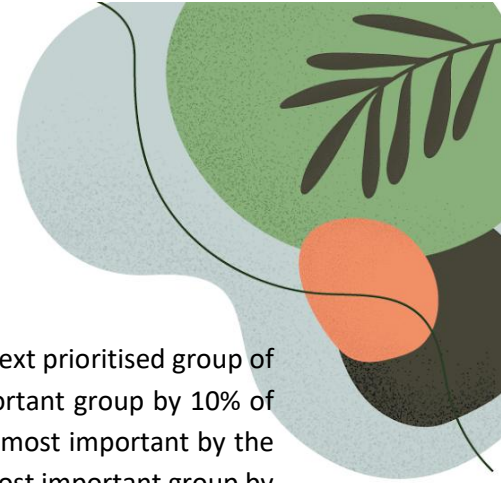


The next figure (figure 3), presents the prioritisation of the eight main groups of skills as prioritised by the participants of the workshop in agriculture, food and feed. The most prioritised group of skills according to the participants, was mindset (most important group by 30% of the participants, second most important by 15% and third most important by 15%). Business and management skills was the second prioritised group of skills (most important group by 10% and second most important group by 10%).

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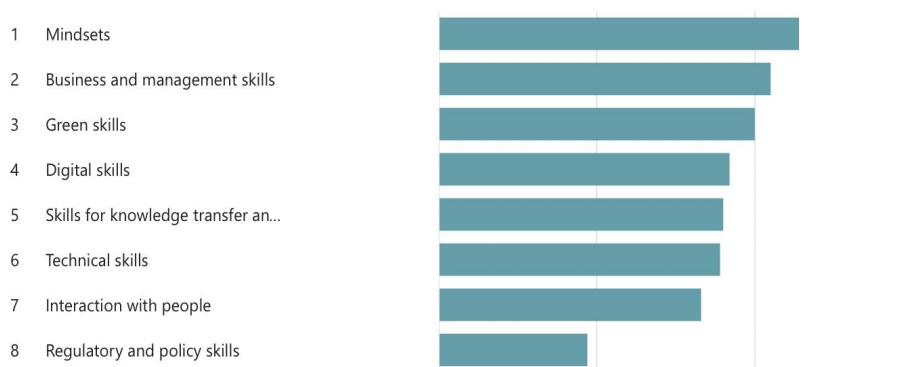
management skills was the second prioritised group of skills (most important group by 10% and second most important group by 10%).





second most important by 15% and third most important by 30%). The next prioritised group of skills according to the results, was the group of green skills (most important group by 10% of the participants, second most important by the 15% of them and third most important by the 10% of them). Next in the prioritisation was the group of digital skills (most important group by 10% of the participants, second most important by the 15% of them and third most important by the 10% of them). As observed in the figure below, skills for knowledge transfer and information exchange, technical skill and interaction with people were the next prioritised group of skills by the participants of this workshop. Less prioritised, but still important was the group of skills regarding regulatory and policy skills.

Figure 3. Prioritisation of groups of skills. 1=most important, 8=least important

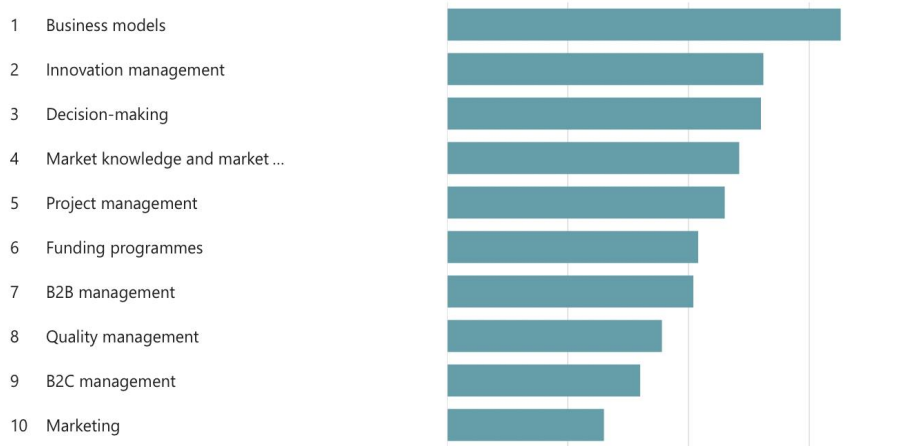


The participants have then prioritised different skills for each group of skills presented previously: As regards the group of business and management skills, the prioritisation of single skills is presented in the figure 4 below. The most prioritised skills according to the participants were business models, followed by innovation management, decision-making, market knowledge and market development. Project management, funding programmes, B2B management were the next prioritised skills, and finally quality management, B2C management and marketing.





Figure 4. Business and management skills



For the group of digital skills (figure 5), the most prioritised skills were digitalization, followed by computational thinking, big data, and virtual collaboration. Next in the prioritisation were skills regarding ICT, and automation. Finally, according to the participants, a less prioritised skill was e-commerce management.

Figure 5. Digital skills



For the group of green skills, the prioritisation of single skills is presented below (figure 6). As observed, sustainability and sustainable development was the most prioritised skill, where climate change and environmental protection were more prioritised than circular economy. Finally, less prioritised but also important was the sustainable use of biomass.



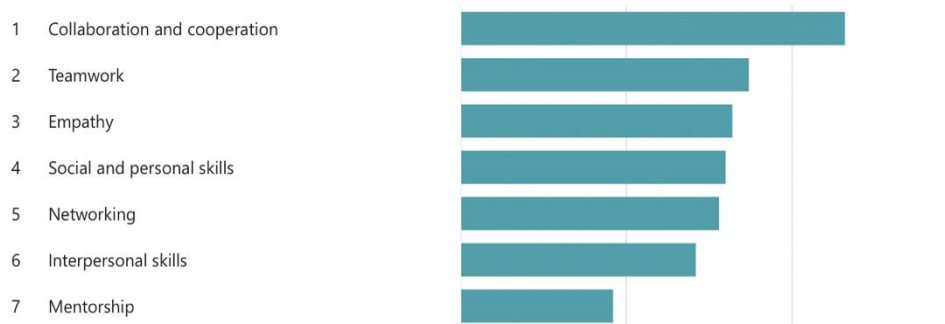


Figure 6. Green skills



As regards the group of skills regarding the interaction with people, the prioritisation of skills is presented in the figure 7. As observed, collaboration and cooperation were the most prioritised skills for the participants of this workshop. Teamwork and empathy were the next prioritised skills, followed by social and personal skills. Networking was the next prioritised skill, and less prioritised according to the participants were interpersonal skills and mentorship.

Figure 7. Interaction with people

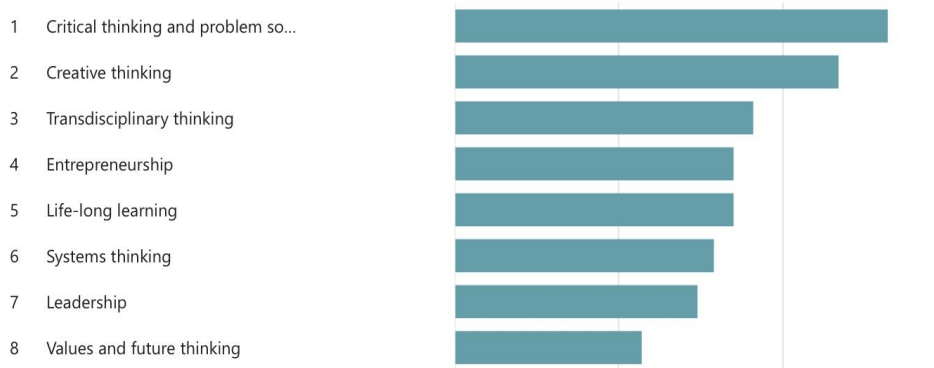


The next group of skills was mindset, and for the prioritisation of different skills within this group is presented below (figure 8). The participants of this workshop reported as the most prioritised skills critical thinking and problem solving, followed by creative thinking, as the second prioritised skill. Next in the prioritisation was transdisciplinary thinking, while entrepreneurship and life-long learning as skills, were next in the prioritisation having the same prioritisation. The participants prioritised next systems thinking, while leadership and values and future thinking were the less prioritised skills in this group.





Figure 8. Mindsets



With regards to the next group of skills that was regulatory and policy skills, observing the next figure (figure 9), safety and health were the most prioritised skills according to the participants of this workshop. Ethics was prioritised as the second most prioritised skill of this group, followed by policy, law and finally regulatory compliance.

Figure 9. Regulatory and policy skills

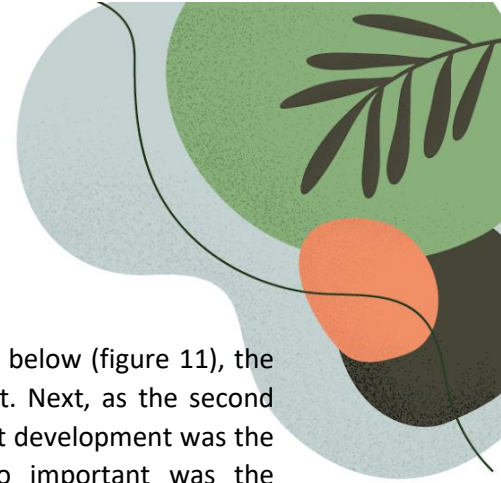


Knowledge transfer and information exchange were the next group skills, and within this group the prioritisation of different skills is presented in the figure 10. As observed in the figure, the most prioritised skill according to the participants was education, followed by communication and finally awareness-raising.

Figure 10. Knowledge transfer and information exchange

- 1 Education
- 2 Communication
- 3 Awareness-raising





With regards to the next group of technical skills, observing the figure below (figure 11), the most prioritised skill within this group was research and development. Next, as the second most prioritised skill the participants reported technology skills. Product development was the next prioritised skill, and finally the less prioritised skill but also important was the manufacturing and operations.

Figure 11. Technical skills



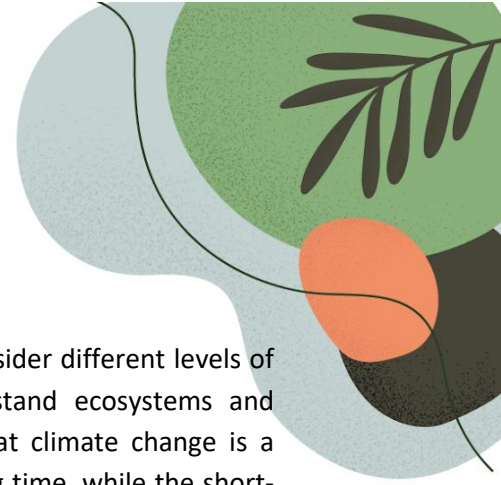
Results of the collaborative platform exercise and of interactive discussion

Some participants expressed their opinion about the fact that the **vision of “the big picture”** is lacking in education and skills development in the context of the European bioeconomy. What many of them highlighted is the need to promote the development of system thinking and knowledge of system sciences, leading to consider the world as a system and design actions considering the results of the system in a sort of feedback loop. Some argued that system thinking is particularly necessary for decision making in companies to promote a change. Nevertheless, a lack of understanding of the meaning of system thinking has been found.

Also, transdisciplinary thinking should be developed. Some participants argued that experts from different fields need to talk to each other and that Food and Agriculture are still divided into different disciplinary fields. For the development of an entrepreneurial mindset, some participants stated that effective logic and future and foresight vision are necessary, working for a sustainable future. One of the participants also highlighted the difference between “entrepreneurship education” and “education for being an entrepreneur.” According to the participant, the former should be provided in specific dedicated courses while the latter should be needed by every student.

The entrepreneurial mindset has been defined as the ability to transform an idea into reality, while seeing how students react in challenging situations has been seen to evaluate and monitor the development of an entrepreneurial mindset. The importance of developing intrapreneurship and entrepreneurship has been highlighted too. Some participants have been surprised by the results of the online survey, given that the skills economy were not among the most priority. Report on Future skills for Bioeconomy workshops – Update





Nevertheless, participants expressed various views on the need to consider different levels of sustainability (environmental, social, and economic) and to understand ecosystems and sustainability when considering food sources. It has been argued that climate change is a broad topic that includes sustainable development. This requires a long time, while the short-term solutions are technical.

Among the skills that emerged from the discussion as necessary they found:

- Digital skills, as well as database literacy as it could help implement automation, which has been considered important for food traceability
- Skills to quantify impact for the company
- Marketing and market communication to show the value you are offering
- Normative skills
- Soft skills in general

One of the participants commented that the skills frameworks at the European level should be updated for the future. Furthermore, it was considered important to follow these frameworks but now we need to identify the new skills. To meet the skills needs that emerged during the discussion, the participants suggested making education more transdisciplinary by involving other stakeholders outside the academia. Some also suggested tailoring the curricula to the region's particularities.

All educational levels were deemed important and relevant to bioeconomy education. In particular, some argued that in order to develop critical thinking, which has been considered necessary for creating the new tools of the future, it is important to start early with education and it should be in the strategies of schools and policymakers.

Life-long learning and education have been considered important since reality is changing. Professional training and capacity development programs should be fostered too, according to participants. In the educational context, it was suggested to present different approaches in the bioeconomy, provide students with career guidance in bioeconomy and present feedback from alumni and more stories from "testimonials".

It has been argued that formal and informal education should depend on the age of the students. For example, outreach projects should be implemented in schools, since children are usually interested in this kind of topic. Furthermore, according to participants social media and hands-on activities should depend on the type of content. Also, you need clear messages and good information to reach more people. Eventually, engagement and education activities should also reach and involve policymakers, investors, teachers, and other multipliers. The figure 12 below, presents the detailed notes on the collaborative platform discussion:



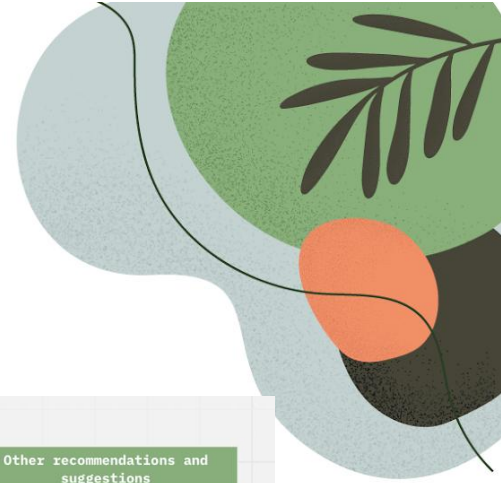


Figure 12. Remarks from the collaborative platform– Agriculture food and feed





Green skills				
Skills	Content (WHAT)	Educational level (WHERE/WHEN)	Stakeholders who need to acquire this skill (WHO)	Other recommendations and suggestions
#1 SUSTAINABILITY AND SUSTAINABLE DEVELOPMENT	Life Cycle Assessment	social media/podcasts For the development of food consumption	industry and consortia executive board	
#2 CLIMATE CHANGE AND ENVIRONMENTAL PROTECTION	Irreversible aspect of sea rise! While climate temperature can be mitigated, once the sea rises there's nothing we can do.	Training courses for professionals Schools (both grade schools and universities) Hands-on labs for pupils and courses for teenagers, etc. education for labor outdoor/indoor/summer courses	both technology and economics experts General public Population	

Digital skills				
Skills	Content (WHAT)	Educational level (WHERE/WHEN)	Stakeholders who need to acquire this skill (WHO)	Other recommendations and suggestions
#1 DIGITALISATION	applications and programs Real time monitoring systems for agriculture imaging techniques	active professional training rural communities outreach	farmers industry logistics and supply chain operators	biosecurity assessment
#2 BIG DATA	use of different tools to generate databases machine learning high-throughput methods		policy makers public authorities	traceability requirement precision farming (livestock and crops) is based on big data and digitisation

1.2 Forestry

Bioeconomy sector on which the event focused: Forestry

Hosting institution: University of Eastern Finland

Date of the event: 14/06/2022

Number of participants:

21

As observed in the two and 14), the participants

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figures below (figures 13 of the workshop





focused on forestry were mainly representatives of academia. Other categories stakeholders represented were also citizens, students, and industry. Moreover, the participants have experience mainly in the field of research and education, but also, communication, policy, production, and procurement.

Figure 13. Type(s) of stakeholders

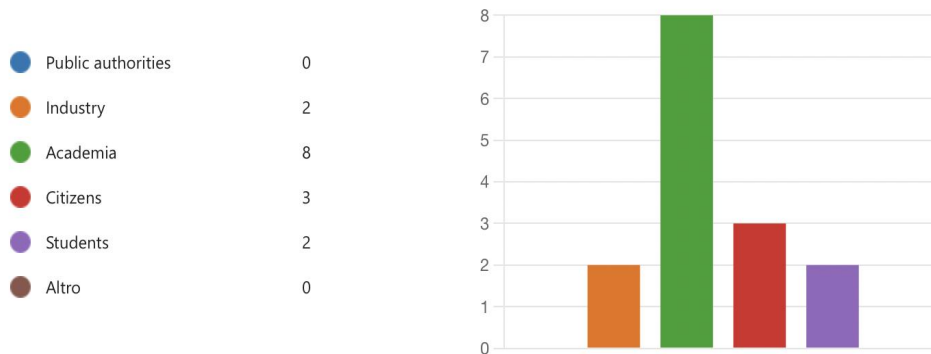
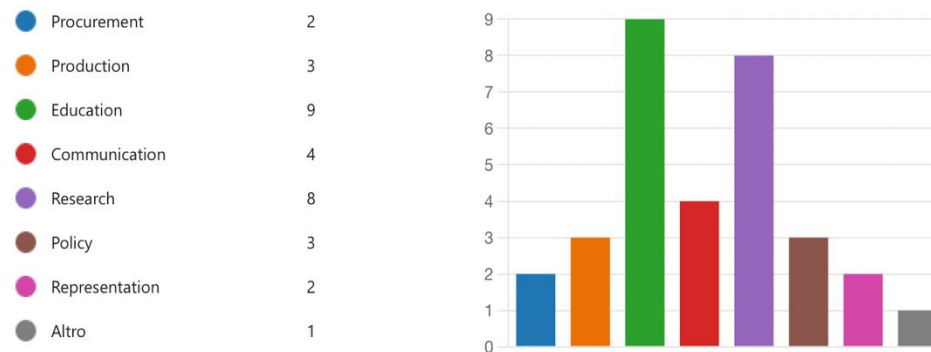
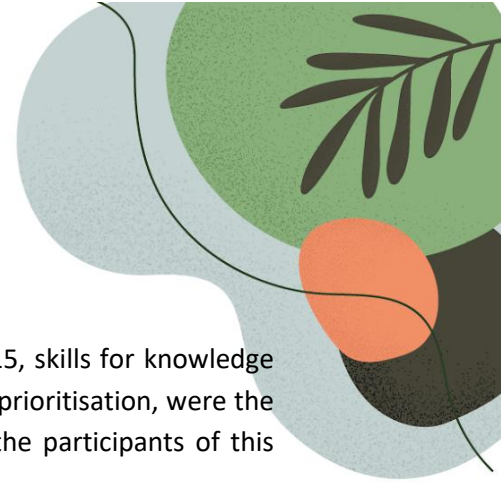


Figure 14. Field(s) of experience and expertise



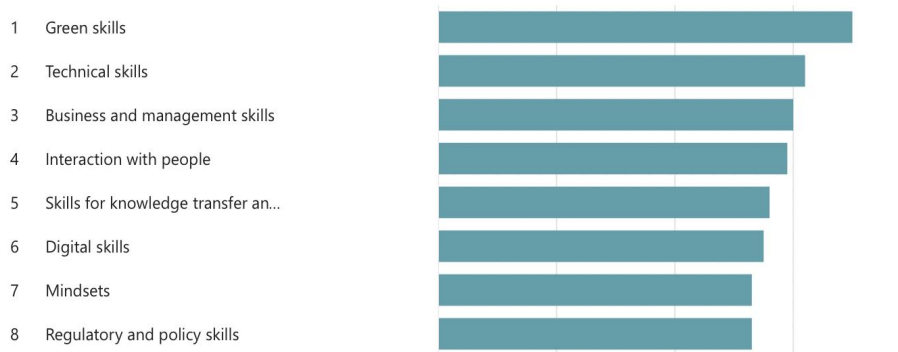
The next figure (figure 15) is presenting the main groups of skills as they were prioritised by the participants of the workshop focused in the sector of forestry. The most important group of skills, according to their opinion, was the group of green skills (most important group by 15% of the participants, second most important by the 23% of them and third most important by the 15% of them). Additionally, technical skills was the second most prioritised group of skills (most important group by 15% of the participants, second most important by the 15% of them and third most important by the 8% of them). The next prioritised group of skills was the group of business and management skills (most important group by 15% of the participants and third most important by 15% of them) and interaction with people skills (most important group by 8%





third most important by the 23% of them). As observed in the figure 15, skills for knowledge transfer and information exchange and digital skills. Finally, next in the prioritisation, were the groups of mindsets and regulatory and policy skills, as reported by the participants of this workshop.

Figure 15. Prioritisation of groups of skills. 1=most important, 8=least important

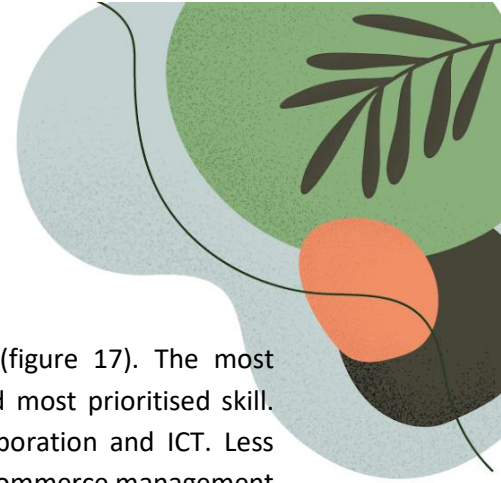


The participants have then prioritised different skills for each group of skills presented previously: As regards the group of business and management skills, as observed in the figure 16 below, the most prioritised skills were decision-making, followed by business models. Next skills in the present prioritisation were project, and innovation management. Next prioritised skills were market knowledge and market development, funding programmes, B2B and B2C management. Less prioritised skills within this group of skills according to the participants, were quality management and marketing.

Figure 16. Business and management skills

- 1 Decision-making
- 2 Business models
- 3 Project management
- 4 Innovation management
- 5 Market knowledge and market development
- 6 Funding programmes
- 7 B2B management
- 8 B2C management
- 9 Quality management
- 10 Marketing





of single skills within the group is presented in the figure below (figure 17). The most prioritised skill was big data, followed by digitalization, as the second most prioritised skill. Next in the prioritisation was automation management, virtual collaboration and ICT. Less prioritised skills within this group according to the participants were e-commerce management and computational thinking.

Figure 17. Digital skills



Next, for the group of green skills, the prioritisation of single skills is presented below (figure 18). As observed, climate change and environmental protection was the most prioritised skill, where sustainability and sustainable development was the second most prioritised skills within this group. Next in the prioritisation were circular economy and finally less prioritised was the sustainable use of biomass.

Figure 18. Green skills



As regards interaction with people, in figure 19 is presented the prioritisation of the skills of this group. As observed, collaboration and cooperation were the most prioritised skills for the participants. Empathy, teamwork, and interpersonal skills were the next prioritised skills, followed by networking, social and personal skills. Finally, less prioritised skill within this group according to the participants, was mentorship.



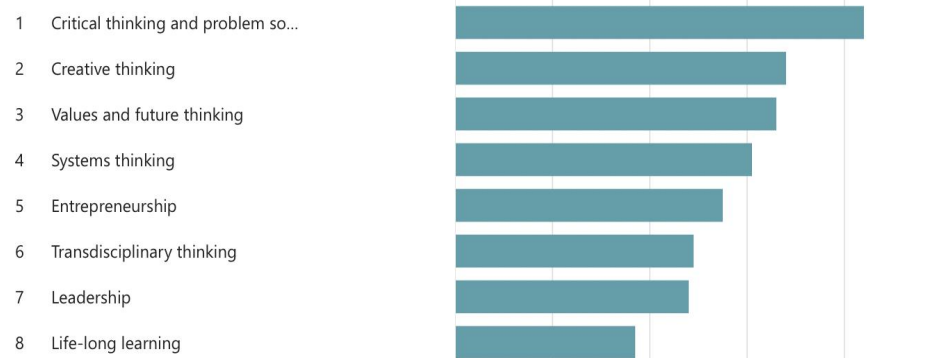


Figure 19. Interaction with people



The next group of skills was mindsets, and for the prioritisation of different skills, as presented below in the figure 20, the participants reported as most prioritised skills critical thinking and problem solving. Next in the prioritisation was creative thinking, followed by values and future thinking. Next in the prioritisation were the skills regarding systems thinking and entrepreneurship. Transdisciplinary thinking and leadership were next, and finally, less prioritised skill within this group according to the participants, was life-long learning.

Figure 20. Mindsets



With regards to the next group of regulatory and policy skills, as presented in the next figure (figure 21), ethics was the most prioritised skill according to the participants of this workshop. Next in the prioritisation was the policy, followed by the skill of safety and health. Moreover, law was next prioritised, and finally regulatory compliance was less prioritised skill within this group.





Figure 21. Regulatory and policy skills



Knowledge transfer and information exchange were the next group skills, and within this group the prioritisation of different skills is presented below in the figure 22. As observed, the most prioritised skill of this group was education, followed by awareness-raising. Less prioritised but still an important skill of this group was communication.

Figure 22. Knowledge transfer and information exchange



With regards to the next group of technical skills, the prioritisation of single skills is presented below (figure 23). The most prioritised skill within this group was research and development. Next prioritised skill according to the participants was product development. The next skills that were prioritised by the participants of this workshop were manufacturing and operations and finally less prioritised were technology skills.

Figure 23. Technical skills



Detailed notes on the and the collaborative

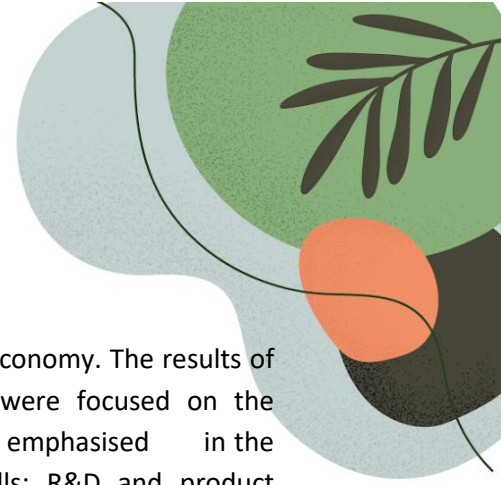
Professor Jouni

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interactive discussion platform discussion:

Pykäläinen opened the





discussion by introducing the topic of future skills for forest-based bioeconomy. The results of the survey did not open any conversations and thus discussions were focused on the interactive platform and themes presented there. The three main skills emphasised in the survey by the workshop participants were 1) with technical skills: R&D and product development, 2) with interaction with people: collaboration and cooperation and empathy, 3) with business and management skills: decision making and business models and 4) with green skills: climate change and environmental protection and sustainability and sustainable development. No remarks were made related to R&D.

Product development was seen as important for new sustainable wood-based products that offer also higher value-added. Vocational and higher education were mentioned as the key education levels and universities, companies and R&D organisations were considered as key stakeholders for enhancing product development. Basic understanding of equal and fair collaboration was seen as important for collaboration and cooperation skills.

Collaborating outside their own industry, as in this case collaborating outside the forest industry with actors such as pharmaceutical, NFTP and chemical companies was seen as crucial. Similarly understanding multidimensionality of issues and resolving conflict issues was considered important for collaboration. Related to this, university level education was seen as important for collaborating for resolving conflict issues. In more general terms, it was discussed that it would be beneficial to develop skills for forth-coming issues.

Hence, it was important to configure what are the new skills needed in the future. The skill to learn new is essential for future bioeconomy. It was mentioned that UNECE and FAO with International Labor Organisation have already looked into the future's green jobs within forest sector (<https://unece.org/forests/green-jobs-forest-sector>) and note that there is potential for creating new job opportunities in enhancing forest ecosystem services in addition to harvesting and management operations. The figure 24 below, presents the detailed notes on the collaborative platform discussion:



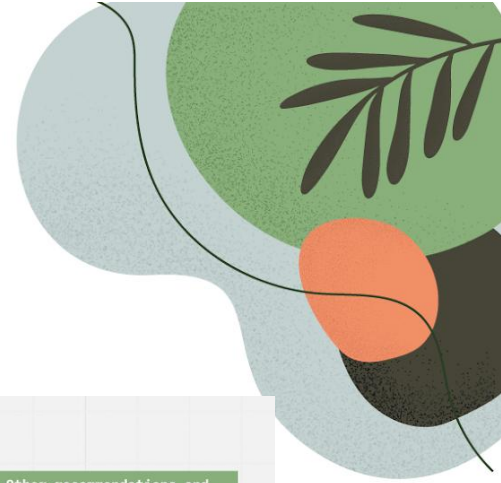


Figure 24. Remarks from the collaborative platform - Forestry





Business and management skills

Skills	Content (WHAT)	Educational level (WHERE/WHEN)	Stakeholders who need to acquire this skill (WHO)	Other recommendations and suggestions
Decision making	<ul style="list-style-type: none"> Sustainability Decision making regarding natural resource use Understanding global developments and business Assessing management options, probability and other criteria Systems view 	<ul style="list-style-type: none"> Higher education Vocational education MASTER 	<ul style="list-style-type: none"> POLICY MAKERS 	
Business models	<ul style="list-style-type: none"> Bringing sustainability along business Material and immaterial value creation INNOVATIVE MODELS Value creation Research business opportunities to solve social problems Specialized platform, industry 	<ul style="list-style-type: none"> ALL 	<ul style="list-style-type: none"> COMPANIES LAND OWNERS POLICY MAKERS 	

Interaction with people

Skills	Content (WHAT)	Educational level (WHERE/WHEN)	Stakeholders who need to acquire this skill (WHO)	Other recommendations and suggestions
Collaboration and cooperation	<ul style="list-style-type: none"> Following through on responsibility Basic understanding on equal and fair collaboration Multidimensionality of things: things are not only black and white Those working with customers and public 	<ul style="list-style-type: none"> Specialized education Vocational education 	<ul style="list-style-type: none"> COMMUNITIES NGOs 	
Empathy	<ul style="list-style-type: none"> Overall skill of collaboration Should be at the core of every activity 	<ul style="list-style-type: none"> All levels The ones working with customers In universities, for people who work on technical fields and are more used to work with people in "soft fields" 	<ul style="list-style-type: none"> Companies 	

1.3 Blue Bioeconomy

Bioeconomy sector on which the event focused: Blue Bioeconomy

Hosting institution: EurOcean

Date of the event:

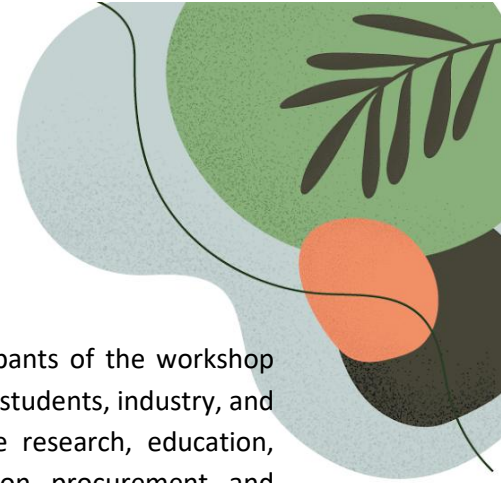
27/09/2022

Number of participants:

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48





As observed in the two figures below (figures 25 and 26) the participants of the workshop focused on blue bioeconomy were mainly representatives of academia, students, industry, and public authorities. The fields that they mostly have experience, are research, education, communication, and policy. Less representative fields were production, procurement, and other representatives.

Figure 25. Type(s) of stakeholders

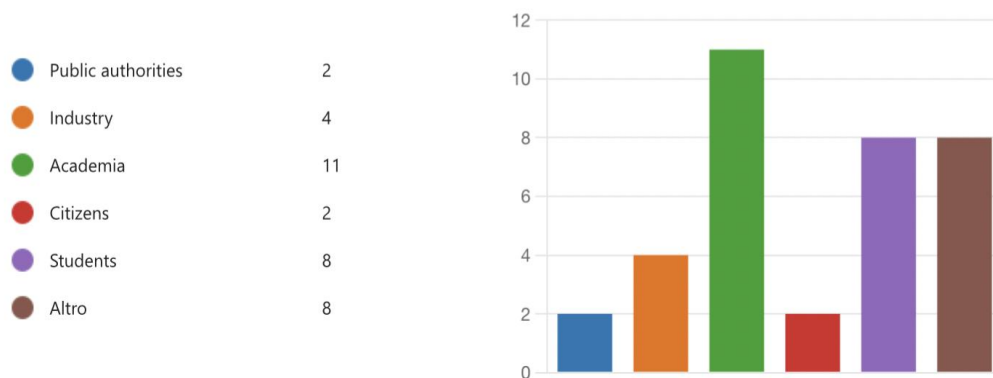
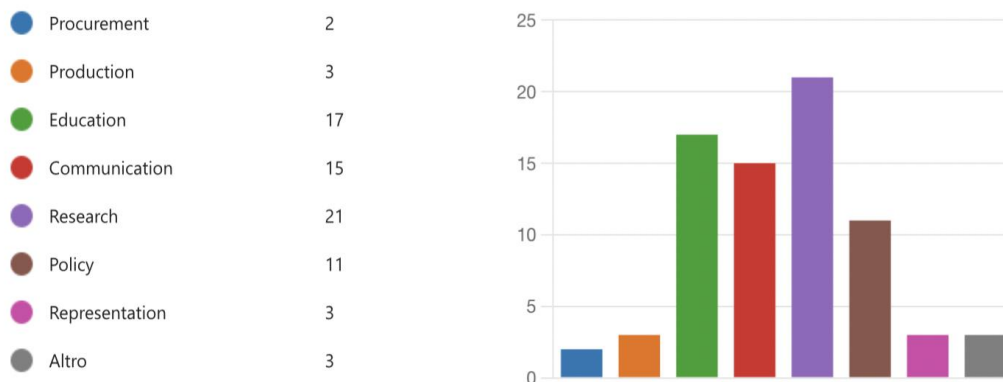


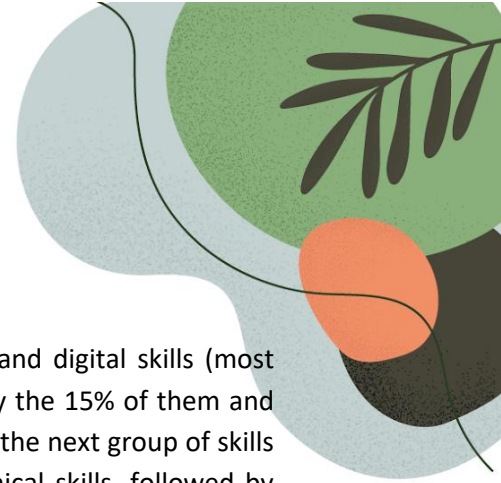
Figure 26. Field(s) of experience and expertise



The figure 27 below, is presenting the main group of skills as they were prioritised by the participants of the workshop in the blue bioeconomy. The most prioritised group of skills according to their opinion, was the group of business and management skills (most important group by 21% of the participants, second most important by the 15% of them and third most important by the 18% of them). The group of green skills was the second prioritised group of skills (most important group by 18% of the participants, second most important by 15% of them and third most important by 9% of them). The next prioritised group of skills were skills for knowledge transfer and information exchange (most important group by 15% of the participants, second most important by 21% of them and third most important by 11% of them).

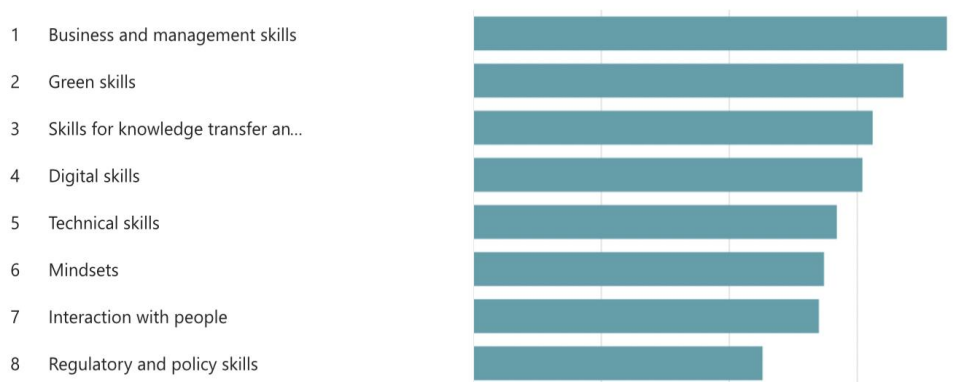
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by the 12% of them and third most important by the 15% of them) and digital skills (most important group by 12% of the participants, second most important by the 15% of them and third most important by the 9% of them). As observed in the figure 27, the next group of skills that were prioritised by the participants of this workshop were technical skills, followed by mindsets and interaction with people. Finally, the less prioritised group of skills according to this workshop was the group of regulatory and policy skills.

Figure 27. Prioritisation of groups of skills. 1=most important, 8=least important

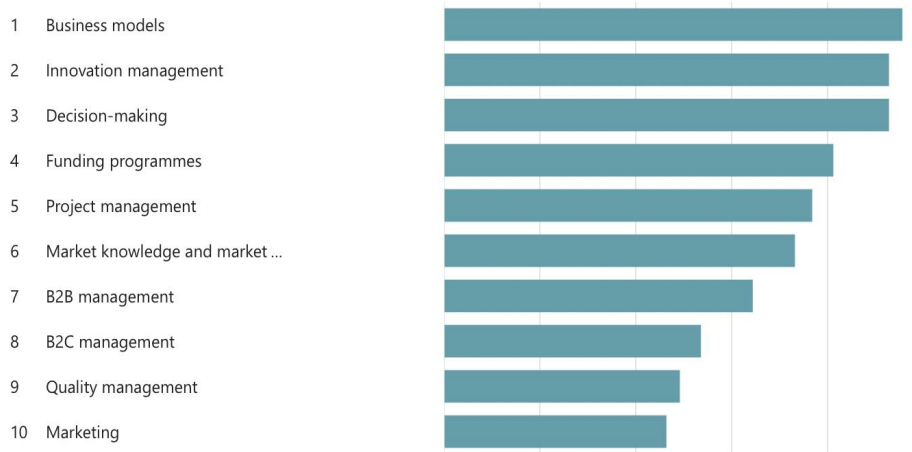


The participants have then prioritised different skills for each group of skills presented previously: As regards the group of business and management skills, the prioritisation of different skills within this group is presented in the figure 28 below. As observed, the most prioritised skills were business models, followed by innovation management. Next in the prioritisation were decision-making and funding programmes. As observed in the figure, the next priority was project management, followed by market knowledge and market development. According to the participants of this workshop, next prioritised skills were, B2B and B2C management and finally, less prioritised were the quality management, and marketing.





Figure 28. Business and management skills



As regards the group of digital skills, the prioritisation of different skills of the group is presented below in figure 29. According to the participants, the most prioritised skills were computational thinking, followed by digitalization and big data. Next prioritised were automation management, followed by the skills regarding ICT and virtual collaboration. Finally, less prioritised was e-commerce management.

Figure 29. Digital skills



Next, for the group of green skills, in the figure below (figure 30) is presented the prioritisation of skills. As observed, circular economy was the most prioritised skill, followed by sustainability and sustainable development. Moreover, climate change and environmental protection were more prioritised than sustainable use of biomass.





Figure 30. Green skills



As regards the next group of skills regarding interaction with people, the prioritisation of single skills is presented in the figure 31 below. According to the participants of this workshop, collaboration and cooperation was the most prioritised skill. Teamwork and empathy were the next prioritised skills, followed by interpersonal skills. Next in the prioritisation was networking, while the next prioritised skills were social and personal skills. Finally, less prioritised skill within this group according to the results, was mentorship.

Figure 31. Interaction with people

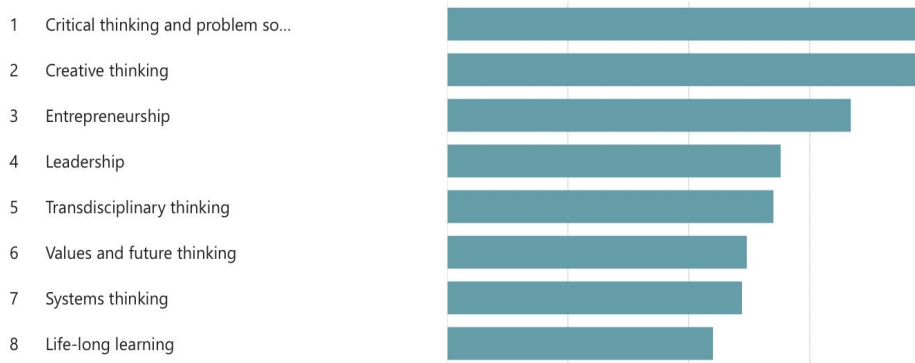


As regards the next group of skills was mindsets, and the prioritisation of different skills within the group is presented below in the figure 32. According to what participants have reported, the most prioritised skill within this group was critical thinking and problem solving, followed by creative thinking. Next in the prioritisation were the skills regarding entrepreneurship and leadership. The next prioritised skills were transdisciplinary thinking and values, and future thinking. Finally, less prioritised skills within this group were system thinking followed by life-long-learning.





Figure 32. Mindsets



The next group of skills was regarding regulatory and policy skills, and the prioritisation of different skills within the group is presented in the figure 33 below. As observed, ethics was the most prioritised skill regarding this group, followed by safety and health, as the second prioritised skill by the participants. The next prioritised skills were policy and law, with almost the same prioritisation, and finally the less prioritised skill of the present group of skills was regulatory compliance.

Figure 33. Regulatory and policy skills



As regards the next group of skills, the knowledge transfer and information exchange, the prioritisation of different single skills, is presented below (figure 34). The most prioritised skill within this category was education. Next prioritised skills were the communication followed finally by the awareness-raising.





Figure 34. Knowledge transfer and information exchange



Finally, the next group of skills was the group of technical skills, and the prioritisation of different skills within the group is presented in the figure 35 below. As observed, the research and development were the most prioritised skill according to the participants of this group. The second most prioritised were technology skills, followed by product development. Finally, less prioritised were manufacturing and operations.

Figure 35. Technical skills



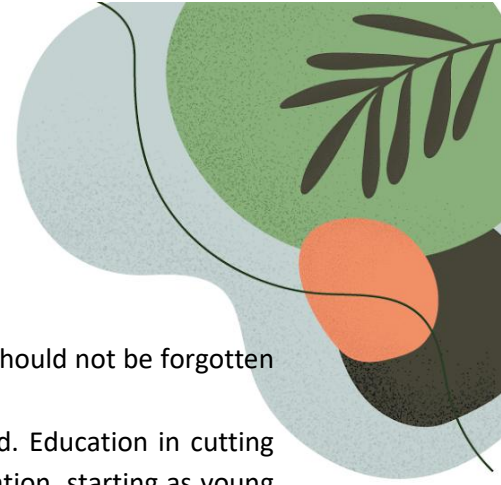
Detailed notes on the interactive discussion and the collaborative platform discussion:

The moderator and Transition 2BIO team attempted to launch discussion of various topics, e.g., the gender dimension of the Blue Economy, readiness of the educational system to include mindset skills in the learning process, but the audience was largely unresponsive. Specifically, the importance of Green Skills emerged from the questionnaire, and Transition 2BIO team asked for more feedback on this since it was not a common theme to other workshops; however, deeper insight was not forthcoming from the audience.

Key Points:

- Skills towards a booming Blue Bioeconomy are largely based around business development and technology.
- Education needs to be transversal and include all stakeholders and actors, e.g., offering business education to Report on Future skills for Bioeconomy scientists and communication workshops – Update education to





industry, to help bridge the gaps between sectors. Consumers should not be forgotten here.

- High tech solutions to Blue Bioeconomy challenges are needed. Education in cutting edge technology should be integrated across all levels of education, starting as young as primary school to build innate skills among upcoming generations, but extending to short, dedicated professional courses for professionals who need these skills right now.
- Training and further education needs to address the gender gap as well as other social inequalities, in order to meet the objective of the Green Deal, for an inclusive, transparent, and participatory European community.
- Difficulties in getting licences and hard bureaucracy for young Blue Bioeconomy entrepreneurs
- Need of more fundings for more applied projects for developing products of Blue Bioeconomy

Final considerations from YAMPA added after the workshop:

- Consider the need to create training specialities aimed at responding to new challenges. In this way, each speciality - chemistry, mechanics, physics, law, IT, telecommunications, oceanography, psychology, - should be promoted as a vertical or transversal speciality. Thus, facilitating the existence of researchers and experts in these areas.
- The education needs have been identified for research teams to be able to have competencies in the field of management and resources; economic, infrastructural, and organisational. We must ensure that the corresponding curricula incorporate these skills from the outset.
- Regarding the result of the first questionnaire, it would be interesting to segment the opinions according to country and geographical area. From the point of view of the weight and importance of each skill, it must be considered that it will be related to niches in which people and teams are oriented. In some projects, skills related to legal aspects will be more important (patents, international regulations, ethics, etc.), while in other niches (subsector sectors), management, direction and leadership skills will be essential.

The figure 36 below, presents the detailed notes on the collaborative platform discussion:





Figure 36. Remarks from the collaborative platform - Blue Bioeconomy

Business and management skills

Skills	Content (WHAT)	Educational level (WHERE/WHEN)	Stakeholders who need to acquire this skill (WHO)	Other recommendations and suggestions
Business models	<ul style="list-style-type: none"> Business model canvas Business model innovation Business model design 	<ul style="list-style-type: none"> University Business school 	<ul style="list-style-type: none"> Entrepreneurs Business owners Managers Business development Business innovation 	
Innovation management	<ul style="list-style-type: none"> Innovation management Innovation strategy Innovation design Innovation process Innovation culture 	<ul style="list-style-type: none"> University 	<ul style="list-style-type: none"> Business owners Managers Business development Business innovation 	

Green skills

Skills	Content (WHAT)	Educational level (WHERE/WHEN)	Stakeholders who need to acquire this skill (WHO)	Other recommendations and suggestions
Circular economy		<ul style="list-style-type: none"> Should begin from a young age. Can be linked with sustainability and education in managing climate change. 		
Sustainability and sustainable development	<ul style="list-style-type: none"> Balance in social, economic and environmental domains. 		<ul style="list-style-type: none"> Business Consumers 	<ul style="list-style-type: none"> Are there specific skills needed to support the greater integration of women and other under-represented social groups into the blue economy to make traditionally male-dominated sectors more accessible?





Skills for knowledge transfer and information exchange

Skills	Content (WHAT)	Educational level (WHERE/WHEN)	Stakeholders who need to acquire this skill (WHO)	Other recommendations and suggestions
Education	<p>Knowledge transfer, as it relates to technology transfer, customer support, or other 1:1, finding partnerships with industry, or 2: self-learning, as per business. Education is needed for both, but customer with research towards this particular, then in path to them, or back to develop your own business.</p> <p>Understanding of the various strategies for knowledge transfer & information exchange.</p>	<p>Should be started from primary/secondary level.</p>		
Communication			<p>The main group who needs to acquire these skills are probably the innovators, many of whom are traditionally trained scientists. There is scope also for industry to better communicate with innovators.</p>	

Digital skills

Skills	Content (WHAT)	Educational level (WHERE/WHEN)	Stakeholders who need to acquire this skill (WHO)	Other recommendations and suggestions
Computational thinking	<p>In the Blue Bioeconomy, digital twins are becoming more important. Knowledge on how they can be helpful and training in their application is still scarce.</p>	<p>Computational thinking can begin from an early age. Primary curricula are still very backward in terms of computing and digitalization. There's a lot of room for improvement.</p>	<p>Relating to digital twins, this knowledge is needed for current professionals, not just for future generations. It is an imminent area for growth.</p>	
Digitalisation	<p>Beyond digitalisation, there is a greater need for technological knowledge, as mandated by initiatives for the operation of AICs and BICs in various sectors.</p>			





1.1 Bioenergy and biofuels

Hosting institution: AgroParisTech

Bioeconomy sector on which the event focused: Bioenergy and biofuels

Date of the event: 21/11/2022

Number of participants: 14

As observed in the two figures below (figures 37 and 38), the participants in the workshop that focused on bioenergy and biofuels, were mainly representatives of academia, industry, and other representatives. The fields that they mostly have experience, are research, education, policy, communication, and production.

Figure 37. Type(s) of stakeholders

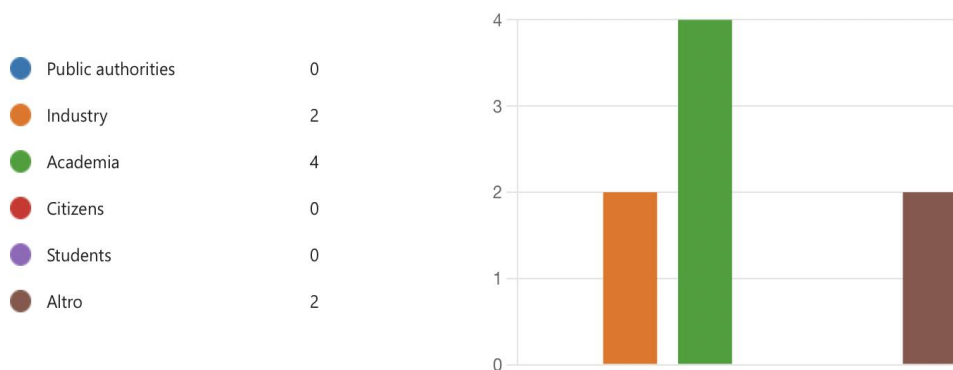
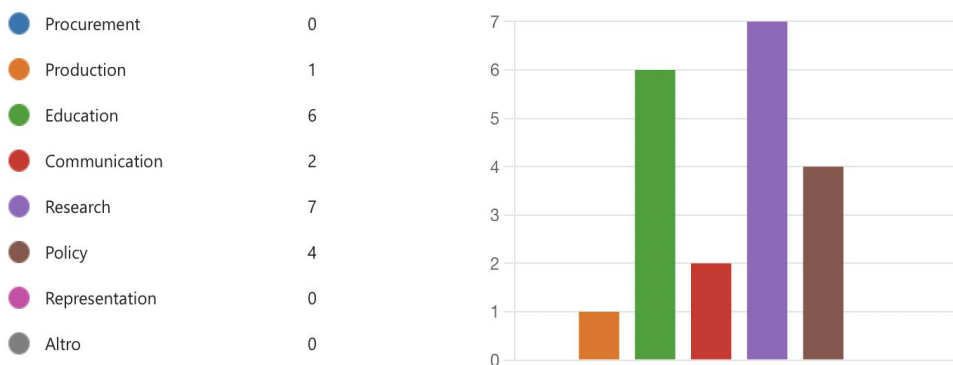
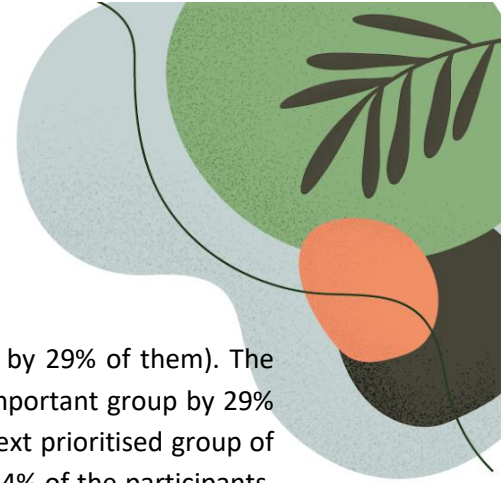


Figure 38. Field(s) of experience and expertise



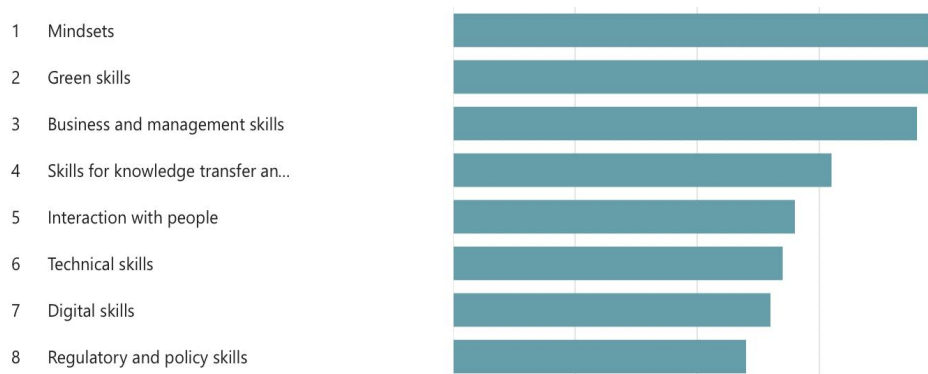
The next figure (figure 39) is presenting the group of skills as prioritised by the participants of the workshop in bioenergy and biofuels. The most prioritised group of skills according to their opinion, was *Report on Future skills for Bioeconomy workshops – Update* mindsets (most





important group by 43% of the participants and third most important by 29% of them). The group of green skills was the second prioritised group of skills (most important group by 29% of the participants and second most important by 29% of them). The next prioritised group of skills were business and management skills (most important group by 14% of the participants, and third most important by the 43% of them) and skills for knowledge transfer and information exchange (most important group by 14% of the participants and second most important by the 29% of them). The group of skills regarding interaction with people and the group of technical skills, were the next prioritised groups, while digital skills and regulatory and policy skills, were the less prioritised groups of skills by the participants of this workshop.

Figure 39. Prioritisation of groups of skills. 1=most important, 8=least important

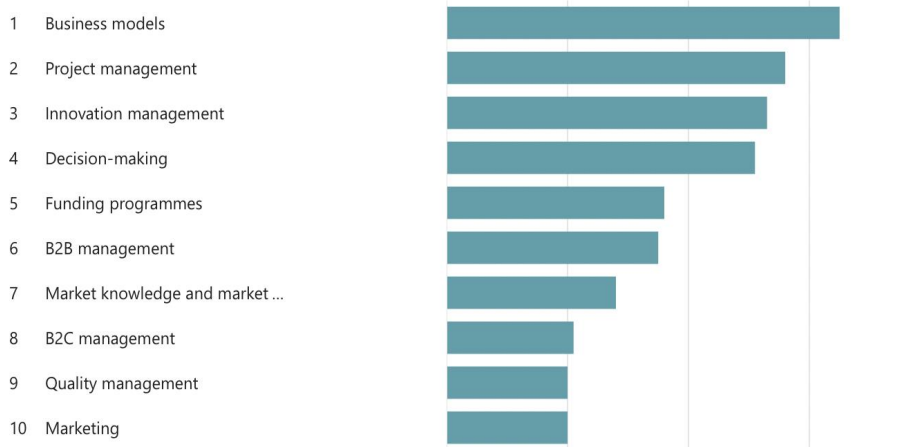


The participants have then prioritised different skills for each group of skills presented previously: As regards the group of business and management skills, the prioritisation of different single skills is presented in the figure 40 below. As observed, the most prioritised skills were business models, followed by project management. Innovation management and decision-making were the next prioritised skills within the present group, followed by funding programmes and B2B management. Market knowledge and market development and B2C management were the next prioritised skills and finally quality management and marketing were the less prioritised skills of this group by the participants of this workshop.



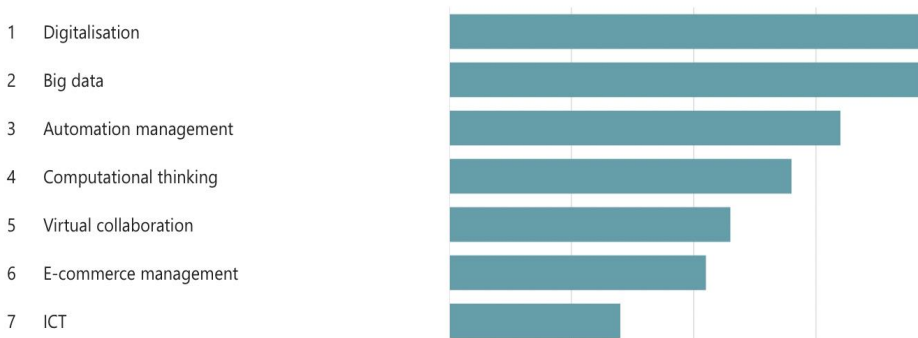


Figure 40. Business and management skills



For the group of digital skills, the most prioritised skills as observed in the figure 41, were digitalization and big data, having almost the same prioritisation. These skills were followed by automation management, then computational thinking, and then virtual collaboration. Next in the prioritisation and less prioritised skills, skills were e-commerce management and finally ICT.

Figure 41. Digital skills



With regards to the next group of skills, the group of green skills, the prioritisation of the different skills is presented in the figure 42 below. As observed, sustainability and sustainable development was the most prioritised skill, followed by sustainable use of biomass. Next prioritised skills were climate change and environmental protection, and finally the less prioritised skills according to the participants was the circular economy.





Figure 42. Green skills



With regards to the group of skills regarding the interaction with people, the prioritisation of different skills is presented in figure 43. The most prioritised skill was collaboration and cooperation. Following the prioritisation as reported by the participants, teamwork was the second prioritised skill, followed by interpersonal skills. Next in the prioritisation were networking, social and personal skills. As less prioritised skills within this group, the participants have reported mentorship, and finally empathy.

Figure 43. Interaction with people

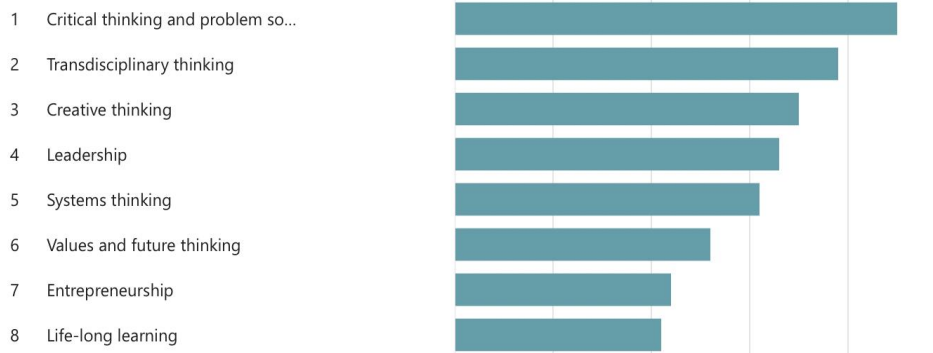


The next group of skills was mindsets, and for the prioritisation of different skills, which is presented below in the figure 44, the participants reported as most prioritised critical thinking and problem solving, followed by transdisciplinary and creative thinking. Next in the prioritisation have resulted in leadership, and after system thinking. The next prioritised skills, according to the participants of this workshop, were values and future thinking, entrepreneurship, and finally, the less prioritised skill was life-long-learning.





Figure 44. Mindsets



With regards to the next group of skills, regarding the regulatory and policy skills, safety and health was the most prioritised skill, followed by ethics, as the second most prioritised skill. The prioritisation of the different single skills is presented in the figure below (figure 45). Next prioritised skills were regulatory compliance and policy. Finally, the participants of this workshop have indicated law as the less prioritised skill.

Figure 45. Regulatory and policy skills

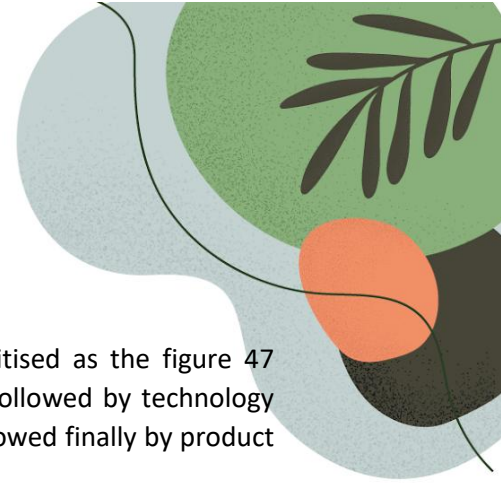


Knowledge transfer and information exchange was the next group of skills, and within this group the prioritisation of different skills is presented in the figure 46. According to the participants of this workshop, education was the most prioritised skill within this group. Next prioritised skills were communication and finally awareness-raising.

Figure 46. Knowledge transfer and information exchange

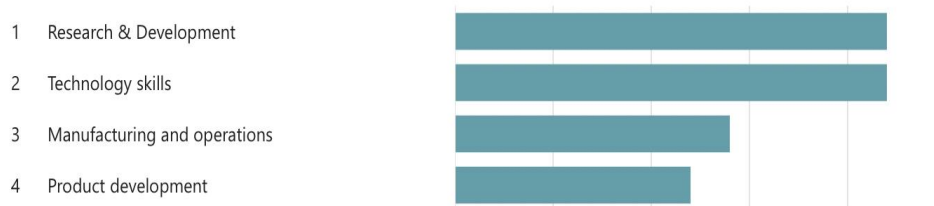
- 1 Education
- 2 Communication
- 3 Awareness-raising





As regards the group of technical skills, the different skills are prioritised as the figure 47 presents. Research and development were the most prioritised skill, followed by technology skills. Manufacturing and operations were the next prioritised skill, followed finally by product development.

Figure 47. Technical skills



Detailed notes on the interactive discussion and the collaborative platform discussion:

Since the number of participants was limited, during the interactive discussion the hosting organisation and UNIBO have decided not to activate the online platform and replace it instead with a roundtable and an open discussion among the participants.

A general comment by the participants was that this kind of interactive workshop can contribute not just to collect simple statements on bioeconomy but to understand how the reality fits with the overall strategy and to bring human resources into the bioeconomy.

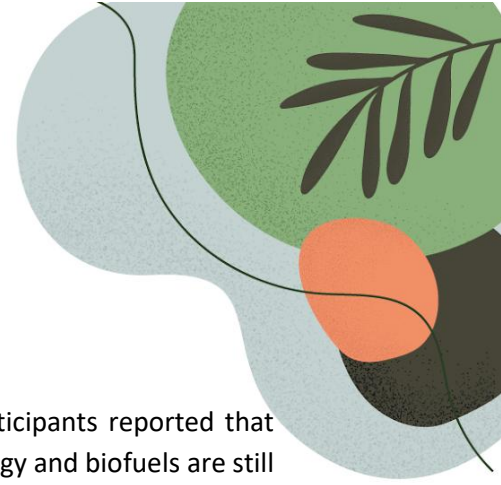
As a project, Transition2Bio has tried to deal with this in a complementary way with other projects and initiatives. There is a need to be oriented also to the future needs, which are in many cases focused more on technical or scientific skills that are already available mainly from university curriculum.

Mindsets, as a group of skills, were indicated the most important by all the participants, highlighting critical thinking and problem solving, transdisciplinary thinking, leadership, and creative thinking among the group of skills. Participants have reported that as regards mindsets, concerning the education we really need to understand each other, how to be able to talk to each other with the same vocabulary and with the same level of competencies.

One point that was also prioritised by the participants was the group of the green skills, and the important message that trying to address sustainability, circularity, and environmentally friendly approaches, may require a specific preparation and specific knowledge and being able to address with the right concept and instruments.

Participants expressed their opinion about the fact that an educational frame should be introduced in the sector. What many of them highlighted is the need to promote a holistic approach (an





example in France has been reported).

In addition, transdisciplinary thinking should be developed. Some participants reported that experts from different fields need to talk to each other and that Bioenergy and biofuels are still divided into different disciplinary fields.

One of the participants reported that part of the success of a project that he coordinated on the production of cellulosic biofuels from agricultural and wood products, was the capacity of sharing skills and competencies.

Some participants have raised the issue of training general skills towards different directions. There is an issue when training is general and trying to cover all the necessary skills. Additionally, when there is a general toolbox available, but there is not enough skill in each sector, the only solution seems to be working as a team.

Another issue that was reported by some of the participants, is the lack of specialised technical skills, especially when people are coming from different sectors, having different skills but need to deal with the same topic.

Final remarks and main issues to be further developed:

- Educational frame around energy
- Vocabulary concept issue that can actually help building a common view
- Connection of bioenergy and biofuels sector with agriculture (well established sector)
- Established education and career pathways (not just single courses e.g., course on biofuels in agriculture degree)
- Transdisciplinary thinking in the Bioenergy sector should be developed

4.1 Biobased products

Hosting institution: Cluster Spring

Bioeconomy sector on which the event focused: Biobased products

Hybrid format in collaboration with the **Transition BIO Final Event:** The BIOSkills: the competences that will drive the transition - (hybrid: online and onsite at Piazza Sassari 4, 00161, Rome)

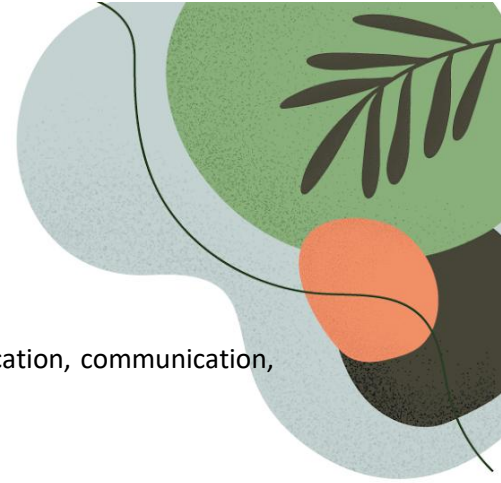
Date of the event: 02/12/2022

Number of participants: 43 (29 online and 14 present)

As observed in the two figures below (figures 48 and 49), the participants of the workshop focused on the biobased products, were mainly representatives of academia including students, industry, citizens, and other

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representatives. The fields that they mostly have experience, are education, communication, research, policy, and production.

Figure 48. Type(s) of stakeholders

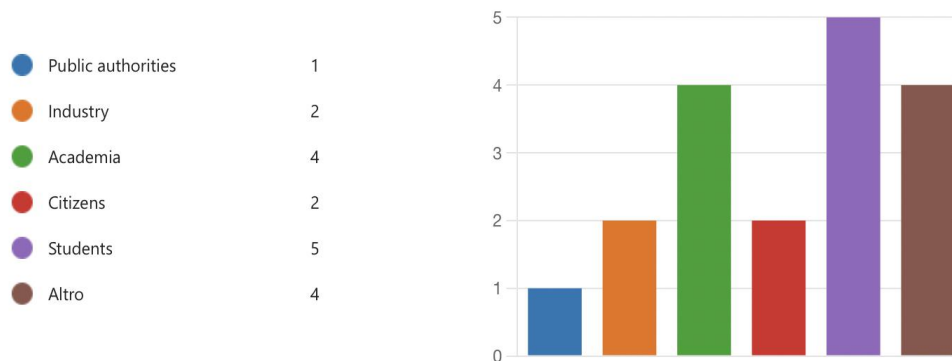
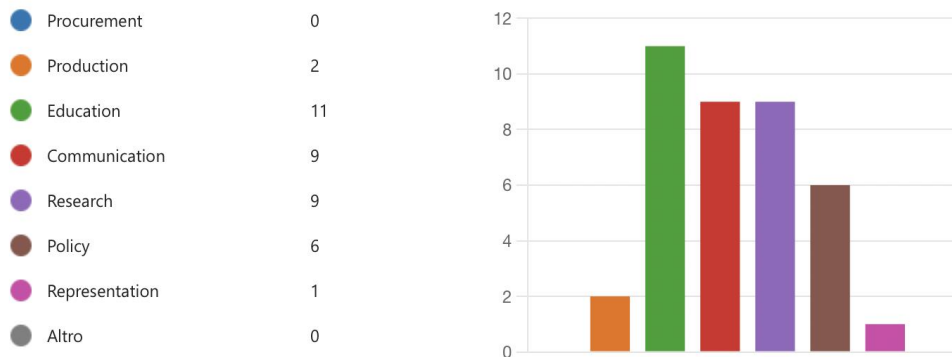
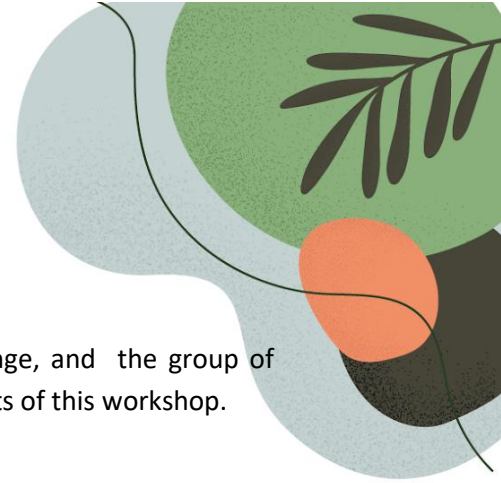


Figure 49. Field(s) of experience and expertise



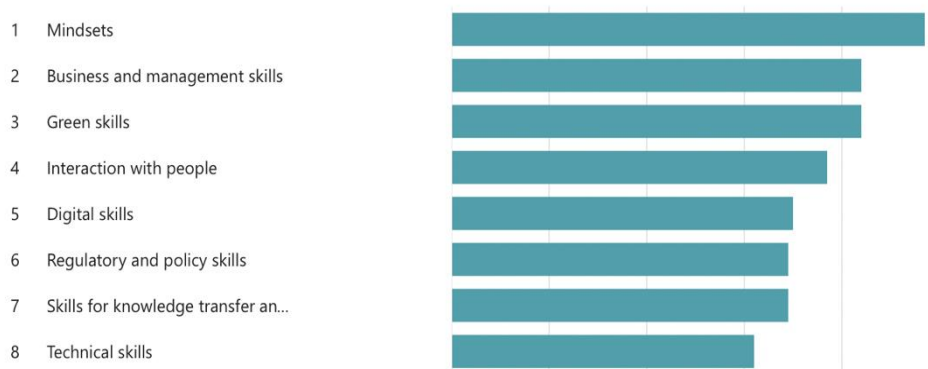
Below the figure 50 is presenting the main group of skills as prioritised by the participants of the workshop focused on biobased products. The most prioritised group of skills according to their opinion, was mindsets (most important group by 35% of the participants and second most important by 24% of them). Business and management skills was the second prioritised group of skills (most important group by 18% of the participants and third most important by 24% of them). The next prioritised group of skills were green skills (most important group by 18% of the participants, second most important group of skills by the 12% of them and third most important by the 12% of them) and interaction with people (most important group by 12% of the participants and second most important by the 18% of them). As observed in digital skills, regulatory





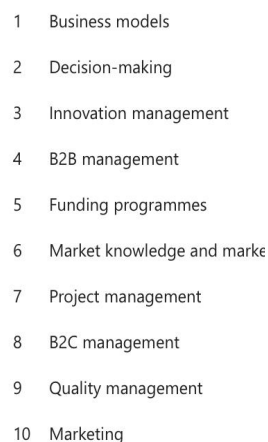
and policy skills, skills for knowledge transfer and information exchange, and the group of technical skills were the next prioritised group of skills by the participants of this workshop.

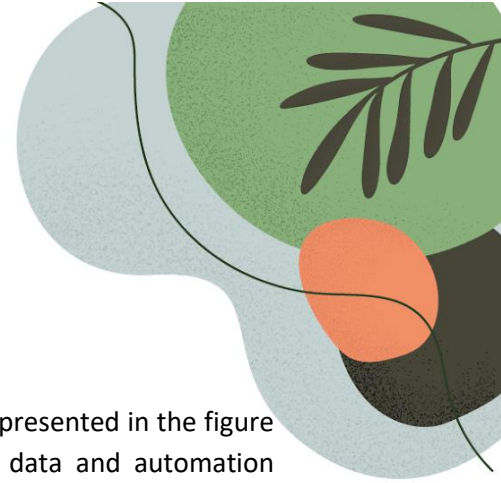
Figure 50. Prioritisation of groups of skills. 1=most important, 8=least important



The participants have then prioritised different skills for each group of skills presented previously: As regards the group of business and management skills, as observed in the figure 51 below, the most prioritised skills were business models, followed by decision-making, as the second most prioritised skill. Next prioritised skills were innovation management, B2B management and funding programmes. According to the results and the participants' responses, the next prioritised skills were market knowledge and market development, project management and B2C management. Quality management and marketing were the less prioritised skills according to the participants of this workshop.

Figure 51. Business and management skills





For the next group of digital skills, the prioritisation of different skills is presented in the figure below (figure 52). As observed, the most prioritised skills were big data and automation management. Next in the prioritisation were computational thinking, then digitalization and after virtual collaboration. The participants of this workshop have reported ICT and ecommerce management as less prioritised skills within this group t.

Figure 52. Digital skills



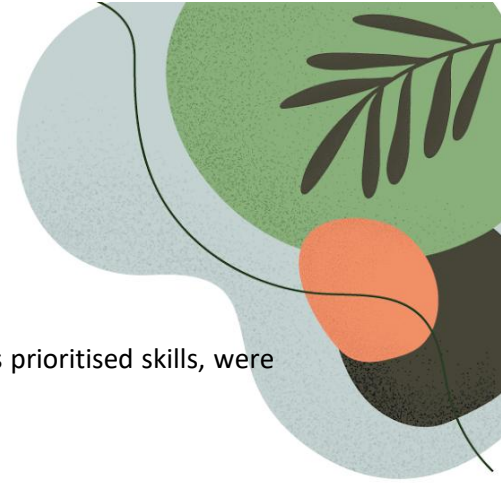
Next, as regards the group of green skills, the prioritisation of the different skills is presented below in figure 53. As observed, circular economy was the most prioritised skill, followed by sustainability and sustainable development. The next prioritised skills were climate change and environmental protection and as less prioritised skills the participants have reported the sustainable use of biomass.

Figure 53. Green skills



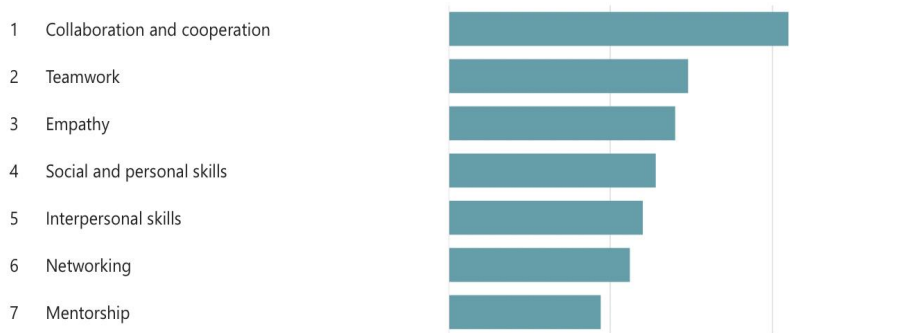
As regards the group of skills regarding the interaction with people, their prioritisation is presented in the figure 54. Collaboration and cooperation were the most prioritised skills for the participants. Teamwork and empathy were next in the prioritisation, with almost the same scores. Next prioritised skills were Report on Future skills for Bioeconomy workshops – Update and Next prioritised skills.





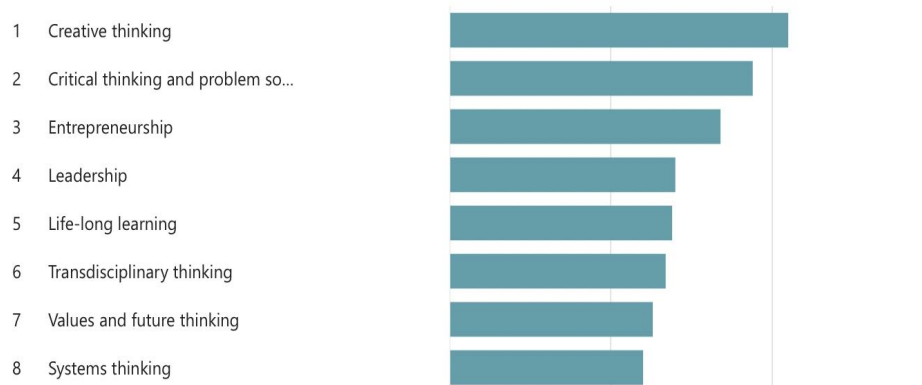
were social and personal skills, and interpersonal skills. Finally, and less prioritised skills, were networking, and mentorship.

Figure 54. Interaction with people



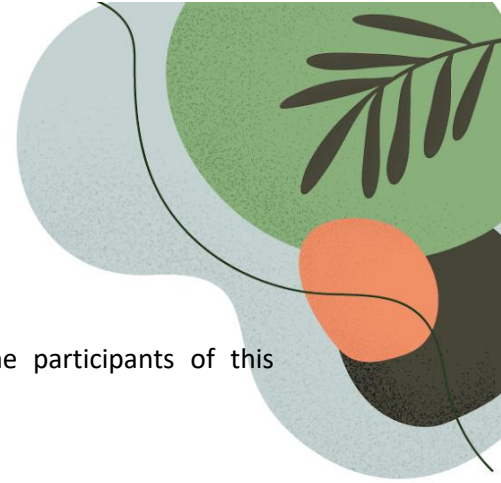
The next group of skills was mindsets, and for the prioritisation of different skills, that is presented in the figure 55, the participants reported as the most prioritised skill the creative thinking, followed by critical thinking and problem solving. The next prioritised skills in this category were entrepreneurship, leadership, and life-long-learning. Next prioritised skills were transdisciplinary thinking, values and future thinking, and finally, the less prioritised skill of this group was system thinking.

Figure 55. Mindsets



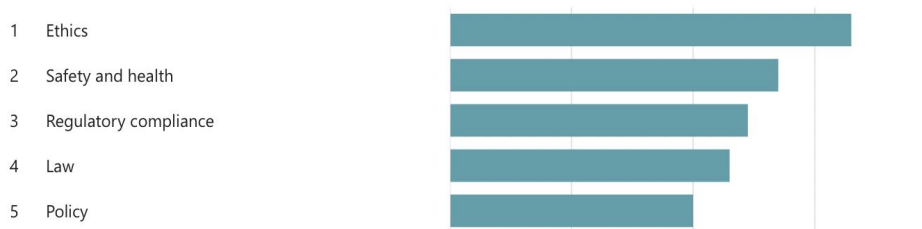
As regards the next group regarding regulatory and policy skills, the prioritisation of the different skills is shown in the figure 56 below. As observed, ethics was followed by safety and health. Next prioritised





skills were regulatory compliance and law. Finally, according to the participants of this workshop, policy was the less prioritised skill of this group.

Figure 56. Regulatory and policy skills



Knowledge transfer and information exchange was the next group of skills, and within this group the prioritisation of different skills is presented in the figure 57. The most important skill of this group was education, followed by communication, as the second most prioritised skill and then awareness-raising, as less prioritised skill.

Figure 57. Knowledge transfer and information exchange



As regards the group of technical skills, the prioritisation of the different skills is presented below in the figure 58. As observed, research and development were the most prioritised skill, followed by product development. Manufacturing and operations, and technology skills, were the next prioritised skills.

Figure 58. Technical skills



Detailed notes on the

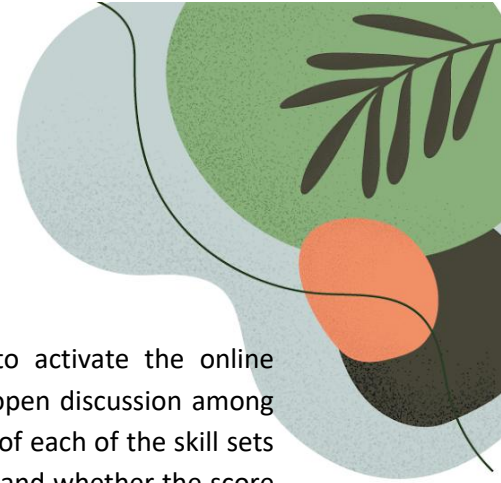
Since the workshop has hybrid format, during

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interactive discussion:

been organised in a the interactive





discussion the hosting organisation and UNIBO have decided not to activate the online platform and replace it instead with a roundtable and an interactive open discussion among the participants. The interactive session started off with the discussion of each of the skill sets needed for bio-based products, investigated through the online survey and whether the score that each of the skills received in the online survey was in line with expectations of the participants.

As regards the results of the survey online, the participants were surprised by the prioritisation and the emergence of soft skills and transversal skills. Mindsets was the most prioritised group, and in this regard, some participants confirmed the importance of mindsets, underlining that it is related also to skills such as creative thinking, systems thinking, leadership, as well as taking role in changing and transformative behaviours. It was discussed that mindsets may mean a change of culture and framework, that later translates to changes on an industrial level. It was also reported that mindsets may point to very different skills depending on the sector; so, the challenge will be to figure out how to deliver the skills to change the mindsets, towards having a holistic approach and a systematic way of thinking. One participant also reported that our target, in this regard, should not be only students at different levels of the education system, but also to target policymakers to trigger a change in terms of mindsets. Meanwhile, another participant noted that the skills of professors in universities are also very important in the context of mindsets. In fact, nowadays, it is not possible to be a good educator if one is not updated on issues and if they are not able to keep an open mind.

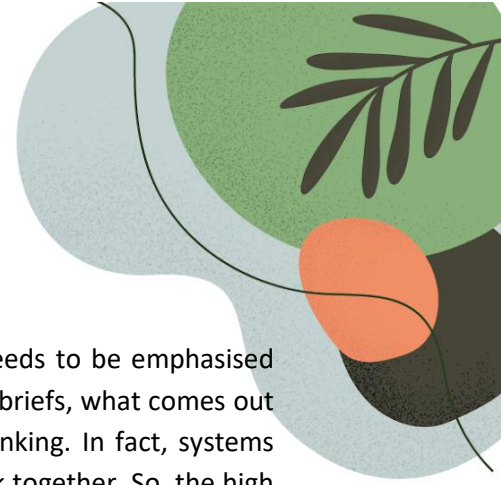
Networking was also a skill that was discussed by the participants. One participant reported that regarding interaction with people as a group of skills, the prioritisation that networking received in the online survey was lower than expected. It was argued that networking is important because interaction with stakeholders and engaging with people is the basis to develop more knowledge and to achieve goals (same applies for the implementation of Horizon projects and similar). It was also noted that through networking, bioeconomy can build bridges (instead of walls), and collaboration among sectors means also to learn from each other (for example, in terms of how to utilise different waste from different sectors). Another point about networking was in relation to the need to integrate networking in education, by e.g., introducing more courses in the participation of exchange students. Allowing the collaboration between different European universities would have many positive outcomes in terms of bioeconomy and its different sectors.

Another discussion point was about systems thinking. Participants were surprised by the fact that the importance of systems thinking was not emphasised, and the skill was low prioritised in the online survey. They reported that systems thinking is the ability of understanding the opportunities and challenges and having a realistic vision of how to address these challenges. It is also connected to creative and critical thinking, transversal skills, and the ability to see beyond the present (to long-term), and to consequences that

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capture the mid-and the
understand all
should be taken into





consideration. In this regard, it was reported that systems thinking needs to be emphasised more. Moreover, it was reported, that in prominent reports and policy-briefs, what comes out usually is the critical importance of circular economy and systems thinking. In fact, systems thinking would help to understand circularity, so these two should work together. So, the high prioritisation of the circular economy, but the low prioritisation of systems thinking in the survey may also point to the need to raise awareness on this issue.

On the other hand, another skill that was pointed as a central skill for the sector by the participants was stakeholder engagement, noting that the ability of involving stakeholders also necessitates understanding of their specific motivations and to identify new ways to motivate them to participate and then to be able to conduct a multi-stakeholder dialogue.

Besides, the ability to learn was reported as an important skill. It was reported that the amount of information we receive through education as well as through our daily lives is so vast, that it is critical to learn first how to filter what is relevant, and then to help stakeholders in filtering what is important and relevant for them as regards bioeconomy.

Main points that were reported regarding bioeconomy education:

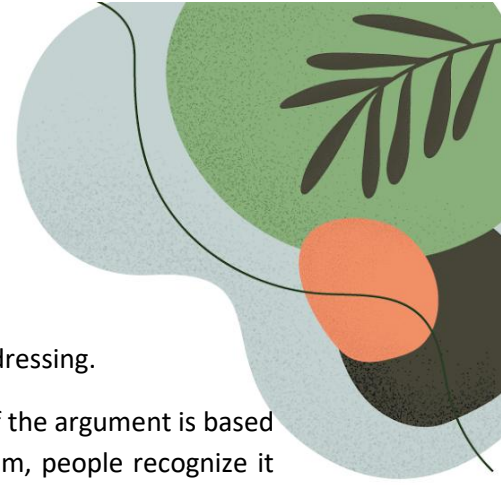
- Education should not be limited only for transmitting knowledge, but also obtaining the capacity to use knowledge;
- It is necessary to develop common terms, so that we all understand what we mean by bioeconomy (as well as biochemistry, bio-based products, life-cycle assessment);
- Learning approaches in education are critical, since this is an era where everything is changing, so learning should be transversal;
- Education should be considered together with communication. The success of the Transition Bio project also stemmed from focusing on communication, in addition to education.
- All sectors in the bioeconomy have completely different value chains and hence have different needs in terms of skills as well as regulatory frameworks. However, common knowledge is mainly required. The challenge is to identify these and to reflect them in the education system.
- There is a need for universities and industry to collaborate. Industry can play an important role in giving guidance to students in their careers, as well as to provide them with skills needed in the industry. On the other side, at the industrial level, there is a need for people with strong scientific backgrounds with a capability to have an open mind, to address the main challenges of the sector, and to be able to collaborate.
- Integrating bioeconomy education into the curricula starting with early ages is of utmost importance to introduce the topics and to prepare the future professionals of the sector.

Another point of the was communicating bioeconomy education).

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interactive discussion bioeconomy (and It was reported that one





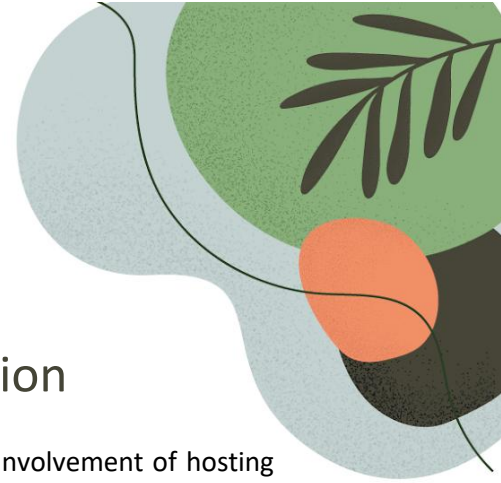
way to communicate bioeconomy is through the challenges that it is addressing.

Participants have also mentioned some examples as regards the issue: if the argument is based on climate change, underlining that bioeconomy addresses this problem, people recognize it better, understanding that bioeconomy contributes to address climate change (same applies to food security, raw materials, energy crisis).

Another example was reported for bioeconomy education. When “bioeconomy” is in the title of a course, it is not clear how many of the students will understand it; however, when the topic is linked to the related challenges and problems (e.g., having sustainability challenges in the name of a course), this will be clearer and more attractive for students and their careers. In the same way, the circular economy is a concept, which people, in most cases, seem to understand, which attracts people more. Participants have pointed out a question that remains: In the universities, is it better to have less “bioeconomy” in the titles of the courses, but more content of bioeconomy in them; or “bioeconomy” coming up more as a word, with less content provided on it.

The real question here is how to communicate the bioeconomy well? A participant highlighted the importance of the role of facilitators, in connecting different actors along the value chain, as well as in conveying messages targeting different stakeholders. One example was given about providing facilitation to teachers in primary and secondary education to empower them in communicating bioeconomy to the students.



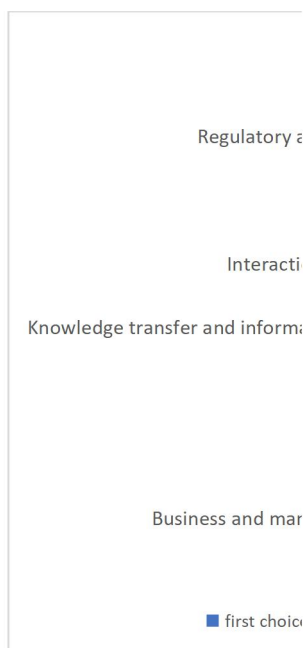


5. Summary of the results and discussion

The division of bioeconomy into five different macro sectors, and the involvement of hosting institutions with expertise and actively involved in different sectors was crucial in this kind of activity, allowing to engage a greater number of participants who may provide useful information to achieve the objectives of the report. However, this section documents the presentation of the results of all different sectors of bioeconomy, trying to emerge the main educational and skills needed in the different macro key sectors and in bioeconomy in general.

As presented in different sections, 162 experts and stakeholders have participated in the co-creation workshops, and have contributed to roundtables followed by interactive discussions. Additionally, the 56% of the participants have also participated in a survey and have filled in a questionnaire (presented in the annex) to contribute and support the identification of the educational and skills needs of different key sectors of the European bioeconomy. The figures below present the main results as collected from all 5 sectors of bioeconomy: As regards the prioritisation of the main group of skills (figure 59), the results presented some differences among sectors. Mindsets was the most prioritised group of skills according to the 30% of the participants, the second prioritised group by the 11% of them and the third prioritised group by the 9% of all participants. Business and management skills was the most prioritised group of skills by the 18% of the participants, the second prioritised group by the 9% of them and the third prioritised by the 24% of them.

Figure 59. Prioritisation of the group of skills

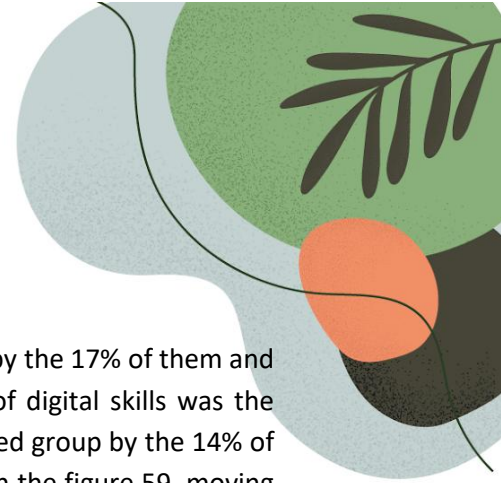


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The group of green skills

was the most prioritised

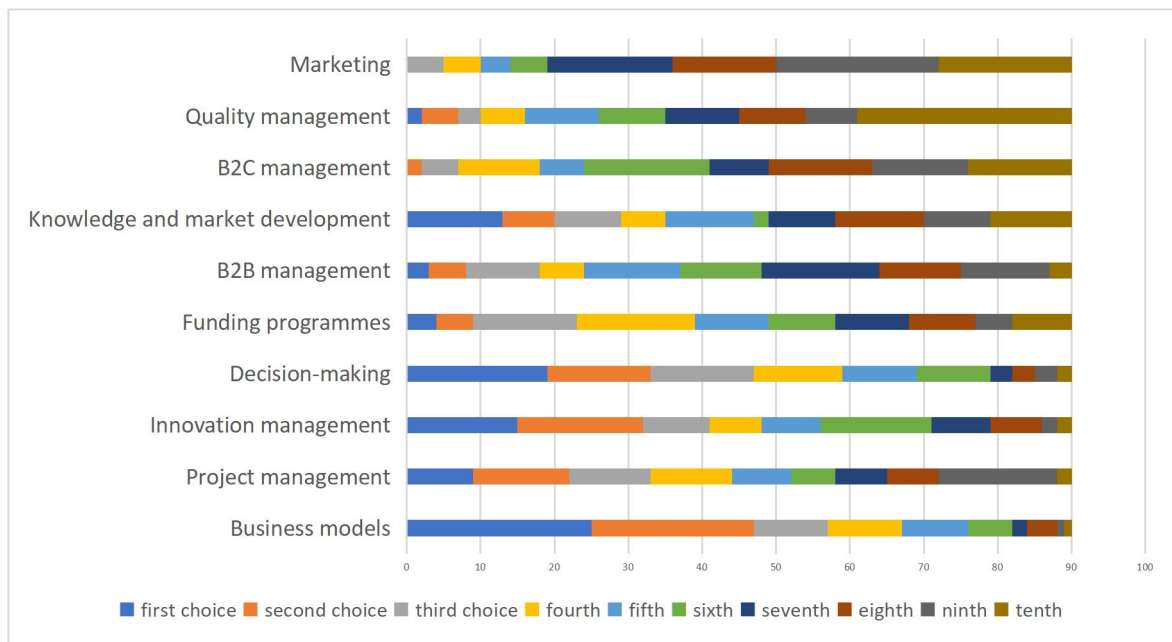




group by the 17% of the participants, the second prioritised group also by the 17% of them and the third prioritised group by the 10% of all participants. The group of digital skills was the most prioritised group by the 7% of all participants, the second prioritised group by the 14% of them and the third prioritised group by the 11% of them. As observed in the figure 59, moving to the other groups, technical skills was the most prioritised group by the 7% of the participants, the second prioritised group by the 19% of them and the third prioritised group by the 9% of all participants. Skills for knowledge transfer and information exchange was the most prioritised group by the 12% of the participants, the second prioritised group by the 9% of them and the third prioritised group by the 21% of them. Regulatory and policy skills was the most prioritised group by the 4% of the participants, and the second prioritised group by the 7% of them and third by the 6% of them. Finally, interaction with people was the most prioritised group by the 4% of the participants, the second by the 7% and the third by the 6% of all participants.

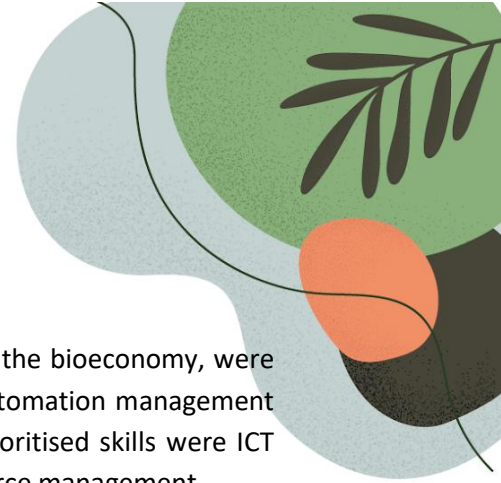
The participants have then prioritised different skills for each group of skills presented previously: As regards the group of business and management skills presented below in the figure 60, the most prioritised skill by all 5 sectors of the bioeconomy were business models, followed by decision-making. Next prioritised skills were innovation management and market knowledge and market development. As observed, the following prioritised skills in this group were project management, funding programmes, B2B management, quality management, followed by B2C management and marketing.

Figure 60. Prioritisation of the skills for business and management



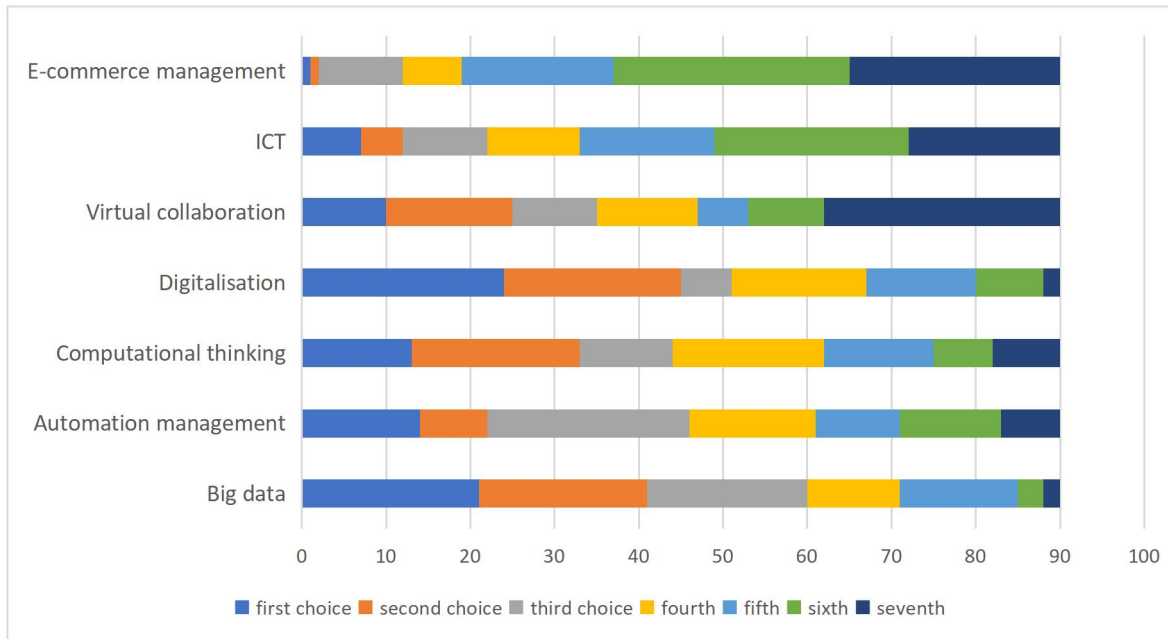
For the group of digital Report on Future skills for Bioeconomy skills, as observed below
workshops – Update





in the figure 61, the most prioritised skills according to all 5 sectors of the bioeconomy, were digitalization and big data. Next prioritised skills in this group were automation management followed by computational thinking and virtual collaboration. Next prioritised skills were ICT and finally, as the less prioritised group, participants reported e-commerce management.

Figure 61. Prioritisation of the skills for digital skills

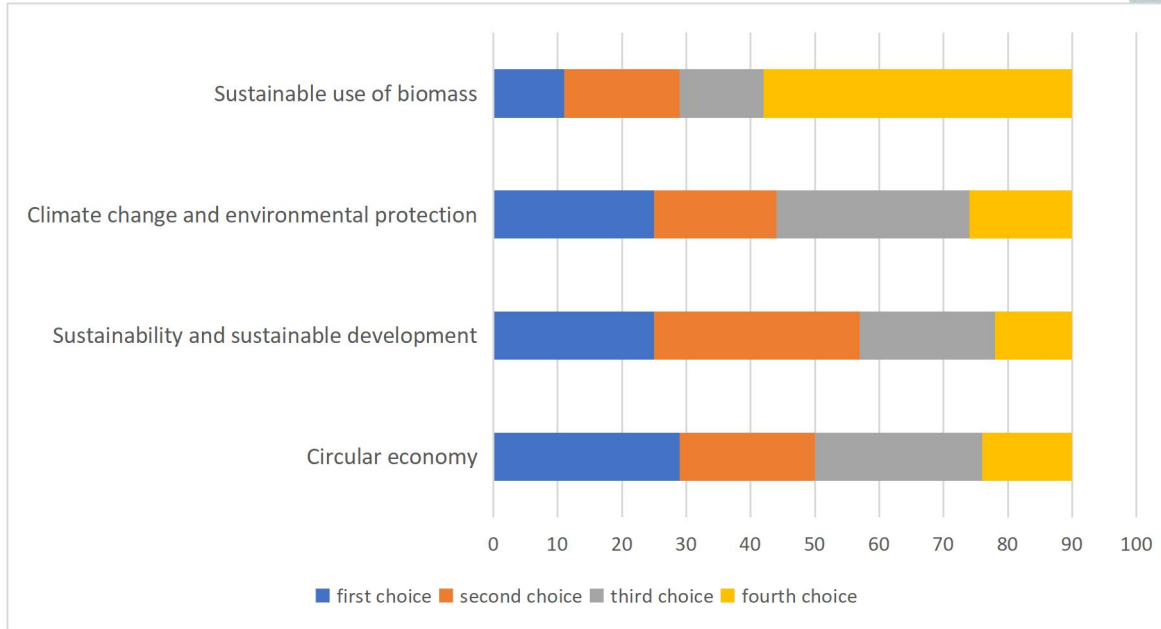


Next, for the group of green skills, the opinions and the prioritisation of the skills was not the same in all the 5 macro sectors. Observing the figure below (figure 62), circular economy was the most prioritised skill by the 32% of the participants, the second prioritised skill by the 23% and the third prioritised skill by the 29% of them. Climate change and environmental protection was the most prioritised skill by the 28% of the participants, the second prioritised skill by the 36% of them and the third by the 23%. Moving forward to the other skills of this group, sustainability and sustainable development was the most prioritised group by the 28% of the participants, the second by the 21% of them and the third by the 33% of them. Finally, sustainable use of biomass was the most prioritised skill by the 12% of the participants, the second by the 20% and the third by the 14% of them.





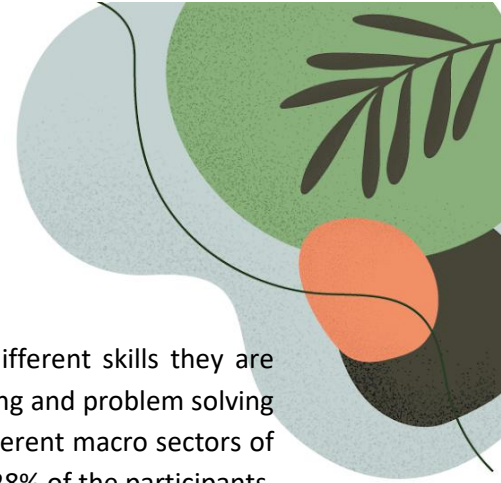
Figure 62. Prioritisation of the skills for green skills



As regards the next group of skills, interaction with people, the most prioritised skill in all sectors of the bioeconomy was collaboration and cooperation, as observed also below in figure 63. The next prioritised skills in this group were empathy, teamwork, and they were followed by social and personal skills. Finally, participants have prioritised less interpersonal skills, mentoring, and networking.

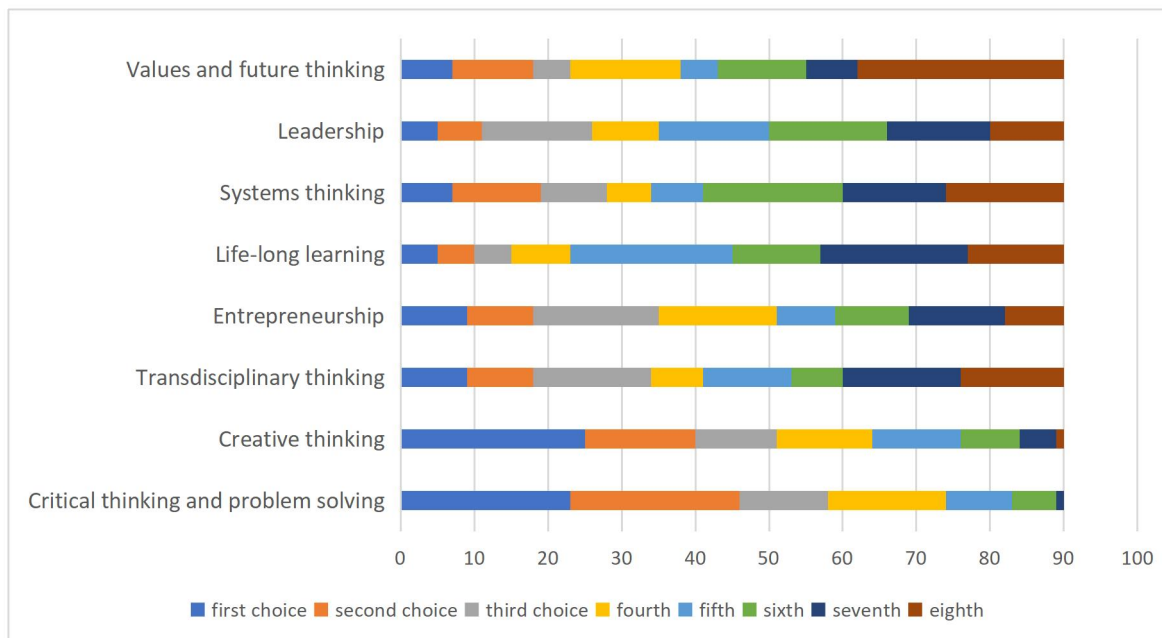
Figure 63. Prioritisation of the skills for interaction with people





The next group of skills was mindsets, and for the prioritisation of different skills they are presented in the figure 64. As observed, creative thinking, critical thinking and problem solving were the most prioritised skills, with some differences according to different macro sectors of the bioeconomy. Creative thinking was the most prioritised skill by the 28% of the participants, and the second prioritised skill by the 17% of them. Similarly, critical thinking and problem solving, was the most prioritised skill by the 26% of the participants and the second prioritised also by the 26% of them. According to the participants of all 5 bioeconomy sectors, next prioritised skills, according to all sectors of the bioeconomy, were entrepreneurship and transdisciplinary thinking, followed by values and future thinking, system thinking, life-long learning and leadership.

Figure 64. Prioritisation of the skills for mindsets

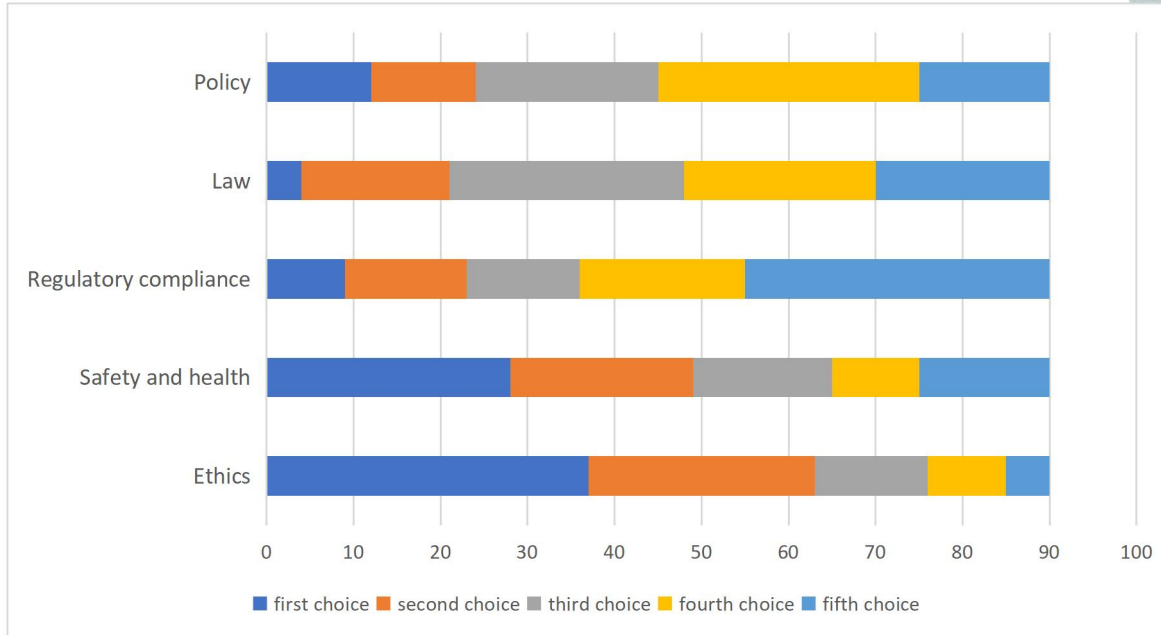


As regards the next group of skills regulatory and policy skills, the prioritisation of the single skills is presented in the figure below (figure 65). As observed, ethics was the most prioritised skill according to all sectors of the bioeconomy, followed by safety and health. Next prioritised skills were regulatory compliance and policy. Participants of all bioeconomy sectors have less prioritised the law as a single skill regarding regulatory and policy skills.



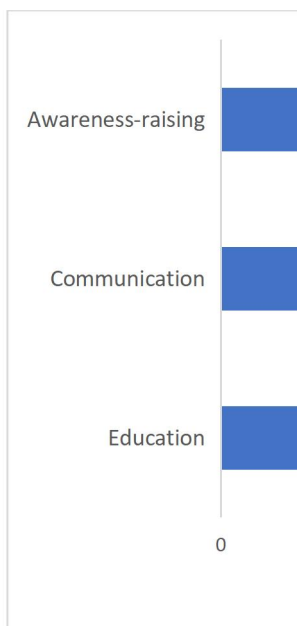


Figure 65. Prioritisation of the skills for regulatory and policy skills



Knowledge transfer and information exchange was the next group of skills, and within this group the prioritisation of different skills is presented in the figure 66. According to all sectors of the bioeconomy, the prioritisation was first for education, the second prioritised skill was communication and less prioritised skill but still important was the awareness-raising.

Figure 66. Prioritisation of the skills for knowledge transfer and information exchange

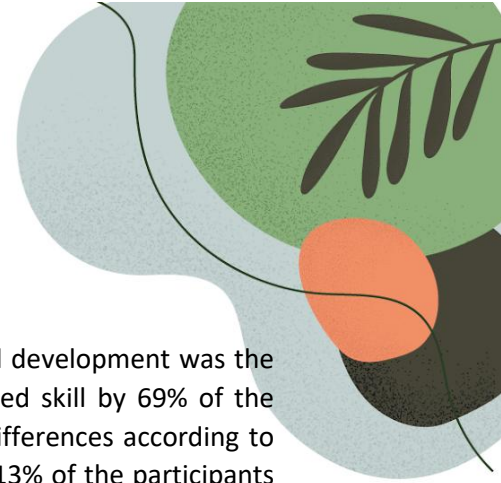


As regards the group of

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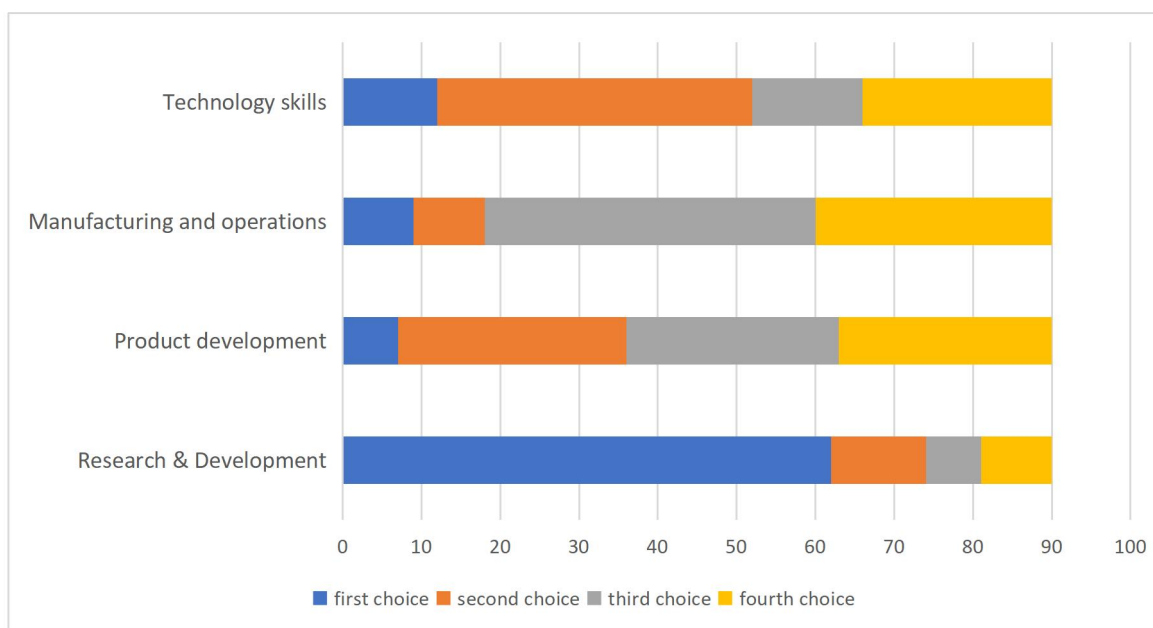
technical skills, the





prioritisation of single skills is presented in the figure 67. Research and development was the most prioritised skill for all sectors of the bioeconomy (most prioritised skill by 69% of the participants). As regards the skills prioritised next, there were some differences according to different sectors. Technology skills was the first prioritised skill by the 13% of the participants and the second by the 44% of them. Manufacturing and operations were the first prioritised skill by the 10% of the participants and the second also by the 10% of them. Finally, product development was the first prioritised skill by the 8% of the participants, and the second prioritised by the 32% of them.

Figure 67. Prioritisation of the skills for technical skills

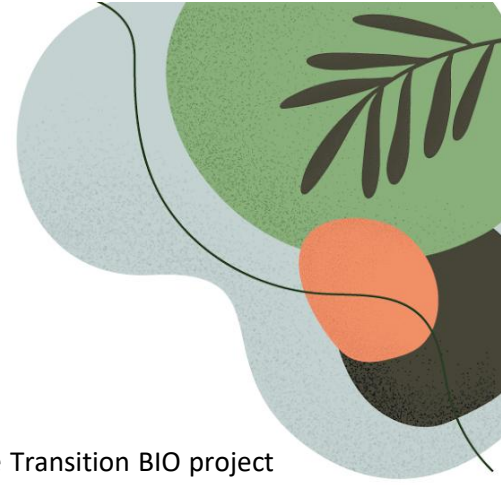


Our results mostly corroborate and confirm those of other recent projects.

The main weaknesses of our exercise rest in two points:

- First, the number of overall participants may be considered as small compared to the diversity of EU Bioeconomy; however, the consistency of the main messages obtained from the different workshops is very high, which supports the quality and trustability of the derived priorities; for the future a better coverage of different regions rather than sectors might be advised.
- Second, the limitations due to the period the workshops were carried out (partially affected by covid-19 and characterised by high political instability) and the fact that the bioeconomy is still an emerging concept may, have affected the results and limited the ability to draw longer term messages; this may encourage regular updates of this exercise.





6. Conclusions

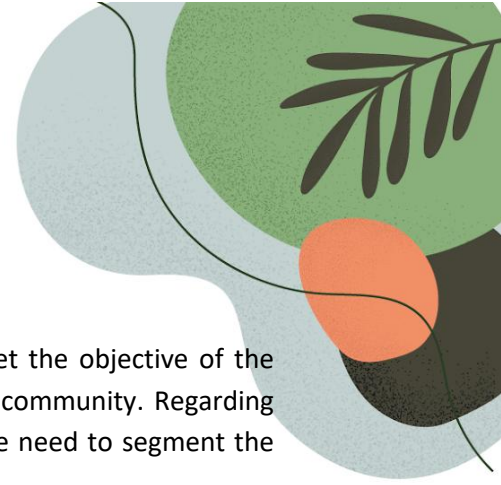
This report corresponds to the objectives of the Work Package 3 of the Transition BIO project and documents the planning and the results of the five co-creation workshops foreseen in task 3.3, which were held during the second year of the project for the identification of the educational and skills needs for the transition towards a sustainable bioeconomy. The involvement of hosting institutions with expertise and actively involved in different sectors of the Bioeconomy was crucial in this kind of activity, allowing to engage a greater number of participants who provided useful information to achieve the objectives of the task. The engagement of participants representing different types of stakeholders also contributed to collect information from different angles and points of view, gaining a holistic view of the context and needs in terms of skills for the bioeconomy.

Different sectors highlighted different skills as prominent and most relevant. The workshop that focused on agriculture, food, and feed highlighted the need to promote the development of system thinking and knowledge of system sciences, leading to consider the world as a system. As part of this, professionals from different fields and disciplines related to the sector need to have a better dialogue, in particular between food and agriculture. For the development of an entrepreneurial mindset, effective logic and future and foresight vision are necessary, working for a sustainable future. The importance of developing intrapreneurship and entrepreneurship has been highlighted too. The circular economy was considered as comparatively less relevant. To meet the skills needs that emerged during the discussion, the participants suggested making education more transdisciplinary by involving other stakeholders outside the academia. Some also suggested tailoring the curricula to the region's particularities.

For the forestry sector, product development was seen as key for new sustainable wood-based value chains offering also higher value-added. Vocational and higher education were mentioned as the key education levels and universities, companies and research and development organisations were considered as key stakeholders for enhancing product development. Basic understanding of equal and fair collaboration was seen as important for collaboration and cooperation skills. Among the new skills needed in the future of the bioeconomy, the ability to learn was identified as essential.

For the blue bioeconomy sector, different issues were discussed, such as gender dimension of the Blue Economy, readiness of the educational system to include mindset skills in the learning process. The main points raised in the interactive discussion were about the skills towards a booming Blue Bioeconomy that are largely based around business development and technology. Moreover, education needs to be transversal and include all stakeholders and actors. Training and further education needs





to address the gender gap as well as other social inequalities, to meet the objective of the Green Deal, for an inclusive, transparent, and participatory European community. Regarding the results of the survey, some interesting points came up, such as the need to segment the opinions according to country and geographical area.

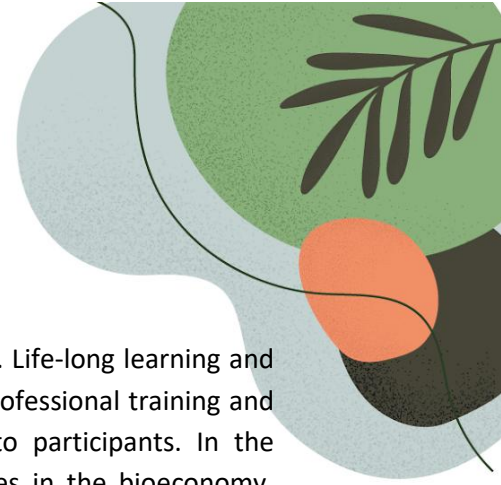
For the bioenergy and biofuels sector, mindsets were prioritised among the groups of skills, highlighting critical thinking and problem solving, transdisciplinary thinking, leadership, and creative thinking among the most relevant components of mindsets. Mindsets also develop through a common vocabulary and a similar level of competencies. Another relevant group of skills was on the green skills. The message here is that trying to address sustainability, circularity, and environmentally friendly approaches, may require a specific preparation and specific knowledge and being able to address with the right concepts and instruments. In addition, transdisciplinary thinking should be developed since experts from different fields need to talk to each other and bioenergy and biofuels are still divided into different disciplinary fields. The connection of the bioenergy and biofuels sector with agriculture as a well-established sector was a key point that was further discussed.

In the workshop that focused on biobased products, participants highlighted the importance of mindsets and the challenge to figure out how to deliver the skills to change the mindsets, towards having a holistic approach and a systematic way of thinking. Though initially not identified as high priority, networking and systems thinking were argued to be of high importance during the discussion. Another prioritised skill for the sector by the participants was stakeholder engagement, noting that the ability of involving stakeholders also necessitates understanding of their specific motivations and to identify new ways to motivate them to participate and then to be able to promote a multi-stakeholder dialogue. Another point of the interactive discussion was bioeconomy education and the emerging issue of communicating the bioeconomy. One way to communicate bioeconomy is through emphasising the societal challenges that the bioeconomy is addressing, while the importance of the role of facilitators was reported, in connecting different actors along the value chain, as well as in conveying messages targeting different stakeholders.

A common issue that has been reported in all the workshops, is that different sectors of the bioeconomy are still divided into different disciplinary fields, and so transdisciplinary thinking needs to be further developed. Another issue that was reported, was the lack of specialised technical skills, especially when people are coming from different sectors, having different skills but need to deal with the same topic.

As regards educational needs, a common point from all the workshops was that all educational levels were deemed important and relevant to bioeconomy education. To develop critical thinking, which has been considered necessary for creating the new tools of the future, is important to start early with the





children and it should be in the strategies of schools and policymakers. Life-long learning and education have been considered important since reality is changing. Professional training and capacity development programs should be needed too, according to participants. In the educational context, it was suggested to present different approaches in the bioeconomy, provide students with career guidance in the bioeconomy and different sectors.

As an overall message, for the identification of the educational needs for the transition towards a sustainable bioeconomy, different bioeconomy sectors have different value chains and hence different needs in terms of skills as well as regulatory frameworks. However, learning approaches in education should be transversal, and a common vocabulary is needed. The challenge is how to identify and reflect this in the education system of different levels. Also, education in bioeconomy should be considered together with communication, and it should not be limited only for transmitting knowledge, but also obtaining the capacity to use knowledge.

Concerning lessons learned on the research approach, participants highlighted how the approach used, based on interactive workshops, can contribute not just to collect simple statements on Bioeconomy, but also to understand how their reality fits with the overall strategy and to bring human resources into the Bioeconomy and its different sectors.





7. References

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8. Annexes

Co-creation workshops Questionnaire:





Respondent information

1. Which type(s) of stakeholder are you (or do you represent)? *

Public authorities

Industry

Academia

Citizens

Students

Other

2. In which country are you (or is your institution placed)? *

Enter your answer

3. In which bioeconomy sector do you have the most experience and expertise? *

Other

4. In which field(s) do you have experience and expertise? *

Procurement

Production

Education

Communication

Research

Policy

Representation

Other






Educational and skills needs

Future skills and related educational needs in the European Bioeconomy sector

5. How much do you agree with the following sentences related to your sector? *

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	Don't know
There is a need of new education	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is a need of new skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

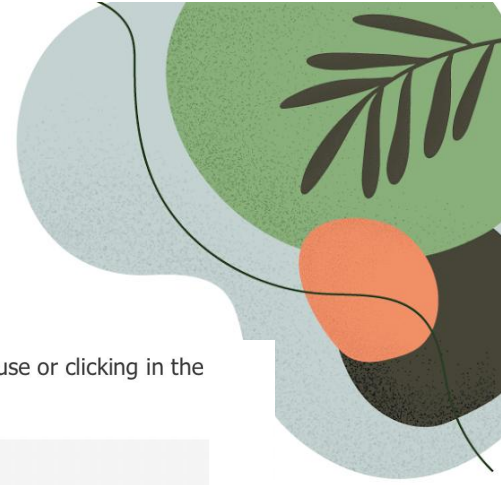
6. Select your answer * 

	Focused only on few technical disciplines	Multidisciplinary	Interdisciplinary	Transdisciplinary	Other	Don't know
Education should be	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

7. Select your answer *

	Only technical/hard skills	Both hard and soft skills	Don't know
The new workforce will need	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

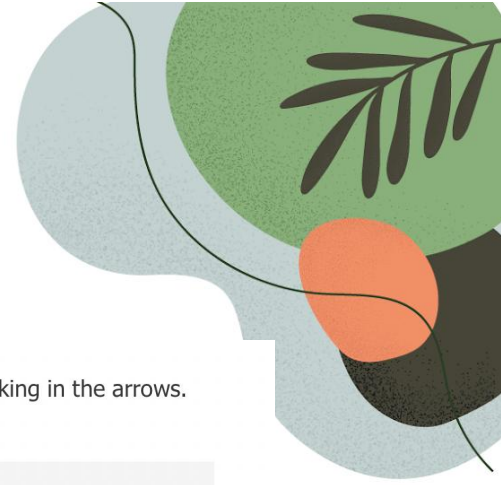




8. Prioritize the following groups of skills by dragging & dropping with your mouse or clicking in the arrows. 1=most important, 9=least important *

Business and management skills
Digital skills
Green skills
Interaction with people
Mindsets
Regulatory and policy skills
Skills for knowledge transfer and information exchange
Technical skills

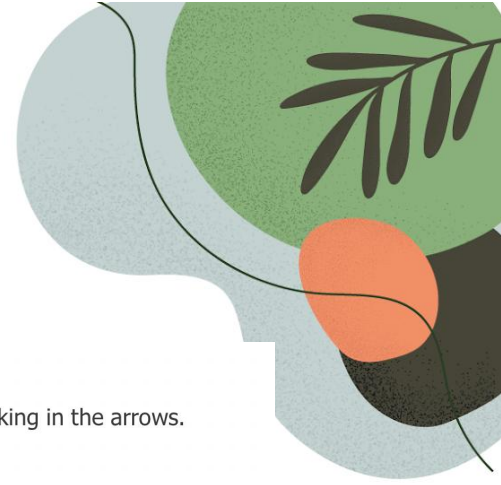




9. Prioritize the following skills by dragging & dropping with your mouse or clicking in the arrows.
1=most important, 9=least important - Business and management skills *

Business models
B2B management
B2C management
Decision-making
Funding programmes
Innovation management
Marketing
Market knowledge and market development
Project management
Quality management





10. Prioritize the following skills by dragging & dropping with your mouse or clicking in the arrows.
1=most important, 9=least important - Digital skills *

- Automation management
- Big data
- Computational thinking
- Digitalisation
- E-commerce management
- ICT
- Virtual collaboration

11. Prioritize the following skills by dragging & dropping with your mouse or clicking in the arrows.
1=most important, 9=least important - Green skills *

Green skills

- Circular economy
- Climate change and environmental protection
- Sustainability and sustainable development
- Sustainable use of biomass



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