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Towards a more sustainable future

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D1.1

Conceptual framework of the awareness, communication and education toolkits – 1st version

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Conceptual framework of the awareness, communication and education toolkits – 1st version

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1. Executive Summary

This document presents the conceptual framework to define the strategy for the design of awareness, communication and education toolkits planned in the project (WP1). The deliverable provides guidelines and recommendations to ensure the coverage of every sector of the bioeconomy and address all the main types of stakeholders. At the same time, it provides suggestions on the actions to be taken (defining the channels, messages, contents, tools, and specific activities), following the needs and interests expressed by the target groups.

The conceptual framework is the result of an analysis of the outcomes of previous projects, the review of the scientific literature and interviews with selected stakeholders. The interviews were conducted with members of the Advisory Board to validate this analysis, provide insights, new ideas and feedback on the needs and interests of the beneficiaries and suggestions about how to set up the actions.

The results highlight the existence of several successful experiences and tools. However, while literature and experiences in traditional sectors of the bioeconomy, such as agriculture and food, is comparatively well developed, both the bioeconomy as a whole and the bio-based sector are rather poor in both specific conceptual frameworks and specialised tools/toolkits that can be used to foster their full deployment and a meaningful engagement of the different stakeholders.

2. Introduction and objective

The general objective of WP1 is to valorise and exploit sectoral communication tools and activities developed at the national, regional, and local level by EU-funded bioeconomy projects and other relevant initiatives (SO1) for the creation of awareness, communication and education toolkits.

The overall aim of this deliverable (D1.1) is to define the strategy for the design of these toolkits to:

- provide tailored actionable knowledge tools and contents to all stakeholders targeted by the project, namely the DEMAND, SUPPLY SIDE and MULTIPLIERS/SUPPORTIVE ENVIRONMENT
- ensure the coverage of all bioeconomy sectors

This conceptual framework is based on the analysis of the target beneficiaries' needs, interests, and motivations, with information and insights from the outcomes of several workshops, surveys, interviews, and other activities implemented by the LIFT, BIOVOICES, BIOWAYS, BLOOM and Biobridges projects, and from the literature review. This analysis is complemented by 9 interviews (9/3 per target beneficiaries' type) with Advisory Board members. The interviews are needed to validate the literature, projects, and initiatives analysis, provide new ideas and recognise priorities and targets' needs and interests in the bioeconomy.

D1.1 therefore provides an initial set of recommendations for the most suitable channels, messages, contents, tools, and activities to be used to target the different stakeholders, providing guidelines for T1.2 (collection of existing information), T1.3 (production of the toolkits), WP2 (for the awareness and public engagement activities), WP3 (for the support activities to Member States and Regions), and WP5 (for the design of the Dissemination and Communication plan and activities).

The remainder of the document is organised as follows. Section 3 illustrates the methodology used to develop the framework. Section 4 illustrates the key dimensions of the framework. In particular, section 4.1 provides an overview of the framework, followed by a specific description of the different dimensions of the framework. Section *4.2 Beneficiaries* guides the tailoring of the toolkits to the different target groups. Beneficiaries' needs, interests and motivations are outlined in *4.3. 4.4 Activities* sub-section of this document briefly presents challenges and opportunities of the activities concerning awareness, communication, and education of bioeconomy. In *4.5 Sectors* a general but comprehensive classification of all bioeconomy sectors is provided, to ensure that the project will cover bioeconomy at large, while the *4.6 How to set up actions* sub-section provides a set of recommendations for the production of the toolkits about channels, messages, contents, tools, and specific activities.

The results of the interviews with Advisory Board members and additional experts are reported in Section 5.

Section 6 provides a discussion, complemented by conclusions and the way ahead in section 7.

3. Methodology

The methodology to build the framework is illustrated in Figure 1.

Figure 1. Methodology to build the conceptual framework.

The analysis of the target beneficiaries' needs, interests and motivations is based on the outcomes of several workshops, surveys, interviews, and other activities implemented by the LIFT, BIOVOICES, BIOWAYS, BLOOM and Biobridges H2020 projects, and insights from other CSA projects on bioeconomy and the literature review.

This analysis is complemented by 9 interviews (9/3 per target beneficiaries' type) with Advisory Board members and additional experts.
The Advisory Board is composed of leading experts in their fields from the different bioeconomy sectors, as well as the additional experts involved. Its members are involved through interviews in the design of the conceptual framework (T1.1), while they provide a review of the project objectives and results to ensure that the activities are sound and pertinent and have a high impact on the community.
The project considers gender as a relevant dimension by including questions addressing gender impacts in the interviews with the Advisory Board members.
The one-to-one interviews were conducted online and include thorough and qualitative open-ended questions, where interviewees could express their opinions. The aim is to validate the literature, projects, and initiatives analysis, provide new ideas and recognise priorities and targets' needs and interests in the bioeconomy, guiding the production of the awareness, communication and education toolkits (T1.3).

A version of the survey template is available as annex 1.

The results of the survey in Section 5 collect the relevant and meaningful quotes from the interviews for each item of the survey.

Given the limited number of interviews, the relevant quotes from each one were merged in tables 2, 3 and 4 without substantial elaborations. Moreover, the repetition of the same concepts provided by different experts was avoided.

4. Key dimensions of the conceptual framework

4.1. Overview of the framework

The main objective of the conceptual framework is to provide a common set of terminology for the main activities in the project, and to classify/qualify tools investigated in WP1. An overview of the conceptual framework is provided in figure 2.

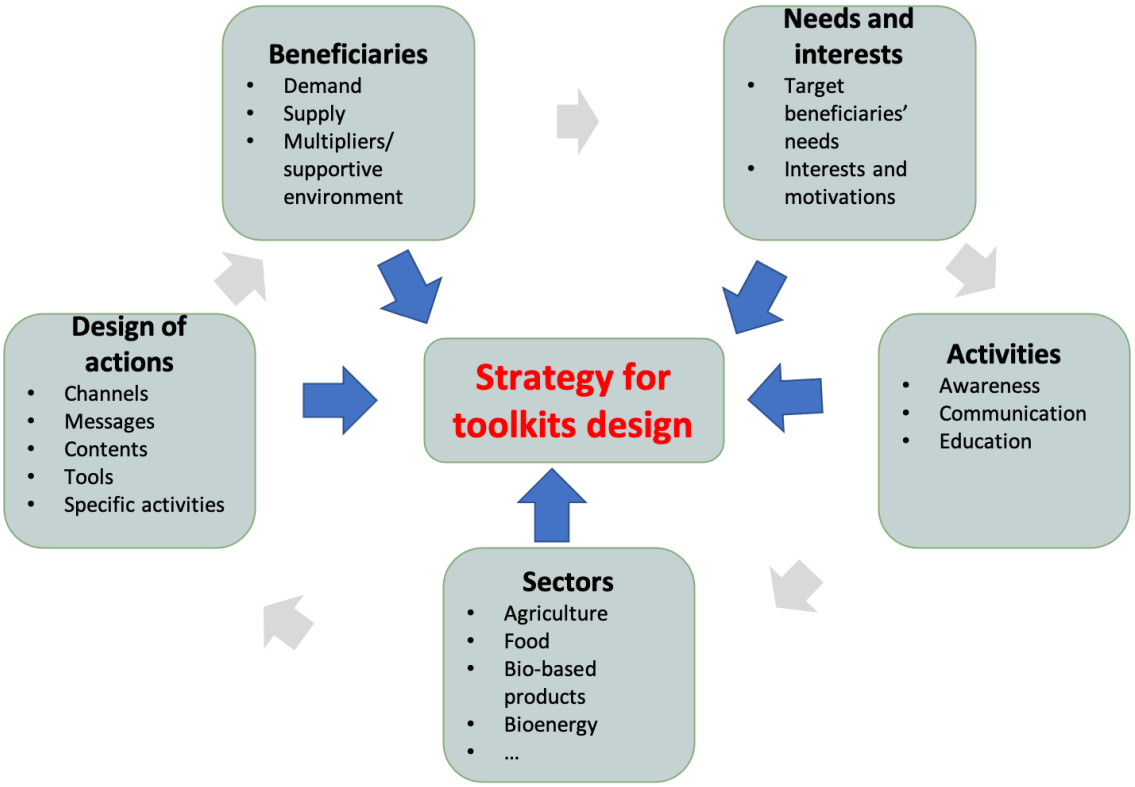

Figure 2. Conceptual framework structure

The conceptual framework identifies five main dimensions (those highlighted by the project) that need to be combined in order to identify strategies for the development of toolkits. The five dimensions also follow a (tentative) sequential logic aimed at designing toolkits (which however does not need to be in this order).

4.2. Beneficiaries

The transition towards the bioeconomy requires a profound transformation on different sides of the economy and involves different multipliers.

Hence, raising public awareness and knowledge about the bioeconomy and its environmental and socio-economic impacts among a wide range of stakeholders is a prominent consideration.

The awareness, communication and education toolkits (T1.3) will be tailored to the different target groups, namely:

- DEMAND SIDE (consumers, citizens, B2B, public procurers, etc.; physical persons in the first two categories can further be classified according to demographic characteristics, such as age, with a focus on young people as the main target for some actions; several of these groups may also be target together under more generic labels, for example the one of general public).

- SUPPLY SIDE (primary production, production industries, biorefineries, etc.; the supply side actors may also be distinguished based on sector/value chain or by structural characteristics, e.g. large industry, SMEs, micro family-managed companies)

- MULTIPLIERS and SUPPORTIVE ENVIRONMENT (EUBIONET, citizens' organisations, NGOs and other associations, brands, retailers, teachers, EU-funded projects and initiatives, influencers, media, policy makers, regional authorities, initiatives, networks, clusters, etc.)

The toolkits will promote bioeconomy from different perspectives and objectives, producing the package of knowledge and supportive media (contents, info-graphic, videos, podcasts, presentations, etc.):

1) For the **DEMAND SIDE** - The objective of this toolkit is to raise awareness and educate the demand side about bioeconomy at large and its benefits for them, in particular: *What is bioeconomy? What are the bioeconomy areas? What are the benefits and impacts for the society, the environment and the economy? What is the contribution of the demand side in driving the transition towards a more sustainable consumption and lifestyle?* etc. This toolkit will provide practical and inspiring examples and stories, like the ones successfully used in the context of the Bioeconomy Village (BIOWAYS) and the BioART gallery (BIOVOICES) and the "Bioeconomy in everyday life" exhibition (BioSTEP).

2) For the **SUPPLY SIDE** - The objective of the toolkit is to raise awareness and educate about bioeconomy at large and its benefits, and highlight the economic opportunities (business, development and jobs) for them. As an example, primary producers (farmers, fisherman, forestry owners, etc.) may benefit from income diversification opportunities that may arise from a sustainable and circular bioeconomy. Also, they might not be aware of interesting small-scale business models associated with the bioeconomy. Selected questions that could be addressed by this toolkit: *What is bioeconomy? What are the bioeconomy areas? What are the opportunities for my sector? What are promising regional business models? How can I valorise my residues? What is the contribution of the supply side in driving the transition towards a more sustainable production? What are possible financial opportunities for bioeconomy sectors?* etc. The toolkit will provide practical and inspiring examples and stories also taking up results from the European Network for Rural Development, BE-Rural, Power4Bio among others.

3) For the **MULTIPLIERS** and **SUPPORTIVE ENVIRONMENT** – The objective of the toolkit is to raise awareness and engage this target group in education activities about bioeconomy at large and its benefits for different stakeholders, providing skills, methodologies, knowledge, and tools. In particular, the toolkit will support multipliers in developing a bioeconomy communication strategy and communicating research results. A selected question that could be addressed by this toolkit is *How to communicate and support bioeconomy?* This toolkit will present practical and inspiring examples and stories, also providing useful insights from the results of BLOOM, SHERPA, DANDELION, Biobridges, and BIOVOICES among others.

4.3. Needs and interests

To raise awareness and engage beneficiaries in education activities, first of all, it is necessary to remove any obstacles to clear and correct information, addressing their needs and issues. After that, it is useful to understand and stimulate their interests and motivations.

- Target beneficiaries' needs

EU population finds information about bioeconomy and bio-based products (BBPs) with difficulties (BIOWAYS, 2017a), and, even if **consumers** usually have positive impressions of these products, they need access to more information. There are also misunderstandings about some concepts, one of which is the confusion between "bio-based" and "organic", due to the use of "bio" for some organic products (BIOWAYS, 2017a). Moreover, the "bio" confusion is also related to the difference between BBPs and biodegradable products (Biobridges, 2020d).

To address these misconceptions, the Biobridges project proposes to "create a 'Glossary of the Bioeconomy', presenting scientific and standard definitions using a comprehensible language to be disseminated among **the large public**" (Biobridges, 2020a). An example of glossary table can be found in AllThings.Bio (BioCannDo, b), while a more policy-oriented glossary is provided by the Knowledge Centre for Bioeconomy (Knowledge Centre for Bioeconomy, s.d.).

Biobridges identifies (Biobridges, 2020c) also the communication needs in the bio-based economy, mainly summarized: the promotion of business opportunities, growth of the market, awareness of bio-based applications and opportunities, need for skilled workers and trust in BBPs; the communication of environmental and socio-economic benefits of bioeconomy and its circularity aspects.

Furthermore, in Europe there are just a few bioeconomy courses covering the social-scientific perspective, limiting the **transdisciplinarity of education** (Masiero *et al.*, 2020).

- Interests and motivations

There is a growing and positive interest of **multipliers and supportive environment stakeholders** in BBPs and bioeconomy (BIOVOICES, 2018; BIOWAYS, 2018c; Stern *et al.*, 2018), but the level of public knowledge and engagement struggles to grow (BIOWAYS, 2018c).

Consumers usually prefer BBPs over their conventional equivalents, though high costs and the lack of available and proper labelling hinder this choice (BIOWAYS, 2018c).

Multipliers and supportive environment stakeholders usually believe that BBPs can lead to environmental benefits, particularly the decrease of the use of fossil fuels and waste and greenhouse gases production, and the increase of sustainable economics and job opportunities (BIOWAYS, 2018c).

Alongside environmental issues, a study about **bioeconomy perceptions** shows that for some stakeholders' categories in Austria there are some doubts about the feasibility of a future bioeconomy (Stern *et al.*, 2018). In detail, **students** seem to be more curious and interested in bioeconomy than others, while **pensioners** are positive and more interested in "back to nature" and "quality of life" aspects. **Farmers** focus on "back to nature" aspect too, but they are also more critical and doubtful about the sustainability and effectiveness of the bioeconomy, believing it could lead to more inequity. As the authors of the study suggest, to address these fears and doubts it could be useful to provide concrete examples about the possibilities of bioeconomy.
However, in Sweden, a positive perception of bioeconomy seems to not change among different stakeholders in the forestry sector, like **Environmental Non-Governmental Organizations**, **industry**, and **forest owners** (Hodge, Brukas, & Giurca, 2017).

A consultation of the Biobridges project (Biobridges, 2020d) also showed that **young people** are more interested in BBPs' end-of-life information, while **elders** are more interested in BBPs' biodegradability.

4.4. Activities

The conceptual framework provides guidelines for the collection of contents, tools, databases, platforms, and good practices (T1.2), and for the production of the awareness, communication and education toolkits (T1.3).

Awareness, communication and education are different kinds of activities, each with a different role in the Bioeconomy.

Each of these fields requires different approaches and tools. At the same time, however, they are related to each other, for two different reasons:

- they are complementary in mobilising a behavioural change;
- there may be a need for a specific combination of the different types of activities depending on the context and starting point of Bioeconomy knowledge.

Awareness is intended as the knowledge or perception of a situation, and related actions are aiming at increasing such knowledge about the Bioeconomy (awareness-rising activities). The development of the bioeconomy and the increase of more sustainable consumption need to raise awareness and knowledge sharing of the environmental and socio-economic impacts of the bioeconomy, both in detail and at large, and of BBPs (European Commission, 2018; LIFT, 2020a).

Stakeholders' engagement in these activities is a primary step (LIFT, 2020c) to be carried out mainly at the regional and local levels with various messages, tools, and points of view (LIFT, 2020a).

Communication involves the exchange of information in a rather general way (though it usually requires a clear identification of targets). Bioeconomy holds some concepts that are difficult to understand and communicate, with complex terminology that can lead to misunderstandings and concerns (LIFT, 2020a). Moreover, not every type of stakeholder is engaged in all contexts and initiatives, with the consequent lack of responses to their needs in the agenda-setting. It is therefore useful to create connections with less reached stakeholders, creating a framework to engage each type of target at different levels (LIFT, 2020c).

Education involves the process of systematic instruction, especially (but not only) provided through formal institutions. 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, indeed, is pivotal to address the challenges and exploit the opportunities of the bioeconomy (LIFT, 2020b). Education needs could be fulfilled by different educational institutions, 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, 2020b).

Skills needed in the bioeconomy include more and more **transversal skills** and competences (LIFT, 2020b; Pubule *et al.*, 2020), and the project will cover the topic in a specific policy brief (D3.7). To provide these skills, formal, non-formal and informal education platforms can be developed, responding to different generational and regional needs and preferences (Hakovirta & Lucia, 2019).

The H2020 LIFT project (2020a) – *Boosting bioeconomy by maximizing CSAs results* collected on the European Bioeconomy Library awareness-raising materials and tools developed by several Coordination and Support Actions projects.

4.5. Sectors

The project accounts for bioeconomy at large and the related environmental and socio-economic impacts for European citizens.

At the international level, however, there is neither a clear definition of bioeconomy, a concept that has changed over time to address new challenges, nor a clear classification of its key sectors (Beluhova-Uzunova, Shishkova, & Ivanova, 2019).

Following classifications elaborated by the JRC (2017), the Updated Bioeconomy Strategy (2018), and Ronzon & M'Barek (2018), all bioeconomy sectors will be covered, such as:

a. land and marine ecosystems, including the services they provide;

b. all primary production sectors using and producing natural resources (agriculture, forestry, fisheries and aquaculture);

c. all economic and industrial sectors using natural resources and processes to produce food, feed, BBPs (bio-based textiles, chemicals, pharmaceuticals, plastics and rubber), wood products and furniture, paper, bioelectricity and liquid biofuels;

d. bio-based services and all support sectors relevant to unlock the full deployment of bioeconomy (regulatory, normative, risk assessment, technology transfer, investment, IPR, dissemination, etc.).

4.6. How to set up actions

Here are listed recommendations and guidelines about how to engage beneficiaries and communicate knowledge and information. Evidence and suggestions were collected from other projects and the literature review, suggesting the most suitable *channels* to reach the target groups, *messages* to frame the *contents* to communicate, usable *tools*, also proposing *specific activities*.

- Channels

Different channels make it possible to reach different types of stakeholders. Furthermore, each channel allows only certain types of tools. The messages and contents should be specifically tailored to the channels as well, due to the different targets that can be intercepted with each channel and the allowed formats.

Among the press and technical and policy documents, the word "bioeconomy" is already spreading (Masiero *et al.*, 2020), though there are some **limitations for citizens** (BIOWAYS, 2017a).

For **students of forestry programmes** in Europe, the principal sources of information about bioeconomy are, in order, university courses, news, scientific papers, social media, colleagues and conferences (Masiero *et al.*, 2020).

The consultation conducted by the Biobridges project (Biobridges, 2020d) showed that European **consumers** of different ages prefer to receive information about BBPs from researchers and brands, through TV and social media. To target **young people**, Biobridges especially suggests using social media (Biobridges, 2020a).

Teachers enjoy mass media and social media, usually in their native language (DESIRE, 2013). Twitter seems to be more appreciated by them among social media, while other useful professional social media to engage educators are national platforms for teachers and educational blogs. When possible, face-to-face activities could be preferred as they are very effective (DESIRE, 2013).

Considering **EU population**, the Special Eurobarometer Report *"Attitudes of Europeans towards the Environment"* (European Commission, 2020) shows that the main sources of information about the environment are, in order, 'Television News', 'Social Networks and the Internet', 'Newspapers'. In particular, with the increasing age of citizens, there are an increase in the use of television and newspapers, while social media and the internet are more used by young people. Furthermore, social media use is different at a geographical level, as shown in Figure 3.

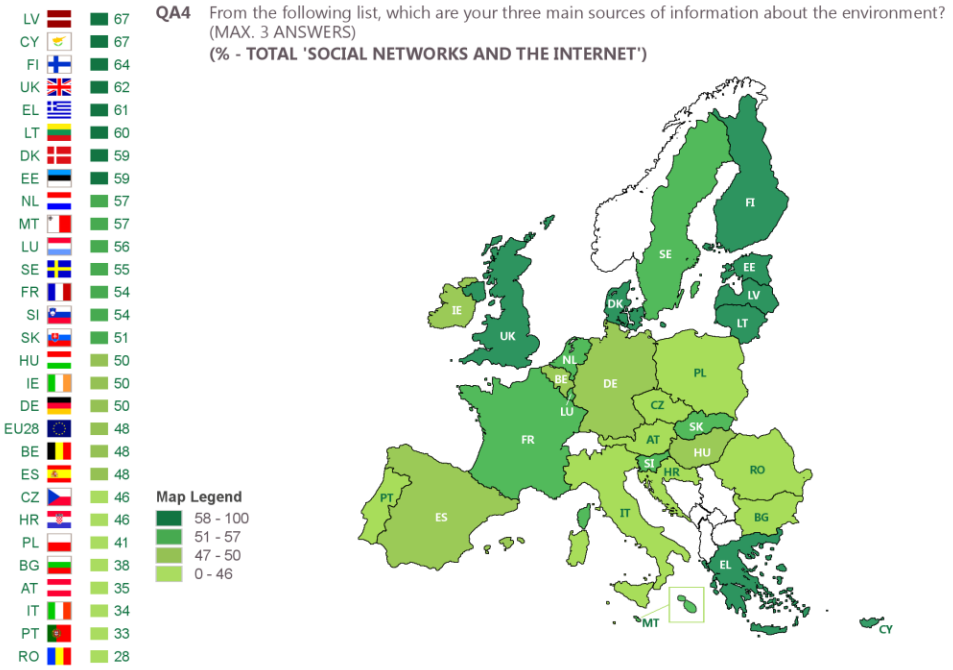

Figure 3. From (European Commission, 2020). The map shows the proportion of respondents in each country who mention social networks and the Internet among the main sources of information about the environment.

Communication activities should be tailored also to the chosen channels, otherwise running the risk of not fully exploiting their potential and not reaching the targets of interest (CommFABnet, 2014). LIFT insights (2020a) about the design of impactful awareness and communication strategies recommend the use of innovative channels (large scale events, science festivals, workshops, fairs, social media), but innovative formats are not seen as a positive aspect by people (BIOWAYS, 2017b; BioCannDo, 2020). Instead, traditional formats are preferred, but with innovative content easily redistributable through the compatible channels (BioCannDo, 2020). Indeed, **the general public** usually prefers formats they are familiar with, and innovative formats could be mistaken for other traditional formats or not be technically properly embedded or shared through external partners' and supporters' channels (BIOWAYS, 2017b; BioCannDo, 2020).

The BLOOM project published an outreach and engagement guidebook (BLOOM, 2020a), which provides useful information on different channels and tools to be used based on the objectives to be achieved and the desired level of stakeholders' engagement:

- Informing stakeholders (public exhibitions, local tv discussions, short animation videos, newsletters, co-created monographs, lecture series, interviews)
- Consulting stakeholders ("real life examples" brochures, podium discussions, gallery walks, participation in conferences)
- Involving stakeholders (social media campaigns, science cafés, online conferences, webinars, multi-sensory exhibitions and experiences)
- Collaborating with stakeholders (civic dialogues, *Open Space Technology* events, study and ambassador study trips, outdoor games for families, innovation bus tour, escape rooms, MOOCs)
- Empowering stakeholders (collections of teaching resources, challenge prizes, deliberative workshops, round tables, workshops, *world cafés*)

- Messages

The core messages of the toolkits will concern the specific interests of the stakeholders of the DEMAND SIDE (*What is bioeconomy?*), of the SUPPLY SIDE (*What are the bioeconomy opportunities for you?*) and of the MULTIPLIERS / SUPPORTIVE ENVIRONMENT (*How to communicate and support bioeconomy?*).

To address these interests, it is essential to decide how to frame the key messages, taking into account the needs and motivations of the target groups.

The demand for environmentally friendly and sustainable products is growing (BioCannDo, 2020), as well as "green" advertising claims are increasing. At the same time, however, there is not enough awareness and clarity about BBPs, and the origin of the raw materials alone is not enough to convince many consumers. In fact, communication about these products risks creating suspicion and being considered greenwashing (BioCannDo, 2020). The choice of key messages and how to transmit them to the target groups to raise awareness, communicate and educate about bioeconomy is therefore a difficult and delicate action.

To address suspicions and reluctances of **consumers**, messages should be based on a solid scientific background made understandable with a lay language, avoiding jargons and technical languages (LIFT, 2020a). They should also be presented in an honest and transparent way, showing practical and concrete applications of interest to the target groups (BioCannDo, 2020).

The key messages then should be adapted to the target audience (BioCannDo, 2019), facilitating its involvement.

Addressing **consumers**, the engagement can be stimulated by letting them share their stories and opinions about the message, while, addressing **experts**, it is needed to ensure representativeness and avoid biases (BioCannDo, 2020). It may also be useful to underline the

incentives for stakeholders' engagement, which may be financial or networking and information sharing opportunities.

Furthermore, the Road To Bio project suggests (Road To Bio, 2019) to set the messages to be concise, relevant, compelling, memorable, real, and tailored. In particular, the messages to be communicated should be few and briefly presented, showing the benefits, responding to audience needs and stimulating actions.

It may be useful to choose messages that show the uses and benefits of BBPs, going into the details of their environmental, social and personal performances (BioCannDo, 2019; 2020; Biobridges, 2020a), as well as economic information. The biodegradability and disposal of these products are other important elements of interest for **consumers**, that should be communicated in a clear and transparent manner, coherently with the provisions and possibilities of regional and local authorities (BioCannDo, 2020).

To improve the perception of the positive impacts of the bioeconomy, the Biobridges project (2020a) recommends explaining specific potential benefits to different stakeholders, as:

- **Primary producers** – "to explain how to valorise unexploited resources that could enable them to increase their incomes";
- **Policymakers** – "to stimulate them to boost the rural development through the definition of strategies and the investment of public resources";
- **Unemployed people** – "to explain new possible opportunities";
- **Young generations** – "to guide them towards educational and career paths that could develop their skills for future jobs in the sector".

Road To Bio (2019) and BLOOM (2020b) projects propose some key messages about bioeconomy, that could be summarised as:

- BBPs can replace fossil fuels by using new renewable raw materials, reducing pollution, greenhouse gases emissions and the damage to the environment;
- The use of reusable and transformable raw materials allows the development of a circular economy, more efficient than a linear economy based on fossil sources;
- Careful management is required in order not to create problems for food production and safety, improving the efficiency of biomass use;
- Sustainable bioeconomy can help achieve several SDGs;
- Bioeconomy includes and involves different types of processes and industries, stimulating economic opportunities for farmers;
- Biomass resources are region-specific;
- To change purchasing choices, more information about bioeconomy and BBPs is needed;
- Bioeconomy can lead to job creation, and specific educational programmes will train the new workforce.

Consumer surveys conducted by BioCannDo (2019) have shown that topics such as innovativeness, biomass cropping issues and ethical issues, like competition with food and genetic modification, seem to be less important in purchasing decisions.

Communicating the scientific aspects of the bioeconomy, it is necessary to show the extent of our actual knowledge and the transparency and inherent uncertainty of research outcomes (Druckman, 2015).

- Contents

Awareness, communication and education activities should communicate objective and complete information and knowledge, which should be scientifically correct but at the same time relevant and in an understandable language for the target group (BioCannDo, 2020; LIFT, 2020a).

In general, using stories and storytelling helps create a framework for the interpretation of the contents, combining data and information with the values, emotions and personal experiences of the target groups (LIFT, 2020a). If stories show positive examples, especially concerning topics widely debated among the stakeholders, raising awareness and motivations is favoured (CommFABnet, 2014; Biobridges, 2020a; LIFT, 2020c).

Stories make contents more appealing, and they should be “unique, exploiting some details that catch the eye, that have a special and striking twist”, as suggested by the DESIRE Reach Out Toolkit (DESIRE, 2013).

Examples of stories are provided by BioCannDo with storytelling kits about specific categories of BBPs (BioCannDo, c).

To increase awareness and acceptance, it is also useful to show the impacts and benefits of BBPs to **consumers** (BioCannDo, 2020; LIFT, 2020a). In particular, it is important to emphasize the additional benefits for **consumers**, especially when they are not immediate and easily understandable, even going beyond the mere difference in the origin of the raw materials (BioCannDo, 2020). Furthermore, when communicating to **industry** and **policymakers**, it is advisable to make information understandable and relevant from a business or policy point of view (CommFABnet, 2014).

BioCannDo project insights (2020) suggest using “Q&A” formats to address the shared doubts and knowledge needs of the audience.

- Tools

Tools allow conveying messages and contents through compatible channels, and should also be used according to the objectives, the type of stakeholders and the age of the audience.

For example, exhibitions can be used to show relevant and current aspects of the bioeconomy and BPPs, while "hands-on" activities can help engage **younger people** by showing them the

bioeconomy and its processes (LIFT, 2020a). Moreover, webinars can also combine the dissemination of project results with external contributions from different points of view (BioCannDo, 2020).

Comics, animations and other visual narratives can be used to allow **general audiences** to understand bioeconomy science (Farinella, 2018), while serious games can be used to effectively make the audiences aware (Wendler & Shuttleworth, 2019). Examples of cartoon visual communications about the bioeconomy can be found on the Global Bioeconomy Summit website (2020a; 2020b).

Examples of tools for the bioeconomy and BBPs have been collected by BIOWAYS (BIOWAYS, s.d.) in a toolkit that presents serious games, quizzes, educational videos, factsheets, and presentations. An online platform was created by BioCannDo with promotional communication tools (BioCannDo, a; LIFT, 2020a).

Other examples of tools, to be used based on the objectives to be achieved and the desired level of stakeholders' engagement, can be found on BLOOM outreach and engagement guidebook (BLOOM, 2020a).

- Specific activities

To involve the target groups of the project, different kinds of activities can be useful.

Extensive and comprehensive lists and descriptions of activities aimed at different types of stakeholders were collected by the BLOOM project in its *Guidebook on engagement and co-creation methodologies* (BLOOM, 2018).

In particular, the Guidebook explains that co-creation workshops could be used to empower stakeholders by helping them to "design and deliver services themselves".

As the LIFT project pointed out in the factsheet *Stakeholder Engagement and Co-creation* (LIFT, 2020c), "Co-creation, e.g., through Mobilisation and Mutual Learning (MML), 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."
This is coherent with what emerged from BIOVOICES quadruple-helix stakeholders interviews (BIOVOICES, 2018), which shows that "MML events are a powerful and extremely useful forum for approaching the challenges of implementing bio-based industries and agriculture, by bringing together representatives of the 4-helix stakeholders groups (business, civil society/users, research, government/policy making)."

Based on previous experience, Biobridges (2020b) provided detailed information and recommendations on how to design and implement co-creation and MML workshops.

Another kind of activities that could be used to provide more learning opportunities to **children** and **young people** is informal education (Hakovirta & Lucia, 2019), which is usually provided by museums, libraries, nature centres, and other types of organisations.

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- Framework

The key dimensions of the conceptual framework are summarised and listed in the table below.

Activities	Main issues
Awareness	-Need to disseminate environmental and socio-economic impacts of bioeconomy and BBP
Communication	-Concepts that are difficult to understand and communicate, with complex terminology that can lead to misunderstandings and concerns -Need to engage every type of stakeholder
Education	-Need of new and transversal skills, increasing the offer of courses

	General	Demand	Supply	Multipliers/Supportive environment
Interests and needs	-Difficult to find information about bioeconomy and BBPs -Confusion about "bio" as organic and "bio-based" concept -Promotion of business opportunities, growth of the market, awareness of bio-based applications and opportunities, need for skilled workers and trust in BBPs -Communication of environmental and socio-economic benefits of bioeconomy and its circularity aspects -Just few bioeconomy courses covering the social-scientific perspective, limiting the transdisciplinarity of education	-Need for clear, user- friendly, understandable messages and informative materials concerning the bioeconomy matter -Lack of knowledge in the bioeconomy matter at large	-Lack of knowledge on economic benefits stemming from bioeconomy	-Lack of personnel/experience/time to develop bioeconomy communication strategy Lack of knowledge on how to communicate research results
Interests and motivations		-Consumers usually prefer BBPs over their conventional equivalents, though high costs	-Farmers focus on "back to nature" aspect too, but they are also more critical and doubtful about the sustainability and	-Growing and positive interest in BBPs and bioeconomy

		and the lack of available and proper labelling treat this choice -Students seem to be more curious and interested in bioeconomy than others -Pensioners are positive and more interested in "back to nature" and "quality of life" aspects -Young people are more interested in BBPs' end-of-life information -elders are more interested in BBPs' biodegradability	effectiveness of the bioeconomy, believing it could lead to more inequity	-Believe that BBPs can lead to environmental benefits, particularly the decrease of the use of fossil fuels and waste and greenhouse gases production, and the increase of sustainable economics and job opportunities -Teachers enjoy mass media and social media usually in their native language

How to set up actions				
	General	Demand	Supply	Multipliers/Supportive environment
Channels	-Use innovative channels, but traditional formats -The main sources of information about the environment are, in order, 'Television News', 'Social Networks and the Internet', 'Newspapers'. In particular, with the increasing age of citizens, there are an increase in the use of television and newspapers, while social media and the internet are more used by young people. Furthermore, social media use is different at a geographical level	-For students: university courses, news, scientific papers, social media, colleagues and conferences -For consumers of different ages: from researchers and brands, through TV and social media		-Twitter seems to be more appreciated by teachers among social media, while other useful professional social media to engage educators are national platforms for teachers and educational blogs. Face-to-face activities could be preferred

	-Channels and tools based on the objectives to be achieved and the desired level of stakeholders' engagement: • Informing stakeholders (public exhibitions, local tv discussions, short animation videos, newsletters, co-created monographs, lecture series, interviews) • Consulting stakeholders ("real life examples" brochures, podium discussions, gallery walks, participation in conferences) • Involving stakeholders (social media campaigns, science cafés, online conferences, webinars, multi-sensory exhibitions and experiences) • Collaborating with stakeholder (civic dialogues, Open Space Technology events, study and ambassador study trips, outdoor games for families, innovation bus tour, escape rooms, MOOCs) • Empowering stakeholders (collections of teaching resources, challenge prizes, deliberative workshops, round tables, workshops, world cafés			

Messages	-Based on a solid scientific background -Use a lay language, avoiding jargons and technical languages -Honest and transparent way, showing practical and concrete applications of interest to the target groups -Underline the incentives for stakeholders' engagement -Set the messages to be concise, relevant, compelling, memorable, real, and tailored -Messages should be few and briefly presented, showing the benefits, responding to audience needs and stimulating actions -Show the uses and benefits of BBPs, going into the details of their environmental, social and personal performances, and economic information -Key messages: • BBPs can replace fossil fuels by using new renewable raw materials, reducing pollution, greenhouse gases emissions and the damage to the environment	-Core message: *What is bioeconomy?* -Let consumers share their stories and opinions about the message -Ensure representativeness of experts and avoid biases -Explain biodegradability and disposal of BBPs in a clear and transparent manner, coherently with the provisions and possibilities of regional and local authorities -For unemployed people – "to explain new possible opportunities" -For young generations – "to guide them towards educational and career paths that could develop their skills for future jobs in the sector"	-Core message: *What are the bioeconomy opportunities for you?* -For primary producers – "to explain how to valorise unexploited resources that could enable them to increase their incomes"	-Core message: *How to communicate and support bioeconomy?* -For policymakers – "to stimulate them to boost the rural development through the definition of strategies and the investment of public resources"

	• The use of reusable and transformable raw materials allows the development of a circular economy, more efficient than a linear economy based on fossil sources • Careful management is required in order not to create problems for food production and safety, improving the efficiency of biomass use • Sustainable bioeconomy can help achieve several SDGs • Bioeconomy includes and involves different types of processes and industries, stimulating economic opportunities for farmers • Biomass resources are region-specific • To change purchasing choices, more information about the bioeconomy and BBPs is needed • Bioeconomy can lead to job creation, and specific educational programmes will train the new workforce			
Contents	-Use stories and storytelling, showing positive examples and creating a framework for the interpretation of the contents, combining data and information with the values, emotions and personal experiences of the target groups	-To consumers: Impacts and benefits of BBPs; emphasize the additional benefits for them, going beyond the difference in the origin of the raw materials	-To industry: understandable and relevant information from a business point of view, materials aiming at showcasing **economic opportunities** in bioeconomy	-To policymakers: understandable and relevant information from a policy point of view

	-Use “Q&A” formats			
Tools	-Comics, animations and other visual narratives can be used to allow general audiences to understand bioeconomy science -Serious games can be used to effectively make the audiences aware -Exhibitions can be used to show relevant and current aspects of the bioeconomy and BPPs -Webinars can combine the dissemination of project results with external contributions from different points of view	-Hands-on activities can help engage younger people by showing them the bioeconomy and its processes		
Specific activities	Co-creation workshops could be used to empower stakeholders			-Informal education for children and young people

5. Results of the Advisory Board survey

Advisory Board members and additional experts representing quadruple-helix stakeholders were interviewed, providing recommendations and suggestions.

The survey template of the interview is available as annex 1.

Table 1. List of the interviewed experts.

Name	Organisation	Main competence
Iris Aquilina Andersen	Bioladies	Gender innovation in bioeconomy
Christophe Cotillon	ACTIA - The French Network for Food Technology Institutes	Technology transfer in food industry, especially SMEs
Yannis Fallas	Cluster of Bioenergy and Environment of Western Macedonia Bioeconomy Stakeholder Panel	Bioenergy and Environment
Barna Kovács	BIOEAST	Policies
Piergiuseppe Morone	UNITELMA	Environmental and socio-economic benefits of bioeconomy
Mario Roccaro	EIT Food	Education in the food sector
Elsebeth Terkelsen	Greencities	Local bioeconomy strategies
Giovanna Cristina Varese	UNITO	Bioeconomy in the Circular Economy
Agueda Gras-Velazquez	European Schoolnet	Education

How to ensure the coverage of all bioeconomy sectors

Interviewed experts confirmed the validity of the bioeconomy sectors' classification listed in *4.5*. They argued that it is coherent with the usual classification criteria used by bioeconomy institutions and allows to cover the bioeconomy at large.

Nevertheless, most of the involved experts recommended including specific sub-sectors, going into more detail in the listed categories:

- The bio-based building sector should be included in the category “c. all economic and industrial sectors using natural resources and processes to produce food, feed, BBPs (bio-based textiles, chemicals, pharmaceuticals, plastics and rubber), wood products and furniture, paper, bioelectricity and liquid biofuels.”
- Biochemicals and bio-based green chemistry sectors should be better detailed.
- Bio-based packaging producers (polymers producers and producers that use polymers) should be included, as well as the biomaterials sector.

- Sustainable production systems, which include the sustainable input part and sustainable use of natural resources in the bioeconomy (caring of the soil, water and air), should be mentioned under a different category or in more detail under the category "b. all primary production sectors using and producing natural resources (agriculture, forestry, fisheries and aquaculture."
- Institutions addressing biodiversity conservation, valorisation, and research should be present in the category "a. land and marine ecosystems, including the services they provide."
- An important aspect that should be included also in the category "b. all primary production sectors using and producing natural resources (agriculture, forestry, fisheries and aquaculture)" is the role of microorganisms. In the near future, microbial biomass (bacteria, fungi, algae) will be a pivotal primary source of different resources, including food and feed, using by-products of other production chains in a circular approach.
- In the category "d. bio-based services and all support sectors relevant to unlock the full deployment of bioeconomy (regulatory, normative, risk assessment, technology transfer, investment, IPR, dissemination, etc.)" the linkages to the European research infrastructures which provide this kind of services (e.g., MIRRI, EMBRC, BBMRI, ELIXIR, OPENSCREEN, etc.) and their national nodes should be also outlined.
- It may be useful to consider, from a circular economy perspective, the recovery of waste from the agri-food sector to create added value in the food, agriculture, pharmaceutical and cosmetic, and energy sectors.
- It could also be useful to consider the points of contact with the circular economy sectors related to plastics and metals.

One member of the Advisory Board suggested that another possible classification criterion could take into account a census of the fluxes of raw materials and secondary raw materials, considering which materials are potentially bio-available with a mapping of the fluxes, seasonality and availability of materials. This affects suppliers, manufacturers, and application sectors across the board.

Some of the experts suggested to also consider industries and SMEs as part of the DEMAND SIDE and not only of the SUPPLY one.

Another one took into account how to properly communicate bioeconomy extent and diversity. She suggested tailoring sectors classification to the different audiences by making it understandable and showing the extension of the bioeconomy.

In particular, according to her the economic sectors classification (e.g., "primary, secondary, tertiary" classification criterion) is easier to understand for consumers, while the conceptual framework's sectors classification is more technical and understandable by those who already know the bioeconomy. Furthermore, it was recommended that science advice to policymakers about the bioeconomy sectors extension should be particularly cared of, in order to avoid possible policy issues of not taking into account the bioeconomy at large.

How to properly divide and define the target groups

The different target groups were identified in a proper way in *4.2*, especially for the MULTIPLIERS and SUPPORTIVE ENVIRONMENT SIDE; experts reported.

All the respondents recommended paying particular attention to the engagement of different specific stakeholders of the target groups, as well as reflecting on the specificities within the same stakeholders:

- Teachers, as the whole education sector are considered very important to address a change. It was also suggested to consider the vocational training sector, as it can help fill the gap of the required skills for the workforce.
  It was pointed out that teachers' perception and engagement could be different, as it could depend on the subject they teach.
- It is fundamental to interface and involve the university and research systems.
- Bankers and investors are considered another important type of stakeholders, as investments are needed for the transition to the bioeconomy, and investors need to know bioeconomy to know the extent of the risk they take in financing start-ups and other innovators.
- Farm-to-fork stakeholders involved in the bioeconomy chain or systems should also be considered.
- Green procurers should know more about how to do green bio-based materials procurement.
- Consumer's organisations could be engaged for making understand and promoting bioeconomy.
- Primary production cooperatives, big farms, or farmers organisations, like the chambers of agriculture, could be approached to connect them with the modern bioeconomy concepts and with other sectors.
- Involving environmental NGOs and stakeholders of the social sectors could help achieve good results in communication activities.

One of the experts also pointed out that other possible classifications are possible:

- dividing the private side (primary production and processing) and the public side (society). Within the society side, consumers, multipliers and supportive environment could be also differentiated.
- Taking into account that teachers and organisations are intermediate steps to reach other target groups.

How to set up actions

Interviews went into detail of the specificities of the different target groups for each activity, focusing on target group's needs and interests, the core message(s) to be conveyed, the most

suitable tools and good practices to better communicate and engage, and the possible impacts on the social and gender dimensions.

DEMAND SIDE

According to the consulted experts, consumers are interested in sustainability and bioeconomy, but they need clear and reliable information about bioeconomy and BBPs. So, they can compare BBPs and traditional fossil-based products about their impacts, performances, and cost reasons.

It was pointed out that the general public usually enjoys information materials in its mother tongue, and that permanent institutional web sites should be created to provide useful information for each target groups.

Using practical activities and telling successful stories were indicated as a good way to communicate and engage this target group. Different kind of professional can provide them useful advice for purchasing bio-based alternatives. To show the bioeconomy in a practical way, BBPs exhibits in big fairs were suggested as a useful tool, as well as web and social media opportunities, and of traditional media too. Furthermore, public authorities should be involved to help disseminate information on the bioeconomy, and training courses providing credits could foster education activities.

Addressing citizens, families and students, challenge-based activities should be used, as they are very useful for the empowerment of these categories, leading to find solutions from below.

It was underlined the real importance to take into account social and gender aspects and impacts. Given that some BBPs are aimed at a specific gender, it is needed to keep in mind the needs of that gender.

Furthermore, since women are very often involved in purchasing decision or in influencing purchasing decision, they can play an important role in the transition to bioeconomy.

The need to involve and depict women and girls in events and graphic materials was also pointed out, so that especially young women can be inspired to pursue certain choices or career paths.

Another aspect of the social dimension is the important social value bioeconomy can have, since some sectors could involve disadvantaged people in different activities.

Table 2. DEMAND SIDE insights from the interviews.

Activities	Needs and interests	Core message(s)	Gender impacts	Most suitable tools	Good practices
Awareness	"Ordinary" people are very interested in actively	If you come as a kind of an expert, you could convince	Many of the innovations in the bioeconomy come from	Exhibit of BBPs in fairs, showing the bioeconomy in a practical	Using practical and creative activities.

	participating in the development of the society, reducing the CO2 concentration, etc. This side's stakeholders may prefer greener and, especially for the companies in the demand side, affordable products for a cleaner future. If consumers know the different socio-economic and environmental impacts of BBPs, they would accept a price increase. It could be argued that, at this stage, raising awareness is far more important than educating people, though the three different Activities are related.	them that there is no danger in using BBPs, but you must be able to document that they work as well as conventional ones and can compete in the price as well or what are the reasons for the difference in costs. We need to provide practical examples of what areas we can act in and why it has not yet been done. We must also show how we can recover this lack of action, also considering that in some sectors it is easier to recover while in others it is more difficult. It could be useful to explain to families and restaurateurs the impact of food waste, as well as the importance of recycling, mainly showing the opportunities offered by waste recovery from a circular economy perspective.	women, and women are who usually make purchasing decisions as consumers or procurement officers. So, they can greatly support the transition to bioeconomy, if properly informed. Women and girls should be represented and depicted in bioeconomy events and graphic materials, so that they can identify themselves with them and understand that they can play a role in the bioeconomy. It should be considered that there is gender imbalance at the management level. The bioeconomy can have an important social value, involving disadvantaged people in raising awareness activities and in the creation of jobs (e.g., in urban gardens and in the conservation and valorisation of biodiversity).	way. It works really well.	Aware architects and other professionals could provide important advice in purchasing decisions. Exhibit of BBPs in fairs. Take action to correct the perception of the role of all biodiversity, including the conservation of microorganisms whose perception is not always positive. Addressing citizens, families and students, challenge-based activities are very useful for the empowerment of these categories, finding solutions from below.

			Contents should be gender-neutral.		
Communication	Consumers need transparent and reliable information about BBPs and their environmental performances. A proper labelling system could help. How to approach the target groups can vary very much based on the country and the region of interest. Most of the general public usually enjoy information materials in its mother tongue. You have to identify their main source of information: public authorities can help disseminate information on the bioeconomy, so they should be involved. Permanent institutional sites that are easily accessible by everyone are needed. There you should find updated information and data, and legislative and dissemination documents	Bioeconomy sectors should be shown in a simple and understandable way, making the audience understand the extension of the bioeconomy.	It could be useful to keep in mind gender specific needs and the peculiarity of BBPs aimed at a specific gender, e.g., personal hygiene products.	Communication campaigns, especially using web tools and social media, as they work well, particularly for wider publics. Also, TV and TV broadcasts could be useful, as a lot of people continues watching them.	Using good stories and good examples, the most convincing. To effectively engage public procurers, you have to do in advance a kind of prep meeting with them, where you can investigate what they do need, how they need it and then you can approach them. Public authorities can help you engage citizens and society in general, or you have to go in a very specific environment, as at schools or at the Universities. Otherwise, it's very difficult to reach out to them.

	made available with a fair approach. Information should then be tailored at a national and regional level.				
Education	Ageing issue: those who are linked with the primary production are ageing. Society at large still considers agriculture as a traditional and old-fashioned sector. It is needed to change this perception.		Women and girls should be represented and depicted in bioeconomy events and graphic materials, so that they can identify themselves with them and understand that they can play a role in the bioeconomy.	Training courses providing credits.	

SUPPLY SIDE

Bioeconomy sectors need more skilled workers, most of the experts reported. Producers also need to be accountable for the sustainability of the production chain.

Interviews also showed that the transition to bioeconomy could be different among sectors, with a change in the labour market in purchasing decisions and in costs. Hence, it is considered important to communicate the need for a fair transition and to take into account that different sides could perceive an alleged decrease in wellbeing.

It was also pointed out that different stakeholders of the same sector could be differently aware of the bioeconomy and use a different technical language. Encouraging cross-sectoriality should be done, contextualizing information at a local level.

One of the experts explained that it is really necessary to provide practical and useful information about waste opportunities and the circular approach in the bioeconomy.

Another one of the respondents underlined that to disseminate information about bioeconomy opportunities, professionals networking and technical advice could be useful. Among tools, he also suggested preferring short videos to paper documents. At the same time, face-to-face meetings have to be preferred.

Table 3. SUPPLY SIDE insights from the interviews.

Activities	Needs and interests	Core message(s)	Gender impacts	Most suitable tools	Good practices
Awareness	The Supply side has to show the sustainability of the entire production chain in a transparent way. Stakeholders of this side usually produce a lot of waste, but they do not know its environmental impacts or how to use it to add value.	The message should be differentiated for the awareness, communication and education activities. (Also valid for the other target groups and activities). Help making sense of waste's opportunities in a circular bioeconomy. We need to provide practical examples of what areas we can act in and why it has not yet been done. We must also show how we can recover this lack of action, also considering that in some sectors it is easier to recover while in others it is more difficult. Cross-sectoriality among the production sectors must be encouraged. To raise awareness on cross-sectoral activities, contextualizing with local needs	Social impacts also valid for consumers: it is necessary to pay close attention to aspects related to a fair transition. Indeed, in the transition to a sustainable bioeconomy, the demand for products and workforce may increase in certain sectors and decrease in others. A change in consumerism and in the production systems could then create imbalances in the labour market, with also an increase in the products prices due to an internalisation of negative externalities costs. It is therefore important to take into account that consumers could perceive an alleged decrease in wellbeing. It should be considered that there is gender imbalance at the	Not many paper documents should be used. You should prefer short videos about specific problems, as they are easier to remember. Short videos are a very good tool in this sense. (Also valid for the other target groups and activities) Face-to-face meetings are pivotal to foster cross-sectoriality.	Networking of professionals could help disseminate information about bioeconomy opportunities. Use more active and engaging campaigns. Show reality in practice. Take action to correct the perception of the role of biodiversity at large, including the conservation of microorganisms whose perception is not always positive. Make SMEs understand that adopting different business models can have economic benefits, together with the impacts on the environment and health. This can be done by showing them examples of best practices in the bioeconomy.

		and opportunities.	management level. The bioeconomy can have an important social value, involving disadvantaged people in raising awareness activities and in the creation of jobs (e.g., in urban gardens and in the conservation and valorisation of biodiversity).		
Communication	Considering farm-to-fork stakeholders, you have to dedicate specific tools and communication activities for each of them, as they don't speak the same "languages" and are not at the same level of awareness about bioeconomy. So, it's important to distinguish these different kinds of stakeholder and tailor special tools for them. Considering packaging producers category as divided in polymers producers and producers that use polymers, you have to consider them as different kinds of stakeholder,			Communication campaigns, especially using web tools and social media, as they work well, particularly for wider publics. Also, TV and TV broadcasts could be useful, as a lot of people continues watching them.	Create information material on general contents, which must then be contextualized at the local level.

	and you have to identify good tools to communicate to each of them. How to approach the target groups can vary very much based on the country and the region of interest. You have to identify their main source of information: for example, private companies from chambers or entities gathering them.				
Education	It is needed an update of the skills of the workforce. It is also necessary to provide education to the categories that are thought to be already trained, providing them with new cross-sectoral skills even outside the school curricula.			Training courses providing credits.	In the private sector, you have to consider that some people may already know that they want to learn how to build up a business case, while at a very general level you have to raise awareness by gathering them multiple times and explaining to them what their opportunities are. An important aspect is that teaching them would be a kind of brokerage activity, through which you are able to show them interlinkages

					between different sectors, and between business models which they were not considering before. You have to be credible, or at least transparent, that you are providing a very general introduction, or you are able to provide a more precise and deep education for them.

MULTIPLIERS and SUPPORTIVE ENVIRONMENT

Interviewees agreed on the importance of education to provide knowledge and skills of the bioeconomy. Young people are interested and should be engaged in raising awareness and education activities. Furthermore, next to schools and university courses, vocational training could be helpful to provide the proper skills for the transition to the bioeconomy.

Each target group then have to be properly trained to better play its role for the transition to the bioeconomy.

The involved experts also reported that different stakeholders need to know better what bioeconomy is:

- Teachers could already know some aspects or sectors of the bioeconomy and not know others, depending on the subject they teach.
- Bankers and investors usually don't know bioeconomy in detail, so they could consider investments to be riskier than they are.
- Policymakers need to know the bioeconomy at large to properly address policy issues.

Moreover, it was said that also multipliers need to know the differences between BBPs and fossil-based products, in order to intervene in the correct way.

Considering social and gender impacts, it was deemed fundamental to avoid greenwashing and ensure women involvement, promoting them to speak.

Among the suitable tools that could be used, workshops and informative seminars were recommended for this type of stakeholders.

Table 4. MULTIPLIERS and SUPPORTIVE ENVIRONMENT insights from the interviews.

Activities	Needs and interests	Core message(s)	Gender impacts	Most suitable tools	Good practices
Awareness	Teachers' perception and engagement could be different, as it could depend on the subject they teach. Bankers and investors need to know bioeconomy in order to know the extent of the risk they take in financing start-ups and other innovators. Multipliers may be concerned and interested in improving the added value to the common good and: -their investments; -their members (clusters and networks); -society (NGOs). Regional authorities usually want to hear something more solid and concrete and	It is necessary to make understand the difference between BBPs and traditional products in terms of performance and the reasons for the difference in costs. Therefore, purchasing decisions must be addressed with the proper incentives.	It is needed to ensure that women are involved in all these aspects, promoting them to speak. You could say multipliers if you could involve all the women.	Workshops and informative seminars could be useful.	Good examples could be shared to show the circular approach in the bioeconomy. Addressing teachers, it is necessary to act on system thinking at the school level to make them understand the linkages of the bioeconomy with their system. Addressing policymakers, it is necessary to involve them in the raising awareness activities of the other target groups to make them understand what the practical issues are.

	deal with legislative issues. Permanent institutional sites that are easily accessible by everyone are needed. There you should find updated information and data, and legislative and dissemination documents made available with a fair approach. Information should then be tailored at a national and regional level.				
Communication	How to approach the target groups can vary very much based on the country and the region of interest. You have to identify their main source of information: for example, public sector from the regional authorities for rural development or regional development.	You need to ensure that bioeconomy sectors are shown in a correct and comprehensive way to policymakers.	Social impacts: it is important to pay attention and be careful to avoid greenwashing.		Public authorities can help you engage citizens and society in general, or you have to go in a very specific environment, as at schools or at the Universities. Otherwise, it's very difficult to reach out towards them.
Education	There is a gap from just talking about sustainability and bioeconomy and then to get to the level where you can	At schools, you need to ensure accuracy, but you need to also understand that the required level of knowledge to be		Training courses providing credits.	Preparative works are needed to train teachers on the bioeconomy.

	actually act. For this, you need more knowledge and information. This could be pursued through teachers, schools and universities, but also through technical tertiary education. The pupils in the schools are very interested and could be extremely engaged in this kind of activities. University teachers, university management, and those evaluating research and technology transfer projects need to receive proper education on the needs and opportunities of the bioeconomy. The same is also true for policymakers, to be engaged at the local level above all. It is necessary to update the structure of university courses, to provide the required skills in the bioeconomy	provided might not be what researchers expect.			

	to the highest number of students, without delegating this task only to post-graduate education, allowing a faster entry into the workforce and speeding up the technology transfer of industries. School teachers need a lot of professional development activities in the bioeconomy				

6. Discussion

This document provides a draft framework for the activities to be developed in the project Transition2BIO. It intentionally focuses on exploring categories useful for the identification and qualification of tools and on identifying the main directions indicated by a small number of selected stakeholders.

The main advantage of this approach is to provide a timely summary of existing knowledge. On the other hand, in the light of this approach, the following limitations should be acknowledged:

- the number of interviewed stakeholders does not allow to expect that our exercise is representative of all possible combinations of target groups, needs and tools;
- the document remains weak in terms of processes and practical approaches to the use of toolboxes.

Both these issues will be better approached in the remaining part of the project and of WP1, task 1.1 activities.

An emerging issue is that the different activities addressed in the project (communication, education, awareness rising) need to be thought in combination in order to yield the expected effects.

7. Conclusions

This conceptual framework provides the guidelines for T1.2 (collection of existing information), T1.3 (production of the toolkits), WP2 (for the awareness and public engagement activities), WP3 (for the support activities to Member States and Regions), and WP5 (for the design of the Dissemination and Communication plan and activities), as well as for the structure and navigation logics for the Transition2BIO Library (T1.4).

The information in this deliverable will be used as an initial set of recommendations for the most suitable channels, messages, contents, tools and activities to target the different stakeholders.
The production of the awareness, communication and education toolkits (T1.3) will be then tailored to the target groups following what emerged here. Subsequently, the Advisory Board members will be involved again, together with other external experts, to validate the toolkits during a Focus Group workshop (T1.3.2) in Brussels.

As all combinations of target users, activities and tools are beyond the objectives of the project, it is recommended a careful choice of further activities in such a way as to identify cases and ideas with the higher level of replicability.

It is further recommended that this deliverable is used as a basis for a living document to be fed during the project activities based on the experiences developed and as a guidance for implementation of other tasks. In the end this will yield D1.2 - Conceptual framework of the awareness, communication and education toolkits – update in month 20.

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9. Annex 1

Survey structure		
Name	Organisation	Main competence in Transition2BIO
CV		
Have the sectors been defined in a clear and comprehensive way?		
Have the target groups been divided and defined in a clear and comprehensive way?		

DEMAND SIDE (consumers, B2B, young people, public procurers, etc.)					
Activities	Needs and interests	Core message(s)	Gender impacts	Most suitable tools	Good practices
Awareness					
Communication					
Education					

SUPPLY SIDE (primary production, industries and SMEs, biorefineries, etc.)					
Activities	Needs and interests	Core message(s)	Gender impacts	Most suitable tools	Good practices
Awareness					
Communication					
Education					

MULTIPLIERS and SUPPORTIVE ENVIRONMENT (citizens' organisations, NGOs and other associations, brands, retailers, teachers, EU-funded projects and initiatives, influencers, media, policy makers, regional authorities, initiatives, networks, clusters, etc.)					
Activities	Needs and interests	Core message(s)	Gender impacts	Most suitable tools	Good practices
Awareness					
Communication					
Education					

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