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BIOVOICES

CONNECTING BIO-BASED FORCES FOR A SUSTAINABLE WORLD

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CONTACT US
info@biovoices.eu

BIOVOICES

CONNECTING BIO-BASED FORCES
FOR A SUSTAINABLE WORLD

DELIVERABLE 3.2

Interviews Data Analysis
Identification of Stakeholders' Interests and Motivations

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Maria Paula Diogo, Paula Urze

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CONTRIBUTORS

NAME	ORGANISATION
MARIA PAULA DIOGO	NOVA.ID.FCT
PAULA URZE	NOVA.ID.FCT

PEER REVIEWS

NAME	ORGANISATION
GREET OVERBEEK	WR
SUSANNA ALBERTINI	FVA
CHIARA POCATERRA	APRE

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ABSTRACT

BIOVOICES aims at encouraging the quality, the relevance, the know-how and the social acceptability of bio-based products for a prosperous bio-economy and a sustainable world, thus responding to today's key environmental, societal and economic challenges in Europe. In Europe, the bio-economy depends on the active collaboration of a broad range of stakeholders, namely those present in the so-called "quadruple helix model" or "4-helix model" — industry, agriculture and business players, public authorities and policy makers, researchers and civil society.
BIOVOICES' main goal is to ensure the engagement of all these relevant stakeholder groups through a platform, that will involve a plurality of voices with different perspectives, knowledge, and experiences whilst also animating open dialogue, co-creation and mutual learning among them (www.biovoices.eu).

This report aims at identifying the quadruple helix stakeholders' interests and motivations to participate in the BIOVOICES MMLs (Mobilisation and Mutual Learning) community (Task 3.2). It analyses within a comparative framework data collected in 82 interviews conducted by the 13 partners of the project distributed among 10 countries (Estonia, Germany, Greece, Italy, the Netherlands, Portugal, Romania, Slovakia, Spain, and the United Kingdom). Its goal is to identify the relevant challenges to prepare future MML events and feed the BIOVOICES MML platform, thus contributing to foster an open dialogue and co-creation of knowledge among all participants.

Therefore, both the choice of the interviewees and the design of the interviews' guideline took into account the 4-helix model. Hence, the interviews target the quadruple helix stakeholders — 23% business, 26% civil society/users, 23% government and 28% research (see Chart 1)—, collect data on their perspectives, knowledge and experience concerning bio-based products, and approach them from an integrative perspective.

We begin by presenting the methodology to prepare the interviews and to select the stakeholders, proceed with the analysis of data collected and conclude with a set of hot topics and trigger questions to be addressed during future MML events. Additionally, we conclude that MML events are a powerful and extremely useful fora 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).

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I. PREPARING THE INTERVIEWS

1.Objectives of task 3.2

1. To identify the quadruple helix stakeholders' interests and motivations from business, consumers, government and research to participate in the BIOVOICES MML community, each of the 13 partners will interview at least 1 stakeholder from each group to assess:

   (i) perceived barriers & expected benefits of the market uptake of bio-based products,
   (ii) the value chains and bio-based products of interest for each group of stakeholders
   (iii) previous experiences in similar initiatives (MML, co-creation, etc.)
   (iv) expectations from other stakeholders' contributions

2. To report the expected interests and motivations of the quadruple helix stakeholders by each partner.

2. Choosing the stakeholders for the interview

All partners were expected to conduct interviews at least with one relevant stakeholder of the 4-helix. However, if possible, we have recommended that a more extended set of interviews should be conducted, namely:

- Business representatives: stakeholders who perform different roles in the value chain (e.g. innovation manager to support start-ups, brand owner who sells bio-based products, provider of input).
- Civil society/users representatives: national consumers or environmental organizations, local associations, individuals.
- Government representatives: local and national representatives.
- Research representatives: universities and business R&D units.

3.Building the questionnaire and conducting the interviews

The guidelines for the interviews bear in mind that on the one hand they prepare the MML events, and on the other hand they foster comparisons across the 13 partners. A harmonizing grid of questions is thus critical to compare both different partners and different perceptions on bio-based products across the 4-helix stakeholders.

Four "questionnaires"/guidelines were developed, one for each of the 4-helix stakeholders (Appendix 1). The interview guide is divided into three blocks:

(i) general information;

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(i) particular questions for each of the 4-helix groups;
(ii) MML-related questions.

The first and third blocks are mostly common to all stakeholders; the second block addresses specific questions concerning different stakeholders.

We designed a semi-structured one-to-one standardized open-ended interview that allow the interviewees to steer the dialogue and establish the flow of the conversation, but still empowers the interviewer to control the process by using the questions as a checklist to make sure all topics are covered.

As the interviews are quite open it is easy to divert from the main questions. Therefore, we ask the partners to lead the interviewee back on track if necessary so that all questions/topics are tackled.

To facilitate the task of the interviewer, the questionnaire has a mix of open and closed questions. The first category aims at exploring topics and collecting information allowing the interviewee to speak freely and to develop their point of view; closed questions aim at obtaining more precise, limited or quantifiable answers that can easily be categorized. The answers to these questions is more restricted, like a simple 'yes' or 'no', or they can take the form of short facts or a choice of defined alternatives.

We included a consent form template (Appendix 2), that should be signed by all the stakeholders interviewed.

Before beginning the interview *strictu sensus*, we recommended partners to set the background of the interview by focusing on the following topics:

- shortly present the project;
- explain the reason why interviewees were chosen;
- introduce the MML concept as a EU program designed to address societal challenges and to stimulate interaction across different stakeholders and to achieve consensus. If different *fora* and methods to encourage debate are already in place (e.g. CoP, mini-delphi meetings, world café events) partners may use them as a support to move to MML strategy.

4.Presenting the information

Once all data was collected it was possible to compare it. In addition, it was possible to design the MML template building on the hot topics and trigger questions pointed out by stakeholders (there is an open question in the questionnaire addressing specifically possible hot topics).

After the interviews were completed partners were asked to write a short national report with context based on at least 4 interviews. Qualitative data requires more work when it comes to coding and analysing the responses. Therefore, we suggest the use of a very simple template in order to allow for a more standardized presentation of the information:

1. context
2. motivation for the selection of interviewees
3. sum up of the results of each block of the interview (see i, ii and iii of the questionnaire)
4. current status (quest 2-4 with table for business and similar ones for others)
5. identification of the stakeholders' main concerns and opportunities (quest 5-7 for business and similar ones for others)
6. challenges (quest 8 with table + specific quest for business and similar ones for others)

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7. expectations from other stakeholders (quest 11-12 for business and similar ones for others)
8. MML issues (quest 13-16 for business and similar ones for others)
9. general evaluation from the interviewer.

Concomitantly the information given by closed questions was presented in tables. Using these two tools – general information presented in a specific template and tables – it was possible to code the information for patterns and themes that provide the necessary basis for a comparative analysis.

II. REPORT

1.Critical appreciation of the quality of data collected

Starting with a template for the interviews and for the national reports of the partners in BIOVOICES as a base, each partner approached the interviews in a flexible way, dropping some of the items and presenting them differently. Additionally, some partners sent only the interviews or the national report with global data instead of doing both.

This flexibility has pros and cons. If we use a simple version of a SWOC (Strengths, Weaknesses, Opportunities and Challenges) analysis, we would say that the strengths and opportunities of this approach is the fact that each partner is able to conduct the interview to its specific target, to build up the relationship and eventually to get more information from the interviewees. These are positive results insofar as it will enrich future local/national MML events. As weaknesses and challenges, the fact that data are not consistently presented makes the comparisons a challenging task and at times even impossible, as not all the information is always available.

However, one should highlight that in general terms the quality of the data is sufficient to tackle the main topics and to identify both common and diverge trends. The total number and the number by each category of stakeholders is sufficient to draw relevant conclusions bearing in mind the main goal of this stage of research within BIOVOICES: to identify a pool of challenges to be used in MML events that will take place afterwards (and not to use the information *per se*).

As mentioned in the abstract, the 13 partners conducted a total of **83** interviews (81 interviewees but 3 of them answered in a double capacity) (Appendix 3). Most of the interviewees have expertise and experience with a number of bio-based applications and developments. Given their small numbers the results rather indicate a number of issues relevant for the bio-based economy in a country than representing a national picture of the bio-based economy.

All partners interviewed at least one representative of each of the four groups of stakeholders. The balance between stakeholders is perfectly acceptable (Chart 1).

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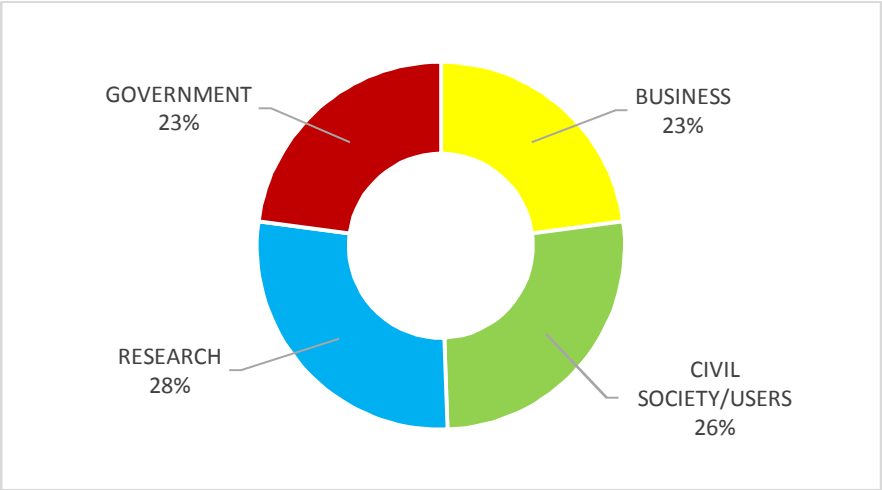

Chart 1 – Interviewees by Stakeholders

The interviews were conducted either by phone/skype or face to face. Although the latter was preferred, because face-to-face usually generates more information, interviewers had to find alternative ways to collect the information needed. All interviewees signed a prepared letter of consent. Although there was a concern about gender equilibrium, there is overall a deviation, men being 62% of the interviewees (Chart 2).

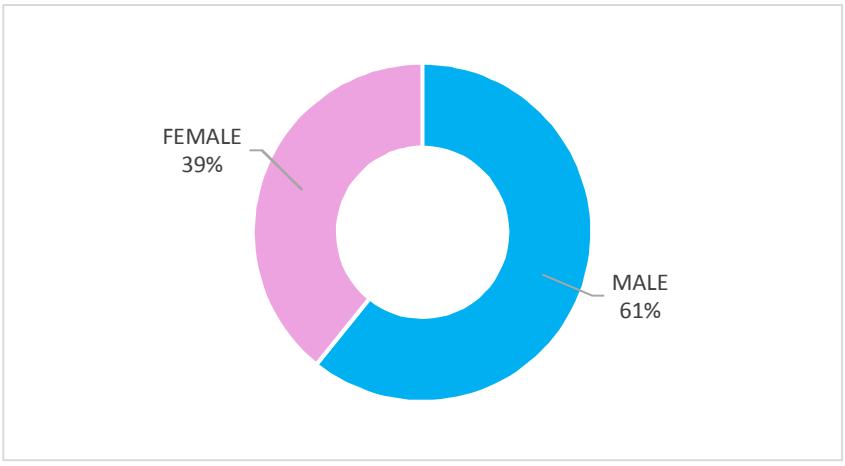

Chart 2 – Interviewees by Gender

2.Analysis of data by blocks

As referred above the interview guide is divided into three blocks: (i) general information; (ii) particular questions for each of the 4-helix groups; (iii) MML questions. The first and third blocks are common to Business, Research and Government stakeholders; Civil society/users have a simplified version of the questions to accommodate a non-expert audience. The second block addresses specific questions

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concerning different stakeholders. In this report, we analyse the main topics identified as critical to the goal of the task. More specific information is available in the national reports sent by the partners.

In the following analysis one should take into account that the number of interviews conducted per country is uneven and thus the comparison must be taken just as indicative (Chart 3). Most of the partners conducted between 4 (the minimum required, one for each of the 4-helix group) and 7 interviews and the partners in Romania, Spain and Italy (with 3 partners collecting data) at the higher end.

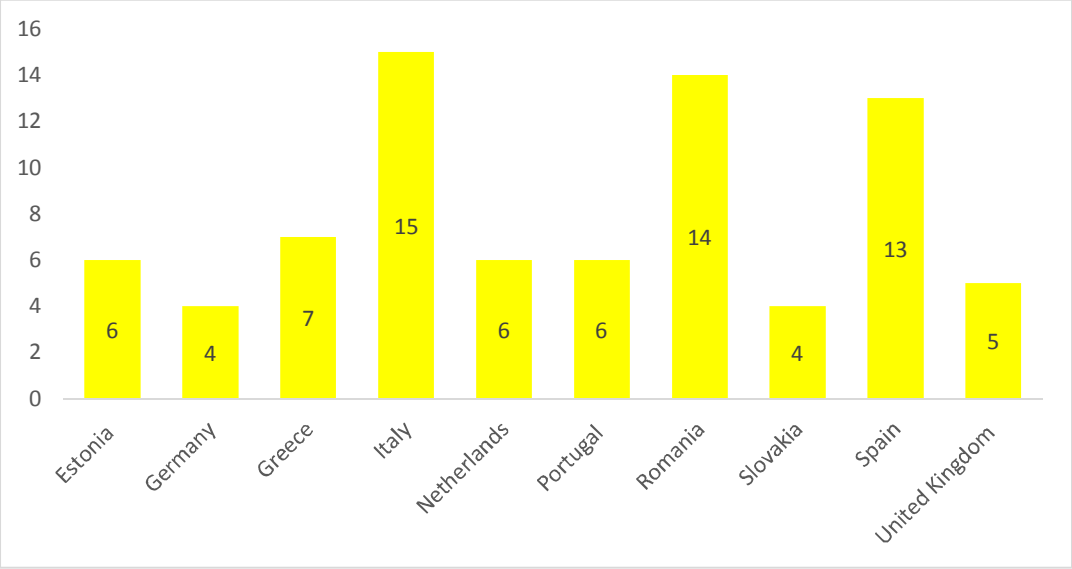

Chart 3 – Number of Interviews by country

2.1 General information on bio-based applications

This block of the questionnaire is common to all stakeholders. However, the second question and the third question are less detailed for civil society/users in order to avoid asking them too much technical content.

Concerning the second question (1st table on the *Interviews Guide*) for Business, Research and Government — "Which of the following bio-based applications have already a (small) market size in your country and do you consider ready for market uptake (take-off)?" — several differences should be highlighted concerning the selection both of applications and the stages in which each country is positioned.

In general terms, the interviewees tackle a large range of applications from the 17 bio-based applications in the table, but, again, the information is quite different among the countries; in some cases, it is possible to identify clearly the answers by a group of stakeholders, while in others the information presented by the partners is only available in an aggregate form. Furthermore, a number

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of interviewees have focused mainly on the applications they know well and have not answered all the 17 applications. Therefore, as the number of interviewees is very different from country to country, the conclusions we can draw from the following table and chart have to take into account not absolute numbers but the global trend within each country.

COUNTRY	NUMBER OF INTERVIEWS (B, R, G)	PRE-DEVELOPMENT	TAKE-OFF	ACCELERATION & STABILIZATION
Estonia	5	14	21	21
Germany	3	4	11	20
Greece	7	5	0	25
Italy	11	38	74	41
Netherlands	5	9	12	13
Portugal	5	22	12	16
Romania	12	45	32	45
Slovakia	3	7	9	4
Spain	9	33	41	41
United Kingdom	3	8	8	7

Table 1 – Phase of development of bio-based applications by country (Business, Research and Government stakeholders' interviews)

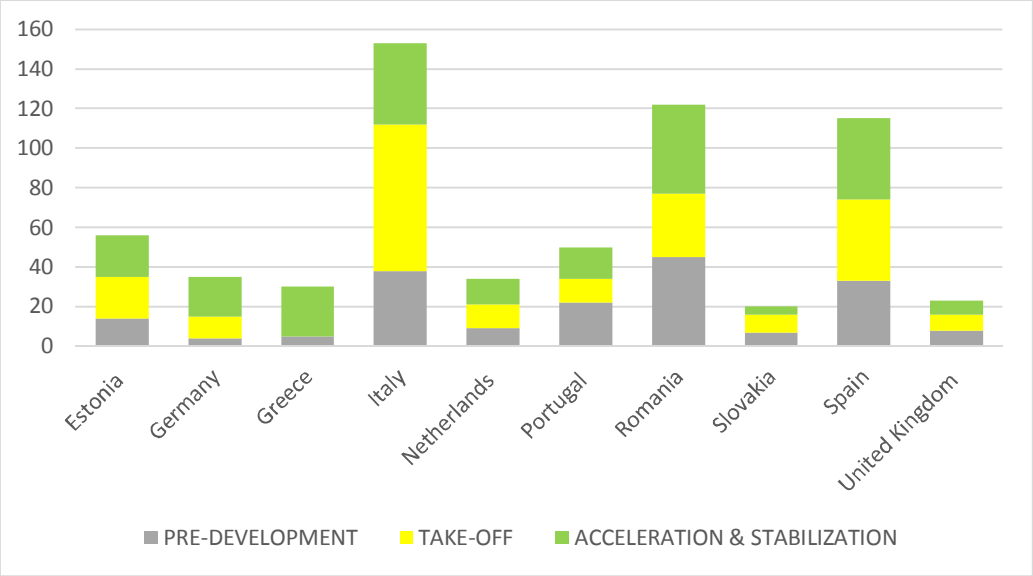

Chart 4 – Phase of development of bio-based applications by country (Business, Research and Government stakeholders' interviews)

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Bio-based applications	ESTONIA	GERMANY	GREECE	ITALY	NL	PORTUGAL	ROMANIA	SLOVAKIA	SPAIN	UK
Packaging & disposals										
Paper										
Construction & furniture old										
Construction & furniture new (1)										
Textile old										
Textile new										
Toys (bio-based plastic)										
Automotive										
Sports										
Personal Care										
Cleaning										
Biomedical										
Neutraceuticals										
Food & feed activities										
Biosynthetic motor oil										
Biogas										
2G/3G biofuels & bioenergy										

Table 2 – Most relevant bio-based applications by country
(Business, Research and Government stakeholders' interviews)

Based on table 1 and chart 4 it is possible to outline different situations among the partners: in Portugal bio-based applications are mostly in a pre-development stage; in Italy and Slovakia in the take-off phase; in Germany and Greece bio-based applications are mostly in the last stage, acceleration and stabilization;— Estonia, the Netherlands and Spain — present a hybrid profile with almost the same number of bio-based applications in the take-off stage and in the acceleration and stabilization phase, Romania also shows a hybrid albeit different profile presenting the same number of bio-based applications in the pre-development stage and in the acceleration and stabilization phase; the United Kingdom has a balanced distribution among the three stages.

Overall the 17 bio-based applications were tackled by at least one interviewed, and the interviewees in the Netherlands added two extra applications to the questionnaire, infrastructures (mainly directed and supported by the government) and insolation.

However, and just as an indicative information, Table 2 shows which bio-based applications were more times ticked by stakeholders in each country as being already in the acceleration and stabilization stage. Just 5 of the 17 bio-based applications proposed to the interviewees are not mentioned in any of the countries.

The Civil society/users' interviewees have answered a different question, as we considered that the one presented to the other three groups was too technical and extremely difficult to be answered by non-experts. Civil society/Users are asked to identify from a set of 15 bio-based applications which ones they are familiar with — "From the following bio-products, which applications you are familiar

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with?". Data is only available for Estonia, Germany, Greece, Italy, the Netherlands, Portugal and Spain, that is only for around half of the countries, either because the information available is not presented by group of stakeholders (just aggregated) or they used the wrong questionnaire.

Just as an indicative trend, the data collected from the interviews in the aforementioned countries show that civil society/users are familiar with almost all applications except in Portugal and Greece.

Concerning question number 4 (2nd table on the *Interviews Guide*) for Business, Research and Government, interviewees were asked "Do you know for each of the selected take-off applications the user groups (specific or mainstream)?" for the same 17 bio-based applications of table 1. As each interviewee could give more than one answer, we received a total of 143 hits for the target group Specific and 226 for the Mainstream one. However, these numbers have to be bear in mind that one of the partners —Romania —, account for a very significant part of the answers (73 Specific; 133 Mainstream).

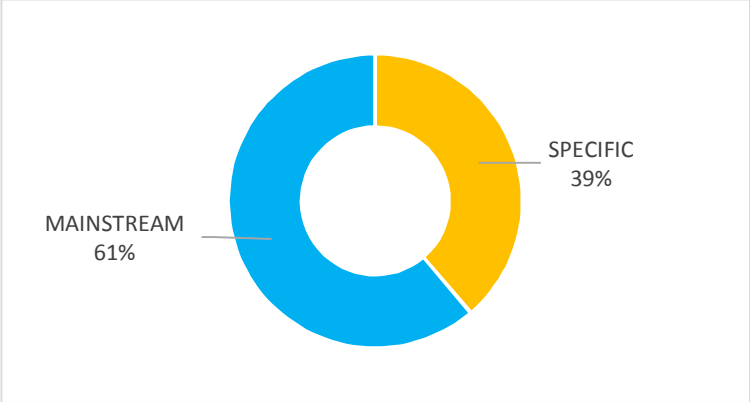

Chart 5 – Target Group of Civil society/Users

However, the global trend stands whether we include Romania or not, although in this case the prevalence of the mainstream group is clearer. As explicit examples of specific targets, we single out university spin-offs in the area of Bio-based Nutraceuticals and Biomedical (Portugal), and as mainstream targets citizens at large; there are also cases where the same bio-based application targets both specific and mainstream audiences as, for example, in the Netherlands concerning house building or renovation of houses. In this case, citizens as owners of the property may select more sustainable solutions for their own house (still a niche of people who prefer a sustainable house and experiment with solutions) and business representatives (architects) who offer support and solutions to constructors of residential areas (intermediates or B2B forerunners who can enhance mainstream building companies).

As far as civil society/users are concerned, the question is simpler: they were asked (i) which bio-products they were familiar with and (ii) if bio-based products would continue to develop in the future or lose momentum. From the 22 civil society/users interviewees, 20 of them considered that bio-products will continue to develop and just 2 consumers considered that they will develop very slowly or even lose momentum.

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In question number 8 (3rd table on the *Interviews Guide*), common to all stakeholders, interviewees were asked to identify main benefits and challenges for bio-based applications in 3 axes: economic, social and environmental — "In your opinion which are the main economic, social and environmental benefits/challenges?" In general terms, environmental benefits were deemed critical, while economic challenges were pointed out as the most relevant.

	BENEFITS	CHALLENGES
ECONOMY		
Higher Production Costs	3	50
Less efficiency	4	35
More efficiency	41	12
Higher Prices of Final Products	8	51
Market Development	31	24
SOCIAL		
Limited awareness	5	47
Competition between feedstock and food	14	31
More employment	50	13
ENVIRONMENT		
Less GHG emissions, fossil, energy use	39	12
Better degradability, recyclability	32	15
Better soil, biodiversity and land use	34	19

Table 3 – Economic, social and environmental benefits and challenges

In terms of economic benefits, the interviewees highlight: more efficiency, while higher production costs, less efficiency and higher prices of final product are the main challenges mentioned. The higher prices and market development mostly concern higher costs of raw products and processing efforts of bio-based products in comparison with fossil-based industry, thus creating economic challenges across the value chain. Despite the fact that high prices of final products is a problem that has to be solved there is a general consensus that the younger generations are interested in better understanding and encourage green added value and open to pay more to secure low environmental footprint and high sustainability

The main social benefit selected by a larger number of respondents is the opportunity to create more employment, particularly in the sector of skilled labor. In all countries this opportunity has been considered as a very positive side effect of bio-industries development. On the other hand, the interviewees also consider a limited awareness of the products and foresee a competition between feedstock and food. Most representatives single out that in order to engage civil society/users in bio-based products more information and common debates are needed in order to build confidence and to change customers' behaviors and habits. The younger generations are, again, singled out as a

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relevant target. Regarding competition between feedstock and food the need to ensure a full circular approach with waste disposal and water management is singled out by several stakeholders. While considered mainly a benefit, the fact that bio-industry will create more jobs also challenges academic institutions (private and public) to develop a properly skilled workforce.

Concerning the environmental benefits, all options — less GHG emissions, fossil energy use, better degradability, recyclability and better soil, biodiversity and land use — were chosen by all stakeholders. It is worth pointing out that a number of interviewees also mentioned several environmental problems: additives incorporated in bio-products, higher acidification of emissions, eutrophication of water, impoverishment of the quality of soils due to over extraction of organic material and nutrients from the soil, possible water scarcity and exhaustion of soils due to over production of crops. They are mentioned particularly by representatives of business and research groups. Civil society/users and government/policy making representatives are more positive concerning the impact of bio-based industry and agriculture on the environment. The former point out that price is the main question for up-scaling the consumption of bio-based products. The latter highlight the traditional techniques in small and medium size farms and factories as a problem, as well as that some bio-based products are only compostable using industrial techniques, thus requiring specific attention by national and local authorities.

2.2 Particular questions for each of the 4-helix group

This block of the questionnaire is tailor-made for each group and aims at identifying specific questions perceived by specific stakeholders. Nevertheless, it is possible to identify some intersections concerning the relationship between stakeholders and bio-based products:

- Business stakeholders were asked if they envisioned themselves as possible feedstock providers and if they considered the bio-based products market to be an interesting business opportunity. Although most of the interviewees considered feedstock as one of the main conditions to realize a stable production (food provision, intermediate bio-based materials), most of them are not able to be providers of feedstock. On the contrary all interviewees are more interested in the marketing of bio-based products. It is also clear that feedstock and markets are still very different within EU countries.

  Concerning markets, business stakeholders pointed out the relevance of a balanced regulation that takes into account common European standards and requirements as well as specific local rules.

  Business stakeholders also agreed that civil society/users are an important part of the 4-helix and that it is important that they feel confident when consuming bio-based products. This implies a strategy of information, education and marketing very much supported by environmental concerns, such as to lower the ecological footprint (green added value).

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- Civil society/users stakeholders were asked to identify their reasons to choose (or not to choose) bio-based applications. It is quite clear that the main reason is sustainability, closely related to circular economy and the need to produce less waste. They are aware that these choices are sometimes undermined by economic issues — bio-based products are more expensive —, although they believe that environmental awareness is becoming more and more determinant.

  All civil society/users interviewees point out that for them to support bio-based products it is important to have more information available at schools and educational-driven events, as well as to raise proximity with these kind of products, as they become part of everyday life. Labelling, both concerning the information displayed and how to read them is considered one of the critical issues.

  Civil society/users consider that it is through their individual choices that they can enforce their specific points of view. Lobbyism and consumer associations are only mentioned as relevant in the United Kingdom.
  Civil society/users are eager to cooperate with the other stakeholders of the 4-helix in order to build a common agenda.

- Research stakeholders present a set of interests and concerns quite close to those of business, which is quite normal as they interact frequently, as stated by interviewees of this group. In this context they point out the relevance of this cooperation, but also the need for feedstock, dynamic entrepreneurship clusters in bio-product applications, and marketing skills to showcase the benefits of bio-products and raise public awareness. To improve labelling is also deemed critical in this process.

  Concerning research itself, stakeholders of this group point out the need for a balanced and flexible regulation that takes into account not only European standards, but also national/local specificities mainly related to different stages of development of the bio-based industry.

  Most researchers acknowledge that even although at times not under the 3P label framework — People, Planet, Profit —their scientific and technological research takes into account these different dimensions, hence focusing on social and environmental benefits, sustainability, and demand. Although interviewees from all countries comply to 3P concerns, the Ps weight differently in different countries, the 2nd P —Planet —, related to sustainability being considered the most relevant.

  Some researchers point out the need for careful analysis of the environmental implications of a global scale bioeconomy. More fundamental research, e.g. in the area of land-use modeling and biomass resource flow analysis is needed, in order to better understand both economic viability and environmental feasibility of a large scale global bioeconomy.

- Government/policy making stakeholders elect the multilayered approach as the main solution to deal with bio-based industry, thus pushing forward an agenda of cooperation between all stakeholders of the 4-helix and among European countries. Bio-based applications are

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perceived as part of a larger European political commitment to strongly encourage circular economy. In this context, the EU Agenda on circular economy enforces a wide range of specific directives, including on standards, that are to be adopted by the different countries within their specific legislation. Frequently these legislative packs are grouped under national programs (e.g. National circular economy program (Estonia and Greece), National Policy Strategy Bio-economy (Germany) Spanish Bio-economy Strategy (Spain), UK Government 25 Years Environment Plan (UK); from the interviews conducted, only Slovakia seems to have still a lack of legislation in this field.

The intersectoral and transversal character of measures to support bio-based industries involves different ministries and funding programs and institutions — agriculture, economy, industry, environment, research — that must cooperate and work together in order to achieve success. Government and policy stakeholders also mention the EU commitment in protecting civil society/users through legislation, including labelling, and increasing the amount of information available to the public

As far as expectations towards other 4 helix stakeholder groups, public procurers point out the need for research to provide the evidence base for environmental and social benefits of bio-based products. The life cycle of many types of bio-based products and its environmental implications are often not fully explored yet (e.g. emissions, fertilization, land use competition, substitution capacity with conventional products and trade-offs). Here science needs to deliver to inform decisions on public procurement.

Although the 4 groups of stakeholders present their concerns differently, it is possible to conclude that there are a set of common topics that mold their agendas and which they feel are at the core of a possible dialogue:

- Sustainability: although bio-based industry and agriculture are considered as assets towards a more sustainable resource management, there are still issues to be discussed and solve as far as environmental topics are concerned, namely concerning use of soils.
- Cooperation: stakeholders have to find common fora to discuss bio-economy and find the best solutions to face different challenges.
- Education: schools should encourage debate and information on bio-based products.
- Information: more information should be available on bio-based products both for business stakeholders and for the public at large, including on European directives.
- Legislation: European standards and flexibility to adapt legislation to local needs should be a priority.

2.3 MML questions

This block of the questionnaire is common to all stakeholders.

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All interviewees consider it extremely relevant to cooperate with other stakeholders within the 4-helix model. Civil Society/users, particularly as individuals, have more difficulty in identifying other specific stakeholders, but they are quite open to collaborate with everybody.

A very significant number of stakeholders from the groups Business, Research and Government already collaborate with each other in formal or informal ways. Civil society/users are the missing link in this collaboration, turning the 4-helix in a 3-helix model.

Although it is not possible to identify in all questionnaires whether interviewees are familiar with MML actions or similar events (Appendix 4), still a significant number of responses — 1/3 of the total and around 50% of those who answered to this question — point out that the process of working and learning together is still not an established practice (Chart 6).

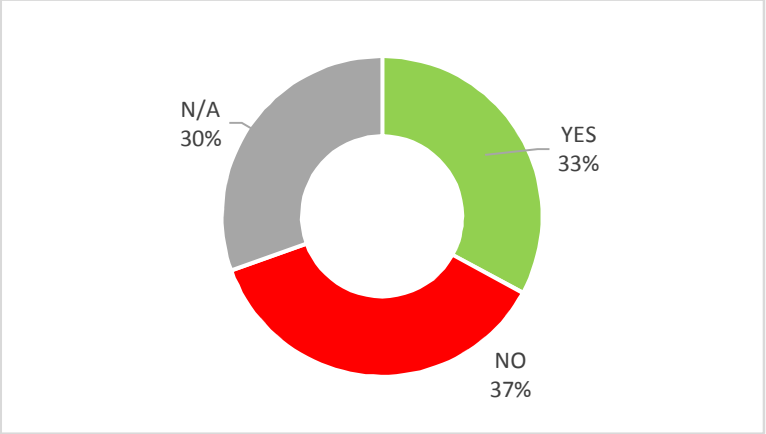

Chart 6 – Familiarity with MML events

This percentage contrasts with the huge will to participate in MML events, provided that they have specific topics, aim at specific goals and have a clear timetable (Chart 7).

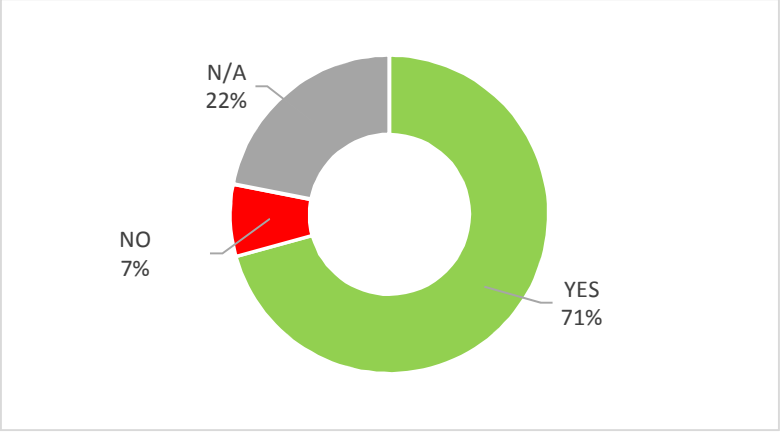

Chart 7 – Availability to participate in MML events

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Looking at the same data by stakeholders, it becomes clear that the civil society/users group are those who have less experience in exchanging opinions in any *fora*, although they are enthusiasts in participating in future events.

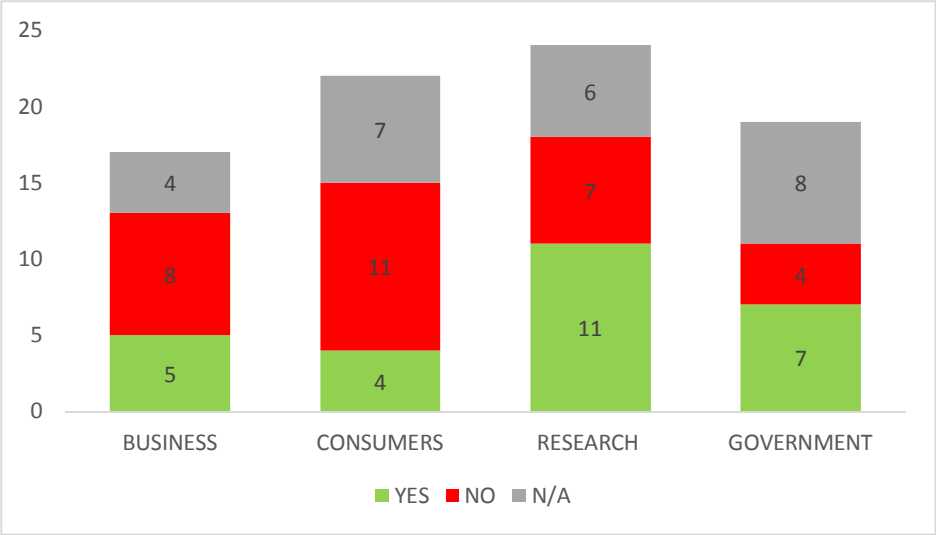

Chart 8 – Familiarity with MML events by stakeholder

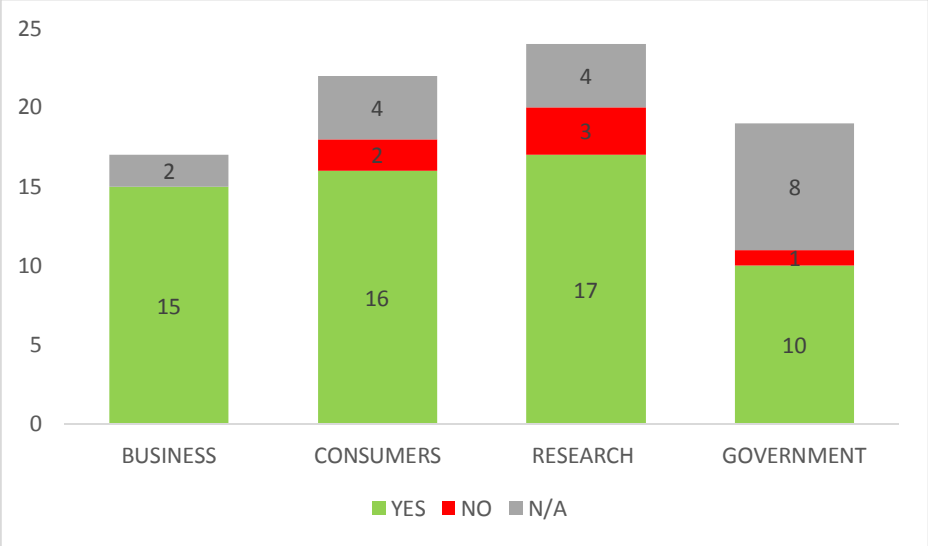

Chart 9 –Availability to participate in MML events by stakeholder

Concerning **Challenges**, interviewees pointed out both national and international questions, the former dealing with local issues and national regulations and the later with more general European-driven topics.

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The subjects identified in the questionnaire as relevant to improve the articulation of bio-based products — (i) More (awareness) activities to use bio-based products; (ii) More (awareness) activities to collect household waste for 2G streams; (iii) More (awareness) activities to support policies that favor bio-based products — were all deemed critical by the different stakeholders.

As far as MML events are concerned, we suggest that organizers pick up local topics identified in their interviews and link them with more global issues. In this global European dimension, stakeholders identified 4 main sets of areas: (i) economy; (ii) legislation, (iii) education/awareness/information and (iv) sustainability. These are the **key questions** they would like to discuss in MML events.

ECONOMY

- Funding
- Increase of production of bio-based products in peripheral European countries
- Public/private collaboration
- Value chain
- Efficiency

LEGISLATION

- Legislation (National and EU)
- Certification/regulation
- Labeling
- Standards

EDUCATION/AWARENESS/INFORMATION

- Raising knowledge concerning bio-economy and bio-based products
- Raising awareness (National and EU strategies) concerning bio-based products
- Raising awareness (National and EU strategies) concerning opportunities and barriers of bio-based products
- Promote engagement concerning bio-economy and bio-based products
- Exchange of information and cooperation among stakeholders

SUSTAINABILITY

- Sustainability (circular sustainable bio-economy)
- Circular economy
- Bio-based products unique characteristics
- Social perception of bio-based products and bio-economy
- Waste management
- Food security

These key questions translate easily into **trigger questions**, some of them, namely the eight first questions, are simple but provocative, challenging us as to whether we really know what are the bio-economy and bio-industry:

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1. If you look around can you find anything that is bio-based?
2. What does bio-based actually means?
3. Which is the most interesting bio-based product?
4. Do you know how to read a label?
5. Do you want to live a healthier life?
6. Do you want to decrease waste?
7. Do you want your children to have the same environment you had?
8. Is the population ready to accept bio-products?
9. How can we bridge urban and rural areas to ensure that benefits and challenges are shared fairly?
10. How can we increase the added value of bio-economy?
11. How can we reconcile the local, the national, and the European dimensions of bio-economy?
12. Value chains of bio-economy with environmental and societal benefits?
13. What is it needed for stakeholders to be motivated to produce/consume/research/legislate on bio-based products and solutions?
14. How to secure a fruitful dialog among stakeholders in order to generate common solutions?
15. What has been the real impact of the existing policies?

3. Conclusions

Bearing in mind the goal of this task — to identify the quadruple helix stakeholders' interests and motivations to participate in the BIOVOICES MML community — we may draw some conclusions. Although there is a large variety of profiles concerning bio-based applications among the 11 countries that participate in the interviews and among the 82 interviewees of the 4-helix stakeholders, it is clear that there is a growing interest, albeit critical, in bio-based-industries and agriculture. It is not perceived as an investment without costs (economic, social and environmental), but the relationship between positive and negative issues is clearly more favorable to the positive ones.

In this global European dimension, stakeholders identified 4 main sets of areas: (i) economy; (ii) legislation, (iii) education/awareness/information and (iv) sustainability. Some specific topics should be highlighted: encouraging cooperation among the 4-helix stakeholders, in order to build trust and to find common solutions; upgrading the level and the scope of information; investing in education. Going through the hot topics and trigger questions offered by the interviewees it is very clear 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).

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APRE, Agency for the Promotion of European Research
www.apre.it
Italy

FVA New Media Research
hwww.fvaweb.eu
Italy

PEDAL Consulting, s.r.o.
www.pedal-consulting.eu
Slovakia

National Research Council of Italy
www.cnr.it
Italy

Civitta Eesti AS
www.loba.pt
Portugal

LOBA
www.civitta.com
Estonia

NOVA ID FCT
ww.novaid.fct.unl.pt
Portugal

Q-PLAN International
www.qplan-intl.com
Greece

Frontier Management Consulting
www.frontierconsulting.ro
Romania

Wageningen Research
www.wur.nl
The Netherlands

Minerva Communications UK Ltd
www.minervacomms.net
United Kingdom

ASEBIO, Asociación Española de Bioempresas
www.asebio.com
Spain

ICLEI Europe
www.iclei-europe.org
Germany

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APPENDIX 1

INTERVIEW GUIDE

STAKEHOLDER: BUSINESS

(i) General Information on bio-based applications

1. Personal data: name, organisation, position, address, field of work (if applicable).
2. Which of the following bio-based applications have already a (small) market size in your country and do you consider ready for market uptake (take-off)?

Phase of development Bio-based applications	(Pre)development	Take-off	Acceleration & Stabilization	Don't know; not available
Packaging & disposals				
Paper				
Construction & furniture old				
Construction & furniture new				
Textile old				
Textile new				
Toys (bio-based plastic)				
Automotive				
Sports				
Personal care				
Cleaning				
Biomedical				
Nutraceuticals				
Food & feed additives				
Biosynthetic motor oil				
Biogas				
2G / 3G biofuels & bioenergy				

3. Could you explain for each of the selected take-off applications, who are the current feedstock providers (1G, 2≥G) & retailers that commercialise them?
4. Do you know for each of the selected take-off applications the user groups (specific or mainstream)?

Target group of consumers Bio-based applications	Specific	Mainstream
Packaging & disposals		
Paper		
Construction & furniture old		
Construction & furniture new		
Textile old		
Textile new		
Toys (bio-based plastic)		
Automotive		
Sports		
Personal care		
Cleaning		
Biomedical		
Nutraceuticals		
Food & feed additives		
Biosynthetic motor oil		
Biogas		
2G/3G Biofuels & bioenergy		

5. Which main barriers (e.g. feedstock provision, more hybrid products, new functions, legislation, standardization) do you consider to constraint their fully market uptake?
6. Which opportunities (e.g. feedstock provision, more hybrid products, new functions, legislation, standardisation) may arise?
7. How do you currently contribute to address the aforementioned barriers and opportunities?

8. In your opinion which are the main economic, social and environmental benefits/challenges?

Economy	Benefits	Challenges
Higher Production Costs		
Less efficiency		
More efficiency		
Higher prices of final products		
Market development		
Social	Benefits	Challenges
Limites awareness		
Competion between feedstock and food		
More employment		
Environment	Benefits	Challenges
Less GHG, emissions, fossil energy use		
Better degradability, recyclability		
Better soil, biodiversity and land use		

(ii) Particular Questions – Businesses (feedstock providers, waste managers or retail)

9. Is it interesting to provide feedstock for some of the selected applications? If yes, could you provide examples? If not, why?
10. Is it interesting to market bio-based products? If yes, please explain why. If not, why?

(iii) Mutual Mobilisation Learning (MML) questions

11. To what extent do you consider cooperation with other stakeholders (4-helix) necessary for market uptake? For which barriers/opportunities?

12. With whom do you collaborate already?

13. Are you familiar with Mutual Mobilisation Learning (MML) workshops? [if not, explain what is a MML action]

14. Would you be available to participate in a MML workshop in order to address the barriers and opportunities you highlighted?

15. Which subjects do you consider relevant for MML-events to improve the articulation of bio-based products and could you specify this with examples:

a. More (awareness) activities to use bio-based products mentioned in table question 3.
b. More (awareness) activities to collect household waste for 2G streams
c. More (awareness) activities to support policies that favour bio-based products.

16. Should you accept to participate in a MML workshop which topics should be the focus?

17. Should you accept to participate in a MML workshop can you list three trigger questions that should launch the discussion among the 4-helix stakeholders?

STAKEHOLDER: CONSUMERS/USERS

(i) General Information on bioproducts applications

1. Personal data: name, organisation, position, address, field of work (if applicable).
2. From the following bio-products, which applications you are familiar with?

Packaging & disposals				
Paper				
Construction & furniture				
Textile				
Toys (bio-based plastic)				
Automotive				
Sports				
Personal care				
Cleaning				
Biomedical				
Nutraceuticals				
Food & feed additives				
Biosynthetic motor oil				
Biogas				
2G / 3G biofuels & bioenergy				

3. Which trends do you think will occur over in the next five years considering bio-based applications?
    a. Continue to develop?
    b. Will loose momentum?

4. Which opportunities do you think may arise in the same scenario?
5. Using your own experience, which barriers do you have/had to overcome?
6. Using your own experience, in which opportunities would you like to invest?

7. In your opinion which are the main economic, social and environmental benefits/challenges?

Economy	Benefits	Challenges
Higher Production Costs		
Less efficiency		
More efficiency		
Higher prices of final products		
Market development		
Social	Benefits	Challenges
Limites awareness		
Competion between feedstock and food		
More employment		
Environment	Benefits	Challenges
Less GHG, emissions, fossil energy use		
Better degradability, recyclability		
Better soil, biodiversity and land use		

Note: questions in grey are only directed to organizations, not individual consumers.

(ii) Particular Questions – Consumers/users

8. What motivates consumers/users to choose bio-based applications?

a. Less expensive
b. Contributes to circular behaviour/limit waste
c. Contributes do sustainability

9. How can consumers/users empower themselves?
    a. through their choices as buyers
    b. lobbyism/consumers associations
    c. Intermediation of NGOs
10. Are you aware of the current use of bio-based materials in products used in your country?
11. Are you able to understand information displayed in labels?
12. What are the reasons why consumers are not selecting bio-ased products?

(iii) Mutual Mobilisation Learning (MML) questions

13. To what extent do you consider cooperation with other stakeholders – business, government, researchers - necessary?
14. With whom do you collaborate already?
18. Are you familiar with Mutual Mobilisation Learning (MML) workshops? [if not, explain what is a MML action]
19. Would you be available to participate in a MML workshop in order to address the barriers and opportunities you highlighted?
20. Which subjects do you consider relevant for MML-events to improve the articulation of bio-based products and could you specify this with examples:
    a. More (awareness) activities to use bio-based products mentioned in table question 3.
    b. More (awareness) activities to collect household waste for 2G streams
    c. More (awareness) activities to support policies that favour bio-based products.
21. Should you accept to participate in a MML workshop can you list two topics that should be the focus of the workshop?
22. Should you accept to participate in a MML workshop can you list three questions that should launch the discussion among the stakeholders?

INTERVIEW GUIDE

STAKEHOLDER: GOVERNMENT

(i) General Information on bio-based applications

1. Personal data: name, organisation, position, address, field of work (if applicable).
2. Which of the following bio-based applications have already a (small) market size in your country and do you consider ready for market uptake (take-off)?

Phase of development Bio-based applications	(Pre)development	Take-off	Acceleration & Stabilization	Don't know; not available
Packaging & disposals				
Paper				
Construction & furniture old				
Construction & furniture new				
Textile old				
Textile new				
Toys (bio-based plastic)				
Automotive				
Sports				
Personal care				
Cleaning				
Biomedical				
Nutraceuticals				
Food & feed additives				
Biosynthetic motor oil				
Biogas				
2G / 3G biofuels & bioenergy				

3. Could you explain for each of the selected take-off applications, who are the current feedstock providers (1G, 2≥G) & retailers that commercialise them?

4. Do you know for each of the selected take-off applications the user groups (specific or mainstream)?

Target group of consumers Bio-based applications	Specific	Mainstream
Packaging & disposals		
Paper		
Construction & furniture old		
Construction & furniture new		
Textile old		
Textile new		
Toys (bio-based plastic)		
Automotive		
Sports		
Personal care		
Cleaning		
Biomedical		
Nutraceuticals		
Food & feed additives		
Biosynthetic motor oil		
Biogas		
2G/3G Biofuels & bioenergy		

5. Which main barriers (e.g. feedstock provision, more hybrid products, new functions, legislation, standardization) do you consider to constraint their fully market uptake?
6. Which opportunities (e.g. feedstock provision, more hybrid products, new functions, legislation, standardisation) may arise?
7. How do you currently contribute to address the aforementioned barriers and opportunities?

8. In your opinion which are the main economic, social and environmental benefits/challenges?

Economy	Benefits	Challenges
Higher Production Costs		
Less efficiency		
More efficiency		
Higher prices of final products		
Market development		
Social	Benefits	Challenges
Limites awareness		
Competion between feedstock and food		
More employment		
Environment	Benefits	Challenges
Less GHG, emissions, fossil energy use		
Better degradability, recyclability		
Better soil, biodiversity and land use		

(ii) Particular Questions – Government

9. Does the government have a political agenda for implementing bio-economy?
10. Does the government have a multi-layered approach concerning local, regional, national and European legislation initiatives?
11. Can you list the most relevant laws issued in the last 5 years concerning this area?
12. Can you list legislative actions concerning standards in the last 5 years within this area?
13. Does the government have a voice concerning European funding for bio-based industries?

14. Does the government stimulate or discourage bio/fossil-based applications?
15. How should the government act on behalf of customer?
16. How should the government integrate bio-based applications in circular economic policies?

(iii) Mutual Mobilisation Learning (MML) questions

17. To what extent do you consider cooperation with other stakeholders (4-helix) necessary?
18. Which barriers would you like to solve in this association and with whom?
19. Which opportunities would you like to take advantage of in this association and with whom?
23. Are you familiar with Mutual Mobilisation Learning (MML) workshops? [if not, explain what is a MML action]
20. Would you be available to participate in a MML workshop in order to address the barriers and opportunities you highlighted?
21. Which subjects do you consider relevant for MML-events to improve the articulation of bio-based products and could you specify this with examples:
    a. More (awareness) activities to use bio-based products mentioned in table question 3.
    b. More (awareness) activities to collect household waste for 2G streams
    c. More (awareness) activities to support policies that favour bio-based products.
22. Should you accept to participate in a MML workshop can you list two hot topics that should be the focus of the workshop?
23. Should you accept to participate in a MML workshop can you list three trigger questions that should launch the discussion among the 4-helix stakeholders?

INTERVIEW GUIDE

STAKEHOLDER: RESEARCH

(i) General Information on bio-based applications

1. Personal data: name, organisation, position, address, field of work (if applicable).
2. Which of the following bio-based applications have already a (small) market size in your country and do you consider ready for market uptake (take-off)?

Phase of development Bio-based applications	(Pre)development	Take-off	Acceleration & Stabilization	Don't know; not available
Packaging & disposals				
Paper				
Construction & furniture old				
Construction & furniture new				
Textile old				
Textile new				
Toys (bio-based plastic)				
Automotive				
Sports				
Personal care				
Cleaning				
Biomedical				
Nutraceuticals				
Food & feed additives				
Biosynthetic motor oil				
Biogas				
2G / 3G biofuels & bioenergy				

3. Could you explain for each of the selected take-off applications, who are the current feedstock providers (1G, 2≥G) & retailers that commercialise them?

Target group of consumers Bio-based applications	Specific	Mainstream
Packaging & disposals		
Paper		
Construction & furniture old		
Construction & furniture new		
Textile old		
Textile new		
Toys (bio-based plastic)		
Automotive		
Sports		
Personal care		
Cleaning		
Biomedical		
Nutraceuticals		
Food & feed additives		
Biosynthetic motor oil		
Biogas		
2G/3G Biofuels & bioenergy		

4. Do you know for each of the selected take-off applications the user groups (specific or mainstream)?
5. Which main barriers (e.g. feedstock provision, more hybrid products, new functions, legislation, standardization) do you consider to constraint their fully market uptake?
6. Which opportunities (e.g. feedstock provision, more hybrid products, new functions, legislation, standardisation) may arise?
7. How do you currently contribute to address the aforementioned barriers and opportunities?

8. In your opinion which are the main economic, social and environmental benefits/challenges?

Economy	Benefits	Challenges
Higher Production Costs		
Less efficiency		
More efficiency		
Higher prices of final products		
Market development		
Social	Benefits	Challenges
Limites awareness		
Competion between feedstock and food		
More employment		
Environment	Benefits	Challenges
Less GHG, emissions, fossil energy use		
Better degradability, recyclability		
Better soil, biodiversity and land use		

(ii) Particular Questions – Researchers

9. Does your research take into account an integrated 3P framework (*People. Planet. Profit*), having in mind an agenda that calls for sustainability? If yes, could you provide examples? If not, why?
10. Does your research take into account transition/innovation plans with a focus on the market demand of the selected bio-based application? If yes, could you provide examples? If not, why?
11. Are there any barriers and difficulties related to your work with bio-based product? (for instance, standards, feedstock availability, consumers' acceptability, market potential, etc.).

12. Does your institution believe that raising awareness of the potential benefits of bio-products is important? If yes, could you provide examples? If not, why?

(iii) Mutual Mobilisation Learning (MML) questions

24. To what extent do you consider cooperation with other stakeholders (4-helix – business, consumers, government) necessary?
25. Which barriers would you like to solve in this association and with whom?
26. Which opportunities would you like to take advantage of in this association and with whom?
24. Are you familiar with Mutual Mobilisation Learning (MML) workshops? [if not, explain what is a MML action]
27. Would you be available to participate in a MML workshop in order to address the barriers and opportunities you highlighted?
28. Which subjects do you consider relevant for MML-events to improve the articulation of bio-based products and could you specify this with examples:
    a. More (awareness) activities to use bio-based products mentioned in table question 3.
    b. More (awareness) activities to collect household waste for 2G streams
    c. More (awareness) activities to support policies that favour bio-based products.
29. Should you accept to participate in a MML workshop can you list two hot topics that should be the focus of the workshop?
30. Should you accept to participate in a MML workshop can you list three trigger questions that should launch the discussion among the 4-helix stakeholders?

APPENDIX 2

Informed Consent

BIOVOICES: Mobilization of a plurality of voices and mutual learning to accelerate the Bio-based sector (Project ID: 774331 Funded under: H2020-EU.3.2.4.3. - Supporting market development for bio-based products and processes)

BIOVoices is a 36 months European funded project (2018-2020) that aims at engaging all relevant stakeholder groups "voices" - policy makers, researchers, the business community and the civil society - in order to address societal, environmental and economic challenges related to bio-based products and applications. BIOVoices builds on the concept of Mobilisation & Mutual Learning Platforms (MML) with the objective of delivering an Action Plan addressing the challenges of raising awareness of and engaging with the citizens on the bio-based products.

We invite you to participate in the BIOVoices project by being interviewed. The interview will take one hour. The material collected in the interviews will be analyzed in order to support Mobilisation and Mutual Learning (MML) events with businesses, citizens, governments and researchers to develop mutual understanding and joint solutions to accelerate the bio-based sector in your country.

Informed Consent to Participate in BIOVoices

I have read and understood the information on the BIOVoices project and received answers to any questions I asked.

I agree to take part in BIOVOices with a recorded interview. My taking part is voluntary; I can withdraw from the study at any time and I do not have to give any reasons for why I no longer want to take part. The interview, recording and collection of any personal details are for scientific purposes only, within the scope of the project.

My personal details will be processed and handled in accordance with European legislation including the General Data Protection Regulation (EU) 2016/679). My words from this interview may be quoted anonymous in research outputs (academic publications, reports, etc.).

Name of interviewee:	Name of researcher:
Signature	Signature
Place Date	Place Date

APPENDIX 3

INTERVIEWS BY COUNTRY

COUNTRY	BUSINESS	CIVIL SOCIETY/USERS	RESEARCH	GOVERNMEN	TOTAL OF INTERVIEWS by COUNTRY	MALE	FEMALE	Observations
Estonia	1 M	1 M	2 F	1 M + 1 F	6	3	3	
Germany	1 F	1 M	1 M	1 M	4	3	1	
Greece	1 F *	1 M + 2 F	1 M +2 F*	3 F*	7	2	5	3 of the interviewees represent simoultaneoulsy 2 stakeholders: 1 business and consumers; 2 research and government
Italy	2 F	1 M + 3 F	4 M + 2 F	2 M +1 F	15	7	8	
Netherlands	1 M	1 M	2 M	1 M + 1 F	6	5	1	
Portugal	1 M 1 F*	1 M	2 F*	1 M	6	3	2	1 of the interviewees represent simoultaneoulsy 2 stakeholders: business and research
Romania	4 M + 1 F	3 M + 1 F	1 M + 2 F	2 M	14	10	4	
Slovakia	1 M	1 F	1 M	1 M	4	3	1	
Spain	3 M + 1 F	3M + 1 F	2 M	2 M + 1 F	13	10	3	
United Kingdom	1 M	1 M + 1 F	1 F	1 F	5	2	3	
					80	48	31	
TOTAL OF INTERVIEWS by STAKEHOLDER	19	22	23	19	83			

APPENDIX 4

APPENDIX MMLFAMILIARITY AND AVAILABILITY

	FAMILIARITY					AVAILABILITY				
COUNTRY	**BUSINESS**	**CONSUMERS**	**RESEARCH**	**GOVERNMENT**	**TOTAL**	**BUSINESS**	**CONSUMERS**	**RESEARCH**	**GOVERNMENT**	**TOTAL**
Estonia	Y	N	Y Y	Y Y		Y	Y	Y Y	Y Y	
Germany	N	Y	N	Y		Y	Y	N	Y	
Greece	Y	Y Y N	Y Y Y	Y Y Y		Y	Y Y N	Y Y Y	Y Y Y	
Italy	N/A N/A	N/A N/A N/A Y	N/A N/A N/A Y Y Y	N/A N/A N		Y Y	Y Y Y Y	Y Y Y Y Y Y	N/A Y Y	
Netherlands	Y	N	N N	N/A N/A		Y	Y	N N/A	N/A N/A	
Portugal	Y N	N	Y N			Y Y	Y	Y Y		
Romania	N N N N N	N N N N	N N Y	N N		Y Y Y Y Y	Y Y Y Y	N Y Y	Y Y Y	
Slovakia	N	N	N	Y		Y	Y	Y	N/A	
Spain	N/A, N/A	N/A,N/A,N/A,N/A	N/A N/A N/A	N/A, N/A,N/A		N/A, N/A	N/A,N/A,N/A,N/A	N/A N/A N/A	N/A, N/A,N/A	
United Kingdom	Y	N N	Y	N		Y	Y N	Y	N	
YES	**5**	**4**	**11**	**7**	**27**	**15**	**16**	**17**	**10**	**58**
NO	**8**	**11**	**7**	**4**	**30**	**0**	**2**	**3**	**1**	**6**
N/A	**4**	**7**	**6**	**8**	**25**	**2**	**4**	**4**	**8**	**18**