



**CO-creating sustainable and competitive FRuits and vEgetableS'
value cHains in Europe**

**Deliverable 2.1
"Guidelines to conduct Co-creation Focus Groups"**

Responsible partner: CREDA



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Table of Contents

Abbreviations and Acronyms	5
1. Executive summary	6
2. Introduction	7
3. Guidelines for Experimental Design	8
3.1 Workshop Design with time allocation	9
3.2 The Delphi Technique with the Analytical Hierarchical Process	11
4. Annexes	12
Annex 1. World Café Technique	12
Annex 2: The Analytical Hierarchical Process (AHP).....	16

Index of Tables

Table 1: Abbreviations and Acronyms.....	5
Table 2: Key partners representing Pilot Cases within CO-FRESH and corresponding support partners	7
Table 3: A1.1. Table rotation for the participants (same pattern repeated every four people).....	12
Table 4: A2.1: The AHP nine-points scale for the pairwise comparison	17
Table 5: A2.1: Random Index values	18

Index of Figures

Figure1: A2.1: Hierarchical structure used to identify the preferred innovation strategy to be implemented	16
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Abbreviations and Acronyms

Abbreviation / Acronym	Description
AHP	Analytical Hierarchical Process
CNTA	Centro Nacional de Tecnología y Seguridad Alimentaria
CREDA	Centre de Recerca en Economia i Desenvolupament Agroalimentari
PCWG	Pilot Cases Working Group
SOI	Sustainability Oriented Innovation
SWOT	Strengths, Weaknesses, Opportunities, and Threats
WC	World Café
WP	Work Package
WULS	Warsaw University of Life Sciences

Table 1: Abbreviations and Acronyms

1. Executive summary

This document constitutes the deliverable D2.1 “Guidelines to conduct Co-creation Focus Groups” developed in the frame of WP2 (task 2.1) and has been compiled by CREDA and reviewed and edited by CNTA.

The objective of this deliverable is to provide the common framework that will be used in each Pilot Case to rank the potential list of innovations that could be implemented in the demonstration phase (WP3). The framework is based in a Co-creation activity with active engagement of stakeholders in each Value Chain (Pilot Case). The framework consists of a two-step procedure: a participatory Workshop followed by a Delphi Technique in which information will be gathered by an Analytical Hierarchical Process.





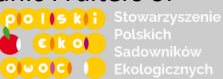


The Workshop aims at providing a short list of potential innovations to be implemented in each Pilot Case. To promote active engagement of involved stakeholders, the Workshop is structured in two parts. In the first part, taking into account the information gathered for the sustainability (environmental, economic, social and consumer acceptance) assessment (WP4) to characterize the baseline scenario in each Pilot Case. A World Café participatory tool is planned to conduct a SWOT analysis. In the second part, results from the SWOT analysis together with information gathered in the Mapping and assessing phase (WP1) and supplied under the form of a Portfolio of Innovative Business Models together with some highlights about the key factors explaining SOI (Sustainability Oriented Innovation) success, stakeholders will be able to provide a short list of potential innovations.

The short list will be ranked using the Analytical Hierarchical Process. A two-rounds Delphi Technique will be used to get at an agreement among stakeholders. The ranked innovations will be analyzed in Task 2.4 in order to select an economic and technically feasible innovation or set of innovations to be further developed in WP3.

2. Introduction

Following the Gran Agreement, one of the specific objectives of the WP2 was to implement a co-creation process in each one of the selected Pilot Case Value chains (Table 2) with the aim of optimizing or re-designing current whole value chains into more competitive and sustainable ones using a common methodology. With this common framework, each Pilot Case will be analyzed and characterized by collaboration between practitioners and researchers with a multidimensional and multi-level approach (Pilot Cases Working Groups - PCWG). This Co-creation process will consider the Portfolio of Innovative Business models produced in WP1. Interventions proposed for each Pilot case will be developed by specialized project partners and reviewed by actors, including potential intervention agents, participants, and others with expertise related to the target situation. Table 2 summarizes the 7 Pilot Cases within CO-FRESH represented by corresponding key partners and assisted, each Pilot case, by a support partner within the CO-FRESH consortium.

Table 2: Key partners representing Pilot Cases within CO-FRESH and corresponding support partners

#	Pilot case Key partner	Support partner
1.	Le Terre di Zoe (Italy) 	Tecnoalimenti s.c.p.a. (TCA)
2.	FLORETTE (Spain) 	National Centre for Food Technology and Safety (CNTA) Centre for Research in Agrofood and Development Economics-UPC-IRTA (CREDA)
3.	FOODVALLEY NL (The Netherlands) 	Wageningen University (WU)
4.	Chambre d'Agriculture du Pays de la Loire (CRAPDL) (France) 	Center of expertise for the food industry (ACTALIA)
5.	The Association of Polish Organic Fruiters of Poland (EKOOWOC) (Poland) 	Warsaw University of Life Sciences (WULS)
6.	Pilze-Nagy Ltd (Hungary) 	National Association of Int. Representations for Small-scale producers and service providers (Kislépték) Organic Agriculture Research Institute (ÖMKI)
7.	Association for F&V Producer Organisations of the F&V sector of Almeria (COEXPHAL) (Spain) 	University of Almeria (UAL)

The objective of this Deliverable is to provide some Guidelines about how to implement a co-creation process with the final aim of providing a very short and ranked list of potential interventions (innovative tools / kits / technological and non-technological solutions) to be implemented in the Pilot cases at the demonstration phase (WP3) under intervention studies form. A two-step process is proposed based on a Workshop or Focus Group to define a short list of potential innovation susceptible to be implemented, plus a Delphi method to arrive at a consensus among stakeholders about a ranked list.

In the Workshop, to actively engage stakeholders in each Pilot Case, we suggest implementing a World Café (WC) technique (see a description and guidelines in Annex 1). This tool (WC) aims at achieving two main objectives for the purposes of CO-FRESH (the specific step will be described in the next section):

- A Strengthens-Weaknesses-Opportunities-Threatens (SWOT) Analysis. Based on the information gathered in Task 2.2 about the current situation of the respective value chains (Pilot Cases), which will be presented at the beginning of the session, during the first half of the session the objective is to arrive at a consensus about the main strengths, weaknesses, opportunities and threatens. Knowing the current situation will help stakeholders to choose/rank the most suitable innovations that could be implemented to increase competitiveness.
- Selecting a short list of potential innovations to be implemented. Taking into account the results from the SWOT analysis as well as the results obtained in WP1 (mainly, the Portfolio of Innovative Business Models, T1.4, as well as the rapport about the key factors for innovation success based on literature review and the performance of the Innovative Business Models analyzed), the objective is to arrive to an initial consensus to include a very short list of innovative approaches to be implemented in the Pilot cases as well as their feasibility and potential replicability, taking into account the existing technological / non-technological innovations. Special attention will be payed to assess the perception of fair distribution of costs, benefits and risks along the value chain among the different actors along each value chain.

Once the short list is obtained, we will use a Delphi Method which was generated in the 50's and now is a very widely prospective technique used to draw information from professional experts. The basic idea is to arrive at a consensus about a specific issue or problem. In our case, the objective is to arrive at a consensus about the most preferred innovations that could be implemented in each case study. The way to rank intervention is through the use of an Analytical Hierarchical Process (AHP), which is described mathematically in Annex 2. We will design a two rounds Delphi Technique, as it is described in the next section.

3. Guidelines for Experimental Design

As mentioned above, the common methodological framework to be implemented in each Pilot Case consists of a Workshop and the design of a Delphi experiment. In both cases, we need a Pilot Case Working Group (PCWG) with the following tentative composition (ideally a minimum of 12 people) representing the complete value chain under study:

- Input suppliers (1-2)
- Farmers (3-4)
- Processors (1-3: different Departments)

- Administration (related to innovation calls): 1-2
- Logistics (1-2)
- Wholesalers (1)
- Retailers (1-2)
- Consumers (3-4)

The structure and composition of the PCWG in each Pilot Case will depend heavily of the specific characteristics of each corresponding value chain. The PCWG members were defined in March 2021 and will be reviewed along 2021, following Task 2.2 until their first meeting scheduled in October – December 2021.

3.1 Workshop Design with time allocation

The following structure is proposed:

- Welcome: Introduction about the structure and objectives of the session (5 min). It has to be clearly stated that this experiment consist of two steps. The first one is going to be taken place immediately for about three hours, with two subtasks (SWOT and short list of potential innovations). The second exercise, based on the results obtained, will be emailed to them at the end of this day and should answered immediately (maximum in 48-72 hours) with a second round in one week. We should inform that the time to answer the questions contained in the AHP will be between 5 and 10 minutes. We should mention that all the session will be recorded in order to get full information about the ideas that will arise during the process. After presenting the objectives, we will ask participants a Letter on Consent about their willingness to participate in this survey.
- Presentation of the baseline scenario (current situation of the pilot case value chains). Stakeholders will be provided with results from WP4. The idea here is to present some of the most significant results generated in the environmental assessment (Sub-task 4.1.1), social assessment (Sub-task 4.2.1) and Economic assessment (Sub-task 4.3.1). A short report describing main results should be generated by each team in a dissemination language. Reports should be sent to stakeholders within two days before the workshop (10 minutes).
- Use the World Café technique to carry out a SWOT analysis. The 12 participants should be distributed in four tables with one moderator in each. Each table should be addressed to gather information about each of the four components of the SWOT analysis: Strengths, Weaknesses, Opportunities and Threatens. Participants will be allocated to each of the four Tables. During 10 minutes participants in each Table should make a list of different Strengths, Weaknesses (factors related to the VALUE CHAIN that can be CONTROLLED by the producers and processors), Opportunities or Threatens (external Factors that affect the SUPPLY CHAIN but NOT CONTROLLED by the producers and processors), respectively. After the 10 minutes, participants rotate to other Table following a predefined path in order to avoid that two participants repeat in two consecutive tables (moderators always remain in the same table). This rotation is repeated two additional times so each stakeholder has participated in the Four tables (45 minutes in total)
- Coffee Break (15 minutes). During the coffee break, the moderators in each compile all items that stakeholders have mentioned in each of the four tables in an excel file (one sheet for each of the four components of the SWOT).

- Voting the most relevant Strengths, Weaknesses, Opportunities and Threatens in each Value Chain. In a Plenary Session, main strengths from the World café will be projected. Participants will vote for the 4 most relevant assigning 4 points to the most important for themselves, 3 points for the second, 2 points for the third and 1 point for the fourth. We will use MENTIMETR or other app to facilitate the process. We repeat this exercise with the other three components of the SWOT analysis (15 minutes).
- END OF THE SWOT ANALYSIS. The total expected duration of this task would around 90 75 minutes. At the end of the day, we will have a consensus about the main components of the SWOT analysis.
- Short break in the same room before starting the second task (5 minutes)
- Presentation of Results from WP1 (15 min). Based on the deliverables from WP1 (The Portfolio of Innovative Business Models and Key factors for innovation success) a short presentation will be provided to stakeholders in an easy dissemination language. This short report should have been also sent to stakeholders within 48 hours before the workshop.
- Use again the World Café technique to identify the most adequate and plausible Innovations that could be implemented in each Pilot case taking into account results from WP1 but also the SWOT analysis carried out during the first half. In this case, we will define 3 Tables, each of them addressed to one of the three types of innovations: in product, in process and managerial/organizational (this typology could change to be consistent with the typology used in WP1). The mechanism is identical than the one use for the SWOT Analysis but only using three Tables (main innovation in products, processes or organizational (both affecting the specific pilot case partner or its contractual arrangements with other stakeholders within the value chain). As in the previous SWOT analysis, stakeholders will be allocated to the three tables to talk about the most appropriate innovations and why. After 10 minutes of discussion, stakeholders will rotate to other table following the similar path than in the previous task (35 minutes)
- Coffee Break. Once all stakeholders have participated in all tables, the moderator will elaborate a list of potential innovations within each typology in an excel sheet (15 minutes)
- Voting a short list of Potential innovations. A similar procedure than that used in the SWOT analysis will be performed in order to define a short list of potential innovations that could be implemented within each typology. Again the Mentimeter or other App will be used for this purpose. We wil stat with innovations in products, then we will move to innovations in processes t end with managerial or organizational innovations (15 minutes)
- Wrap-up of the workshop and a short explanation about the next step. We will explain the fundamentals of the Analytical Hierarchical process and how they have to answer the questionnaire stakeholders are going to receive within 24 hours. We will highlight the need to receive the answers in 48-72 hours after receiving the questionnaire by email (it should be emphasized that it will take them between 5 to 10 minutes to answer it). Finally, we will explain also that they will receive a second round to collect the same information and how the information will be delivered in this second round (15-20 minutes)
- END OF THE WORKSHOP

3.2 The Delphi Technique with the Analytical Hierarchical Process

The outcome of the Workshop is a short list of the three most preferred Innovations by type: 1) Product; 2) Process; and 3) Managerial. We used a two-round Delphi Method to arrive at a consensus about the rank of the preferred innovations. As mentioned, the analytical tool to be used is the Analytical Hierarchical Process (Annex 2) which will have been explained to participants at the end of the workshop.

In the first round, stakeholders will be asked to answer a pre-questionnaire in which participants must show, on one hand, preferences among innovation within each type of innovation. That is, participants will start by product innovations and will show their preference between that ranked first at the workshop and that ranked second, between that ranked first and that ranked third, and between that ranked second and that ranked third. The same process will be done with process and managerial innovations. After that, they will rank innovation typologies. That is, they will show their preference between product and process innovations; between product and managerial innovations; and between process and managerial innovations. Obviously, preferences will be site specific.

This tasks will be coordinated by CREDA for all Pilot Cases. Once we have received the answers, we will elaborate the results and will prepare a second questionnaire to be sent to the stakeholders. The structure will be exactly the same. However for each comparison we will provide three column. The first will indicate what was preference showed by each individual (in this second round the questionnaire should be individualized). The second will show the average value assigned by all stakeholders. The third column will be empty and the participant should show the preference in the light of this information (each stakeholder can assign the same value than in the first round or change it).

The final outcome is an agreed rank of potential interventions to be sent to the demonstration phase (WP3) to analyze both their technical and economic feasibility to be designed, implemented and assessed in the different Pilot Cases.

4. Annexes

Annex 1. World Café Technique

The "World Café" is a structured conversational process intended to facilitate open and intimate discussion, and link ideas within a larger group to access the collective intelligence in the room. Participants move between a series of tables where they engage into the discussion in response to a set of questions, which are predetermined for each table and focused on the specific goals of each World Café. A café ambience is created in order to facilitate conversation and represent a third place.

In this case, we will use the World Café set up to discuss SWOT and potential innovation alternatives to be implemented in the different Pilot Cases. At each round of the world café, each table will discuss one element and the discussion will be moderated in each thematic table by the project researchers.

Some key hints for the development of the World Café:

- 1) Setting: Create a "special" environment, most often modeled after a café, i.e. small round tables covered with butcher block paper, so that the participants can write down their ideas before saying them aloud, colored pens, and a flip chart with paper, so that the moderators can write down and summarize ideas. Recommended size of groups is between around four people.
- 2) Welcome and Introduction: The host begins with a warm welcome and an introduction to the World Café process, setting the context, sharing the Cafe Etiquette, and putting participants at ease.
- 3) Small Group Rounds: The process begins with the first of three 15-20 minute rounds of conversation for the small group seated around a table. At the end of the 15-20 minutes, each member of the group moves to a different new table. It is important to avoid that the groups keep the same people through the different rounds, so that dominant roles are not built and maintained through the session. For this purpose, name each table (A,B,C,D) and give to the participants "itineraries" on the order they should move from one table to the other. In this way we introduce a component of randomness in the process (see Table A1.1 below on a potential example with 4 Tables and 4 people in each). The "table host" person at each table will stay for the next round, who welcomes the next group, explain the topics under discussion in this table and acts as a reporter for the session.

Table 3: A1.1. Table rotation for the participants (same pattern repeated every four people)

PARTICIPANTS (Stakeholders)	TABLES			
	1 ST ROUND	2 ND ROUND	3 RD ROUND	4 TH ROUND
1	A	B	C	D
2	D	A	B	C
3	C	D	A	B
4	B	C	D	A
5	A	B	C	D
6	D	A	B	C
7	C	D	A	B
8	B	C	D	A
9	A	B	C	D
10	D	A	B	C
11	C	D	A	B
12	B	C	D	A

4) Questions: each round is prefaced with a question specially crafted for the specific context and desired purpose of the World Café. In this particular case, the same questions can be used for more than one round, or they can be built upon each other to focus the conversation or guide its direction.

Colorful pens on the tables and a plentiful supply of blank paper provide the opportunity for participants to write down the key words, phrases, images and symbols that reflect ideas emerging in their conversations.

When a recorder works in large format, a record of the proceedings is visible for all to see. Enabling people to see their contribution to the whole increases participation and fosters trust and connection and the large displays of themes and insights naturally weave together diverse perspectives into a composite “picture” that reflects the collective intelligence in the room.

World Café design principles

The following seven World Café design principles are an integrated set of ideas and practices that form the basis of the pattern embodied in the World Café process.

Set the Context

Pay attention to the reason you are bringing people together, and what you want to achieve. Knowing the purpose and parameters of your meeting enables you to consider and choose the most important elements to realize your goals: e.g. who should be part of the conversation, what themes or questions will be most pertinent, what sorts of harvest will be more useful, etc..

Create Hospitable Space

Café hosts around the world emphasize the power and importance of creating a hospitable space—one that feels safe and inviting. When people feel comfortable to be themselves, they do their most creative thinking, speaking, and listening. In particular, consider how your invitation and your physical set-up contribute to creating a welcoming atmosphere.

Explore Questions that Matter

Knowledge emerges in response to compelling questions. Find questions that are relevant to the real-life concerns of the group. Powerful questions that “travel well” help attract collective energy, insight, and action as they move throughout a system.

Encourage Everyone’s Contribution

As leaders we are increasingly aware of the importance of participation, but most people don’t only want to participate, they want to actively contribute to making a difference. It is important to encourage everyone in your meeting to contribute their ideas and perspectives, while also allowing anyone who wants to participate by simply listening to do so.

Connect Diverse Perspectives

The opportunity to move between tables, meet new people, actively contribute your thinking, and link the essence of your discoveries to ever-widening circles of thought is one of the distinguishing characteristics of the Café. As participants carry key ideas or themes to new tables, they exchange perspectives, greatly enriching the possibility for surprising new insights.

Listen together for Patterns and Insights

Listening is a gift we give to one another. The quality of our listening is perhaps the most important factor determining the success of a Café. Through practicing shared listening and paying attention to themes, patterns and insights, we begin to sense a connection to the larger whole. Encourage people to listen for what is not being spoken along with what is being shared.

Share Collective Discoveries

Conversations held at one table reflect a pattern of wholeness that connects with the conversations at the other tables. The last phase of the Café, often called the “harvest”, involves making this pattern of wholeness visible to everyone in a large group conversation. Invite a few minutes of silent reflection on the patterns, themes and deeper questions experienced in the small group conversations and call them out to share with the larger group. Make sure you have a way to capture the harvest!

OVERVIEW OF THE SESSION

We present here a tentative structure of a typical World Café

- Welcoming
- Consent agreement- signing
- Presentation
- Open debate-what do they know
- Presentation of the world café dynamics
 - 1st round of world café
 - 2nd round of world café
 - 3rd round of world café
 - 4th round of world café
- Plenary
 - What was more important, prioritizing the most and the least important
 - Wrap up

SUGGESTED MATERIALS

- Consent sheet
- Flip charts to write down ideas
- One flip chart per table
- Sticker or badge for writing the names of all the participants (including the moderators. The badge should include the order in table 1, so each participant knows where she/he should move to after each round
- Butcher paper for the tables, so people can write-down on the tables if they are willing to do so
- Pens for everybody
- Markers to write in the flipcharts
- Audio recorder (and video if possible may also help)

GENERAL TIPS FOR THE MODERATOR

If some people in the group begin to whisper to each other, sigh or disrupt the silent period, it is important that the leader quickly and impersonally sanction the distracting behaviour.

Clarification is not restricted to comments concerning what the words expressing an item “meaning”. In the discussion members of the group can convey THE LOGIC OR ANALYSIS BEHIND THE ITEM AND THE RELATIVE IMPORTANCE THEY PLACE ON THE ITEM. This should be encouraged by the moderator, as it is of high relevance for our work to know the ideas that the participants have behind each of the attributes.

Individuals should be encouraged to express their agreement or disagreement.

If arguments occur: “I think we understand both points of view at this point. Perhaps, however, we should move on the next item in the interest of time”.

Leave the group to talk during the open debate sessions and to react to what other people say.

Example of questions to boost the debate:

- Is there anybody with a different opinion?
- Does anybody have something else to add?

As a moderator, try to say as little as possible. Let them filling in the silences. Establish eye-contact with the participants when you want them to talk. Try not to summarize things a lot, as you may face the risk of not mentioning some of the opinions and you would exclude that person, and that can unintentionally be steering.

Annex 2: The Analytical Hierarchical Process (AHP)

The AHP is a multi-criteria decision-supporting method in discrete environments (Saaty, 1977; 1980). It aims to decompose a complex decision problem in a hierarchy of smaller constituent sub-problems. In our case, **the determination according to the opinion of stakeholders the most preferred innovation alternatives to be implemented in each case study**: Innovation in products, innovations in processes and non-technological innovations (managerial, organizational,...).

Determining the preferred innovation strategies to be implemented **along the supply chain with guidelines for creating added value and matching market demands** is a decision problem where the top level of the hierarchy represents each stakeholder preference and opinion regarding the best innovation strategy. This decision problem is decomposed into a predefined number of characteristics on the second level (**the three types of innovations**) and their corresponding descriptors on the third level as can be seen in Figure 2.

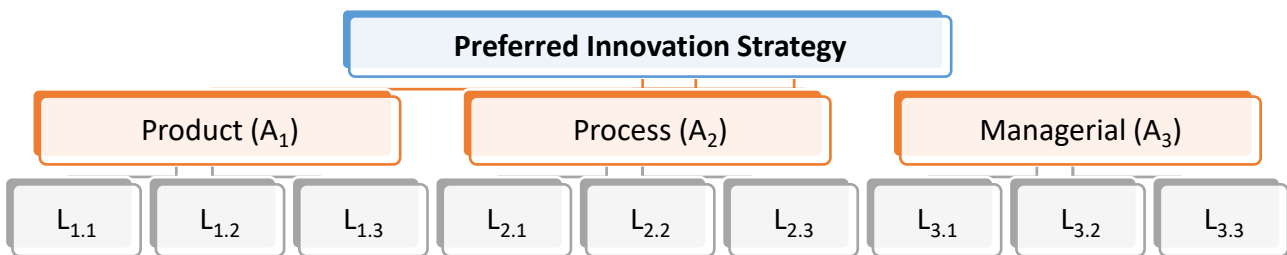


Figure 1: A2.1: Hierarchical structure used to identify the preferred innovation strategy to be implemented

AHP estimates eliciting weights (w) for each Type of Innovation (A) (Product, Process and Managerial) and for each specific innovation (descriptors) within each type (selected in the World Café, L) in order to explain Stakeholders behavior in choosing the preferred strategy. The relative importance or weight (w) for innovation policy (A_n) and descriptors ($L_{n,p}$), where; n ($1, \dots, N$) is the number of innovation types (3) and p ($=1, \dots, P$) is the number of descriptors (we will select a maximum of 3 from the World café), are obtained from pairwise comparisons.

In order to implement the AHP, one needs to carry out an interview or survey where individuals are asked to make two types of pairwise comparisons: a) a pairwise comparison of the descriptors within each type of innovation; and b) a pairwise comparison of the descriptors themselves. First, respondent has to indicate which of the two elements prefers as the best or the most important to define the corresponding policy. Then a nine-point scale is used to measure the strength of this preference/importance/suitability by means of verbal judgments as shown in Table A2.1.

From the answers provided, a matrix with the following structure is generated for each individual k ($1, \dots, K$) and is known as a Saaty matrix:

$$S_k = \begin{bmatrix} a_{11k} & a_{12k} & \dots & a_{1jk} \\ a_{21k} & a_{22k} & \dots & a_{2jk} \\ \dots & \dots & a_{ijk} & \dots \\ a_{i1k} & a_{i2k} & \dots & a_{NNk} \end{bmatrix} \quad (1)$$

where a_{ijk} represents the value obtained from the pairwise comparison between type of innovation/descriptor i ($i \in N / i \in P$) and type of innovation/descriptor j ; ($j \in N / j \in P$) for each individual k . The fundamental properties of this comparison matrix are: a) if $a_{ijk}=x$ then $a_{jik}=1/x$ (*reciprocal comparison*); b) if characteristics i and j are judged to be of equal relative importance then, $a_{ijk} = a_{jik} = 1$ (*homogeneity*); and c) all the elements along the main diagonal take a value of one ($a_{iik}=1 \forall i$).

Table 4: A2.1: The AHP nine-points scale for the pairwise comparison

Definition of the scale (Degree of importance)
1: The two innovations have the SAME importance
2: The first innovation has an importance between 1 and 3 against the compared innovation
3: The preferred innovation is SLIGHTLY more important
4: The first innovation has an importance between 3 and 5 against the compared innovation
5: The preferred innovation is MODERATELY more important
6: The first innovation has an importance between 5 and 7 against the compared innovation
7: The preferred innovation is STRONGLY more important
8: The first innovation has an importance between 7 and 9 against compared innovation
9: The preferred innovation is VERY STRONGLY more important

If perfect consistency in preferences hold for each decision-maker, it should also hold that $a_{ihk} \times a_{hjk} = a_{ijk}$ for all i, j and h ($h \in N / h \in P$). This condition implies that values given for pairwise comparisons represent weights given to each objective by a perfectly rational decision-maker $a_{ijk} = w_{ik}/w_{jk}$ for all i and j . Therefore, the Saaty matrix can also be expressed as follows:

$$S_k = \begin{bmatrix} \frac{w_{1k}}{w_{1k}} & \frac{w_{1k}}{w_{2k}} & \dots & \frac{w_{1k}}{w_{Nk}} \\ \frac{w_{2k}}{w_{1k}} & \frac{w_{2k}}{w_{2k}} & \dots & \frac{w_{2k}}{w_{Nk}} \\ \dots & \dots & \dots & \dots \\ \frac{w_{Nk}}{w_{1k}} & \frac{w_{Nk}}{w_{2k}} & \dots & \frac{w_{Nk}}{w_{Nk}} \end{bmatrix} \quad (2)$$

Under such circumstances, K weights (w_{Nk}) for each type of innovation and K weights (w_{Pk}) for each descriptors can be easily determined from the $N(N-1)/2$ values and $P(P-1)/2$ values for a_{ijk} respectively.

However, perfect consistency is seldom present in reality, where personal subjectivity plays an important role in the pairwise comparison. Thus in the case of perfect consistency it should hold that:

$$S_k \times W = N \times W \text{ (for type of innovation) and } S_k \times W = P \times W \text{ (for descriptors), where } W = (w_1, w_2, \dots, w_{N/P}).$$

Therefore, in Saaty matrixes ($S_k = a_{ijk}$) some degree of inconsistency is present. Therefore, Saaty (2003) proposed the redefinition:

$S_k \times W = \lambda_{max} \times W$, where λ_{max} is the maximum eigenvalue of matrix S_k which is determined by:

$$\lambda_{max} = \sum_i \sum_j \hat{a}_{ijk} \hat{w}_{ik} \quad (2)$$

Saaty proved that $\lambda_{max} \geq N$ (types pf innovation) and $\lambda_{max} \geq P$ (descriptors) enables one to test the degree of inconsistency in respondent ratings. Thus the quantity $\lambda_{max} - N$ (types of innovation) and $\lambda_{max} - P$ (descriptors) measures the degree of inconsistency within S_k . In this line, Saaty proposes the Consistency Index (CI):

$$CI = \frac{\lambda_{max} - N}{N - 1} \text{ (for types of innovation) and } CI = \frac{\lambda_{max} - P}{P - 1} \text{ (for descriptors)}$$

Saaty (1980) defined the Consistency Ratio as $CR = CI/RI$ where RI is a Random Index which denotes the CI for a randomly generated S_k matrix as can be seen in Table A2.1. Values of $CR \leq 0.1$ are acceptable and higher value respondents are asked to revise their pairwise comparison.

Table 5: A2.1: Random Index values

<i>n</i>	1	2	3	4	5	6	7	8	9	10
RI	0,00	0,00	0,58	0,90	1,12	1,24	1,32	1,41	1,45	1,49

In Saaty matrices where some degree of inconsistency is present, alternative approaches have been proposed to estimate the weight vector that is better able to represent the decision-maker’s real weight vector. Saaty (1980; 2003) proposed two options as the accurate estimate of real weights: the geometric mean and the main eigenvector. Other authors have proposed alternatives based on regression analysis (Laininen & Hämäläinen, 2003) or goal programming (Bryson, 1995). As all criteria meet the requirements to estimate the above-mentioned weights, we choose the geometric mean (Aguarón & Moreno, 2000; Kallas, Gómez-Limón & Barreiro, 2007). Using this approach, weights assigned by subject to each policy and descriptors are obtained using the following expression:

$$w_{ik} = \sqrt[N \cdot P]{\prod_{i=1}^{i=N, P} a_{ijk}} \quad \forall i, k(3)$$

AHP was originally conceived for individual decision-making, but it was rapidly extended as a valid technique for the analysis of group decisions (Easley, Valacich & Venkataramanan, 2000). Therefore, we need to aggregate the corresponding individual weights (w_{ik}) across subjects to obtain a synthesis of weights for each type of innovation and descriptors (w_i). The aggregation process should be carried out according to Forman and Peniwati (1998), who consider that the most suitable method for aggregating individual weights (w_{ik}) in a collective decision-making context is that of the geometric mean:

$$w_i = \sqrt[K]{\prod_{k=1}^{k=K} w_{ik}} \quad \forall i(4)$$

With the aim to obtain and ordering of weights for descriptors of each type of innovation, we need to calculate a global weight for each descriptors ($W_{G_Ln,p}$). These global descriptors weights are obtained by multiplying aggregated descriptors' weights (w_i for each descriptor $L_{n,p}$) by its corresponding weight (w_i) of type of innovation (A_n):

$$W_{G_Ln,p} = W_{An} \times W_{Ln,p} \quad (5)$$

where, $\sum W_{G_Ln,p} = 1$, for all descriptors.

For the empirical application of the AHP to each Pilot Case in task 2.3, we will developed a **harmonized template** that will be made accessible in a training session to be scheduled by Month 18.

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