

NEXUS-NESS

NEXUS NATURE ECOSYSTEM SOCIETY SOLUTION

Fair and sustainable resource allocation demonstrator of the multiple WEF E Nexus economic, social and environmental benefits for Mediterranean regions

GRANT AGREEMENT NUMBER 2042

Deliverable D2.1

Nexus Ecosystem Labs – Innovation Ecosystems Methodology V1.1 30 December 2021

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WP2 Leader and Task 2.1 Leader: XPRO, Xenia Schneider





**NEXUS-NESS - NEXUS NATURE ECOSYSTEM SOCIETY SOLUTION:
FAIR AND SUSTAINABLE RESOURCE ALLOCATION
DEMONSTRATOR OF THE MULTIPLE WEFE NEXUS ECONOMIC,
SOCIAL AND ENVIRONMENTAL BENEFITS FOR
MEDITERRANEAN REGIONS**

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WP2 Leader and Task 2.1 Leader: XPRO, Xenia Schneider

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Abstract	The deliverable describes the Nexus Ecosystem Lab Methodology, which is based on the principles of Responsible Research and Innovation, systemic innovation, and participatory approaches. The document specifies the Water, Energy, Food Ecosystem (WEFE) Nexus transition stages, steps, and tools for creating the NEXUS Ecosystem Labs (NELs) of the NEXUS-NESS project. This methodology will enable multidisciplinary stakeholders reach their co-defined WEF E-Nexus vision.		
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Abbreviations

FAIR	Findable, Accessible, Interoperable and Reusable	SDD	Structured Democratic Dialogue
IEA	Innovation Ecosystem Approach	SDG	Sustainable Development Goals of the United Nations
MSUP	Multi Stakeholder and User Platform	SMART	Specific, Measurable, Attainable, Realistic and Time bound
NEL	Nexus Innovation Ecosystem Labs	SWOT	Strengths, Weaknesses, Opportunities and Threats
NNS	NEXUS-NESS Services	WEFE-Nexus	Water, Energy, Food, Ecosystem Nexus
PESTLEEC	Political, Economic, Social, Technological, Legal, Environmental, Ethical and Citizen	WP	Work Package of the Project consisting of tasks and subtasks
RRI	Responsible Research and Innovation		

1. Purpose of the Deliverable

The primary purpose of this deliverable is to specify the common methodology that all NEXUS-NESS partners and stakeholders will follow for developing the four Nexus Ecosystem Labs (NELs) during the NEXUS-NESS project. The four NELs take place in the a) Cornia watershed, in coastal Tuscany, Italy; b) Duero watershed, Spain, c) Wadi Jir watershed in Tunisia and d) Wadi Naghamish watershed, Egypt.

The main objective of the four NELs is to mobilise and engage all relevant stakeholders in each of the NELs' locations to co-define and co-test specific Water-Energy-Food-Ecosystem Nexus plans (WEFE Nexus plans) for fair and sustainable allocation of resources. Through the NELs, local and regional stakeholders will be engaged and mobilised through participatory workshops applying the Responsible Research and Innovation (RRI) Roadmap for identifying needs, prioritising them, ideating and framing a WEFE-Nexus future, co-defining a common WEFE-Nexus common vision, co-design an action plan for moving towards this vision, implement actions, measure, and adjust the action plan and intensify actions to move even closer to the WEFE-Nexus common vision.

The following Innovation Ecosystem methodology does not only promote the necessary multidisciplinary approach to be followed, but it also provides the “non-technical” tools, for focusing on the human factor for transitioning successfully to the WEFE-Nexus concept.

2. Introduction to the WEFE-NEXUS Concept

The Nexus approach aims to make visible complex trade-offs among the natural resource dependencies of energy, food and water systems, and environmental threats including biodiversity loss, climate change and localized air and water pollution¹. The nexus between water, energy, and food has recently evolved as a resource-management concept to deal with this intimately interwoven set of resources, their complex interactions, and the growing and continuously changing internal and external set of influencing factors, including climate change, population growth, habits and lifestyles alternations, and the dynamic prices of water, energy, and food². Water, energy, and food are enormously interrelated^{3,4}: any actions in any one of these sectors will directly impact the other two. Today, the Water-Energy-Food (WEF) Nexus researchers and policymakers are seeking to establish synergies among the three interdependent sectors.

This NEXUS-NESS project provides a practical and actionable roadmap to address the interdependence and synergies across water, energy, and food. Additionally, this project examines the effects of the three sectors on the natural ecosystems and provides solutions on how to protect them through WEF Nexus. Moreover, WEFE-Nexus highlights the importance of food and water security. Food and water security are national security matters for any sovereign nation, and they are closely related to land-use planning⁵. Food and water security are national security matters for any sovereign nation, and they are closely related to land-use planning⁵. The NEXUS-NESS project uses specific hydro-agrological models (i.e., WATNEEDS⁶, Chiarelli et al, 2020) and identifies four living laboratories for studying the WEFE-Nexus and applying solutions. These

¹ Water efficiency, productivity and sustainability in the NENA regions (WEPS-NENA), FAO, <http://www.fao.org/in-action/water-efficiency-nena/activities/nexus-framework/en/> (last accessed 09/06/2021)

² Higgins C. W., Abou Najm M., 2020, *An Organizing Principle for the Water-Energy-Food Nexus*, Sustainability, DOI: 10.3390/su12198135.

³ D'Odorico, ... & Chiarelli ... Rulli, M. C. (POLIMI) (2018). The global food-energy-water nexus. *Reviews Geophysics*.

⁴ Rosa L. Chiarelli D ... Rulli, M. C. (POLIMI), P. (2020). Global agricultural economic water scarcity. *Science Advances*.

⁵ Mohtar R.H., 2021, *A Water-Energy-Food Nexus approach for evaluating the sustainability of the Mediterranean Diet: The Case of Lebanon, 2021*, <https://www.sei.org/events/fao-water-energy-food-nexus-webinar-series/#session-3-on-2-march-2021> (last accessed 09/06/2021)

⁶ Chiarelli, ..., & Rulli, M. C. (POLIMI) (2020). The green and blue crop water requirement WATNEEDS model and its global gridded outputs. *Scientific Data*, 7(1), 1-9.

living laboratories are named Nexus Ecosystem Labs (NELs) and they are located in Egypt, Italy, Spain and Tunisia.

Because of its holistic and multidisciplinary approach, the WEFE-Nexus can be leveraged to create a common platform for engaging and bringing together the various stakeholders to address food and water security matters.



WEFE-Nexus provides actionable tools and a practical roadmap to engage and empower policymakers in their efforts to address water, energy and food security, which are paramount in national security strategy for any nation, while valuing and preserving natural and socio-economic ecosystems.,.

While the WEFE Nexus concept may appear simple as a manageable system of resources that can be balanced between demand and supply, a closer look reveals a complex system of interrelated layers, as illustrated in Figure 1:

- a) Supply of water, energy, land-availability, soil quality, time, price, and readily available or not,
- b) interconnectivity between physical attributes of the supplies and the biogeochemical cycles of nature,
- c) economic factor such as cost for producing a ton of a crop, consumption willingness, and price competition from imported crops,
- d) technological advances,
- e) human pressures and factors under the social net,
- f) local experience and know-how, as well as perceptions,
- g) policies, culture, and traditions.

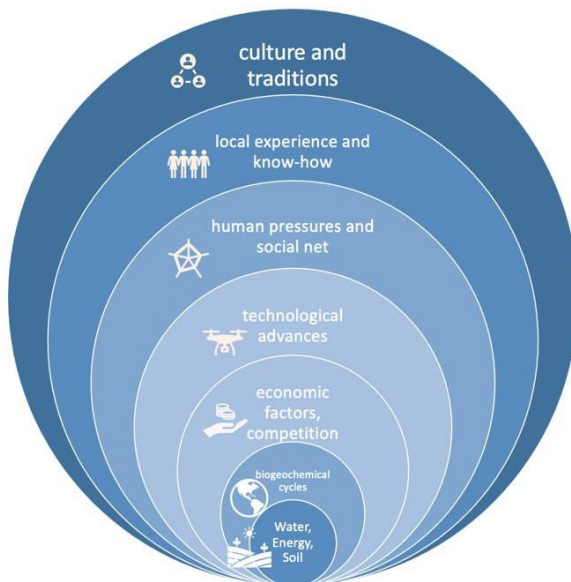


Figure 1: Water-Energy-Food-Ecosystem Nexus Layers

In the outer layers of Figure 1, the complexity increases due to the many different stakeholders and actors involved and their remarkably different priorities and focus areas. This deliverable D2.1 focuses on decreasing this complexity by bringing together and empowering these stakeholders and actors to collaborate, identifying the key WEFE Nexus challenges, and designing and applying possible solutions. Specifically, the stakeholders in the four NELs will be empowered to co-create the WEFE Nexus vision to address challenges and examine the impact of external macro factors such as climate change, digitisation, and economic and technological advances. This process will be enabled with the assistance of the NEXUS-NESS scientists and the transferring of WEFE Nexus models, data and scenarios into a NEL-issue(s) solution-oriented NEXUS-NESS Services (NNS). The goal is to create living labs⁷ in each of the four NELs.

A living lab is defined as user-centric innovation environment built on every-day practice and research, with an approach that facilitates user influence in open

⁷ Liedtke, C. et al, 2014, *User-integrated innovation in sustainable LivingLabs: an experimental infrastructure for researching and developing sustainable product service systems*, Journal of Clean Production.

and distributed innovation processes engaging all relevant partners in real-life contexts, aiming to create sustainable values⁸.

Each NEXUS-NESS living lab will be empowered with the tools and approaches to study the models for co-implementing suitable WEFE Nexus solutions, measure results, and adjust the plans of action to intensify their WEFE-Nexus transition towards a co-defined vision for sustainable use of the resources for responsible food production and consumption.

The WEFE-Nexus can positively impact national sector policies because it assists in “breaking down silos”. Silos often keep sectoral policies separate and with limited scope. Silos often create incongruence, leading to unnecessary conflicts and degradation of the natural environment and ecosystem. Policy coherence⁹ is necessary for WEFE-Nexus to succeed. Policy coherence means avoiding potential disputes due to working in isolation across ministries through synergies and cooperation across common objectives. Often nexus interlinkages are not explored across ministries’ boundaries and thus goals and policies negatively impact other policies and practices in other ministries¹⁰. The role of ecosystems deeply supports water, energy, and food access. Therefore, it is crucial to think proactively, to work in a transdisciplinary manner and to facilitate dialogue across sectors and to identify new ways to collaborate.

Furthermore, thinking in an ecosystem approach it optimises resource use (land, water, and energy production) and infrastructure (hydro, flood, and droughts) in long-term planning.

3. Introduction to the Innovation Ecosystem Approach (IEA)

Any sector (agricultural, water, energy, food) operates in a cluster of similar organisations and builds its value chain to promote efficiency and to reduce transaction costs¹¹. At the same time, it allows for knowledge exchanges within the cluster. Since a sector cannot exist in isolation, it needs to extend its value chain to other related sectors. In the case of the WEFE Nexus concept, the agricultural sector depends on the water, energy, and food sectors. Likewise, the water and energy sectors rely heavily on each other. To address pressing societal, economic, and environmental pressures, sectors must innovate. Thus, the regional innovation network concept was introduced to promote a formal and informal cooperation and knowledge exchange, leading to innovation among the regional actors (universities, scientific research institutes, regional and local authorities, enterprises, and their individuals).

Innovation occurs at the intersection of collaborative activities among all these actors, by allowing them to exchange knowledge, learn from each other and to innovate horizontally¹². Since the different multidisciplinary regional actors depend on each other, they create a net of interconnected and dependent entities, just like a biological ecosystem that must evolve based on the complex interplay between competitive and cooperative strategies of the different actors. Moore first used the term an Innovation Ecosystem to illustrate this interplay and interdependence among the different entities¹³. An excellent example of an innovation ecosystem is the European Commission’s program for research and innovation strategies for smart specialization (RIS3), applied successfully in the Helsinki Region. The Helsinki Region uses smart

⁸ Bergvall-Kaareborn, B. et al., 2009, *A Milieu for Innovation-Defining Living Labs*

https://www.researchgate.net/publication/228676111_A_Milieu_for_Innovation-Defining_Living_Labs (last accessed Sep 01 2021).

⁹ Weitz Nina et al., 2017, *Closing the governance gaps in water-energy-food nexus: Insights from integrative governance*, *Global Environmental Change* 45: 165-173.

¹⁰ FAO, 2021, *Water-Energy-Food Nexus Webinar*

¹¹ Porter, M.E., 1990, *Competitive Advantage of Nations*, 10th ed.; Free Press: New York, NY, USA, and Potter, A.; Watts, H.D., 2012, *Revisiting Marshall’s Agglomeration Economies: Technological Relatedness and the Evolution of the Sheffield Metals Cluster*. *Reg. Stud.* 2012, 48, 603–623.

¹² Lazzarretti, L. and Capone, F., 2016, *R&D networks in High Technology applied to Cultural Goods in Tuscany. A Social Network Analysis*. *Italian Journal of Management*. 34, 75–99.

¹³ Moore, J.F., 1993, *Predators and prey: A new ecology of competition*. *Harvard Business Review*. 71, 75–86.

specialization in an ecosystem manner through the active role of universities to enhance regional innovation through knowledge co-creation and development, identification and exploration of opportunities, capacity building. The Helsinki Region has shown that a smart region can become even smarter through these processes¹⁴.

Like biological ecosystems, innovation ecosystems may evolve into a structured community of multidisciplinary and diverse actors. The innovation ecosystems are open but structured at the same time based on cooperation and a win-win mindset among the actors looking at optimize their own value chain through the common innovation activities and capacity building.

An example of a successful innovation ecosystem is the Middle East and North African within the water, energy and food sectors that has been established in Lebanon, which has supported up to 50 WEF innovators by 2018 and reaching 750,000 smallholder farmers, of which 25 % are women, to adopt WEF innovations in their businesses and out of which 300,000 would experience increase in income¹⁵.

3.1 Definition and Purpose of the NEXUS-NESS Ecosystem Labs (NELs)

Each NEXUS-NESS Ecosystem Lab (NEL) is an open space for discussion, deliberation, mutual learning and negotiation to develop priorities, test and agree to concrete WEF policy recommendations and the actions for removing technical and non-technical barriers.

NELs are based on the Living Labs concept. The decision to use the concept of Living Labs is due to the necessity to involve multidisciplinary stakeholders (science, policy, industry and society) from three different sectors (water, energy and food). The transition towards WEF-Nexus is a wicked problem with several pros and cons, compromises and trade-offs, barriers and enablers it requires sensemaking. Moreover, the need for change is external due to the climate change. Thus, the Living Labs is the optimal way to involve all these diverse stakeholders to create trust for collaboration and transition towards WEF-Nexus¹⁶. Living Labs empower stakeholders to design strategies, policy agreements, operational concepts, or plans. Methods are entirely oriented towards sensemaking and achieving shared understanding for mutual action¹⁶. In conclusion, the NELs are defined as user-centred, open innovation structures based on systematic user co-creation approach, integrating research and innovation processes in real life communities and settings¹⁷.

The overarching goal of the NEXUS-NESS Ecosystem Labs (NELs) is to create an open and collaborative network of stakeholders to demonstrate the benefits of the Water-Energy-Food-Ecosystem Nexus approach through the Nexus Ness Services (NSS) for improving holistically the management of water in farming and to deliver fair and optimal economic development through fair access to natural and energy resources and at the same time protect the natural environment.

Each NEL must strive and achieve the following NEXUS-NESS project impact requirements:

EI.1.: “Ensure viability and replicability of the demonstration cases also after the end of the project”

¹⁴ Markkula, M.; Kune, H., 2015, *Making Smart Regions Smarter: Smart Specialization and the Role of Universities in Regional Innovation Ecosystems*. Technological Innovation Management Review 10, 7–15.

¹⁵ FAO, 2021, *Securing Food sustainably: Business Cases of Nexus Innovation in MENA*”, Webinar Series Water-food-Energy NEXUS, 8th session.

¹⁶ P. Jones, 2018, *Contexts of Co-creation: Designing with System Stakeholders: Theory, Methods, and Practice*, DOI: 10.1007/978-4-431-55639-8_1

¹⁷ *What are Living Labs*, <https://enoll.org/about-us/what-are-living-labs/> (last accessed 23/12/2018),

https://www.researchgate.net/publication/330607794_Contexts_of_Cocreation_Designing_with_System_Stakeholders_Theory_Methods_and_Practice

Each NEL-leader and her/his team will apply the NEL Innovation Ecosystem approach and the NSS in the NEL through active involvement of stakeholders and she/he will record the approach-steps and results to be reported to the rest of the NEXUS-NESS partners.

EI.2.: “Mobilize a wide uptake by creating strong cross-sectoral links between institutions including ground-level beneficiaries and relevant public authorities that govern the Nexus approach”

EI.5.: “At a broad-level, the project aims to encourage shifts in the ‘way-of-doing-business’ in the management of water, energy, food and ecosystems.”

Each NEL-leader and her/his team will identify, mobilise, motivate, and engage stakeholders in her/his NEL to ideate and frame the local WEFEE issues, to co-define a commonly agreed WEFEE-vision, to co-design WEFEE solutions by applying the NSS and advise by the NEXUS-NESS project, to co-construct the agreed solutions, to measure the results and adjust the solutions, and to intensify the WEFEE solutions and actions to become the norm “normal business”.

Furthermore, *each NEL must strive to enhance innovation capacity, create market opportunities, strengthen competitiveness and growth of companies by addressing WEFEE Nexus issues that are found relevant and important to the local and regional society.* Through the NEXUS-NESS project, several economic and social indicators will be used and developed to measure all the above.

The NELs and IEA will be formed and realized to share knowledge, mutually learn, and collaborate among the multi-sectorial actors of each NEL. These actors are all stakeholders, and they are farmers and other food private sector, public, associations of famers, local scientists and academia, local and regional authorities as well as citizens. All these actors will learn from each other and from the NEXUS-NESS project by applying the tools offered through the NSS and Multi-Stakeholder User Platform (MSUP) platform. Thus, the co-creation activities in the NEL Innovation Ecosystems will push to link closer all these stakeholders to push for the transition towards the WEFEE-approach, and to become flagship examples for replication.

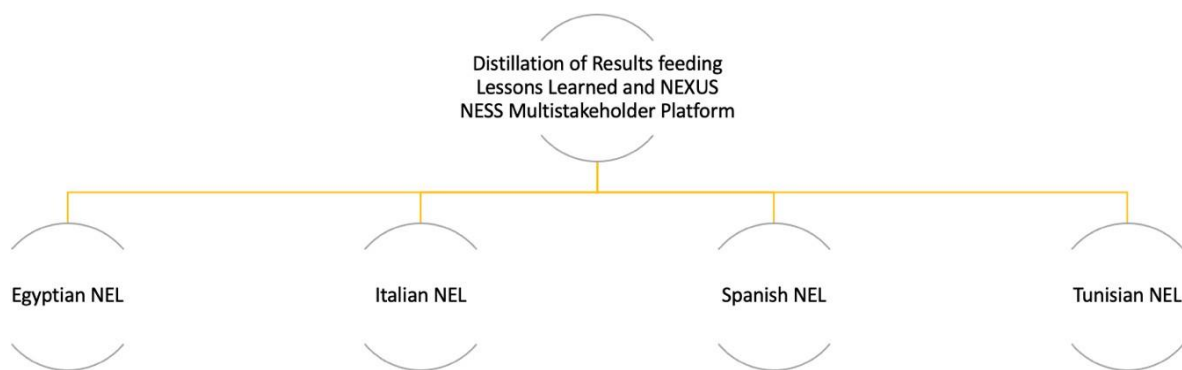


Figure 2: The NEXUS-NESS Ecosystem Laboratories will report results for Lessons Learned distillation for dissemination

3.2 NEXUS-NESS Ecosystem Labs Actors and Stakeholders (NELs)

Each NEL is a living lab, which makes the NEL a user-centred operating laboratory in a territorial context. The NEL focuses on integrating concurrently research results and innovative actions into field activities through a public-private-people partnership. The living lab concept is based on a systematic user co-creation approach integrating research and innovation processes into the direct stakeholder / user communities. These stakeholders/users are not only observing and absorbing, but instead they are also sources of knowledge and

ideas that are fed into the research and innovative processes. Furthermore, this approach will secure faster uptake and adoption of new practices through active and participatory capacity building.



Stakeholders are entities that have an interest in the WEFE-Nexus and can either affect or be affected by the WEFE-Nexus actions. Normally there are four types of stakeholders Users, Governance, Influencers and Providers. Actors are people that represent the Stakeholder Entities.

To make the NEL as operative as possible, it is distinguished between the stakeholders/ users and the actors of the NEL. The actors are representatives of the stakeholders, who have the authority to represent their organisations and possess the decision-power to take decisions and commit their organisation in the NEL’s actions. The actors are willing to actively participate and to feedback their organisation with WEFE-Nexus initiatives so that their organisation starts a WEFE-Nexus transition internally. The actors will collaborate with other NEL actions to co-create, explore new ideas, experiment, and co-construct WEFE-Nexus solutions. The NEXUS-NESS project has established 4 NEL locations in 4 different countries (Italy, Spain, Tunisia and Egypt). The following Figure 3 illustrates the WEFE-Nexus stakeholders represented by their actors in the NELs.

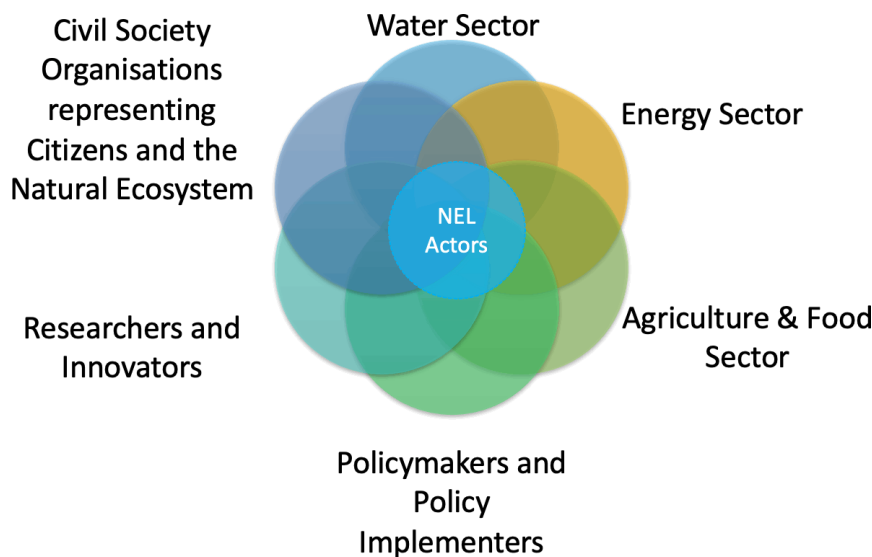


Figure 3: WEFE-Nexus Stakeholders are represented by their named-actors in each NEL

WEFE-Nexus Stakeholders involved in each NEL:

The following local and regional stakeholders (depending on the nature of each NEL):

Sectors that must be involved:

- a. Water Authorities and Providers
- b. Wastewater Authorities
- c. Energy Authorities and Providers
- d. Agricultural and Husbandry Authorities and Providers (Farmers, Farmers associations, cooperatives, etc.)
- e. Food industry (other than farmers)
- f. Climate and Meteorological
- g. Research and Scientific Organisations (Public and Private Universities and Research Centres)

h. Civil Society Organisations (CSOs) representing the society and the natural ecosystem

The NEL stakeholders will be engaged and motivated to:

- 1) Interlink and create strong synergies of water, energy, and food resources by taking into consideration their effect on the environment and how to become resilient towards socio-economic and climate change.
- 2) Learn to interpret and use the WEF services provided through the agrohydrological model for WEF-Nexus (WATNEEDS), the NEL scale hydrological and ecosystem service model (FREEWAT) and NEL Nexus scenarios. NEXUS-NESS will apply and simplify the WEF-Nexus in an easily understood way to better allow the adoption of WEF-Nexus practices.
- 3) Commence a WEF-Nexus transition internally in their organisation for reviewing and modifying organisational practices and policies towards WEF-Nexus principles and practices.
- 4) Review related policies and propose adjustments as needed for improving local and regional conditions for fully adopting the WEF-approach so that it becomes “business as usual”.

Each of the four NELS will focus to:

- 1) Deepen insights from WEF-related conflicts, risks and vulnerabilities at different scales spatial, temporal as well as political, cultural, economic and social.
- 2) Identify technological, political, cultural and socio-economic barriers.
- 3) Test the effects of WEF-NM and stakeholders’ co-developed solutions.
- 4) Involve all necessary actors representing their stakeholder organisations (water, wastewater, energy, food (agriculture and food industry) to co-design, co-develop, co-evaluate and co-promote technological operational and planning strategies, necessary cultural and behavioural shifts needed to achieve sustainable, safe and climate-resilient WEF-Nexus resource governance.
- 5) Co-develop recommendations for streamlining WEF-related policies after identifying incoherencies in WEF policies at multiple levels.

3.3 Why the NEXUS-NESS NELS are necessary as a concept and transition method

3.3.1 Moving towards a sustainable Europe by 2030

The reflection paper “**Towards a sustainable Europe by 2030**” published by the European Commission in January 2019 provides the key elements to frame the gaps and opportunities analysis for better governance of innovation. According to the European Commission, “*Sustainable development is about upgrading people’s living standards by giving people real choices, creating an enabling environment, and disseminating knowledge and better information. This should lead us to a situation where we are living well within the limits of our planet through smarter use of resources and a modern economy that serve our health and well-being. We should therefore continue the path that we set ourselves: a **transition** to a low- carbon, climate-neutral, resource-efficient, and biodiverse economy in full compliance with the United Nations 2030 Agenda and the 17 SDGs. This transition needs to be for the benefit of all, leaving no one behind, ensuring equality and inclusiveness. Our economic growth must depend less on non-renewable resources so that we maximise the use of sustainably managed renewable resources and ecosystem services.*”

Further, the European Commission defines **bioeconomy** as “*those parts of the economy covering all sectors and systems that rely on biological resources (animals, plants, micro-organisms, and derived biomass, including organic waste), their functions and principles. It includes and interlinks all ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture,*

forestry, husbandry, etc.); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services” (European Commission, 2018).

3.3.1.1 Promoting sustainability transitions in the EU and in the Mediterranean Area

The European Commission urges all actors in the EU to prioritise the sustainability transition, “*further developing the cross-cutting policy agendas that have been adopted at EU level in recent years (...), building bridges and increasing coherence between different agendas at all levels (...) Policy coherence is a critical condition to ensure that we can deliver on the SDGs and ensure long-term green and inclusive growth for the EU*” (European Commission, 2018).

In the EU, the document of reference for sustainability transitions is the report produced by the European Environment Agency and published in September 2019, “*Sustainability transitions: policy and practice*”. Drawing on historical evidence and case studies, the document explains that “*transitions emerge through interactions among multiple actors, including businesses, users, scientific communities, policymakers, social movements and interest groups. They are evolutionary processes, meaning that they are typically based on searching, experimenting, reflecting, and learning. They also depend critically on interpretations and social acceptance. Transitions are therefore fundamentally uncertain and open-ended. Surprises and unintended outcomes are to be expected. Transitions are also conflictual and deeply political, producing trade-offs, winners and losers, and related struggles, as politically influential and well-resourced incumbents often resist change*”.

Moreover, sustainability transitions aim at achieving horizontal, vertical, temporal, and territorial coherence¹⁸. These coherences¹⁹ reflect on the governance of innovation policies in the following manner:

- **Horizontal coherence** refers to the need for individual objectives, instruments and projects developed by different entities to be mutually reinforcing. It means strengthening the inter-connectedness of policies and actors and promoting shared perspectives and roadmaps focused on societal challenges. *Horizontal coherence also means identifying and correcting misalignments in policy mixes and considering social, environmental, and economic value on the same footing. This is very relevant for achieving WEFE-Nexus.*
- **Vertical coherence** refers to actions designed and implemented at different scales of multilevel governance, i.e., international, national, and sub-national levels of government, and to the need to ensure that the different approaches and policy choices of these different actors reinforce each other. *That is why in the NELs local and regional levels of government are involved as stakeholders.*
- **Temporal coherence** is about ensuring that policies and initiatives contribute to longer-term commitments and continue to be effective over time, without being contradicted by short-term decisions. *Indeed, the temporal coherence is important for ensuring that the NELs will continue to exist and grow after the NEXUS-NESS project ends.*
- **Territorial coherence** is ensured when initiatives relate to the dynamics of territories, in terms of direction, space and time. In other words, *the NEL initiatives under the NEXUS-NESS project must be based on the local and territorial realities for ensuring that the WEFE-Nexus becomes then new normal.*

¹⁸ European Environmental Agency, 2019, *Sustainability transitions: policy and practice*, Publications Office of the European Union, 2019. <https://www.eea.europa.eu/publications/sustainability-transitions-policy-and-practice> (last accessed 25 July 2021).

¹⁹ Fernández Sirera T. et al., 2020, *Gaps and opportunities for a better governance of innovation policies from the Interreg MED perspective*, Working Document Panoramad Project, Interreg MED Programme 2014-2020. Panoramad Governance Platform Directorate-General for Economic Promotion, Competition and Regulation, Government of Catalonia <http://catalunya2020.gencat.cat/> (last accessed 25 July 2021).

In this context, the **role of NEXUS-NESS partners and the stakeholders involved in the NELs are to become the enablers of WEFE-NEXUS wide transformation processes** rather than only acting as “pilots” of WEFE-Nexus on their path towards sustainability. Furthermore, it is needed to recognise that it will not suffice if governments continue to implement environmental regulations and market-based business as usual in their attempt to drive efficient food production and hoping that they will achieve change towards WEFE-Nexus. What is needed is to stimulate and manage the change by looking at the core drivers of WEFE and environmental (water, soil, air) degradation. To do this, it is required to involve policymakers and stakeholders broadly in each NEL and to adopt a broad and critical view on the initiatives, collect experiences and adjust the **policy mix**. The adjusted policy mix is necessary to regulate long-term effect of the NEL’s WEFE-Nexus practices to become the new “business as usual”.

Additionally, it is necessary to recognise that sustainability transitions must include **normative choices among alternative visions** of the future and how to get there. For this it is vital to include public engagement to foster consultation and deliberation¹⁸. Moreover, when dealing with crucial sustainability challenges, it is essential to focus concurrently on the production and consumption of food, energy, mobility, and the built environment because of their interlinkages and considering their social implications. According to the EC, this is where sustainability changes are most needed and are potentially most beneficial for the EU economy, society, and natural environment, with strong positive spill-over effects²⁰.

In this respect the European Environment Agency (EEA) has defined several key messages for policy to promote systemic innovation and the coordination of systemic change processes towards long-term sustainability goals. Several of these key messages apply to the NEXUS-NESS NEL concept as follows:

European Environment Agency Key message:	NEXUS NESS NEL Actions:	
<p>1.Promote experimentation with diverse forms of sustainability innovation and build transformative coalitions</p>	<p>The emergence of new technologies, practices and business models requires a culture of experimentation. This implies supporting diverse innovative activities, from publicly funded research and development (R&D) projects to local social movements, as well as creating new networks of actors. Research and firms are crucial, but open innovation policy should also target users, civil society, communities and other actors. Innovation policy should also stimulate organisational innovations and new business models, which are important in determining the commercial feasibility of sustainability innovations.</p>	<p>1. Involvement of Stakeholders: Water, Energy, Food producers, associations, authorities, scientists and all necessary WEF value chain actors and society. 2. Open innovation will be promoted through the NEL workshops (WP2 and WP3). 3. New science-informed WEFE Nexus Management plans (WP4) and business models (WP5) will be explored and demonstrated.</p>
<p>2. Stimulate the dissemination of green niche innovation</p>	<p>To achieve sustainability transitions, radical innovation needs to move beyond experimentation and become more widely disseminated. Novel technologies, social practices and infrastructure systems pose different challenges and disseminate in varied ways, which require various kinds of policy support (financial and non-financial</p>	<p>1. NELs will push for sustainable practices through experimentation, lessons learned distillation (WP2, WP3, WP4). 2. Policy dialogue and support in the NELs for achieving the transition towards WEFE-NEXUS (WP5).</p>

²⁰ European Commission, 2018

	incentives, regulations, infrastructure investment, new narratives to promote social acceptance, horizontal coordination of policy areas, stimulation of knowledge, dissemination, etc.).	3. Dissemination of lessons learned and good practices (WP6).
3. Support the reconfiguration of whole systems, phase out existing technologies and alleviate negative consequences	Sustainability transitions can involve disruption and conflict when the diffusion of new technologies and practices affects existing systems and businesses. Impacts on sectors or regions can be severe, implying a role for public policy in offsetting inequalities and facilitating structural change. Ensuring a just transition requires measures to alleviate negative consequences and help firms, employees, and regions to reorient (e.g., compensation, retraining and regional adjustment).	WEFE-Nexus and sustainability analysis will be executed (WP3 and WP5) to ensure that the WEFE-Nexus transition is successful. (WP2 Task 2.2).
4. Promote clear direction for change through ambitious visions, targets and missions	Sustainability transitions are purposeful and oriented towards defined sustainability outcomes (SDGs). This creates a difficult governance challenge, as the complexity and uncertainty of societal change means that transitions cannot simply be planned and implemented from the outset. To make long-term visions concrete and to incentivise supporting actions it is important to translate these visions and missions into sectoral and cross-sectoral policy strategies, programmes, and instruments. It is also relevant to guarantee consistency between short, medium, and long-term targets.	WEFE-Nexus vision and sustainability goals will be defined for each NEL in WP2 Task 2.2 and WP4 Task 4.5; they will be measured and followed in WP3 Task 3.3 and WP4 Task 4.3. WP5 Task 5.3 will focus on the economic measures of WEFE-Nexus in the NEL.
5. Align policies between different domains to improve policy coherence for transitions	The multidimensional nature of transition processes means that they are influenced – positively or negatively – by multiple policies (environment, innovation, sectoral, fiscal, education), creating significant risks of inconsistencies and incoherence. Therefore, contrasting objectives across policy areas and actors, policy coordination and policy integration are essential.	The transition process including policy issues will be discussed during the workshops of WP2 Subtask 2.2.3 and 2.2.4 to identify policy enablers, disablers and risks. Furthermore, water, energy and food policy-coherence or incoherence will be studied in each NEL (WP6, Task 6.3).
6. Promote coherence of actions across EU, national, regional and local governance levels	Sustainability transitions necessarily involve actions at multiple levels of governance, as they are multi-actor processes that cannot be steered by any actor on any level of governance on its own. They require coordinated policy action at all levels of	Governance will be promoted as one of the RRI dimensions locally and regionally at the NELs as part of Task 2.2 and WP3.

	governance. Promoting both top-down and bottom-up processes of governance requires new mechanisms to promote dialogue and increased flows of information and resources. Thematic working groups crossing different governance levels and including industry and civil society actors can be a valuable tool to facilitate this coordination.	Governance at higher levels will be tackled as part of the work of Task 6.3.
7. Monitor risks and unintended consequences and adjust pathways as necessary	Transitions processes are highly unpredictable, open-ended, complex, and non-linear processes that often produce unintended consequences and trade-offs between social, economic, and environmental sustainability outcomes. It is essential to continuously identify and evaluate risks associated with transitions using anticipatory governance approaches. Ex ante approaches must be complemented with adaptive governance approaches based on iterative cycles of policymaking and planning, implementing, evaluating, and learning.	The WEF-Nexus transition processes in all 4 NELs will be followed and intensified in Task 2.2 and all tasks of WP3 and in particular Task 3.4 which focuses on pathways for capacity development.

3.3.2 Sustainability is closely related to the services of the Natural Ecosystem

In the above-described WEF-Nexus sustainability and policy-related contexts, it is necessary to highlight the conceptual framework of the last “E” of the WEF-Nexus, which stands for ecosystem. This *ecosystem* indicates that in each NEL the balance among Natural Ecosystem, Social Ecosystem and Economic Ecosystem is studied, imbalances identified, and corrective actions are embedded in the WEF-Nexus plan of each NEL as illustrated in Figure 4.

It is thus necessary to have a conceptual network for studying and balancing the three ecosystems in each NEL, which in turn will underpin and be influenced by the management of water, energy, and food.

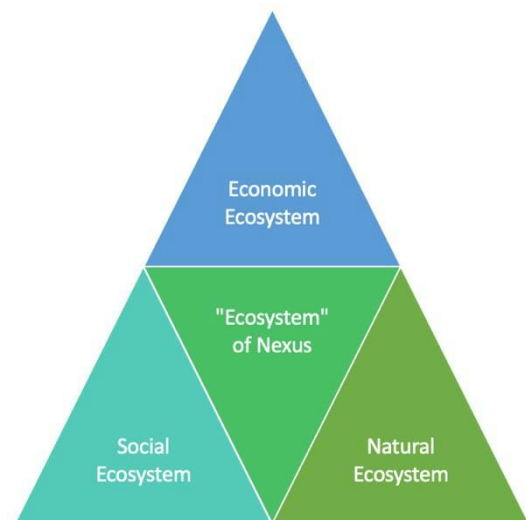


Figure 4: The Ecosystem of WEF-Nexus: interdependence among the Natural, Economic and Social Ecosystems

Four different kinds of services²¹ relating to the Natural, Social and Economic Ecosystems, all vital to human health and well-being have been identified as follows:

1. *Provisioning services* of the natural ecosystem such as supply of water, food, timber, and fibre.

²¹ European Commission, Ecosystem Goods and Services, 2009

2. *Regulating services* govern climate and rainfall, water (e.g., flooding), waste, and the spread of disease.
3. *Cultural services* cover the beauty, inspiration and recreation that contribute to our spiritual welfare.
4. *Supporting services*, which is habitat for species, include soil formation, photosynthesis, and nutrient cycling, which underpin growth and production.

Furthermore, according to the Millennium Ecosystem Assessment, it is necessary to first understand how the natural environment works and its influences on human health and well-being and why is it important to protect the natural environment while studying and implementing WEFE-Nexus solutions. “To co-create a sustainable future, we need to devise adequate means to value our natural capital and human resources”²². Translating this vital message in the WEFE-Nexus terms, means that nature-based solutions must be carefully considered before moving into a technology-based solution. As for example, to solve the scarcity of water, instead of only considering desalination, which is an energy intensive solution with negative effects on the natural ecosystem, nature-based solutions such as agroforestry solutions or reinstating wetlands should be considered. Another example is the execution of a hydro-energy plant in an African country that harmed the social and natural ecosystems, and it was utterly abandoned just after it was built.



All three types of ecosystems will be mapped and carefully considered during the NEL workshops for co-defining the WEFE-Nexus plan in the tasks of WP3, WP4 and WP5.

As the three types of ecosystems are totally depended on the human activities, new multi-actor governance models are necessary for aligning the efforts of all actors towards the WEFE-Nexus and hence towards sustainability and the Sustainable Development Goals, which are part of the PRIMA strategic aims.

Each NEL, will aim towards alignment of the collective perspectives of all stakeholders and their actors to enable the transition towards WEFE-Nexus co-created solutions and directly or indirectly moving closer to the SDGs. Therefore, the four NELs will push for executing sustainable and responsible research and innovation to form long-term innovation ecosystems²³ by **locally embedding participatory and multi-stakeholder governance**. This multi-stakeholder governance will consider local or regional specificities in geography, culture, social capital, gender issues and gender balance. The multistakeholder governance is based on the close collaboration of each of the five main types of stakeholders for each of the three sectors of water, energy and food: 1) public administration comprised of local authorities and ministry representatives, 2) scientists, 3) industry/ utilities and 4) farmer associations and 5) civil society representing the citizens/ consumers as illustrated in Figure 6.

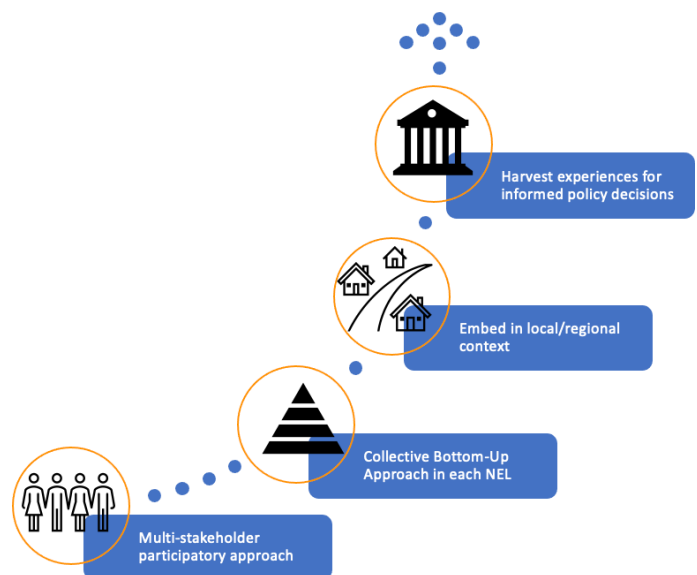


Figure 5: Each NEL is following a bottom-up approach of collaboration towards multi-stakeholder governance

²² Odeh Al-Jayyousi, *The state of ecosystems and progress of society*, IUCN West Asia, Central Asia and North Africa Regional Office, Amman- Jordan <https://www.oecd.org/site/worldforum06/38703904.pdf> (last accessed 25 June 2021)

²³ Based on works on transitions literature of Geels, 2002; Schot & Steinmueller, 2018, Berkowitz (2020)

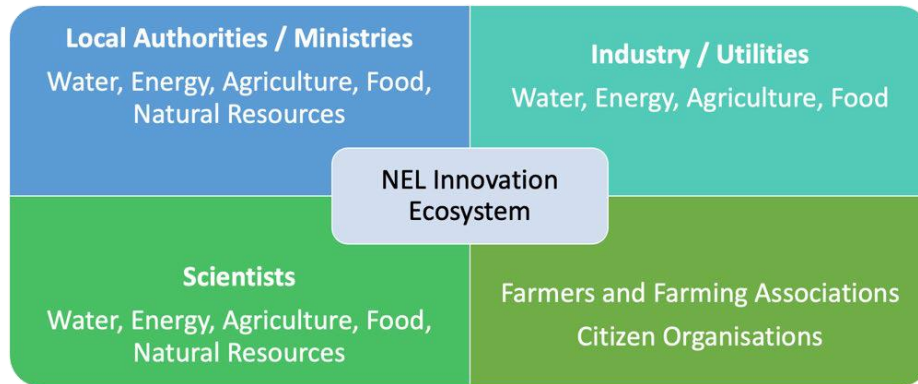


Figure 6: Each NEL Innovation Ecosystem will result from the mutual learning and collaboration among the three sectors and four helixes representing the multi-stakeholders

A large part of the success of sustainable innovation for achieving over time a fully functioning innovation ecosystem based on the framework participatory governance depends on the cohesiveness of the actors, who must have a **shared vision**. The breadth of activities across the three sectors and policy areas needs coordinated actions, which are co-created based on the shared vision²⁴. This shared vision will be based on **identifying major challenges and agreeing on their prioritisation** by setting specific goals, milestones, and targets, as well as translating those goals into concrete criteria that guide prioritisation of investment and policy implementation²⁵. Thus, in the NEXUS-NESS, by following the RRI Roadmap and its specific milestones and steps a NEL common vision and WEF-NEXUS transition plan will be defined, executed, and measured. However, as for any transition plan it is important to translate it into sectoral and cross-sectoral policy strategies and incentives at local/ regional and even national level for it to become the new norm and “business as usual”.

²⁴ Weber and Rohrer, 2012; Reichardt and Rogge, 2016, as in European Environment Agency, 2019

²⁵ Miedzinski, Mazzucato and Ekins, 2019

4. Transition towards the WEFE-Nexus

For transitioning towards the WEFE-Nexus it is necessary to manage the change that the WEFE-Nexus brings. As WEFE-Nexus requires reflexive transformation²⁶ and innovation in collaboration among sectors and their practices. This transformation does not apply only to the NEL stakeholders but also to the researchers and scientists of the NEXUS-NESS project beneficiaries as well as to the researchers and scientists from stakeholder universities involved in the NELs. Nexus issues and nexus-related interactions are a mix of large-scale and small-scale interactive **objective** systems such as water, energy and food. Nonetheless, these nexus issues and nexus-related interactions are also **subjective** because they depend on the people as well as on the social and ecological systems where they are embedded²⁶. This is illustrated in Figure 7 showing contrasting perspectives of WEFE-Nexus depending on the priorities and starting point of the different stakeholders that generate variability that must be recognised in the WEFE-Nexus transition. Thus, in the WEFE-Nexus transition, both the objective and the subjective perspectives must be considered. This is called **reflexivity**, the ability to reflect on how perspectives look different depending on how they are viewed. Therefore, this reflexivity must be embedded in the WEFE-Nexus transformation processes. As the WEFE-Nexus transformation brings change this change must be managed, and the goal is to move all the actors (NEXUS-NESS partners and NEL stakeholders) towards trans-disciplinarity. **Trans-disciplinarity** expects that research and innovation processes engage in broad, in-depth and equal knowledge exchange despite the disparate interests of the actors involved. Trans-disciplinarity happens when the design, implementation and interpretation of the entire research and innovation processes, including measurement and appraisal, are conducted in an equal and collaborative partnership despite disparate interests.

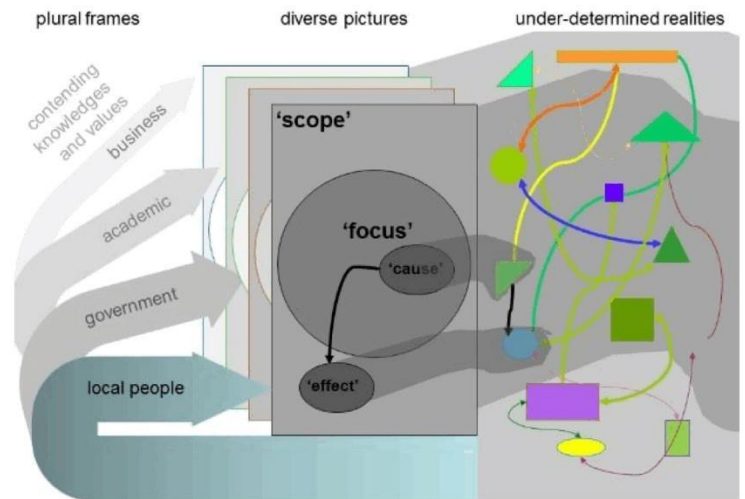


Figure 7: WEFE-Nexus perspectives may be contrasting and must be recognised for achieving a WEFE-Nexus transition. Ref: Figure from Stirling²⁶.

Thus, in the WEFE-Nexus transition, both the objective and the subjective perspectives must be considered. This is called **reflexivity**, the ability to reflect on how perspectives look different depending on how they are viewed. Therefore, this reflexivity must be embedded in the WEFE-Nexus transformation processes. As the WEFE-Nexus transformation brings change this change must be managed, and the goal is to move all the actors (NEXUS-NESS partners and NEL stakeholders) towards trans-disciplinarity. **Trans-disciplinarity** expects that research and innovation processes engage in broad, in-depth and equal knowledge exchange despite the disparate interests of the actors involved. Trans-disciplinarity happens when the design, implementation and interpretation of the entire research and innovation processes, including measurement and appraisal, are conducted in an equal and collaborative partnership despite disparate interests.

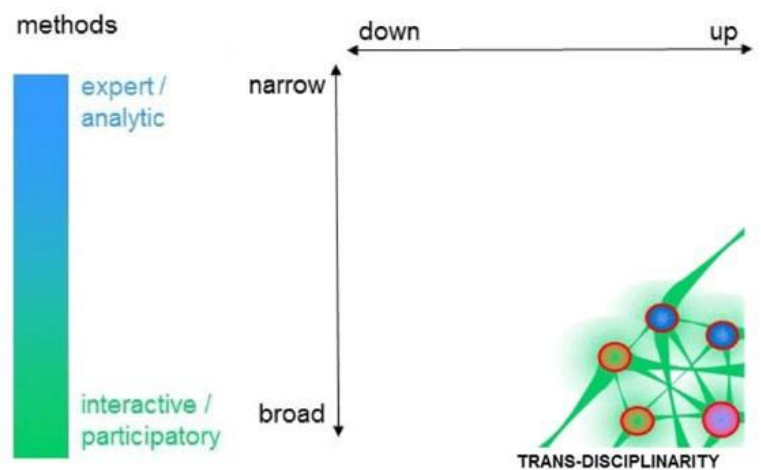


Figure 8: Trans-disciplinarity is essential for WEFE-Nexus transformation

Thus, to accomplish a WEFE-Nexus transformation not only the change must be managed but the research and innovation processes must be broad, open, interactive, and participatory. Therefore, Responsible Research and Innovation will be applied on the research and innovation processes of NEXUS-NESS by following the RRI Roadmap and its steps.

²⁶ Stirling, A., 2015. *Developing 'Nexus Capabilities': Towards Transdisciplinary Methodologies*. *The Nexus Network*. <http://www.thenexusnetwork.org/wp-content/uploads/2015/06/Stirling-2015-Nexus-Methods-Discussion-Paper.pdf> (last accessed 6/8/21)



For the WEFE-Nexus transition of the NELs, all research, innovation and implementation processes must be trans-disciplinary and conducted in an equal and collaborative partnership despite disparate interests among all stakeholders.

5. Responsible Research and Innovation – What is it and why we need it

For achieving the transition to WEFE-Nexus it is necessary to have all actors and stakeholders adopting the WEFE-Nexus practices and moving in the same direction. For such a transformation and adoption, it is required that actors and stakeholders actively participate in the transition process and to take ownership of this transition. If actors and stakeholders do not feel that they are part of this change and transition processes, then the transition is bound to fail. It is well documented that the failure rate of transitions is about 70-80% depending on the sector and the change management maturity of organisations. Moreover, when transition concerns the most important societal goods of water, energy, and food security and at the same time preserving the natural ecosystem and environment, a carefully planned transition process is even more critical to secure successful adoption by all concerned stakeholders and their actors. In this respect, the concept of **Responsible Research and Innovation (RRI)** is very suitable for facilitating the transition to WEFE-Nexus in the NELs. RRI, as defined by the European Commission²⁷, is “an approach that anticipates and assesses potential implications and societal expectations with regard to research and innovation, with the aim to foster the design of inclusive and sustainable research and innovation.” Thus, RRI aims at an interactive process where societal actors, researchers and innovators actively cooperate to









Figure 9: The Responsible Research and Innovation dimensions

together co-define, co-design and co-construct solutions, services and products that are socially acceptable, sustainable and resolve important societal issues. This means that researchers, scientists, and policymakers **interact and involve** other societal actors, such as farmers, for mutual awareness, co-defining and co-designing new socially acceptable solutions. In other words, RRI focuses on making research and innovation **beneficial** to society and simultaneously **protect the environment**. Furthermore, RRI may be a vital communication channel for approaching science to policy and vice-versa, and for enabling policymakers to be better informed and equipped to adjust policies to achieve sustainability and resilience.

In practical terms the European Commission defined the RRI concept through six interconnected and interlinked dimensions:

²⁷ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/responsible-research-innovation> (last accessed 20/07/2021)

RRI Dimension	Explanation
Multi-actor and Public Engagement 	To better align research and innovation results with society’s values, needs and expectations, engage industry, policymakers, civil society and citizens in the R&I processes to co-define and to co-construct the solutions, products, and services.
Gender 	Gender has a double meaning: on one hand, it is about gender equality in the R&I processes and on the other hand, it is about carefully considering gender issues in the R&I processes, as for example reclaimed water for irrigation is perceived differently by women and men farmers and consumers.
Science education 	Enhance education processes to attract and better equip future researchers and other societal actors with necessary knowledge to fully responsible join research and innovation processes.
Open Science/ Open access 	Complex societal issues require open access to research results through open platforms. Open science represents an approach to research that is collaborative, transparent, and accessible.
Ethics 	Ensure dialogue among the EU countries' ethics and integrity bodies and the respective communities. Execute all R&I activities based on the highest standards of ethics and integrity. Ensure that products, services, and results are inclusive for all societal groups.
Governance 	This dimension concerns all other five dimensions in the sense of “good governance”: openness, participation, accountability, effectiveness, and coherence. “Participation” plays a key role. It is presented as a necessary condition for the implementation of the other four principles and is what justifies speaking of a genuine discourse of European participatory governance. Governance expects to avoid sectoral perspectives and selective application of the European Framework Directives, rules, and guidelines.

5.1 Applying RRI in the NEXUS-NESS Ecosystem Laboratories

Given the multidimensional and complex nature of the nexus, a transdisciplinary approach to knowledge development through co-production is needed to timely and effectively inform the decision-making processes to build societal resilience to these shocks going beyond the sectorial of current research practice²⁸.

Applying RRI in the NELs for succeeding in the WEF-NE Nexus transition will allow greater awareness and holistic governance. Moreover, RRI underpins the requirements of the PRIMA call topic to **support systemic innovation** towards “mechanisms and tools that support common evidence, build and enhance trust between the different stakeholders and allow them to address the trade-offs and identify win-win strategies jointly”. Thus, it is evident that to achieve this call topic requirement, each NEL-Leader must push for active participation of all NEL stakeholders through their actors, as well as, to push for all other six RRI dimensions (gender, science education, open science and open access, ethics and overall governance).

Europe’s Green Deal for decarbonising Europe and focusing on sustainable and green technologies that focus on source-efficient and competitive economy is a response for tackling climate change and environmental stress as well as social challenges such as water, energy, and food security. Fundamental changes in production and consumption of these three resources are necessary to be able to survive and progress sustainably and

²⁸ Howarth C., Monasterolo I., 2016, *Understanding barriers to decision making in the UK energy-food -water nexus: The added value of interdisciplinary approaches*, Environmental Science & Policy 61 53–60

responsibly. The WEFE-Nexus approach aims exactly at dependable use of water and energy for ethical and responsible food production without destroying the natural resources and the ecosystem while being resilient to climate change. For this reason, the NEXUS-NESS whole workplan embeds RRI for bringing WEFE-NEXUS actors to work together during the whole research and innovation process and to align these with the values, needs and expectations with local/regional societal needs.



RRI is ambitious since it pushes researchers and innovators out of their comfort zones to focus on the needs of society by engaging all societal actors and stakeholders via inclusive participatory approaches.

RRI crosscuts all NEL activities and all work-packages of the NEXUS-NESS project. RRI fits particularly well the WEFE-Nexus topic. It requires a multitude of stakeholders from many sectors (water, energy, agricultural, husbandry and food industry) with multidisciplinary focus of work (policy making, industrial business focus and innovation, scientific research, and consumers/ end users).

Hereafter, the RRI concept and its dimensions will be applied in the NEXUS-NESS NELs and project overall workplan (WP2, WP3, WP4, WP5 and WP6). The Responsible Research and Innovation Roadmap RRI Roadmap²⁹ will be used to operationalise and achieve the NEXUS-NESS objectives to meet the sustainability objectives as stated on page 12. WP6 will facilitate the communication and dissemination of results and actions of the other WPs and help “translate” them in the different stakeholder languages to ensure a smoother WEFE-Nexus transition. In NEXUS-NESS the RRI Roadmap is embedded throughout the project’s work packages and tasks.

The **RRI Roadmap** outlines the transition process through 8 transition stages as illustrated in Figure 14, where each phase reaches one RRI Roadmap Milestone. The milestones and their steps guide the transition process to identify the needs, motivate change, engage, ideate & frame, co-design, co-construct and implement solutions, measure them, and adjust them and intensify them. This will ensure viable, sustainable, and worthwhile actions towards solutions that are created and accepted by most stakeholders. In each of these phases, the RRI dimensions will be applied as follows:

a) Multi-actor and Public Engagement (MPE) dimension, in each NEL, is about taking status of the present state of things (“as-is” situation) and for co-design and constructing the future (“as it should be” situation). This will be done by bringing together the broadest possible diversity of actors, including researchers and innovators, farmer associations and farmers, sector representatives (water, energy, and food), SMEs, policymakers, non-governmental organisations (NGOs) and civil society organisations that would not normally interact with each other. MPE is about mobilisation and mutual learning iterative, inclusive, and participatory process of people. MPE in research and innovation will educate and be educated with local and cultural knowledge. Thus, MPE fosters more societally relevant, desirable, and creative WEFE actions and policy agenda, leading to wider acceptability of WEFE-Nexus science and actions. Hence, MPE is a very relevant dimension for the WEFE-Nexus process.

b and c) Open science and science education are needed and made available to any stakeholder using simple language for science to be understood and to be embedded into farming and food production practices, policy-informed decisions, and business-informed options for sustainable and responsible use of natural and social resources.

²⁹ Xenia Schneider, 2019, *The RRI Roadmap*, XPRO Consulting, <https://www.researchgate.net/publication/339630196> *The Responsible Research and Innovation RRI Roadmap* (Last accessed 30 June 2021)

d) *Gender equality and gender issues* are important to be considered in research and innovation since perceptions and technology-effects differ depending on the gender and the uptake of results by society. This is for example very relevant for water reuse.

e) *Ethics* govern the shared values of society, and the WEFE-Nexus plans must ensure that they are ethical, responsible, and inclusive for the good of society, humans and their natural environment and ecosystem.

f) *Governance* is about policy responsibility to anticipate and assess potential implications and societal expectations. It is thus of great importance that water, energy and food policies do not work against each other and against the society. On the other hand, policy responsibility is about fostering the design of inclusive and sustainable WEFE-Nexus solutions for the good of society and its natural environment.

6. The RRI Roadmap, Change Management and Systemic Innovation

The RRI Roadmap³⁰ is based on RRI, the principles of Leading Change, Design Thinking, and Systemic Innovation.

The principles of **Leading Change** followed in the RRI Roadmap are based on the 8-step Process for Leading Change³¹:

1. Create a sense of urgency: Help others see the need for change through a bold, aspirational opportunity statement that communicates the importance of acting.
2. Build a guiding coalition: Identify effective stakeholders' people, who are willing to guide, coordinate and communicate the change activities.
3. Form a strategic vision and initiatives: Clarify how the future will be different from the past and how you can make that future a reality through initiatives linked directly to the vision.
4. Enlist a volunteer army: Clarify how the future will be different from the past and how you can make that future a reality through initiatives linked directly to the vision.
5. Enable action by removing barriers: Removing barriers such as inefficient processes and hierarchies provides the freedom necessary to work across silos and generate real impact.
6. Generate short-term wins: Wins are the molecules of results. They must be recognized, collected, and communicated – early and often – to track progress and energize volunteers to persist.
7. Sustain acceleration: Press harder after the first successes. Your increasing credibility can improve systems, structures, and policies. Be relentless with initiating change after change until the vision is a reality.
8. Institute change: Articulate the connections between the new behaviours and organizational success, making sure they continue until they become strong enough to replace old habits.



Figure 10: 8-step process for Leading Change. Ref: J. Kotter

³⁰ Xenia Schneider, 2019, *The RRI Roadmap*, XPRO Consulting,

<https://www.researchgate.net/publication/339630196> *The Responsible Research and Innovation RRI Roadmap* (Last accessed 30 June 2021)

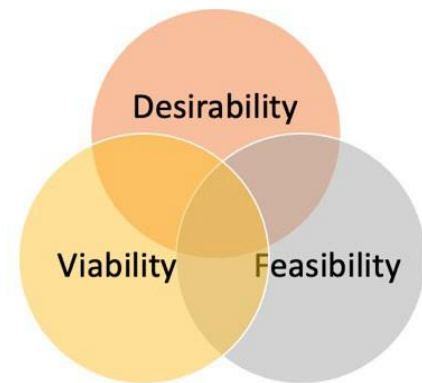
³¹ Kotter J.P. , 2007, *Leading Change: Why Transformation Efforts Fail*, Harvard Business Review

Change transformations like WEFE-Nexus require a strong vision that is easily communicated by anyone and understood by anyone. This vision must be clear and create urgency to drive people outside their comfort zones. People by default they will resist the change and thus the change leader must be patient, persistent and ready to overcome the immunity to change. That is why communication is key for successful transformations.



To lead change successfully every transformation step must be clearly communicated in different forms and followed by clear actions moving forward.

Design Thinking is an iterative process focusing on the end-user of the method/ model/ tool/ service. Design Thinking seeks to understand a challenge or a problem by first deeply understanding the user for whom the solution is created. Design thinking is a human-centred approach to innovation by focusing on the end-user needs and using rapid prototyping generates ideas that can be transformed into innovative services/ tools/ model etc. The advantage of design thinking is that it involves the end-user in the design and development processes to deliver useful and practical method/ model/ tool/ services than just relying on historical data and desk-surveys. Furthermore, design thinking ensures faster uptake of the developed method/ model/ tool/ service by the end-users since they have been involved in the process from the start.



Design thinking (Figure 11) focuses on:

- What is **desirable**? What makes sense for the people that will use the method/ model/ tool/ services?
- What is **feasible**? What is technically and economically possible within a foreseeable future?
- What is **viable**? What is likely to become part of a sustainable future?

Figure 11: Design Thinking is a human centred iterative innovation process

Systemic innovation leads to fundamental changes in both social dimensions (values, regulations, attitudes) and technical dimensions (infrastructure, technologies, tools, processes, and workflows). It is essential to point out that the relations between the social and the technical dimensions positively change and affect each other through systemic innovation. This is illustrated in Figure 12.

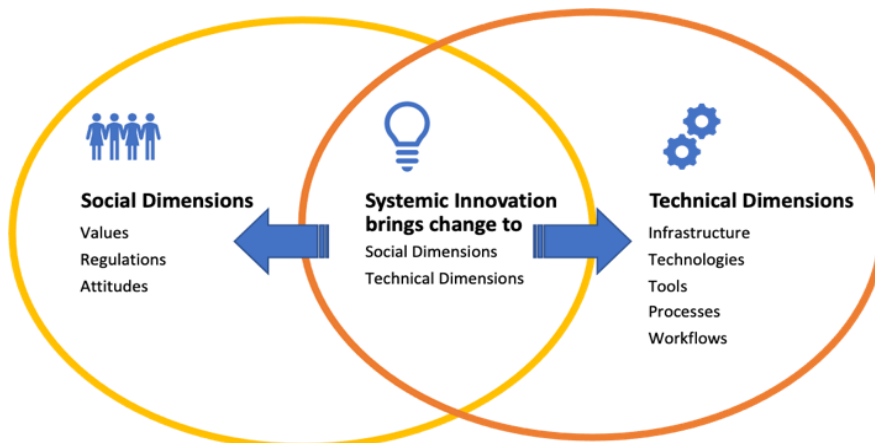


Figure 12: Systemic Innovation enables change both in the Social and Technical Dimensions



While planning to apply a new technology or a new water/ energy/ food supply chain model in an area, it is essential to consider the values and attitudes of the users and resource producers (e.g., utilities, farmers, etc.) for the latest technology or model to be taken into use. Likewise, regulations must be examined and if needed adjusted.

Systemic innovation (Figure 13) takes place at three different levels: micro, meso and macro³². The interactive dynamics among these three levels define how systemic changes occur.

The **macro level is about societal challenges** of water quality and quantity; the energy created through water but also used to produce and transport water; food produced using water and energy, as well as the agreed UN SDGs and the Green Deal that push for change due to the human and climate change pressures.

At the **meso level exists the socio-technical system** that currently dominates in serving societal needs (water management, energy management and food production). The barriers and strong lock-in effects exist at this level that can be at local/ regional, transboundary, or national/ international levels. At the meso level, users use the resources (water, energy, and food) without much consideration about their value, production costs and effects on the environment and its natural ecosystems.

At the **micro level**, WEFE-Nexus advances and initiatives for change are taking place. It is at this level that the innovations are born. For an innovation, which comes from the micro level to be able to break through these lock-in effects and barriers, it is necessary to gain thrust through awareness and learning processes, having value-price-performance improvements and support from powerful stakeholder groups, market representatives, policymakers, and policy implementers.

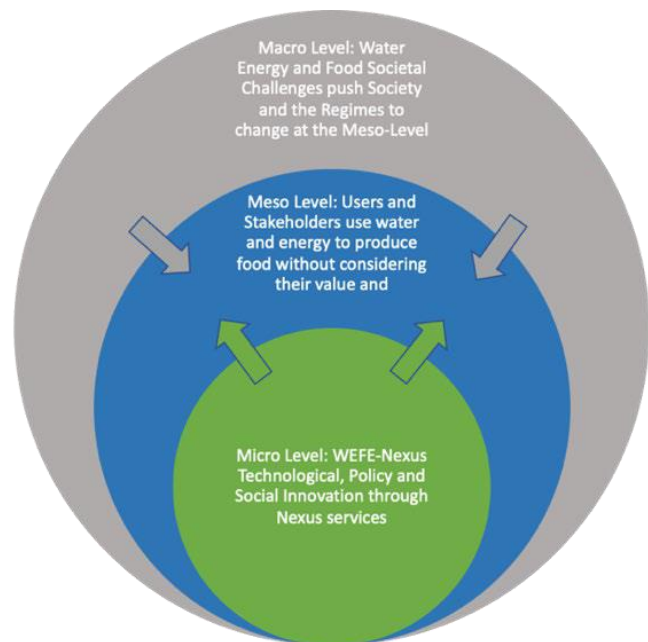


Figure 13: Systemic Innovation Levels and their interactions

Therefore, in the *NEXUS-NESS project*, at the *macro level* the WEFE-Nexus issues must be identified and analysed in detail by the NEL Leaders and the NEL actors to create the baseline of the current “as-is” situation, which will be used to define the WEFE-Nexus future vision. At the *micro level* the NEXUS-NESS partner organisations together with the NELs’ actors will push for technological, policy and social innovations by actively involving their stakeholder organisations from the start of the project and its research and innovation processes. At the *meso level*, all water, energy and food users, who are also the stakeholders (policy, farmers and husbandry, food industry, science, consumers) must become aware of the WEFE-NEXUS challenge through targeted communication from the NEL-Leaders and with the help of WP6 Communication and

³² TNO, 2014, “Systemic Innovation: Concepts and tools for strengthening National and European eco-policies”, , https://www.tno.nl/media/3388/systemic_innovation_eco_policies_tno_2014_r10903.pdf (last accessed 26/08/20)

Dissemination. The actors, who represent their stakeholder organisations, will be actively involved in the NELs to collaborate for undergoing the WEFE-Nexus transition in their organisations.

Responsible Research and Innovation, Leading Change, Design Thinking and Systemic Innovation are applied through the RRI Roadmap phases in NEXUS-NESS to initiate and intensify the application of the innovative NEXUS Services in order to reinforce the WEFE-Nexus transition at the meso level for 1) accepting to collaborate for creating a common WEFE-Nexus transition, 2) up-taking the Nexus Services (climate services, WEF Nexus modelling and scenarios, achieving cross-sectorial governance and mutually learning by sharing knowledge) and 3) providing policy recommendations regionally, nationally, across Mediterranean countries and at EU-level. Finally, the systemic innovation approach used in NEXUS-NESS will attempt to improve socio-environmental and economic issues by investigating market structures with knowledge development, entrepreneurial activities, market formation and advocacy, as well as connection with international platforms for expanding the exploitation across the Mediterranean countries. The operationalisation of systemic innovation performed through the RRI Roadmap is done through the Nexus Ecosystem Laboratories (NELs) which are multisectoral and multidisciplinary spaces of operations and learning. Each NEL is to establish a **permanent dialogue** among scientists, public authorities (national and regional), farming associations and farmers, natural ecosystem organisations for the application and adoption of the WEFE-NEXUS.



NELs are practice-driven formations facilitating and fostering systemic innovation. All actors and stakeholders are involved in providing input, learning, co-innovating, testing and experimenting with the NEXUS Services models and services in their context of WEFE-Nexus reality.

It is important to keep in mind that WEFE-Nexus requires deep participatory involvement of all stakeholders from the areas of water, energy, food, land, agriculture, husbandry, and the ecosystem.

The **RRI Roadmap** is a participatory methodology that emphasizes engaging the stakeholders qualitatively. This means that stakeholders collectively define their WEFE-Nexus future and co-develop scenarios and models' inputs to ensure volume into the process and transparency in the quantitative aspects of the scenarios and models.



The RRI Roadmap emphasizes active and qualitative stakeholder engagement linking all necessary sectors of the WEFE-Nexus to ensure stakeholder buy-in in the NEXUS-NESS models and services and to make WEFE-Nexus the new normal.

As illustrated in Figure 14 the RRI Roadmap will guide the NEL through the necessary change management towards the WEFE-Nexus and not to let anyone behind. The following sections of this Report will explain in detail the application of each RRI milestone, steps, and tools.

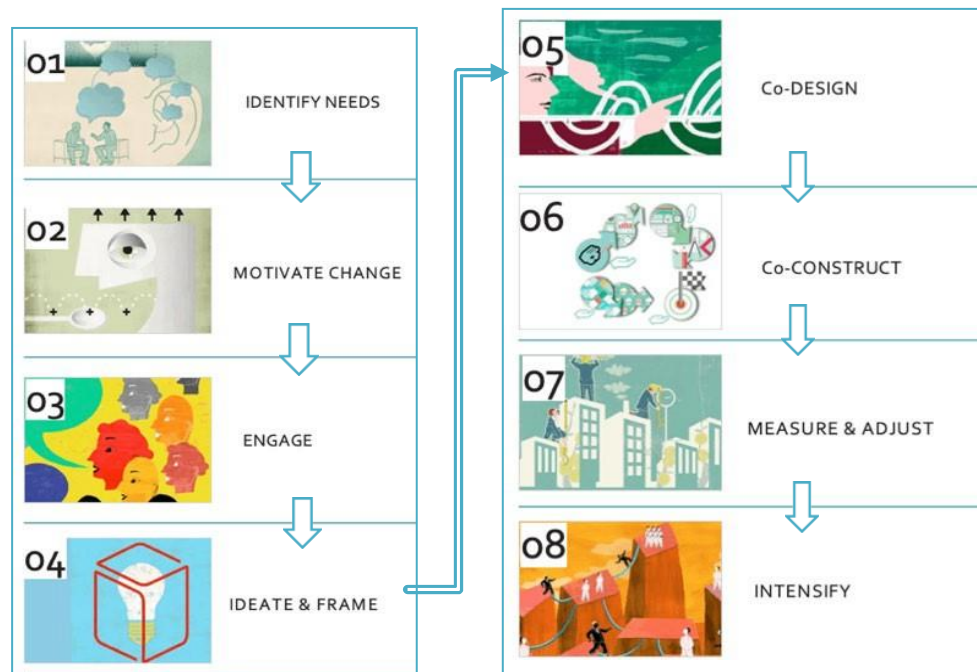


Figure 14: The RRI Roadmap transition stages guide the NEL stakeholder towards the WEFE-Nexus

To conclude the RRI Roadmap has 8 transition stages defined as the RRI Milestones:

1. **Identify needs** by analysing the WEFE challenges of each NEL.
2. **Motivate Change** by using facts to create urgency and to motivate change in each NEL.
3. **Engage** the multisectoral and multidisciplinary stakeholders, including farmer associations, to open dialogue and to build trust among them to start sharing knowledge and engage in common dialogues.
4. **Ideate and Frame** where the stakeholders generate possible ideas and to frame a common WEFE-Nexus future.
5. **Co-Design** a common vision and a common transition action plan towards WEFE-Nexus future.
6. **Co-construct** with the Project partners WEFE-Nexus solutions using the Project's NEXUS Services tools, methods, and indicators.
7. **Measure and adjust** the piloted solutions and co-decide the next steps towards the WEFE-Nexus vision; and
8. **Intensify** the WEFE-Nexus transition actions so they become the new normal. Push for policy adjustments, if necessary, based on NEL recommendations.









All the different transition stages are strengthened with targeted communication for achieving the WEFE-Nexus transition. The NEXUS-NESS NELs will share their knowledge and experience regarding the application of WEFE-Nexus, aiming at recognising lessons learned and good practices. Furthermore, this knowledge will be spilled over through the Multi-Stakeholder and User Platform (MSUP) and the dissemination activities of NEXUS NESS (WP6) to other transnational thematic working groups in the Mediterranean Region.

The following sections describe all the RRI Roadmap in detail the transition stages, steps and tools steps necessary for the WEFE-Nexus transition. The following sections are practical, providing guidance, tools and reporting requirements for the different NEXUS-NESS tasks.



It is very important to remember that the WEFE-Nexus is more about collaboration of people across sectors and afterwards about methods and tools and not the other way around. For the WEFE-Nexus transition to succeed, the people must come first.

6.1 Overview of the RRI Milestones and Steps in each Nexus Ecosystem Laboratory

	<p>IDENTIFY NEEDS</p>	<p>Milestone 1: Identify the Needs of the WEFE-Nexus challenges</p> <ol style="list-style-type: none"> 1. Analyse the current situation 2. Stakeholder Analysis: “Who is who” and their priorities
	<p>MOTIVATE CHANGE</p>	<p>Milestone 2: Create urgency and Motivate the need for change</p> <ol style="list-style-type: none"> 1. Use facts to create urgency 2. Use Storytelling to motivate stakeholders based on their priorities
	<p>ENGAGE</p>	<p>Milestone 3: Engage stakeholders for active participation</p> <ol style="list-style-type: none"> 1. Open dialogue based on challenges 2. Build trust among all stakeholders 3. WEFE-Nexus Challenges Lists from the Water, Energy, Food and Ecosystem Perspectives
	<p>IDEATE & FRAME</p>	<p>Milestone 4: Stakeholders generate ideas for solutions and frame the WEFE-Nexus future</p> <ol style="list-style-type: none"> 1. Participatory workshops for mutual learning of different perspectives to generate ideas and explore solutions 2. Frame the future of the WEFE-Nexus
	<p>Co-DESIGN</p>	<p>Milestone 5: Co-Design the WEFE-Nexus vision and Transition plan</p> <ol style="list-style-type: none"> 1. Co-Design common WEFE-Nexus vision 2. Explore and understand solutions towards the common WEFE-Nexus Vision 3. Identify gaps of scientific information, science education and policy 4. Enable knowledge sharing for better decisions 5. Communicate widely the co-design WEFE-NEXUS vision and transition plans
	<p>Co-CONSTRUCT</p>	<p>Milestone 6: Co-Construct WEFE-Nexus solutions and transition</p> <ol style="list-style-type: none"> 1. Prioritise solutions and start with the easiest first 2. Make research results available to enable action 3. Educate NEL actors 4. Inform Policy and push for policy adjustments to enable solutions 5. Communicate widely the planned actions
	<p>MEASURE & ADJUST</p>	<p>Milestone 7: Measure and adjust implemented solutions</p> <ol style="list-style-type: none"> 1. Measure WEFE-Nexus solutions and adjust as needed 2. Take status of WEFE-Nexus vision and Transition plan 3. Adjust WEFE models and feed-back results and new knowledge 4. Communicate widely the achieved results
	<p>INTENSIFY</p>	<p>Milestone 8: Intensify the WEFE-Nexus Transition</p> <ol style="list-style-type: none"> 1. Intensify WEFE-Nexus NEL stakeholder awareness and education 2. Push to involve more actors in the NELs 3. Push to use the NEXUS-NESS services and MSUP platform 4. Push for long-lasting policy adjustments and incentives 5. Intensify WEFE-Nexus awareness and education

The following Figure 15 illustrates how the RRI Roadmap milestones are applied on a WEF Nexus context³³.

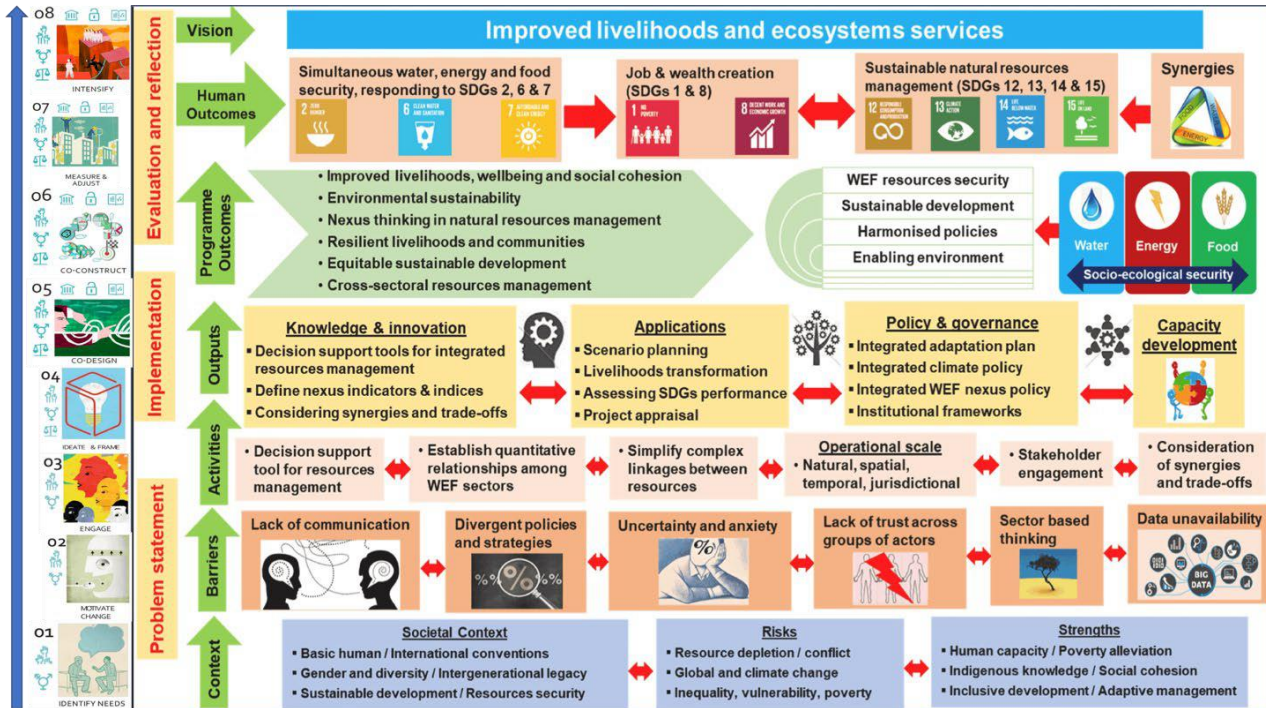


Figure 15: How the RRI Roadmap Milestones can support a complete WEF-Nexus Transition by managing the change at NEL local levels.

The above figure illustrates how the change towards WEF-Nexus was applied in the context of southern Africa. This illustration applies well also to the NEXUS-NESS project. The figure illustrates a bottom-up approach starting with the problem definition. Likewise, the WEF-Nexus challenge statement in each NEL will define the local/regional context of the WEF-Nexus. Then perceived barriers by the NEL stakeholders will be identified and analysed by the NEL actors collectively. By viewing how to balance trade-offs and positively reinforce synergies, the NEL actors will co-define and co-construct WEF-Nexus solutions and push for the WEF-Nexus transformation.

Lastly, the illustration highlights how WEF-Nexus has impact on most of the UN SDGs, which the PRIMA funding agency focuses on in improving local livelihoods and ecosystems by underpinning the UN SDGs.

³³ Naidoo D. et al, 2021, *Operationalising the water-energy-food nexus through the theory of change*, Renewable and Sustainable Energy Review 149 (2021) 111416, Elsevier, <https://www.sciencedirect.com/science/article/pii/S1364032121006997?via%3Dihub> (last accessed 3 Aug 2021)

6.2 The RRI Roadmap Fundamental Questions and Urgency vs. Complacency

The RRI Roadmap is based on four fundamental questions, which are asked in a specific sequence as illustrated in Figure 16. The arrow in the figure shows the sequence of the questions and it must always be followed.

In the NEXUS-NESS project, the WHO, the WHY, the HOW and the WHAT must come in this order whenever a task must be performed in each NEL. This is an important reminder to all NEXUS-NESS partners, who tend to focus more on the scientific part of the work, as for example on a water-model or tool and forget the end-

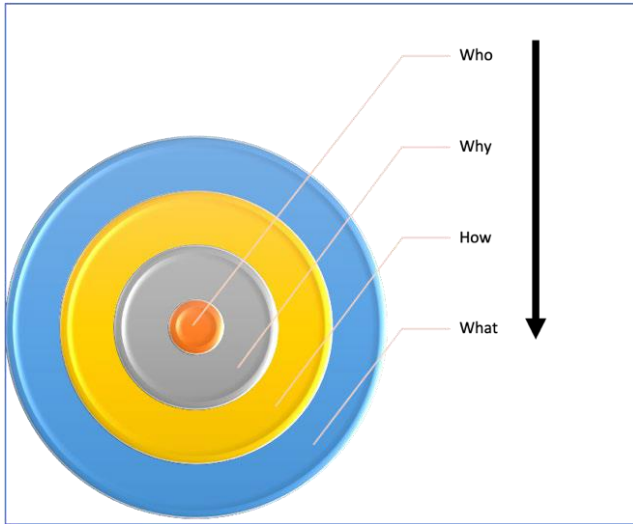


Figure 16: Always start with Who, Why, How and What to have end-user centric processes and systems.

user.

The end-users in the NELs are the stakeholders and their actors. They will use the NEXUS Services generated by the project, but they are part of this generation process. Therefore, *it is important to remember this rather simple model of motivating human behaviour to have them on board as motivated collaborators. Thus, it is recommended that the NEXUS-NESS partners start each task and subtask of the project with four basic questions in the sequence shown by the arrow in the adjacent figure: Figure 16.*

1st Question: Who?: Who is the end-user? Who is the stakeholder? Who is the actor representing the stakeholder? Which language do they speak? Language has two dimensions: 1) the national language (Italian, Egyptian, Spanish Tunisian, etc.)

and 2) their discipline or technical language (farming, water, energy, environment, economics, policy, etc.).

2nd Question: Why?: Why do you believe in WEFN-Nexus? Why should they care about WEFN-Nexus? Why is WEFN-Nexus important? Why should the “Who should” care? Why should the “Who” take a certain action or use a certain tool or model? The ‘why’ allows to communicate to the actors limbic part of brain, which is responsible for behavioural and emotional responses. By explaining “why” in a “language” that the “Who” will easily understand, then possible resistance and defence against the WEFN-Nexus transition may be minimised or avoided. Moreover, this type of reasoning touches the individuals’ limbic brain, which is responsible for memory and learning selection from positive and negative experiences³⁴. Under this question actors will define and prioritise WEFN issues to be addressed.

3rd Question: How?: How will the stakeholders and their actors be involved to define the new WEFN-Nexus reality? How will the WEFN-Nexus be implemented and how explicit will be the models and the NEXUS Services. Explain that the conventional sectorial planning has limitations. Moreover, planning based on scenarios (high, medium and low) often fail to consider inter-sectorial connections and possibilities of the future. Therefore, models and tools that can help predict several scenarios to better predict several future possibilities towards resilience and sustainability by looking at deep uncertainty. Under this question, actors will co-define how they may solve the identified challenges. They will prioritise these possible solutions and work towards in agreeing the WEFN-Nexus priority actions.

4th Question: What?: What do the stakeholders and their actors need to do to realise the WEFN-Nexus priority actions. What concrete actions must each stakeholder perform to reach the agreed WEFN-Nexus future and priority actions? What tools, data, visuals etc. are needed for the actors? What information must be shared

³⁴ Darcy A. Umphred et al., 2016, *The limbic system: influence over motor control and learning*, <https://musculoskeletalkey.com/the-limbic-system-influence-over-motor-control-and-learning/> (last accessed 24/07/2021)

among the stakeholders and their actors for the actions to be executed? What resources are required? What subsequent workshops and meetings must be planned for follow-up?

Change brings resistance against this change because people feel insecure in moving forward to an unknown situation and to have to change ways of working and for sharing knowledge with people in sectors that they have not previously collaborated with. Moreover, people prefer **complacency** because in the situation of “change nothing” they feel comfortable. They prefer to keep things “as they are”, which is the “as-is” situation. To motivate people to move out of this *complacent* position, **urgency** must be created³⁵. Urgency pushes people to want to do something about the “as-is” situation and to want to identify how to improve the situation. Urgency is a proactive attitude of stakeholders and their actors to identify issues, focus on the critical ones and to act for improvement. Urgency is also the capacity of to bring the right information to the right people at the right time for action. All the above questions help actors, and their stakeholder organisations move out of complacency into urgency by pushing them to look outside and around them.



To move stakeholders out of complacency, you need to create Urgency through the Who, Why, How and What questions. Urgency is needed to start the WEFÉ-Nexus transition and change the “as-is” situation to “what it should be”.

³⁵ John P. Kotter, 2008, *A Sense of Urgency*, Harvard Business Press

6.3 Overview of the RRI Roadmap Milestones Templates

The following table provides an overview of all the templates to be used in each NEL during the RRI Roadmap milestone steps, which are described in detail in the next chapters.

The NEL-Leader will use these templates for the WEFE-Nexus NEL systemic innovation and for the management of the WEFE-Nexus transformation.

The NEXUS-NESS partners will be supporting the NEL-Leader in performing these activities as defined in the NEXUS-NESS tasks.

RRI Mile stone	RRI Milestone Step	Template Purpose	Name of Template to be completed by NEL-Leader	Document Type	Use during Task	NEXUS-NESS Project Period	During Workshop?
M1	M1.1	NEL Current Situation “As-Is”	RRI M1-Step 1.1 PESTLEEC and SWOT Template FV NEL-Name.docx	Word	Subtask 2.2.1	M4-M6	No (To be verified during 1 st Workshop)
M1	M1.2.1	NEL Stakeholder Analysis Map	RRI M1-Step 1.2.1 NEL Stakeholder Analysis Template FV NEL-Name.xlsx	Excel	Subtask 2.2.1	M4-M6	No (To be verified during 1 st Workshop)
M1	M1.2.1	NEL Overall Stakeholder Map Visualisation	RRI M1-Step 1.2.2 NEL Overall Stakeholder Map Template FV NEL-Name.pptx	PowerPoint	Subtask 2.2.1	M4-M6	No (To be verified during 1 st Workshop)
M1	M1.2.3	Detailed Individual Stakeholder Engagement Analysis Canvas: Engagement	RRI M1-Step 1.2.3 NEL Individual Stakeholder Engagement Analysis FV Template NEL-Name.pptx	PowerPoint	Subtask 2.2.2	M6-M11	Before 1 st Workshop
M2	M2.1	NEL WEFE-Nexus Motivation Story	RRI M2-Step 2.1 NEL WEFE-Nexus Storytelling Canvas Template FV NEL-Name.docx	Word	Subtask 2.2.2	M6-M11	Before 1 st Workshop



RRI Mile stone	RRI Milest one Step	Template Purpose	Name of Template to be completed by NEL-Leader	Document Type	Use during Task	NEXUS-NESS Project Period	During Workshop?
M2	M2.2	NEL Stakeholder Spectrogram to “break the ice” during the 1 st Stakeholder NEL Workshop	RRI M2-Step 2.2 NEL Stakeholder Spectrogram FV.pptx	PowerPoint	Subtask 2.2.2	M6-M11	During 1 st Workshop
M3	M3.1	Create Dialogue through the WEFE-Nexus Challenge Mapping Sheet with Stakeholders	RRI M3-Step 3.1 NEL WEFE-Nexus Grand Challenge Mapping Sheet Template FV NEL-Name.pptx	PowerPoint	Subtask 2.2.2	M6-M11	During 1 st Workshop
M4	M4.1	NEL WEFE-Nexus Grand Challenge Framing with Stakeholders	RRI M4 Step 4.1 NEL WEFE-Nexus Grand Challenge Framing Template FV NEL-Name.pptx	PowerPoint	Subtask 2.2.2	M6-M11	During 1 st Workshop
M4	M4.1	NEL WEFE-Nexus Stakeholder Pains and Knowledge Gaps with Stakeholders	RRI M4 Step 4.1 NEL WEFE-Nexus Stakeholder Pains and Knowledge Gaps Template FV NEL-Name.pptx	PowerPoint	Subtask 2.2.2	M6-M11	During 1 st Workshop
M4	M4.2	Address Stakeholder Resistance concerns with Stakeholders	RRI M4-Step 4.2 NEL Stakeholder Resistance Scheme Rose-Bud-Thorn Template FV NEL-Name.pptx	PowerPoint	Subtask 2.2.2	M6-M11	During 1 st Workshop
M5	M5.1	Co-Defined NEL WEFE-Nexus Vision with Stakeholders	RRI M5 Step 5.1 NEL WEFE-Nexus Vision Canvas Template FV NEL-Name.pptx	PowerPoint	Subtask 2.2.3	M8-M15	During 2 nd Workshop



RRI Mile stone	RRI Milest one Step	Template Purpose	Name of Template to be completed by NEL-Leader	Document Type	Use during Task	NEXUS-NESS Project Period	During Workshop?
M5	M5.2	Co-Defined NEL WEFÉ-Nexus Transition Action Plan with Stakeholders	RRI M5-Step 5.2.1 NEL WEFÉ-Nexus Transition Actions Template FV NEL-Name.pptx	PowerPoint	Subtask 2.2.3	M8-M15	During 2 nd Workshop
M5	M5.2.2	Co-Define NEL WEFÉ-Nexus SMART Transition Actions with Stakeholders	RRI M5-Step 5.2.2 NEL WEFÉ-Nexus Transition Actions SMART Template FV NEL Name.docx	Word	Subtask 2.2.3	M8-M15	During 2 nd Workshop
M5	M5.2.3	Identify WEFÉ-Nexus Grand Challenge Stakeholder Knowledge Gaps with Stakeholders	RRI M5-Step 5.2.3 NEL WEFÉ-Nexus Grand Challenge Stakeholder Knowledge Gaps Template FV NEL Name.pptx	PowerPoint	Subtask 2.2.3	M8-M15	During 2 nd Workshop
M5	M5.3	Each Stakeholder must complete the Stakeholder's WEFÉ-Nexus Transition Plan	RRI M5-Step 5.3 Stakeholder WEFÉ-Nexus Transition Map Template FV NEL-Name-Stakeholder-Name.pptx	PowerPoint	Subtask 2.2.3	M8-M15	During 2 nd Workshop or right after (max. 10 days)
M7	M7.1	Measure Stakeholder Transition Actions towards the co-defined WEFÉ-Nexus Vision	RRI M7-Step 7.1 NEL Stakeholder Transition Measurement Template FV NEL-Name.xlsx	Excel	Subtask 2.2.4	M15-M36	During the 4 NEL Follow-up Workshops

7. WEFE-Nexus Transition in the NELS through the RRI Roadmap Milestones

01



IDENTIFY NEEDS

7.1 RRI Roadmap Milestone 1 for Task 2.2: Identify the Needs of the WEFE-Nexus Challenge

RRI Dimensions included in these three RRI Roadmap Milestones are:

- **Public Engagement** = All steps must include NEL Stakeholder representatives with sufficient decision power.
- **Gender Equality** = The NEL Stakeholder representatives must be men and women. The NEL-Leaders must do the maximum to ensure that women are included in the decision-making processes of the NELS. In the Analysis of the current situation, remember to also focus on gender issues such as women as farmers, perception of men and women differ as for example reusing treated wastewater for irrigation.

Tasks that must apply it and expected results

Task 2.2 – Subtask 2.2.1 NEL WEFE Situational and Stakeholder Analysis (M4-M6)
Result: Each NEL completes the PESTLEEC + SWOT Analysis and the Stakeholder Mapping
Milestone M2.2.1 NEL WEFE Situational and Stakeholder Analysis completed (NEL-Leaders, M6)

The RRI Milestone 1 is about describing the WEFE-Nexus challenge and identifying the societal needs in each NEL. This milestone is about starting the WEFE-Nexus transformation process in each NEL by analysing the current situation of each NEL and for learning about the NEL’s stakeholders.

Two questions are asked in this milestone: Who and Why.

The goals of Milestone 1 are:

1. determine the current situation of each NEL. To describe the “As-Is” situation. In other words, describing the current state of things in each NEL by qualifying and quantifying the situation to create urgency through facts for starting the WEFE-Nexus NEL transition.
2. Learn and better understand the NEL stakeholders for successful engagement and motivation for co-creation and WEFE-Nexus NEL transition

7.1.1 RRI Roadmap Milestone 1 Steps

In each NEL, the NEL-Leader and her/his team will perform the following using the templates found under their NEL Common Drive:

7.1.1.1 Step M1.1: Map the NEL Current Situation through a PESTLEEC analysis

Perform a “PESTLEEC” Analysis of the current situation of the NEL’s WEFE Challenge and describe it using the template provided in each NEL Working Directory. This analysis will be used to create urgency for the WEFE-Nexus transition in the NEL workshops, as well as a benchmarking tool for the subsequent NEXUS-NESS tasks. Based on the each NEL’s main aim, analyse the current “as-is” situation by performing a PESTLEEC and SWOT analysis. To perform this analysis, use the template made available in each NEL’s common drive.

A PESTLEEC analysis is used for environmental scanning. It includes the elements of Political, Economic, Social, Technological, Legal, Environmental, Ethical and Citizen factors that may have a direct or long-lasting

impact on the NEL. The results of the analysis will be used as part of the NEL’s strategic planning by providing NEXUS-NESS an oversight to the NEL’s current situation and how to proceed by designing a specific change management approach towards the NEL’s WEF-Nexus Transition.

7.1.1.2 Step M1.2: Stakeholder analysis and mapping

The term stakeholder describes individuals, groups or organizations that have an interest in a challenge and can mobilize resources to affect its outcome in some way. Stakeholders may be actively involved, and their interests may be positively or negatively affected by the challenge.

The Stakeholders in the NELs represent organisations from the water, energy, and food sectors as well as representative organisations that care about the natural ecosystem and environment, economic situation, social environment.

The NEL stakeholder organisations have been already identified as part of the NEXUS-NESS Milestone M3.1. Thus, the goal of this step of the RRI Roadmap Milestone 1, is to start understanding the stakeholders, “Who is who”, by performing the Stakeholder Analysis and using the templates available in the NEL’s common folder:

1. Identify the NEL actors from the NEL stakeholder organisations
2. NEL Stakeholder Analysis Map
3. NEL Overall Stakeholder Map Visualisation
4. Detailed Individual Stakeholder Engagement Analysis Canvas: Engagement

Describe the NEL actors and stakeholders, their priorities and define their needs through a Survey and Semi-structured interviews. This analysis will be used to create trust, motivation, and engagement in the NEL workshops.

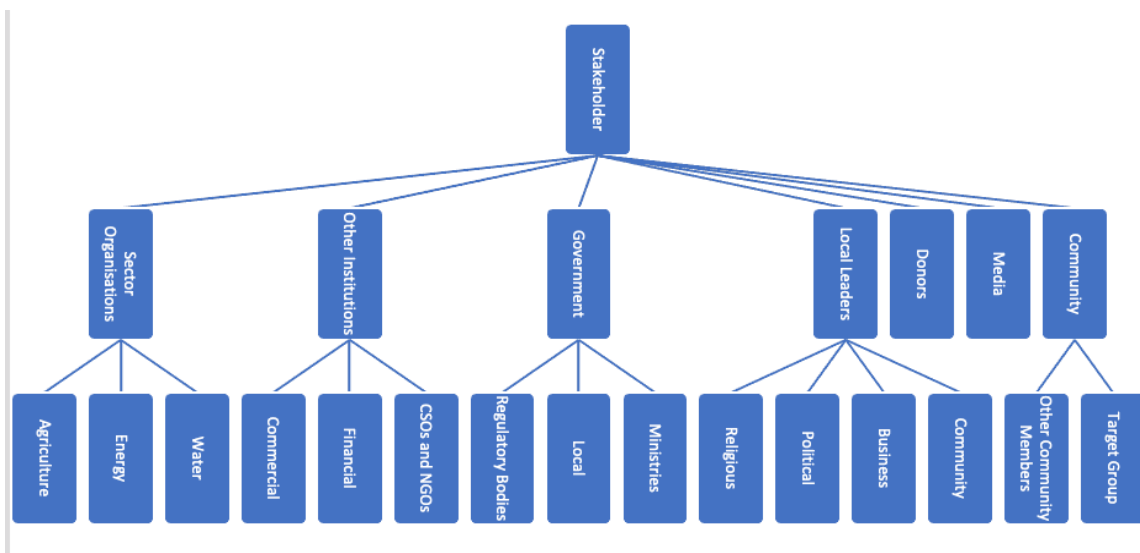


Figure 17: Possible types of Stakeholders in a NEL

7.1.1.2.1 Prioritising the stakeholders

The prioritisation of the stakeholders is based on their 1) Level of Interest, which is about to what extent the stakeholder group will be affected by the NEL positively or negatively, and 2) Level of Power and Influence, which is the ability of that stakeholder to affect the NEL’s activities and outcomes positively or negatively.

Each stakeholder is evaluated and plotted in the graph depending on their degree of influence and interest to the challenge and to the NEL’s objectives and work.

The most important group is **GROUP B** because they have high influence and high interest in the project. These stakeholders must be **managed closely**. These are the **Key-Payers**, and they must be engaged and consulted regularly. Representatives from these stakeholders must become NEL actors because they are key for the NEL’s success.

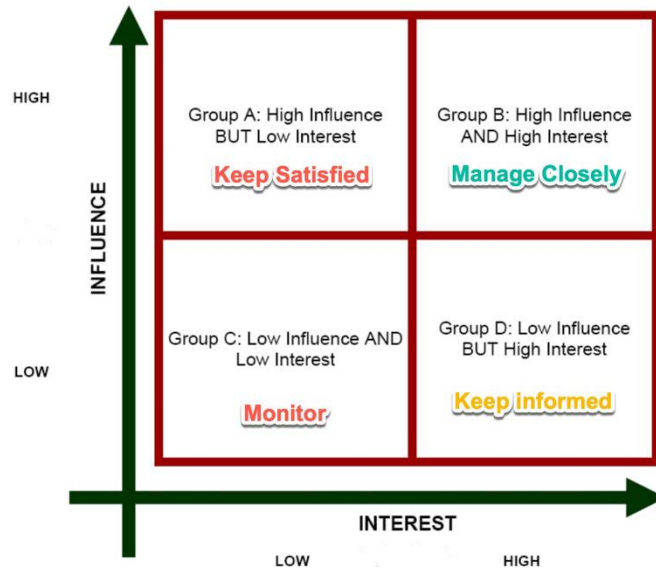


Figure 18: Stakeholder prioritisation helps focusing project actions for greater stakeholder involvement and augmentation of project results

The **Group A** stakeholders, who have high influence and low interest in the NEL, must be carefully analysed as to understand their priorities and their expectations. NEXUS-NESS must understand and meet their needs. This can be done through semi-open interviews. This **Group A is the most difficult and must be kept satisfied**. It must be invited to NEL activities without expecting them that they will show up and actively participate. Make sure that they are consulted in their interest area even if they do not engage. The best option is to really understand them and try to convert them to Group B.

Group C, which has low influence and low interest in the project **must be monitored** because their influence or interest may shift over time. But these stakeholders are the least important of all. They should be **kept informed** via general communications like a newsletter.

Group D has low influence, but high interest and the stakeholders of this group must be kept informed of the NEL’s activities, initiatives, workshops, and results. These stakeholders must be consulted in their interest areas. In other words, **show consideration for these stakeholders**.

To plot the NEL stakeholders use the “RRI M1-Step 1.2.2 NEL Overall Stakeholder Map Template NEL-Name”, which is found in the NEL’s common drive.

7.1.1.2.2 Understanding the Stakeholders

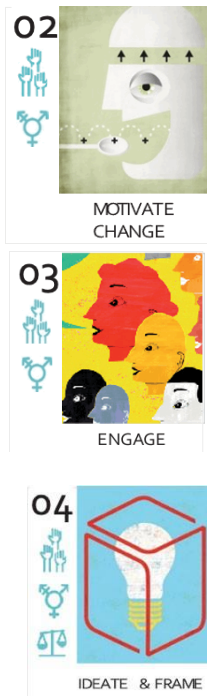
For each of the stakeholders identified ask the following questions in a semi-interview or survey and record the answers using the template provided in each NEL Working Directory. The questions are focusing in better understanding each stakeholder:

1. Why should the stakeholder care about the NEL?
2. Why should the stakeholder care about the WEF-NESS?
3. What kind of interest does the stakeholder have in the NEL’s outcomes?
 - a. Is it a positive or negative interest?

- b. Is it a financial gain or loss?
 - c. Is it related to status and power?
 - d. Is it about attachment to traditions and cultural values?
 - e. Is it emotionally interested or pragmatically interested?
 - f. Is it resistant to change?
 - g. Does it understand science?
4. What do you need from the stakeholder?
 - a. What kind of support do you need from them?
 - b. What role should they play in the NEL?
 5. What does the stakeholder need from you?
 - a. What kind of support do they need?
 - b. What expectations do they have?
 - c. What kind of information will the need and when?
 - d. What kind of capacity building do they need and when?
 6. What kind of attitude to the stakeholders have towards NEXUS-NESS and the NEL initiatives?
 - a. If their attitude is negative, why is this and what are they afraid of?
 - b. What can you do to address these fears and gain their support and later their trust?
 - c. If you see that a stakeholder will oppose NEXUS-NESS and the NEL initiatives, how do you plan to deal with it? How can their resistance be minimised?
 - d. Is there the risk that negative stakeholders can influence others against the NEL initiatives?
 - e. Should these negative stakeholders be included in the NEL planning and initiatives?

Good Practices to Remember:

- ✓ *Keep in mind the local context to answer local needs and specificities of the NEL.*
- ✓ *Attract different stakeholders in order to have a diversity and complementarity to obtain inputs as complete as possible.*
- ✓ *Organise carefully the engagement phases for successfully meeting the NEL objectives and for engaging all stakeholders.*



7.2 RRI Roadmap Milestones M2, M3 and M4 for Tasks 2.2 and 3.1: Motivate Change, Engage, Ideate and Frame

RRI Dimensions included in these three RRI Roadmap Milestones are:

- **Public Engagement** = All steps must include NEL Stakeholder representatives with sufficient decision power.
- **Gender Equality** = The NEL Stakeholder representatives must be men and women. The NEL-Leaders must do the maximum to ensure that women are included in the decision-making processes of the NELs.
- **Gender Issues** = When discussing WEFE-Nexus challenges and possible solutions, gender issues must be also discussed. Gender issues include different perceptions of men and women on WEFE-Nexus issues, as well as how do the proposed WEFE-Nexus solutions affect women and men differently as for example ways of work, perception etc.
- **Ethics** = The WEFE-Nexus issues and solutions must highlight any ethical concerns, and these must be addressed. The WEFE-Nexus solutions must be socially inclusive; ethical towards working conditions and towards the natural environment; and, ethical towards the local and regional economies.

Tasks that must apply it and results

Task 2.2 – Subtask 2.2.2 NEL Transition Motivation (M6-M11)

Results: Each NEL has motivated and engaged its stakeholders to co-define a common WEFE-Nexus Vision and execution plan.

Task 2.2 – Subtask 2.2.3 Co-design the NEL common WEFE Nexus vision and transition plan (M8-M15)

Results: Each NEL has motivated and engaged its stakeholders to co-define a common WEFE-Nexus Vision and execution plan.

Milestone M2.2.2 NEL Common WEFE Nexus Vision and Transition Action Plan available online (NEL Leaders, M11)

Task 3.1 – Nexus Ecosystem Labs (SSSA and NEL Leaders, XPRO) (M1, M36)

Deliverable 3.1 The Nexus Ecosystem Lab depicting the WEFE resources and challenges of the 4 NELs (SSSA with UPM (Spain), SSSA (Italy), UA (Egypt), IRA/CRDA (Tunisia), M6)

The RRI Roadmap Milestones 2, 3 and 4 are about motivating the need for change in the NEL and actively engaging the stakeholders. The steps of these milestones build on the results achieved in the RRI Milestone 1. The need for change in each NEL will be generated by creating urgency for change while actively engaging all identified stakeholders from the previous Milestone and Subtask 2.2.1.



The RRI Roadmap Milestone 2, 3 and 4 are the MOST CRITICAL of the whole NEL initiative. They can make or break the NEL. Each NEL Leader must invest time and resources in these steps. The planning and execution must be first-rate.

All identified stakeholders in the Stakeholder Mapping Analysis will be formally invited to participate in the work of the NEL. Also, the stakeholders identified with low interest and low influence in the NEL. No stakeholder should be left out of the NEL. This is because stakeholders that may be seen as with low interest or low influence may join forces with others and oppose the aims and work of the NEL if they do not understand it.



All identified stakeholders in the Stakeholder Mapping Analysis will be invited. No stakeholder should be left out of the NEL.

Two questions are asked in these milestones: Why and How.

The goals of the RRI Milestones 2, 3 and 4 are to:

1. Prepare the NEL ground, engage, motivate the NEL stakeholders to come to the first NEL workshop.
2. To create trust among them to be willing to continue investing their time and knowledge in the NEL.
3. To build trust so that they start sharing knowledge and to learn from each other.
4. To start collaborating.

RRI dimensions to focus on:

- ✓ Public Engagement – by having a wide spectrum of stakeholders involved in the NEL.
- ✓ Gender Equality and Gender Issues – try to engage both women and men as actors in the NEL workshop.

7.2.1 RRI Roadmap Milestones 2, 3 and 4 Steps Overview:

Milestones 2, 3 and 4 are explained in detail in the following sections. They are all required for executing Task 2.2 “Applying the NEL Innovation Ecosystem Approach” and they are outlined below as follows:

1. **Create Urgency** to initiate the NEL and prepare the WEFÉ-NEXUS transition and transformation.
2. **Use storytelling** and facts to motivate the stakeholders and to create urgency for starting the WEFÉ-Nexus NEL transition.
3. How to **open dialogue and build trust** among stakeholders.
4. Understanding **resistance to change** and how to deal with it.
5. Organise **the 1st NEL Workshop: 1-day World Café Workshop** and invite all stakeholders. Send **personalised invitation** based on the needs of each stakeholder.
6. **Engage all stakeholders’ actors** for active participation in the NEL.
7. **Execute the 1st NEL Workshop: 1-day World Café Workshop**

7.2.1.1 *Creating Urgency to initiate transition and transformation:*

1. Use facts to create urgency: To motivate stakeholders to want to change the current situation and address the challenge, it is important to create Urgency. Collect facts that show the gravity of the challenge. Use drawings, pictures, and figures to illustrate the challenge and highlight your story’s current situation.
2. Motivate stakeholders based on their priorities: Based on the Stakeholder analysis go deeper and identify a list of priorities for each type of stakeholder. Use these in your story.
3. Explain the challenge using storytelling: People get involved when they hear a great story. This is because an effective story creates the desire and motivation to help others and cooperate more. An effective story creates trust and enhances the sense of empathy and willingness to be more open-minded. Stories are important because they will make the facts stick in the minds of the stakeholders. Good stories will be remembered and repeated after they are told; they help create Urgency for change; motivation, and empathy to be open-minded towards other stakeholders.

7.2.1.2 Storytelling – To engage and motivate, you need a great story

Based on the work done in the RRI Roadmap Milestone 1 with mapping the NEL current situation through the PESTLEEC analysis and the stakeholder analysis and mapping, now prepare the motivational story for the NEL stakeholders. The stakeholder analysis and mapping help define the level of the narrative of the story. Due to the diversity of the stakeholders, their multidisciplinary knowledge, the story narrative must touch every one of them, and hence its language must be simple but strong and motivational. It must be written in active voice and without technical terms.

Storytelling is a powerful tool of persuasion, engagement, and trust-building. However, scientists do not use it often. But looking at science, it is inherently a narrative pursuit. Scientists identify problems or questions, and then they embark on a bit of a quest to find the answer and asking a scientist about his or her research; inevitably, a story will be told. Participatory models work with communities so that people with local knowledge and being impacted by socio-environmental problems are a part of solving problems and the solution. Therefore, storytelling a method of participants engagement. Stories are important as an inspirational and persuasion tool. People remember better facts and figures when these are part of a story. Storytelling is transformational for the storyteller and the audience. To create a strong story, reflect on the challenge and the future and refocus the NEL’s purpose so that different stakeholders can identify with it. A great story will help you connect to your stakeholders and gain their support. The template to use for creating the story is found in the NEL Common Drive and it is called “RRI M2-Step 2.1 NEL WEFÉ-Nexus Storytelling Canvas Template NEL-Name”.


How to write and tell a great story³⁶:

1. **Choose a clear central message:**
 - a. Start by looking at your diverse multidisciplinary and multisectoral audiences.
 - b. What is the core message that you wish your stakeholders must remember?
 - c. Try to write this message into one single sentence.
 - d. Start with the message that you are trying to convince the audience. What kind of feeling does this challenge give you? your story must get the audience to have the same feeling as you.




Figure 19: Storytelling is a powerful engaging tool for transformation. *Picture credit: The learning Vine*


2. **Put into your story your own experiences and illustrate struggle and failure not only successes.** You wish to have the empathy of your stakeholders. The hero is the end-user/ stakeholder of the WEFÉ-Nexus. What are their needs and wants? The story starts with the hero wanting good status affordable water and energy. The question is how can WEFÉ-Nexus ensure this need? Then move into describing the problem(s), which may be a physical problem of what the hero must deal with, but also an internal problem of




Hero




Guide




Action




Transformation



Problem



Plan



Success

Figure 20: How a great story is built. *(By Ebaqdesign)*

³⁶ Carolyn O’Hara, 2014, *How to Tell a Great Story*, Harvard Business Review. <https://hbr.org/2014/07/how-to-tell-a-great-story> (last accessed 4 Aug 2021)

what the hero feels. Now identify the “villain character”, who is the villain that causes the hero to experience the internal frustration?

Now the story must show empathy and authority, that the hero’s problems are well understood and that the NEXUS-NESS project has the authority in terms of long-term experience to guide the hero to resolve the problems. The plan will illustrate step-by-step how the NEXUS-NESS will help the hero, but with the hero’s involvement. Then, the story will explain the Call to Action, which are clear messages what the hero must do as direct actions and transitional actions. What does the hero get for free out of this action? How is this action going to help the needs and wants of the hero, if the hero acts? After the action, comes success or failure?

Did you know that...

we all produce a neurochemical in our brain called Oxytocin. Oxytocin is produced when we are trusted or shown kindness, and it motivates cooperation with others. Oxytocin enhances the sense of empathy and willingness to put us in the situation of others. Research shows that a good story can produce Oxytocin by creating tension during the narrative and thus readers/ listeners will share the emotions of the story and be willing to cooperate with others.

Heroes want success. So how can this success be ensured? What would they lose if they are not part of the NEXUS-NESS initiative and do not participate in the NEL? What are the potential losses and gains? By telling them about failure, it creates urgency to do something. The story ending should be specific and clear by referring to the problems and needs to define success. Then, tell the hero what the transformation would be through the NEL and the NEXUS-NESS in their own “language”. Remember that the story is about “*What’s in it for me?*”.

3. **Try to make your audience the hero of the story.** Each of your stakeholders must see themselves in the story. Do not focus on your own decisions because your audience will not listen. Instead focus on challenges and hardships that show that your stakeholders can help you with and they will be the heroes.
Have a clear structure and purpose explaining the current situation as it was before it became problematic, how it is now and how it may be after if we take action for improvement. Use the facts to build the story. Give the story a clear purpose by answering the questions:
 - “Why must you tell this story?”
 - “What is your motivation and belief that makes you tell this story?”
 - “What greater purpose does this serve?”
 - “What does it teach?”
4. **Challenge your audiences with the challenge.** Tell them that the WEFU-Nexus will be difficult and a struggle. But also tell them how rewarding would be if everyone works towards the WEFU-Nexus and what would it mean for each one of them. Tell them that you need their knowledge to help you achieve the WEFU-Nexus transition.
5. **Keep it simple** and do not overwhelm the story with unnecessary details.
6. **Embrace conflict.** Tell them clearly that there will be heated discussions and opposite opinions, but also explain that this type of conflict is helpful to reach common goals
7. **Call to action:** The story must build around the NEL call to actions making them obvious for your audience to take this next step.
8. **Before telling the story, practice it with your friends.** Make your story so compelling that people would like to tell their friends about it.

7.2.1.3 Open stakeholder dialogue and build trust

Building trust among the stakeholders, the NEL and the NEXUS-NESS project is important for knowledge transfer and learning³⁷, two pivotal ingredients for building an innovation ecosystem and transitioning towards

³⁷ Huemer, L., 2004, *Activating trust: the redefinition of roles and relationships in an international construction project*, International Marketing Review, Vol. 21, No. 2, pp.187–201.

WEFE-Nexus. Furthermore, trust is essential for creating long-lasting collaborations and relationships, both needed for a long-lasting and sustainable NEL. But creating trust among the NEL stakeholders and the NEL-leader organisation can be difficult since the stakeholders may not have prior collaborative relationships. Building trust or even better earning trust is a quality that comes over time through active listening, talking, collaboration and accomplishing together³⁸. Moreover, trust enables cooperative behaviour, promotes adaptive organisational forms, reduces damaging conflicts, reduces transaction costs, and promotes more effective responses to crises³⁹, which is critical for having sustainable and resilient water-energy-food security. Besides, trust is needed in problem-solving as it encourages the exchange of information and determines whether stakeholders are willing to permit others to influence their decisions and actions⁴⁰. This last statement is critical for functioning science-policy-industry interfacing. In the NEXUS-NESS project trust is defined as a psychological state, where one has positive expectations about the other party's behaviour or intentions and, therefore, accepts some degree of vulnerability³⁹. Trust builds upon being truthful, open communication and keeping agreements in the NEL. In other words, trust is about integrity, ethics, and governance. The last two are important RRI dimensions. Having trust among stakeholders, the NEL and the NEXUS NESS project helps the execution of project activities and requires less control of actions, which eases the project execution and the success of the NEL.

So how to enable trust among the stakeholders, the NEL and the NEXUS-NESS project?

Use the Stakeholder analysis results of RRI M1 Steps 1.2.1, Step 1.2.2, and Step 1.2.3 results to guide you. As you start understanding better your NEL stakeholders, update the accordingly the above stakeholder analysis templates.

- **Communication** is the most important trust-building mechanism. Positive communication makes it easier to understand the other party, promote one's own opinions and share knowledge.
 - The NEL-leader must execute well the Stakeholder analysis.
 - That is why the NEXUS-NESS and NEL messages must be adapted to each stakeholder group and "language". The NEL-leader must spend time with WP6 to correctly formulate the messages.
- **Reliability:**
 - The NEL-leader must ensure that the tasks agreed in the NEL are executed.
 - Co-defined actions must be executed reliably and as much as possible on time.
- **Sincerity** is necessary:
 - Open, honest, and truthful in keeping promises.
- **Competence:**
 - Competence and result-achievement help building trust.
- **Integrity:**
 - Walking the talk and executing what has been promised in the different project tasks, as well as, at NEL level by the different actors.

Concretely, to build trust among the NEL stakeholders and the NEL, the NEL-Leader and the NEXUS NESS partners must ensure that the following are taking place:

1. **Co-design and co-construct** necessary parts of tools and models with the stakeholders.

³⁸ Karlsen, J.T., Græe, K. And Massaoud, M.J., 2008, *The role of trust in project-stakeholder relationships: a study of a construction project*, Int. J. Project Organisation and Management, Vol. 1, No. 1, pp.105–118.

³⁹ Rousseau, D., Sitkin, S.B., Burt, R.S. and Camerer, C., 1998, *Introduction to special topic forum. Not so different after all: a cross-discipline view of trust*, Academy Management Review, Vol. 23, No. 3, pp.393–404.

⁴⁰ Carnevale, D.G. and Wechsler, B., 1992, *Trust in the public sector, individual and organizational determinants*, Administration and Society, Vol. 23, No. 4, pp.471–494.

2. **User-friendly tools and models:** Ensure that the NEXUS-NESS tools and models especially from **WP3, WP4 and WP5** are working reliably, and they are easy to be understood and used by the stakeholders.
3. Understand stakeholder **culture and language**. Always involve the NEL-leader when dealing with the NEL's stakeholders to avoid misunderstandings. All NEXUS-NESS WPs must keep the NEL-leader involved, who in turn will involve the stakeholders through the NEL.
4. Ensure **goal congruence** by aligning goals and expectations through the NEL workshops by following the RRI Roadmap milestones and steps.
5. **Frequent communication** is pivotal for any transition and change management. **WP6** activities are pivotal for ensuring targeted and frequent communication. Use the “NEL Overall Stakeholder Map Visualisation” and the “Detailed Individual Stakeholder Engagement Analysis Canvas: Engagement” to guide you.



Stakeholder dialogue and building trust is a responsibility of every NEXUS-NESS partner. The NEL-leaders will initiate it and sustain it. But the WP-leaders must enable it through active stakeholder involvement in their tasks.

7.2.1.4 Understanding and Dealing with Resistance to Change

With every change comes resistance and it is important to manage it. Resistance may be irrational and self-serving, and it can arise from scepticism, missing information, faulty assumptions, weak stakeholder engagement and previously faltered implementations. Resistance is feedback on an innovation and change process from people who know more about day-to-day operations than the project team does. Thus, resistance should not be dismissed because it can be used to implement change. Instead, use resistance to better understand the stakeholders and users in active conversations.



Resistance is a type of feedback on an innovation and its change process from people who know more about day-to-day operations than the project team does. Resistance should not be dismissed but used in the change.

If resistance is dismissed stakeholder goodwill will be damaged, important information will be missed and the transformation will eventually fail because the resistance will grow. So, use resistance to learn better the stakeholders, involve them even more in the process and improve the overall solution to the challenge at hand. The questions to be asked and honestly answered are:

- “Who is resisting and why?”
- “What kind of behaviour I am seeing?”
- “If I see this resistance as feedback, what could I learn?”
- “How can I refine the innovation and the change effort?”

How to use resistance productively⁴¹:

1. **Boost Awareness:** Remember that because an action is clear to the NEXUS-NESS team, it does not mean that is clear to the stakeholders. For each of the stakeholders, a specific communication and awareness campaign must take place explaining “what is it in for them”. Early meetings are necessary

⁴¹ Ford J.D. and Ford L.W., 2009, *Decoding Resistenca to Change*, Harvard Business Review

- to explain the NEXUS-NESS project and objectives and what does the project do for them, their position, and their way of working and functioning. WP6 must be active here to support the NEL.
2. **Return to purpose:** Explain the purpose of the NEXUS-NESS project. Remember that the purpose answers the WHY. People (stakeholders) need to understand what is about to change and why it is changing and what it would mean for them workwise, economically, socially, and environmentally. That is why storytelling and active participation in the NEL's workshops is extremely important. Additional meetings with the stakeholders must be planned as necessary. Collecting and using their feedback in the NEXUS-NESS tasks and services is important. The use of the feedback must be made visible in each NEL and the project. This feedback must be aligned back to WP2, WP3, WP4, WP5 and WP6.
 3. **Change the change:** Identify the resisters and schedule individual meetings to understand their motives, evaluate and if necessary, perform the necessary modifications to the NEL's plan. The motives must be evaluated in the NEXUS-NESS project in one of the technical meetings of WP2 and WP3. Discuss and explain the necessary modifications to the rest of the NEL stakeholders and the NEXUS-NESS project.
 4. **Strengthen participation and engagement:** If resistance is already visible during the first steps of the RRI Roadmap, then ask the stakeholders to record their concerns in the **Rose-Bud-Thorn Scheme** found on the NEXUS-NESS Common Drive under each NEL with an approximate duration of about 45 - 60 minutes. The Rose-Bud-Thorn Scheme will assist you in addressing the specific stakeholder concerns in good time and before this stakeholder starts negatively influencing other stakeholders.

7.2.2 Organise and execute the first NEL Workshop and invite all stakeholders

The workshops are the core of the NELs collaborative activities with all stakeholders at once. The workshops are intended to be an opportunity for stakeholder participants to engage and to co-define and co-agree science-policy-industry outcomes within the specific NEL's focus area. This workshop aims to initiate the WEFE-Nexus transition by co-defining a common vision generate and how to reach it through development of improved strategies and their execution with the NEXUS-NESS tools, models, and partnerships. This workshop and follow-up should develop specific action plans with commitments to work together for their co-development.

Organise a **1-day World Café Workshop** and invite all stakeholders:

1. The NEL-Leader, with the support of other partners involved in WP2 and WP3, will organise the 1st NEL workshop with all the stakeholders identified and mapped. **This workshop will mark the start of the WEFE-Nexus transition** and thus it must cover all three sectoral perspectives:
 - Agricultural Centred
 - Energy Centred
 - Water Centred
2. The 1st NEL workshop in **all NELs** will follow and execute the **World Café participatory approach** (see specific chapter 8.1 for step-by-step guidance.).
3. For guidance in how to organise a NEL participatory workshop follow the steps in chapters 9 and 8.1.1. It is important to follow all the steps and prepare the materials for the workshop well in advance. It is also important to identify a suitable neutral facilitator for the workshop.
4. Due to COVID-19 restrictions, check and follow the guidelines that apply at the workshop's location. You may not be able to execute the workshop in a face-to-face setting. Then you must execute it remotely. In the case of a remote workshop, test the run the whole workshop to ensure that everything runs well. Always, prepare a plan B just in case.
REMEMBER: the first impression counts a lot. If the 1st workshop is successful, stakeholders will be motivated to join you for the subsequent NEL activities.
5. The 1st NEL workshop in all NELs will have a duration of 1-day with the following structure.

6. The NEL-leader is responsible for the following activities:
- Workshop preparation:
 1. Prepare an invitation for highly participatory workshop.
 2. You must involve actively all identified NEL stakeholders (suitable people must be already identified from the Stakeholder Analysis and Mapping). Stakeholders must represent farming cooperatives and associations, scientists and researchers, policy makers and implementers at different levels from local and regional authorities, businesses and SMEs, other industry representatives and citizen associations.
 3. Make sure that you have a gender balance across the types of stakeholders.
 4. Plan well in advance the workshop (on-site/ on-line/ hybrid, location, invitations, structure, clear goals, what is expected from the participants).
 5. Identify an experienced and neutral facilitator.
 6. Prepare attractive invitations and include catching parts of the Story.
 7. Invite the stakeholders and follow-up with a phone-call and/or email.
 8. Make a dry run before the workshop (on-site/ on-line/ hybrid)
 - a. Turn on the lights and make sure they fall in the right place.
 - b. Try out the microphones and watch out for feedback.
 - c. Arrange the tables and seating for World Café if on-site or prepare the virtual tables based on the World Café software or both.
 - d. Make sure everyone can see what's going on no matter where they sit.
 - e. Put up the venue décor (white board, markers with the right colours, sticky notes, etc.)
 - f. Proof-read all documents, slides, and files.
 - g. Prepare the nametags (for table and for clothes) for all participants if on-site workshop. Otherwise, instruct the participant to join the online workshop with their full name and organisation.
 - h. Execute all steps of the workshop and test the timings with the facilitator.
 - On the day of the workshop (on-site/ on-line/ hybrid):

Step	Step Description and Main Responsible	Max Duration
Part 1	Workshop Part 1: Motivate Change	145 min
08:30	Participant Registration:	30 min
09:00	The workshop secretary welcomes the participant, gives the name tag to the participant, and asks the participant to sign the GDPR form. The NEL-Leader stands at the door of the room and as the workshop host welcomes participants as they arrive at the venue/ on-line meeting. In a face-to-face meeting, ask the participants to choose a seat in one of the round tables.	
09:00	The NEL-Leader welcomes everyone and states clearly the purpose of the workshop and its context. The NEL-Leader presents the workshop facilitator and the recorder and their roles. Maximum 10 minutes.	10 min
09:10	The facilitator takes over the execution of the workshop. The recorder starts taking meeting notes as precise as possible. The facilitator has the important task to pass the floor to all stakeholders regardless of affiliation, sector, rank or gender. The facilitator must make clear from the beginning that all opinions value the same in the process. If the meeting is recorded, all participants must be informed in advance.	5 min
09:15		
10:15	To break the ice among the participants run the <i>Human Spectrogram</i> . For instructions, please see section 8.2. Depending on the number of participants this exercise can take maximum 1 hour.	60 min
10:15	The NEL-Leader presents the WEFE-Nexus challenge based on the Story to engage all stakeholders and to create empathy and willingness to cooperate among them. The NEL objectives are clearly presented.	15 min
10:30		

10:30	Inspirational Speaker 1 (invited speaker who highlights the WEFE-Nexus issues, preferably from one of the sectors and non-scientist or an applied-scientist)	10 min
10:40	Inspirational Speaker 1 (invited speaker who highlights the WEFE-Nexus issues, preferably from a different sector than the first speaker and non-scientist)	10 min
10:50	The facilitator explains to the participants the schedule of the rest of the day.	5 min
10:55	Networking Coffee Break	20 min
11:15		
Part 2	Workshop Part 2: Engage Stakeholders and start Building Trust	
11:15	Exercise 1: Create Nexus dialogue among the participants and their sectors	5 min
11:50	<p>The facilitator now asks the participants of each table to start a discussion based on WEFE-challenge as they see it by using the <i>RRI M3-Step 3.1 NEL WEFE-Nexus Challenge Mapping Sheet NEL-Name</i> (found in the NEL common drive and to be printed and prepared in advance). Participants must map the current picture of “Dealing with water scarcity and water inefficiencies” in the NEL. Let them use their perspective as for example starting from water and moving to the others or starting from the energy perspective and moving to the others and so on.</p> <p>The goal of this exercise is to start pushing the participants to start engaging them into thinking in the WEFE-Nexus perspectives, create a freedom of expression among them and to start building trust.</p> <p>Meanwhile, the recorder places on each table the <i>RRI M3-Step 3.1 NEL WEFE-Nexus Challenge Mapping Sheet NEL-Name</i> printed as A0 (flip chart page).</p> <p>The facilitator:</p> <ol style="list-style-type: none"> 1. displays and explains the structure of the sheet, where each corner indicates one sector/ aspect of the WEFE Nexus. 2. shows slide number two with the example and walks it through. 3. shows slide number 3 saying that the goal of the NEL is by year three the WEFE-Nexus works as one system with common agenda, goals and actions. 4. displays the WEFE-Nexus challenge of the NEL to be discussed at the tables. For example, it can be “Water scarcity and drought has effects in all 4 sectors. How in your opinion this challenge affects the current situation at NEL level?” <p>The participants work on the <i>NEXUS Challenge Mapping Sheet</i>: It is up to each table’s participants how they will tackle the mapping of the challenge using the <i>NEXUS Challenge Mapping Sheet</i> by starting from the water perspective or the energy, or the food perspective or the ecosystems. The participants at each table indicate their starting perspective on the top of the sheet and with arrows indicate how an issue in one perspective (water/energy/food/natural ecosystem) affects the other perspectives with arrows.</p>	30 min
11:50	Exercise 1: Each table presents its NEXUS Challenge Mapping Sheet	30 min
12:15	<p>Each table selects a speaker to present the common <i>NEXUS Challenge Mapping Sheet</i>. The recorder takes notes of what is said, table by table. (The duration of this step depends on the number of tables. Each table must get equal speaking time of 5 minutes. The facilitator must ensure this.)</p>	Max 5 min per table
12:15	Networking Lunch	45 min
13:00	(Standing lunch with small round tables for standing people helps people mingle. Make sure that the food is easily handled and keeps the sanitary Covid-19 rules)	
12:15	While the participants move to the lunch area, the NEL-leader and the recorder take all the Challenge Mapping Sheets and glue them on the walls so that they are visible for all.	
12:30	If the workshop is remote, then the Challenge Mapping Sheets are collected into one PowerPoint presentation that can be edited.	

Part 3 Workshop Part 3: Run a World Café to Ideate for possible solutions		
13:00 14:40	Run the first World Café: Participants try to “ideate” together in other words to generate ideas for tackling the challenge “Dealing with water scarcity and water inefficiencies” from a WEFE-Nexus perspective. The goal of part 3 of the workshop is to start blending more the stakeholders and to start convergence of mindsets. The facilitator:	
	<ol style="list-style-type: none"> 1. Welcomes back the participants and checks that everyone is present. 2. The NEL-Leader reminds the participants of the WEFE-Nexus perspective. 3. Shows the workshop agenda, takes stock of the morning’s results pointing at the NEL’s common language that the participants begin to develop. Whereas, in the morning they were individuals with their own focus, in the afternoon they show signs of convergence (this of course will depend on the results achieved so far through the active participation or not of the stakeholders). 4. Explains the rules and procedures of the World Café. The NEL challenge, as presented in the Story, is briefly revisited and the participants’ attention is drawn on the set of Nexus Challenge Mapping Sheets. 5. A new clean <i>NEXUS Challenge Mapping Sheet</i> is on each round table. 6. The participants are to “ideate” generate ideas for tackling the challenge “Dealing with water scarcity and water inefficiencies” and write the ideas on the <i>NEXUS Challenge Mapping Sheet, which is on each table.</i> 7. The participants are expected to run 3 rounds of the World Café. Each round is maximum 20 minutes, where the participants move from table to table. 8. Asks the tables to appoint a table host and the recorder hands out the necessary equipment (sticky notes, markers, etc.) 9. Keeps track of time, participants move from table to table and the table host keeps track of the main points of the discussion. 10. At the end of round 3, the facilitator asks each table host to stand and present the results of his/her table and the possible solutions identified. 5 minutes per table. 11. The recorder takes notes. 	1 min 5 min 4 min 60 min 30 min
14:40 15:00	After the presentation of the World Café table results, the tables sheets are glued on the wall by the recorder, while the facilitator hands out 5 votes to each participant. Each vote is a sticky round coloured dot. The facilitator asks the participants table by table to walk to the wall and vote on the identified solutions. While this is going on, the NEL Leader observes the table conversations and makes note if the atmosphere is positive, neutral, silent etc.	20 min
15:00 15:10	Networking Coffee Break While the participants mingle over a coffee, the NEL Leader, facilitator and recorder take status of the most voted solutions. Someone moves the chairs away from the tables and puts them in a large U form.	10 min
Part 5 Workshop Part 5: Frame the NEL WEFE-Nexus Challenge		
15:10	After mapping possible solutions from their own different perspectives, the stakeholders will work together to frame the NEL WEFE-Nexus Challenge. The facilitator asks participants to return to the chairs, which are now in a U format. The participants should be sitting blended and not in groups by sector. By now the participants should be comfortable with each other and started feeling at ease and trusting each other. The facilitator stands in the middle of the U. The NEL WEFE-Nexus Grand Challenge Framing Canvas helps create an inclusive environment, where all participants can contribute to building a shared understanding of the challenge at hand. The facilitator should ensure each participant is encouraged to	75 min

	<p>speak up. This tool helps foster an adaptable mindset among groups, and they often end up coming up with new ways to describe the challenge they are working on. The goal is to frame the NEL WEFÉ-Nexus Grand Challenge all together by using the NEL WEFÉ-Nexus Challenge Framing canvas to explore a challenge space and formulate a robust challenge statement to ensure you are solving the right challenge.</p> <p>This approach helps teams:</p> <ul style="list-style-type: none"> • Establish consensus about the team’s purpose • Gain a sense of what action will look like • Define the scope of NEL’s initial activities and goals • Reduce the likelihood of working at cross purposes <p>The facilitator displays the “RI M4 Step 4.1 NEL WEFÉ-Nexus Grand Challenge Framing Template” to the participants. The recorder is ready to start entering the input from the participants. The facilitator invites participants to start describing the issue, and the recorder captures it on the canvas. The facilitator asks the participants to raise their hand if they agree with the statement on the canvas. If there is no clear majority agreeing with the statement, then the facilitator invites opinions from those not in agreement. The statement is adjusted and the voting retakes place. The process continues until the canvas is complete in agreement.</p>	
Part 6	Workshop Part 6: Identify/State possible negative concerns and/ or barriers	
16:25	<p>The facilitator invites the stakeholders to identify/ state any concerns they may have about their involvement in the NEL WEFÉ-Nexus initiative by filling out the “RRI M4-Step 4.2 NEL Stakeholder Resistance Scheme Rose-Bud-Thorn Template”.</p> <p>The recorder collects all the sheets for input to the next RRI Roadmap milestone and workshop.</p>	20 min
16:45	Workshop Wrap-Up	
	<p>The facilitator highlights the results of the workshop, thanks everyone and gives the word to the NEL-Leader</p> <p>The NEL-Leader thanks all participants for their active participation and highlights how all the workshop outputs will be used in the consecutive phases of the project and the NEL’s WEFÉ-Nexus transformation. The NEL-Leader stresses that all inputs are valuable, and she/he hopes that the participants will be willing to continue their contribution and investment of their time.</p>	15 min
17:00	Workshop ends with filling out the workshop questionnaire	5 min



7.3 RRI Roadmap Milestone M5 Co-Design for Tasks 2.2, 3.1, 3.2, 3.3, 3.4, 4.3 and 4.4.

RRI Dimensions included in these three RRI Roadmap Milestones are:

- **Public Engagement** = All steps must include NEL Stakeholder representatives with sufficient decision power.
- **Gender Equality** = The NEL Stakeholder representatives must be men and women. The NEL-Leaders must do the maximum to ensure that women are included in the decision-making processes of the NELs.
- **Gender Issues** = When discussing WEFE-Nexus challenges and possible solutions, gender issues must be also discussed. Gender issues include different perceptions of men and women on WEFE-Nexus issues, as well as how do the proposed WEFE-Nexus solutions affect women and men differently as for example ways of work, perception etc.
- **Ethics** = The WEFE-Nexus issues and solutions must highlight any ethical concerns, and these must be addressed. The WEFE-Nexus solutions must be socially inclusive; ethical towards working conditions and towards the natural environment; and, ethical towards the local and regional economies.
- **Science Education** = The stakeholders must be educated by the NEL-Leaders and NEXUS-NESS partners regarding the scientific aspects of the WEFE-Nexus to better make informed decisions for increasing the WEFE-Nexus transition and impact.
- **Open Access** = Any NEL stakeholder and NEXUS-NESS partners must provide open access to all their data and information for guaranteeing the WEFE-Nexus transition and impact. The NEL-Leader must inform the stakeholders about the open access requirement and ethos of the NEXUS-NESS project. Moreover, open access must be guaranteed for the NEL's future after the NEXUS-NESS project ends. The data must follow the FAIR (findable, accessible, interoperable, reusable) principles and made as much as possible available through the NEXUS-NESS Multi-stakeholder and User Platform (MSUP).
- **Governance** = The NEL stakeholders must understand their overall ethical, technical, scientific, economic, environmental, and social responsibilities. The NEL policymakers and policy-implementers must be open for policy adjustment to assure fair and sustainable allocation of resources for the NEL for a long-term benefit of the NEL's society and natural ecosystem and environment.

Tasks that must apply it and Results

Task 2.2 – Subtask 2.2.3 Co-design the NEL common WEFE Nexus vision and transition plan (M8-M15)

Results: Each NEL has motivated and engaged its stakeholders to co-define a common WEFE-Nexus Vision and execution plan.

Milestone M2.2.2 NEL Common WEFE Nexus Vision and Transition Action Plan available online (NEL Leaders, M11)

Task 3.1 – Nexus Ecosystem Labs (SSSA and NEL Leaders, XPRO) (M1, M36)

Deliverable 3.1 The Nexus Ecosystem Lab depicting the WEFE resources and challenges of the 4 NELs (SSSA with UPM (Spain), SSSA (Italy), UA (Egypt), IRA/CRDA (Tunisia), M6)

Task 3.2 - NEXUS-NESS Service validation (SSSA; Participants: UNIFI, POLIMI, UEO, NEL Leaders) (M15-M34)

Deliverable D3.2 The NEXUS-NESS Service validation (SSSA, M12, M24, M30) - Report describing the NNS validation implemented in the project from Demo testing to NEL co-validation with stakeholders.

Task 3.3 - WEFE Nexus indicators (M9-M30). Task leader: UNIFI; Participants: SSSA, POLIMI, SAS and the NEL-Leaders

Deliverable D3.3 WEFE Nexus indicators and related dataset (UNIFI, M18, M24, M30) - Report with associated dataset with the description of specifications of the WEFE Nexus indicators. The report/dataset include the indicator values in the different scenarios and consider actual versus post-solution application conditions.

Task 3.4 - Pathways to impact and capacity development (M12-M36). Task leader: UNIFI; Participants: SSSA, NEL Leaders and XPRO

Deliverable D3.4 Lesson-learnt from successes and challenges from NEL implementation (UNIFI, M36) – Report describing the synthesis of experiences on the four NELs, with guidance/guidelines for geographies in the rest of the world on how to roll-out NNS.

Deliverable D3.5 Pathways to impact and capacity building: NEL training and capacity building material (UNIFI, M12, M24, M36) - Reports and documents produced in support of the capacity building. This deliverable also includes major specifications of Policy and Stakeholder briefs.

Task 4.3 - NEL WEFE Nexus Data and Scenarios (M6-M36). Task leader: POLIMI; Participants: SSSA, UEO, SAS, FEEM, XPRO and NEL-Leaders

Deliverable D4.3 WEFE Nexus indicators and related dataset (POLIMI, M15, M30) [R & OTHER, PU] - Report with associated dataset with the description of specifications of the WEFE Nexus indicators. The report/dataset include the indicator values in the different scenarios and consider actual versus post-solution application conditions.

Task 4.4 - NEXUS-NESS SERVICE solution conceptualization and deployment (M15-M36). Task leader: UEO; Participants: SSSA, POLIMI, XPRO and NEL-Leaders

Deliverable D4.4 WEF Nexus Management plans (POLIMI, M24, M36)

Milestone M4.4 Nexus-Ness Service released as DEMO (UEO, M15) and for operational use in the NELs (UEO, M30)

7.3.1 RRI Roadmap Milestones 5 Steps Overview:

The RRI Milestone 5 is about co-designing the WEFE-Nexus transformation process in each NEL, and all the necessary steps, actions and measurement indicators required to achieve the WEFE-Nexus transition in each NEL that will become the new “business as usual” situation. Based on the outputs of the previous RRI Roadmap Milestones 1, 2, 3 and 4 the RRI Roadmap Milestone 5 will involve the NEL stakeholders to define the WEFE-Nexus actions and measurement indicators.

The goals of Milestone 5 are:

1. Based on the previous RRI Roadmap Milestones, to have a trustful space where stakeholders feel at ease to discuss, exchange knowledge, share experiences, learn from each other, and come to an agreement for how to achieve their NEL’s WEFE-Nexus goals, as well as transformation.

2. Through agreement, the NEL stakeholders co-define the NEL WEFE-Nexus common vision and action plan based on the agreed framed future.
3. Based on the co-designed action plan, agree on necessary measurements and indicators to each the WEFE-Nexus vision.
4. Identify gaps of scientific information and science education that must be filled to enable knowledge sharing for better informed decisions and actions through the MSUP and the stakeholders' own platforms and knowledgebases.

The questions asked in this milestone is: Why, What and How.

- What is a co-defined process?
- Why do NEL stakeholders need to co-define a common NEL WEFE-Nexus vision and action-plan.
- How to get the stakeholders to co-define a common NEL WEFE-Nexus vision and action-plan.
- How to get commitment from the stakeholders to execute them?
- What is the NEL-WEFE vision and action plan, what to measure and how to measure WEFE-Nexus actions.

The following figure highlights the end-result of the RRI Milestone 5:

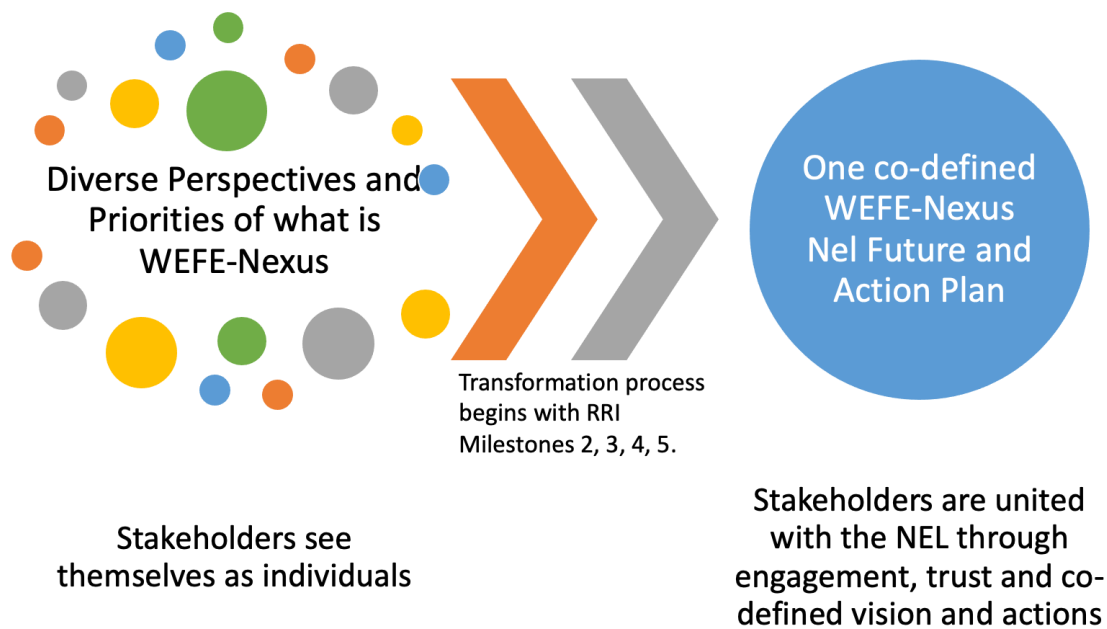


Figure 21: NEL Stakeholders move from individuals with separate perspectives into a unified NEL with co-defined WEFE-Nexus Vision and Action Plan

7.3.2 What is Co-Design and Why is it needed?

Co-design is a process of involving a wide range of people to make creative contributions in the formulation and solutions of a problem. Co-design is an important milestone in implementing RRI and identifying solutions for addressing the specific challenge at hand. Co-design is a highly participatory process where all stakeholders are respected as equal partners for sharing knowledge and findings, for generating ideas and for deciding by vote key-priority areas. Based on the previous RRI Milestone results such as the framing of the WEFE-Nexus future of their NEL, stakeholders must together define a common WEFE-NEXUS vision to define and agree on a common action-plan for implementing WEFE-Nexus actions and accomplishing the NEL WEFE-Nexus transformation.

By now, the NEL-stakeholders are engaged, motivated and have an open-mind to reach consensus. During the co-design process, more RRI dimensions are becoming important such as Open Access and Science Education. Open access is important in this step because it will enable knowledge sharing and access to scientific results important for finding solutions to address the challenge. Thus NEL-stakeholders need to be encouraged to share their data and information with other NEL stakeholders, even if these are not in the same sector. Science Education is also important for explaining in simple terms scientific information and knowledge so that non-sectoral stakeholders understanding their meaning and effect on their own activities and results.

When stakeholders are involved themselves in a co-design process, they start understanding difficulties, risks, interdependencies of actions and impact of results or impact on not acting at all. This is an important step to reduce resistance to change in taking ownership of the new processes, tools, and methods. Moreover, through this process the NEXUS-NESS partners will understand better local challenges and risks, how to improve tools and methods for ensuring easy-to-use applicability and to ensure their wide-spread usage. One important point to remember is that when the stakeholders, who are the end-users of WEFÉ-Nexus, are co-designing their NEL's WEFÉ-Nexus vision and transformation actions will take its ownership. Consequently, their motivation for change towards WEFÉ-Nexus will grow.



Co-design helps achieve greater buy-in and ownership by the stakeholders affected by the change process as they are involved in the co-design process. Co-design aids build sustainable, fit-for-purpose solutions since those involved often have “field” knowledge, which scientists may not have, about what changes are required at local/ regional levels.

7.3.3 How to Co-Design with Stakeholders in each NEL

Each NEL will execute one or more co-design workshops during the execution of the above-mentioned tasks. Stakeholder representatives with decision capability from all three sectors and organisations representing the natural ecosystem should be invited to contribute.

The aimed results of the NEXUS-NESS co-design process for all above-mentioned tasks will be:

1. A co-deigned and common WEFÉ-Nexus vision and mission for all sectors (water, energy, food). This vision will serve as a clear guide for which WEFÉ-Nexus actions and transition steps are necessary to reach it.
 - The NEL WEFÉ-Nexus vision statement must be aspirational, concrete, concise, memorable and time-specific. It should be between 10-15 words long.
 - A transition plan will be defined to move the stakeholders' organisations from the current “as-is” situation to the future vision WEFÉ-Nexus.
2. WEFÉ-Nexus actions with measurement indicators must be defined based on the SMART principle (specific, measurable, achievable, realistic, and time-specific).
 - The SMART actions will be based on the highest voted ideas from Milestone 3 and 4.
 - Identify which SMART actions influence and interact with which other SMART actions.
3. Identify gaps of scientific information and science education that must be bridged for successfully executing the SMART actions.
 - Based on the action plan, stakeholders must identify any knowledge gaps and how to bridge them. If the scientific information does not exist, then define research actions to create them.
 - Identify what scientific information is needed for the actions and how to find them.
 - Identify, if possible, who owns the necessary information and how to get access to them.

→ For long-term actions, identify what science education must be created/ expanded/ offered and to whom.

7.3.4 The NEL Co-Design Workshop for the WEFE-Nexus Vision, Mission and Transition Actions

Under each of the specific tasks 2.2, 3.1, 3.2, 3.3, 3.4, 4.3 and 4.4, one or more dedicated co-design stakeholder workshops will be organised in the NELs through a close collaboration between the NEL-Leader and the task-leader. The co-design workshop methodology can follow the same preparation, execution and follow-up phases described on pages 71 and 83. The organisation and execution steps can be adjusted accordingly to the need of the task. Likewise, the participatory method for the co-design workshop may differ from workshop to workshop. For more descriptive guidance as to which participatory method to be used please refer to [Action Catalogue](#)⁴².

The rest of this section will focus on the needs of subtask 2.2.3 of task 2.2 and task 3.1. The specific subtask 2.2.3 refers to “Co-design the NEL Common WEFE Nexus vision and transition action plan” and it must take place between months M8 and M11 of the NEXUS-NESS project. The subtask specification refers to organising and executing the co-design NEL workshop based on the Structured Democratic Dialogue (SDD) participatory approach, which has been described in detail on page 79. Running an SDD participatory approach requires an experienced SDD-facilitator and specific SDD software tools. In case a specific NEL is unable to deploy the SDD participatory approach, then the NEL-Leader together with the Task 2.2 leader will decide what specific participatory method may be used to substitute the SDD participatory approach, with a World Café approach, for example.

7.3.4.1 Organise the NEL Co-Design Workshop

General guidance: For guidance in how to organise a NEL participatory workshop follow the steps in chapters 9. It is important to follow all the steps and prepare the materials for the workshop well in advance. It is also important to identify a suitable neutral facilitator for the workshop.

Due to COVID-19 restrictions, check and follow the guidelines that apply at the workshop’s location. You may not be able to execute the workshop in a face-to-face setting. Then you must execute it remotely. In the case of a remote workshop, discuss with the WP2 Leader to choose the right software for the NEL. Test the run the whole workshop to ensure that everything runs well. Always, prepare a plan B just in case.

Duration: The workshop’s duration is 1 full day.

Participants: The total number of participants should be around 15 representing all 4 sectors of the Nexus and the natural ecosystem. Gender equality must be respected as much as possible.

The workshop must have representatives from all stakeholders, who have high influence and high interest in the NEL (Group B “Manage Closely” of the NEL Overall Stakeholder Map). Depending on the number of this type of participants, you may want to also invite stakeholders from Group D “Keep Informed” and Group A “Keep Satisfied”. This will depend on the NEL-Leader’s opinion and the local situation of each NEL.

⁴² The Engage2020 Action Catalogue is an online decision support tool that is intended to enable researchers, policy-makers and others wanting to conduct inclusive research, to find the method that is best suited for their specific needs. The Action Catalogue is made easily searchable among 57 participatory methods with focus on research driven by involvement and inclusion. The tool offers 32 different search criteria allowing the user to identify the most suitable method for their purpose.

Facilitator and Recorder: Designated capable and experienced people to fulfil these two workshop roles. They must prepare in advance all workshop materials and timetable. If the workshop is held remotely, then all the tools and templates must be tested online before the workshop.

Good Practices to consider:

Whichever the participatory method, the following good practices should be considered when planning and executing the co-design NEL workshops:

1. Ask to the participants to obtain in advance the necessary authorization from the Institutions they represent, to propose actions during the workshop.
2. Push participants to move beyond exchanging ideas and to start co-creating a vision.
3. Promote local communities and their traditions for societal relevance of the scientific outputs.
4. Ensure that all participants stay until the end of the workshop to have coherent results.
5. Ask participants to rank the priorities and discuss from the highest to the lowest to co-construct a common vision.
6. Have a discussion phase that is long enough for all participants to be fully aware of all the implications of the proposed ideas without extending the duration of the workshop.
7. Try to obtain clear actions from people from different areas of interest, whilst targeting the common vision.
8. Focus not only on high-level ideas, but also on required research and innovation actions needed to execute them.
9. Apply a long-term and crosscutting strategic planning by defining SMART common vision and actions with a more narrow and specific focus combining development milestones and follow-up workshops.
10. Translate workshop results in something short and friendly fast and disseminate among the participants and others, not to lose WEFÉ-Nexus transformation momentum.

7.3.4.2 Execute the NEL Co-Design Workshop

For the RRI Milestone 5 you will need to use the following templates that you find in the NEL common drive:

- Step 5.1: “RRI M5 Step 5.1 NEL WEFÉ-Nexus Vision Canvas Template NEL-Name”
- Step 5.2.1: “RRI M5-Step 5.2.1 NEL WEFÉ-Nexus Transition Actions Template NEL-Name”
- Step 5.2.2: “RRI M5-Step 5.2.2 NEL WEFÉ-Nexus Transition Actions SMART Template FV NEL Name”
- Step 5.2.3: “RRI M5-Step 5.2.2 NEL WEFÉ-Nexus Grand Challenge Stakeholder Knowledge Gaps Template FV NEL Name”
- Step 5.3: “RRI M5-Step 5.3 Stakeholder WEFÉ-Nexus Transition Map Template FV NEL-Name-Stakeholder-Name”

For this RRI Milestone 5 Step 5.1 and Step 5.2.1, 5.2.2 and 5.2.3 follow the actions in the table below:

Total time required: Between 165 minutes (2 hours and 45 minutes) – 195 minutes (3 hours and 15 minutes)

Action Description and Main Responsible		Max Duration
Part 1	Co-Defined NEL WEFÉ-Nexus Vision and Mission Statements	330 min
08:30	Participant Registration:	30 min
09:00	The workshop secretary welcomes the participant, gives the name tag to the participant, and asks the participant to sign the GDPR form. The NEL-Leader stands at the door of the room and as the workshop host welcomes participants as they arrive at the venue/ on-line meeting. In a face-to-face meeting, ask the participants to choose a seat in one of the round tables.	

09:00-09:10	The NEL-Leader commences the workshop by welcoming everyone. The NEL-Leader uses the NEL Story to reignite the participants' motivation and to summarise the results so far. Then the NEL-Leader highlights the goal of the CO-Design Workshop and the importance of the WEFE-Nexus Vision and Mission Statements.	10 min
09:10-09:20	The facilitator provides each round table a copy of the NEL WEFE-Nexus Vision Canvas Template and the instructions. The facilitator explains the objective of this session and the difference between a Mission Statement and a Vision Statement. A vision statement should describe future NEL WEFE-Nexus situation in aspirational terms. A mission statement describes the activities in concrete terms to reach and support the vision. Begin with a VISION statement if you are starting from scratch. Begin with a MISSION statement if the NEL has already started or has a general vision established.	10 min
09:20-10:00	The workshop participants will work in small round table mixed-sector groups . The facilitator invites the groups to spend 40 minutes quietly discussing and writing responses to the questions in the boxes from the canvas labelled A – D (Vision) or A – E (Mission).	40 min
10:00-10:30	Each table selects a speaker to present the common <i>NEXUS Challenge Mapping Sheet</i> . The recorder takes notes of what is said, table by table. (The duration of this step depends on the number of tables. Each table must get equal speaking time of 5 minutes. The facilitator must ensure this.)	30 min Max 5 min per table
10:30-10:45	Networking Coffee Break The recorder takes the filled templates and displays them on a wall or on a screen visible to all.	15 min
10:45-11:45 (12:15)	The facilitator then leads the table-groups through a discussion of the questions in the boxes, capturing key ideas, insights, and phrases for each. Use clarifying questions and prompts such as “Say more words about that...” or “Can you be more specific?” The “Five Why’s” is a good technique as well. The facilitator highlights or circles key words from the lettered boxes.	60-90 min depending on the discussion.
12:15-12:45	Then the facilitator helps the participants all together using these circled words in plenary to draft a Mission and Vision statement in the box on the right of the canvas.	20-30 min
12:45-13:15	The facilitator then asks the participants to assess the drafted statement using the quality check guidelines and the Test provided on the lower right section of the canvas.	30 min
13:15-14:00	Networking Lunch (Standing lunch with small round tables for standing people helps people mingle. Make sure that the food is easily handled and keeps the sanitary Covid-19 rules)	45 min
13:15-14:00	While the participants are at lunch, the Recorder clearly writes the Mission and Vision statements and displays them so that it is visible for all.	
Part 2	Co-Defined NEL WEFE-Nexus Transition Actions	145 min
14:00-14:50	The facilitator explains the steps for using A. the Lotus Blossom tool to co-define the NEL WEFE-Nexus Transition Actions: <ol style="list-style-type: none"> Eight 3-by-3-inch squares are arranged around a centre blossom. The centre square of each blossom contains the Co-Defined NEL WEFE Vision and Mission Statements in the Box I in the centre. Brainstorm NEL WEFE-Nexus main transition actions and put them in the boxes immediately surrounding the centre box (Boxes A-H). Now write each of the 8 main transition actions in the corresponding boxes (A-H) in each corner. (You're propagating the transition actions.) For each of the 8 main transition action, brainstorm related tasks, components, solutions and enter these in the eight boxes surrounding each of the 8 main transition action in each outer lotus blossom. Try your best to complete all the blossoms to maximize the solutions. 	50 min

	<p>5. When you complete all boxes, you will have at least 64 new actions (solutions, tasks, components, initiatives) to explore related to the NEL mission.</p> <p>6. These are displayed by the Recorder so that everyone can see them.</p>	
14:50 – 15:10	<p>B. Vote and Prioritise the Actions:</p> <p>The facilitator hands out five vote-stickers to each participant.</p> <ol style="list-style-type: none"> The facilitator asks participants to vote which actions are the most viable and important for reaching the NEL WEFE-Nexus Vision. The actions with votes must be now prioritised by the participants based on identifying the most critical ones for the success of the WEFE-Nexus Transition in the NELs. 	20 min
15:10 – 15:20	<p>C. The facilitator explains the 5Is categorisation and asks participants to categorise the prioritised actions into the 5 Is: Now display these prioritised actions and ask participants all together to categorise them based on the 5Is categories (UNICE 2015): Institutions, Information, International Cooperation, Instruments, and Infrastructure. The recorder keeps track of which action moves into which category. The result will be the Categorisation of the WEFE-Nexus Transition Actions of the NEL.</p>	20 min
15:20 – 16:20	<p>D. Make the prioritised transition actions SMART.</p> <p>The facilitator asks the participants to indicate which table will work on which categorised transition actions to make them SMART (Specific, Measurable, Achievable, Relevant and Time-Bound). The participants are divided three or four in tables. They will use the “RRI M5-Step 5.2.2 NEL WEFE-Nexus Transition Actions SMART Template NEL Name”. The facilitator asks them to choose which Transition Actions they will work. When the allocation is complete the participants go ahead with the specification including action measures and what resources and skills are required. ** Refreshments are served at the tables while the participants are working. The facilitator and the NEL-leader walk from table to table and support the participants.</p>	60 min
Part 3	Co-Identify gaps of scientific information and science education	40 min
16:20 – 16:45	<p>After the SMART transition actions have been defined, each group highlights the gaps of scientific information, missing knowledge and skills. A short discussion takes place to see if a stakeholder or the NEXUS-NESS project can fulfil these gaps. The recorder takes notes using the NEL WEFE-Nexus Grand Challenge Stakeholder Knowledge Gaps Template.</p>	25 min
16:45 – 16:55	<p>The facilitator highlights the results of the workshop, thanks everyone and gives the word to the NEL-Leader</p> <p>The NEL-Leader thanks all participants for their active participation and highlights how all the workshop outputs will be used in the consecutive phases of the project and the NEL’s WEFE-Nexus transformation. The NEL-Leader stresses now each stakeholder must work internally to see how the WEFE-Nexus transformation can be done internally in the stakeholder’s organisation. The NEL-Leader requests the participants to fill out the “RRI M5-Step 5.3 Stakeholder WEFE-Nexus Transition Map Template NEL-Name-Stakeholder-Name” within 10 working days from today.</p>	10 min
16:55- 17:00	Workshop ends with filling out the workshop questionnaire	5 min

7.3.4.3 NEL WEFE-Nexus Stakeholder Transition Map

For this **RRI Milestone 5 Step 5.3** you will need to use the “RRI M5-Step 5.3 Stakeholder WEFE-Nexus Transition Map Template NEL-Name-Stakeholder-Name” that you find in the NEL common drive.

Total time required: 2 hours for each individual WEFE-Nexus Transition Map

This step may take place after the co-define workshop. The NEL-Leader must offer assistance to the stakeholders if necessary and must definitely follow-up that the step is executed in time maximum 10 working days after the co-define workshop ends.

This step must be performed by each stakeholder organisation because each stakeholder organisation must think how their organisation will transition towards the NEL WEFE-Nexus common vision, mission and action plan.

1. Request each stakeholder to detail the visualisation process of the WEFE-Nexus transition process by filling out in teams the WEFE-Nexus Transition Map. The WEFE-Nexus Transition Map provides a one-page visual of the transition process from the stakeholders' point of view. The stakeholder will commit to ensure that their organisation can transition towards the NEL WEFE-Nexus vision.
2. This must be completed at most 7 working days after the Co-Define workshop. The NEL-Leader may wish to fill out these transition maps by interviewing each stakeholder.
3. The NEL-Leader will collect these WEFE-Nexus Transition Maps from all stakeholders.
4. The NEL-Leader together with XPRO will analyse these WEFE-Nexus Transition Maps and to synthesise one NEL WEFE-Nexus Transition Map. A consolidated Knowledge Gaps list will be prepared for discussion with other partners in NEXUS-NESS and for actions for bridging these specific NEL Knowledge Gaps.
5. The WEFE-Nexus Transition Maps will be made visible for all stakeholders on the NEL common drive and in the MSUP.
6. The NEL WEFE-Nexus Transition Maps (from all four NELs) will be used for communication and dissemination purposes in the NEL, locally and regionally, internally in the NEXUS-NESS project and beyond.



7.4 RRI Roadmap Milestone M6 Co-Construct for Tasks 3.1, 3.2, 3.4, 4.3 and 4.4

RRI Dimensions included in these three RRI Roadmap Milestones are:

- **Public Engagement** = All steps must include NEL Stakeholder representatives with sufficient decision power.
- **Gender Equality** = The NEL Stakeholder representatives must be men and women. The NEL-Leaders must do the maximum to ensure that women are included in the decision-making processes of the NELs.
- **Gender Issues** = When discussing WEFE-Nexus challenges and possible solutions, gender issues must be also discussed. Gender issues include different perceptions of men and women on WEFE-Nexus issues, as well as how do the proposed WEFE-Nexus solutions affect women and men differently as for example ways of work, perception etc.
- **Ethics** = The WEFE-Nexus issues and solutions must highlight any ethical concerns, and these must be addressed. The WEFE-Nexus solutions must be socially inclusive; ethical towards working conditions and towards the natural environment; and, ethical towards the local and regional economies.
- **Science Education** = The stakeholders must be educated by the NEL-Leaders and NEXUS-NESS partners regarding the scientific aspects of the WEFE-Nexus to better make informed decisions for increasing the WEFE-Nexus transition and impact.
- **Open Access** = Any NEL stakeholder and NEXUS-NESS partners must provide open access to all their data and information for guaranteeing the WEFE-Nexus transition and impact. The NEL-Leader must inform the stakeholders about the open access requirement and ethos of the NEXUS-NESS project. Moreover, open access must be guaranteed for the NEL's future after the NEXUS-NESS project ends. The data must follow the FAIR (findable, accessible, interoperable, reusable) principles and made as much as possible available through the NEXUS-NESS Multi-stakeholder and User Platform (MSUP).
- **Governance** = The NEL stakeholders must understand their overall ethical, technical, scientific, economic, environmental, and social responsibilities. The NEL policymakers and policy-implementers must be open for policy adjustment to assure fair and sustainable allocation of resources for the NEL for a long-term benefit of the NEL's society and natural ecosystem and environment.

Tasks that must apply it and Results

Task 3.1 – Nexus Ecosystem Labs (SSSA and NEL Leaders, XPRO) (M1, M36)

Deliverable 3.1 The Nexus Ecosystem Lab depicting the WEFE resources and challenges of the 4 NELs (SSSA with UPM (Spain), SSSA (Italy), UA (Egypt), IRA/CRDA (Tunisia), M6)

Task 3.2 - NEXUS-NESS Service validation (SSSA; Participants: UNIFI, POLIMI, UEO, NEL Leaders) (M15-M34)

Deliverable D3.2 The NEXUS-NESS Service validation (SSSA, M12, M24, M30) - Report describing the NNS validation implemented in the project from Demo testing to NEL co-validation with stakeholders.

Task 3.4 - Pathways to impact and capacity development (M12-M36). Task leader: UNIFI; Participants: SSSA, NEL Leaders and XPRO

Deliverable D3.4 Lesson-learnt from successes and challenges from NEL implementation (UNIFI, M36) – Report describing the synthesis of experiences on the four NELs, with guidance/guidelines for geographies in the rest of the world on how to roll-out NNS.

Deliverable D3.5 Pathways to impact and capacity building: NEL training and capacity building material (UNIFI, M12, M24, M36) - Reports and documents produced in support of the capacity building. This deliverable also includes major specifications of Policy and Stakeholder briefs.

Task 4.3 - NEL WEFEX Nexus Data and Scenarios (M6-M36). Task leader: POLIMI; Participants: SSSA, UEO, SAS, FEEM, XPRO and NEL-Leaders

Deliverable D4.3 WEFEX Nexus indicators and related dataset (POLIMI, M15, M30) [R & OTHER, PU] - Report with associated dataset with the description of specifications of the WEFEX Nexus indicators. The report/dataset include the indicator values in the different scenarios and consider actual versus post-solution application conditions.

Task 4.4 - NEXUS-NESS SERVICE solution conceptualization and deployment (M15-M36). Task leader: UEO; Participants: SSSA, POLIMI, XPRO and NEL-Leaders

Deliverable D4.4 WEFEX Nexus Management plans (POLIMI, M24, M36)

Milestone M4.4 Nexus-Ness Service released as DEMO (UEO, M15) and for operational use in the NELs (UEO, M30)

7.4.1 RRI Roadmap Milestones 6 Steps Overview:

The RRI Milestone 6 is about co-constructing the WEFEX-Nexus actions in each NEL with the stakeholders and their designated actors.

The WEFEX-Nexus actions in this milestone are of three types:

1. The WEFEX-Nexus Transformation Actions for WP2
2. The WEFEX-Nexus Service operationalisation and the NEXUS-NESS Service deployment together with the WEFEX-Nexus management plans of the NELs for WP3 and WP4
3. The WEFEX-Nexus Socio-Environmental and Economic integrated assessment for WP5

The first type about the WEFEX-Nexus Transformation Actions is about executing the actions defined in the RRI Milestone 5 for realising the transition towards WEFEX-Nexus so that it becomes the new normal in the NEL and all the implicated stakeholder organisations.

The second type concerns the development and adjustment of all the WEFEX-Nexus models, tools, and practices that the stakeholders will implement in the field. Furthermore, this type concerns also the awareness and the capacity building of the stakeholders and especially the water managers, energy managers, farmers and other food producers.

The goals of Milestone 6 are:

1. Based on the previous RRI Roadmap Milestones and especially the co-defined WEFEX-Nexus Vision, Mission and Transition Action Plan, the stakeholders and their actors will execute the agreed transition actions through close collaboration.
2. Co-construct actions to bridge the identified knowledge gaps in the NEL.
3. Co-implement vertically and horizontally the WEFEX-Nexus field actions of the tasks in WP3, WP4 and WP5. The WP-Leaders of these three WPs will involve the NEL-actors designated by the stakeholders in their tasks for receiving local knowledge from them and for transferring knowledge from the partner universities.

4. Research and development results will be collected, distilled to improve WEFE-Nexus Governance modes for truly improving the WEFE-Nexus status locally and regionally in the NELs.
5. The newly Governance modes and results will be fed to policymakers and together with them begin necessary policy adjustments for fully enabling reaching the WEFE-Nexus vision and mission.

The question asked in this milestone is: How.

- How can the stakeholders together with the NEXUS-NESS partners co-construct and co-implement the WEFE-Nexus NEL field activities and WEFE-Nexus transition activities?
- How will the stakeholders use the WEFE-Nexus models, tools and data to improve their everyday supply and demand requirements?
- How will the NEL ecosystems improve?
- How will the Governance structure become more coherent and consistent with the NEL needs?
- How will the stakeholders' organisations fully transition towards the WEFE-Nexus vision?

In the short term, the innovation processes of WP3, WP4 and WP5 will generate a series of measurements, models, tools, and methods to be used by the stakeholders in the NEL. But during the project, the NELs and their stakeholders will be involved in the design and testing of the NEXUS-NESS solution, which will be a unique service developed in WP3, WP4 and WP5. The ultimate goal of WP3, WP4 and WP5 is to create the NEXUS-NESS solution easily accessible by stakeholders. The NEXUS-NESS solution will provide Services that integrate measurements, models, tools, and methods.

To answer all the above How-questions and to be able to fulfil the goals of the RRI Roadmap Milestone 6, several workshops will be organised among the stakeholders in the field to co-construct these innovation results. The nature of the workshops and their frequency will be done NEL by NEL among the NEL-Leaders and the WP3, WP4 and WP5 WP-leaders and task leaders.

Thus, this section of the methodology will not describe how these workshops will be organised. Nonetheless, the following figure illustrates how the NEL innovation processes in the four NELs will provide input for diagnosis to specific NEL issues. These NEL issues will be investigated to determine if they are caused by plurality of stakeholder perspectives and/ or lack of information and knowledge. Based on the specific NEL WEFE-Nexus Vision and Missions, stakeholders will be co-consulted to identify a specific solution and for further enabling the innovation processes and the implementation of WEFE-Nexus solutions in the field. These links among innovation processes and their implementations with the WEFE-Nexus transition in each NEL are inspired by the STEER approach⁴³. The STEER approach focuses on developing cumulative knowledge for improving the diagnosis of each local situation based on a variety of factors for understanding the performance of environmental governance and management systems.

⁴³ Pahl-Wostl C. et al., 2020, *Enhancing the capacity of water governance to deal with complex management challenges: A framework of analysis*, Elsevier, <https://doi.org/10.1016/j.envsci.2020.02.011> (last accessed 16 Aug 2021)

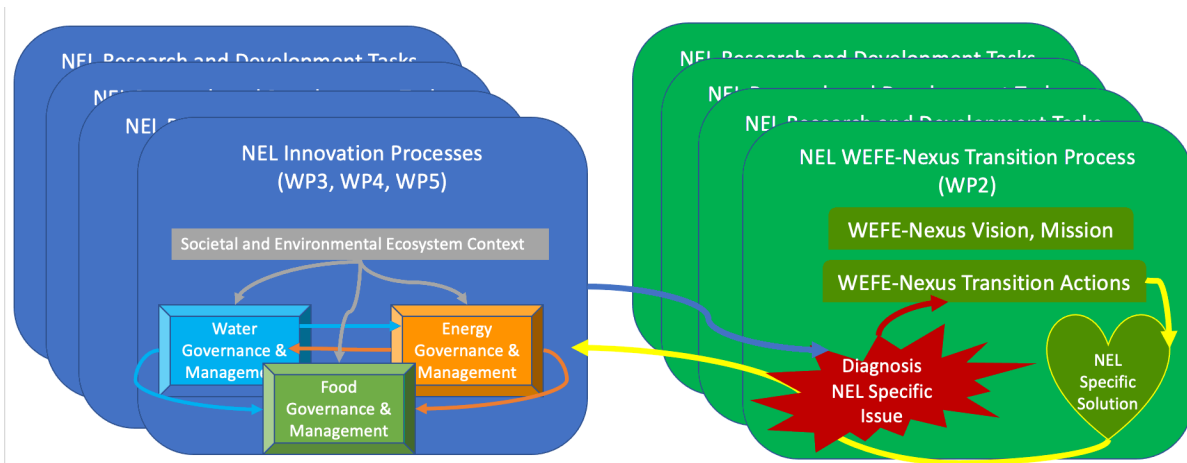


Figure 22: In each NEL, the approaches and results of the research and development processes influence the approaches and results if the WEFE-Nexus transition processes.

For connecting the WEFE-Nexus transition and the WEFE-Nexus innovations, it is significant to follow the stakeholders' involvement in the co-construction/ co-development of these innovations. This involvement will also indicate how the stakeholders are moving closer to the WEFE-Nexus vision and mission that they co-defined. Thus, an innovation inventory will be created and in each NEL the stakeholder involvement will be recorded. This innovation inventory will be also used as a measurement and monitoring tool for the WEFE-Nexus transition in the RRI Roadmap Milestone 7.



7.5 RRI Roadmap Milestone M7 Measure and Adjust for Tasks 2.2, 3.1, 3.2, 3.3, 3.4, 4.3 and 4.4.

RRI Dimensions included in these three RRI Roadmap Milestones are:

- **Public Engagement** = All steps must include NEL Stakeholder representatives with sufficient decision power.
- **Gender Equality** = The NEL Stakeholder representatives must be men and women. The NEL-Leaders must do the maximum to ensure that women are included in the decision-making processes of the NELs.
- **Gender Issues** = When discussing WEFE-Nexus challenges and possible solutions, gender issues must be also discussed. Gender issues include different perceptions of men and women on WEFE-Nexus issues, as well as how do the proposed WEFE-Nexus solutions affect women and men differently as for example ways of work, perception etc.
- **Ethics** = The WEFE-Nexus issues and solutions must highlight any ethical concerns, and these must be addressed. The WEFE-Nexus solutions must be socially inclusive; ethical towards working conditions and towards the natural environment; and, ethical towards the local and regional economies.
- **Science Education** = The stakeholders must be educated by the NEL-Leaders and NEXUS-NESS partners regarding the scientific aspects of the WEFE-Nexus to better make informed decisions for increasing the WEFE-Nexus transition and impact.
- **Open Access** = Any NEL stakeholder and NEXUS-NESS partners must provide open access to all their data and information for guaranteeing the WEFE-Nexus transition and impact. The NEL-Leader must inform the stakeholders about the open access requirement and ethos of the NEXUS-NESS project. Moreover, open access must be guaranteed for the NEL's future after the NEXUS-NESS project ends. The data must follow the FAIR (findable, accessible, interoperable, reusable) principles and made as much as possible available through the NEXUS-NESS Multi-stakeholder and User Platform (MSUP).
- **Governance** = The NEL stakeholders must understand their overall ethical, technical, scientific, economic, environmental, and social responsibilities. The NEL policymakers and policy-implementers must be open for policy adjustment to assure fair and sustainable allocation of resources for the NEL for a long-term benefit of the NEL's society and natural ecosystem and environment.

Tasks that must apply it and Results

Task 2.2 – Subtask 2.2.3 Co-design the NEL common WEFE Nexus vision and transition plan (M8-M15)

Results: Each NEL has motivated and engaged its stakeholders to co-define a common WEFE-Nexus Vision and execution plan.

Milestone M2.2.2 NEL Common WEFE Nexus Vision and Transition Action Plan available online (NEL Leaders, M11)

Task 3.1 – Nexus Ecosystem Labs (SSSA and NEL Leaders, XPRO) (M1, M36)

Deliverable 3.1 The Nexus Ecosystem Lab depicting the WEFE resources and challenges of the 4 NELs (SSSA with UPM (Spain), SSSA (Italy), UA (Egypt), IRA/CRDA (Tunisia), M6)

Task 3.2 - NEXUS-NESS Service validation (SSSA; Participants: UNIFI, POLIMI, UEO, NEL Leaders) (M15-M34)

Deliverable D3.2 The NEXUS-NESS Service validation (SSSA, M12, M24, M30) - Report describing the NNS validation implemented in the project from Demo testing to NEL co-validation with stakeholders.

Task 3.3 - WEFEX Nexus indicators (M9-M30). Task leader: UNIFI; Participants: SSSA, POLIMI, SAS and the NEL-Leaders

Deliverable D3.3 WEFEX Nexus indicators and related dataset (UNIFI, M18, M24, M30) - Report with associated dataset with the description of specifications of the WEFEX Nexus indicators. The report/dataset include the indicator values in the different scenarios and consider actual versus post-solution application conditions.

Task 3.4 - Pathways to impact and capacity development (M12-M36). Task leader: UNIFI; Participants: SSSA, NEL Leaders and XPRO

Deliverable D3.4 Lesson-learned from successes and challenges from NEL implementation (UNIFI, M36) – Report describing the synthesis of experiences on the four NELs, with guidance/guidelines for geographies in the rest of the world on how to roll-out NNS.

Deliverable D3.5 Pathways to impact and capacity building: NEL training and capacity building material (UNIFI, M12, M24, M36) - Reports and documents produced in support of the capacity building. This deliverable also includes major specifications of Policy and Stakeholder briefs.

Task 4.3 - NEL WEFEX Nexus Data and Scenarios (M6-M36). Task leader: POLIMI; Participants: SSSA, UEO, SAS, FEEM, XPRO and NEL-Leaders

Deliverable D4.3 WEFEX Nexus indicators and related dataset (POLIMI, M15, M30) [R & OTHER, PU] - Report with associated dataset with the description of specifications of the WEFEX Nexus indicators. The report/dataset include the indicator values in the different scenarios and consider actual versus post-solution application conditions.

Task 4.4 - NEXUS-NESS SERVICE solution conceptualization and deployment (M15-M36). Task leader: UEO; Participants: SSSA, POLIMI, XPRO and NEL-Leaders

Deliverable D4.4 WEFEX Nexus Management plans (POLIMI, M24, M36)

Milestone M4.4 Nexus-NESS Service released as DEMO (UEO, M15) and for operational use in the NELs (UEO, M30)

7.5.1 RRI Roadmap Milestones 7 Steps Overview:

The goal of the RRI Milestone 7 is about measuring the results of the WEFEX-Nexus actions in each NEL and in the NEXUS-NESS project, and to provide constructive feedback both to the NEL and its stakeholders, and to the NEXUS-NESS partners. The feedback will be used to adjust the necessary actions in the NEL and/or the innovation and its use in the NEL.

The results of the WEFEX-Nexus actions that will be monitored are:

1. The WEFEX-Nexus Transformation Actions for WP2 in relation to the WEFEX-Nexus Vision and Mission and to the adaptation of the WEFEX-Nexus innovations by the NEL stakeholders.
2. The use of the MSUP platform by the stakeholders.
3. The WEFEX-Nexus Service operationalisation and the NEXUS-NESS Service deployment together with the WEFEX-Nexus management plans of the NELs for WP3 and WP4

4. The WEFE-Nexus Socio-Environmental and Economic integrated assessment for WP5

The questions asked in this milestone is: What, Who, Why and How:

- What must be measured?
- Who uses the innovation?
- Why do the results look like this?
- How can actions be improved/ adjusted?
- Who must take corrective action?

Measurement and adjustment are integral parts of any innovation and transformation approach. This RRI Milestone depends on the nature of the actions and the co-agreed key performance indicators and measurements. Under The RRI Roadmap Milestone 5, the stakeholders have already co-designed a WEFE-Nexus transition action plan with SMART actions that are Specific, Measurable, Achievable, Relevant and Time-bound actions. Therefore, the NEL WEFE-Nexus transition actions are measured as defined in the SMART actions by the stakeholders and the NEL-Leader.

It is central to acknowledge that there is not a standard set of measurements or key performance indicators or a “one size fits all” approach. Instead, it is more appropriate to define the measurements based on the NEL challenge, the co-defined vision, mission, and actions.

Some other relevant measures to be applied on the NEL’s transformation process for ensuring that is moving in the right direct are the following indicators⁴⁴:

- Interest in the WEFE-Nexus (Low, Medium, High)
- Influence in the WEFE-Nexus (Low, Medium, High)
- Interest in the NEL (Low, Medium, High)
- Influence in the NEL (Low, Medium, High)
- Stakeholder Motivation (Low, Medium, High)
- Stakeholder Engagement in the NEL⁴⁵ (Unaware, Resistant, Neutral, Supporting, Leading)
- Stakeholder Frequency of Engagement in the NEL (Bi-weekly, Monthly, Quarterly, Yearly, Never)
- Attitude of the stakeholders⁴⁶:
 - Acceptance of process and outcomes.
 - Seeking other points of view.
 - Ability to question, discuss and draw conclusions.
 - Working with the other gender.
 - Connecting topics with previous knowledge, scientific topics.
- Perception of the stakeholders⁴⁶ how they perceive the action and the common vision while working on it and working with each other. Measure perception based on:
 - Enjoyment of being involved.
 - Sense of empowerment and belonging.
 - Entrepreneurship.
 - Own ability to perform a scientific/ innovative activity.
- Evaluating the process:
 - Levels of participation were considered appropriate for the stakeholders
 - Methods were appropriate, and successful.

⁴⁴ PMI Stakeholder analysis a pivotal practice of successful projects, <https://www.pmi.org/learning/library/stakeholder-analysis-pivotal-practice-projects-8905> (last accessed 30 July 2021)

⁴⁵ Stakeholder Engagement Assessment Matrix. <https://project-management.info/stakeholder-engagement-matrix/> (last accessed 30 July 2021)

⁴⁶ Benamati, J. “Skip”, 2010, *An Instrument to Measure Student attitudes Toward and Perceptions of MIS: exploring the Success of efforts to Change Perceptions of the Field Across Time and Gender*, AMCIS 2010 Proceedings. 45. <http://aisel.aisnet.org/amcis2010/45> (last accessed 30 July 2021)

- Costs were reasonable
- Time invested
- Evaluating the innovation⁴⁷:
 - Appropriateness is the perceived fit, relevance, or compatibility of the innovation or evidence-based practice for a given practice setting, provider, or consumer; and/or perceived fit of the innovation to address a particular issue or problem.
 - Adoption on is defined as the intention, initial decision, or action to try or employ an innovation or evidence-based practice. Adoption also may be referred to as “uptake.”
 - Acceptability is the perception among implementation stakeholders that a given treatment, service, practice, or innovation is agreeable, palatable, or satisfactory.
 - Feasibility is defined as the extent to which an innovation can be successfully used or carried out within a given agency or setting
 - Fidelity is defined as the degree to which an intervention was implemented as it was prescribed in the original protocol or as it was intended by the program developers.
 - Implementation Cost
 - Penetration is defined as the integration of a practice within a service setting and its subsystems.
 - Sustainability is the extent to which a newly implemented innovation is maintained or institutionalized within a service setting’s ongoing, stable operations. It becomes the new norm.

Templates will be provided for the measurement of the NEXUS-NESS workshops, activities, innovations, and transition actions. The WP-Leaders, task leaders and NEL-Leaders will be responsible for the evaluation as required.

Regarding the measurement of the Stakeholder Engagement, The NEL-Leaders are required to fill out the following template found in the NEL common drive: “RRI M7-Step 7.1 NEL Stakeholder Transition Measurement Template FV NEL-Name.xlsx”.

⁴⁷ Enola Proctor et al., 2010, *Outcomes for Implementation Research: Conceptual Distinctions, Measurement Challenges, and Research Agenda*, Springer, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3068522/> (last accessed 18 Aug 2021)



7.6 RRI Roadmap Milestone M8 Intensify for Tasks 2.2, 3.1, 3.2, 3.3, 3.4, 4.3 and 4.4.

RRI Dimensions included in these three RRI Roadmap Milestones are:

- **Public Engagement** = All steps must include NEL Stakeholder representatives with sufficient decision power.
- **Gender Equality** = The NEL Stakeholder representatives must be men and women. The NEL-Leaders must do the maximum to ensure that women are included in the decision-making processes of the NELs.
- **Gender Issues** = When discussing WEFE-Nexus challenges and possible solutions, gender issues must be also discussed. Gender issues include different perceptions of men and women on WEFE-Nexus issues, as well as how do the proposed WEFE-Nexus solutions affect women and men differently as for example ways of work, perception etc.
- **Ethics** = The WEFE-Nexus issues and solutions must highlight any ethical concerns, and these must be addressed. The WEFE-Nexus solutions must be socially inclusive; ethical towards working conditions and towards the natural environment; and, ethical towards the local and regional economies.
- **Science Education** = The stakeholders must be educated by the NEL-Leaders and NEXUS-NESS partners regarding the scientific aspects of the WEFE-Nexus to better make informed decisions for increasing the WEFE-Nexus transition and impact.
- **Open Access** = Any NEL stakeholder and NEXUS-NESS partners must provide open access to all their data and information for guaranteeing the WEFE-Nexus transition and impact. The NEL-Leader must inform the stakeholders about the open access requirement and ethos of the NEXUS-NESS project. Moreover, open access must be guaranteed for the NEL's future after the NEXUS-NESS project ends. The data must follow the FAIR (findable, accessible, interoperable, reusable) principles and made as much as possible available through the NEXUS-NESS Multi-stakeholder and User Platform (MSUP).
- **Governance** = The NEL stakeholders must understand their overall ethical, technical, scientific, economic, environmental, and social responsibilities. The NEL policy-makers and policy-implementers must be open for policy adjustment to assure fair and sustainable allocation of resources for the NEL for a long-term benefit of the NEL's society and natural ecosystem and environment.

Tasks that must apply it and Results

Task 2.2 – Subtask 2.2.3 Co-design the NEL common WEFE Nexus vision and transition plan (M8-M15)

Results: Each NEL has motivated and engaged its stakeholders to co-define a common WEFE-Nexus Vision and execution plan.

Milestone M2.2.2 NEL Common WEFE Nexus Vision and Transition Action Plan available online (NEL Leaders, M11)

Task 3.1 – Nexus Ecosystem Labs (SSSA and NEL Leaders, XPRO) (M1, M36)

Deliverable 3.1 The Nexus Ecosystem Lab depicting the WEFE resources and challenges of the 4 NELs (SSSA with UPM (Spain), SSSA (Italy), UA (Egypt), IRA/CRDA (Tunisia), M6)

Task 3.2 - NEXUS-NESS Service validation (SSSA; Participants: UNIFI, POLIMI, UEO, NEL Leaders) (M15-M34)

Deliverable D3.2 The NEXUS-NESS Service validation (SSSA, M12, M24, M30) - Report describing the NNS validation implemented in the project from Demo testing to NEL co-validation with stakeholders.

Task 3.3 - WEF Nexus indicators (M9-M30). Task leader: UNIFI; Participants: SSSA, POLIMI, SAS and the NEL-Leaders

Deliverable D3.3 WEF Nexus indicators and related dataset (UNIFI, M18, M24, M30) - Report with associated dataset with the description of specifications of the WEF Nexus indicators. The report/dataset include the indicator values in the different scenarios and consider actual versus post-solution application conditions.

Task 3.4 - Pathways to impact and capacity development (M12-M36). Task leader: UNIFI; Participants: SSSA, NEL Leaders and XPRO

Deliverable D3.4 Lesson-learned from successes and challenges from NEL implementation (UNIFI, M36) – Report describing the synthesis of experiences on the four NELs, with guidance/guidelines for geographies in the rest of the world on how to roll-out NNS.

Deliverable D3.5 Pathways to impact and capacity building: NEL training and capacity building material (UNIFI, M12, M24, M36) - Reports and documents produced in support of the capacity building. This deliverable also includes major specifications of Policy and Stakeholder briefs.

Task 4.3 - NEL WEF Nexus Data and Scenarios (M6-M36). Task leader: POLIMI; Participants: SSSA, UEO, SAS, FEEM, XPRO and NEL-Leaders

Deliverable D4.3 WEF Nexus indicators and related dataset (POLIMI, M15, M30) [R & OTHER, PU] - Report with associated dataset with the description of specifications of the WEF Nexus indicators. The report/dataset include the indicator values in the different scenarios and consider actual versus post-solution application conditions.

Task 4.4 - NEXUS-NESS SERVICE solution conceptualization and deployment (M15-M36). Task leader: UEO; Participants: SSSA, POLIMI, XPRO and NEL-Leaders

Deliverable D4.4 WEF Nexus Management plans (POLIMI, M24, M36)

Milestone M4.4 Nexus-Ness Service released as DEMO (UEO, M15) and for operational use in the NELs (UEO, M30)

7.6.1 RRI Roadmap Milestones 8 Steps Overview:

The goal of the RRI Milestone 8 is to **intensify** all WEF-Nexus activities, both the transition towards WEF-Nexus vision and the use of the NEXUS-NESS Solution and its services. This milestone and its steps are important for keeping the momentum of the process, capitalize on previous success, reflect and learn from the previous milestones and strengthen the WEF-Nexus in the NELs through RRI considerations. In this milestone, activities with all stakeholders are reinforced with the goal to strengthen their NEL established relationships so that the NEXUS-NESS Solution and its services are used extensively so that they feel natural and effortless.

In this Milestone 8, all RRI dimensions are relevant and all matter with the same intensity.

The results of the WEFE-Nexus actions that will be monitored are:

5. The use of the MSUP platform by the stakeholders.
6. The WEFE-Nexus Service operationalisation and the NEXUS-NESS Service deployment together with the WEFE-Nexus management plans of the NELs for WP3 and WP4.
7. The WEFE-Nexus Socio-Environmental and Economic integrated assessment for WP5.
8. The intensification of the Science-Stakeholder-Policy dialogue of Task 6.3.
9. The Exploitation Strategy for the WEFE Nexus Forum Task 6.4.

As illustrated in figure Figure 23, the results of all NEL activities, will provide input for policy recommendations and adjustments at regional and national levels. Moreover, the results and lessons learned from the NEL will provide input for strengthening the NEL to grow and sustain itself after the NEXUS-NESS project ends.

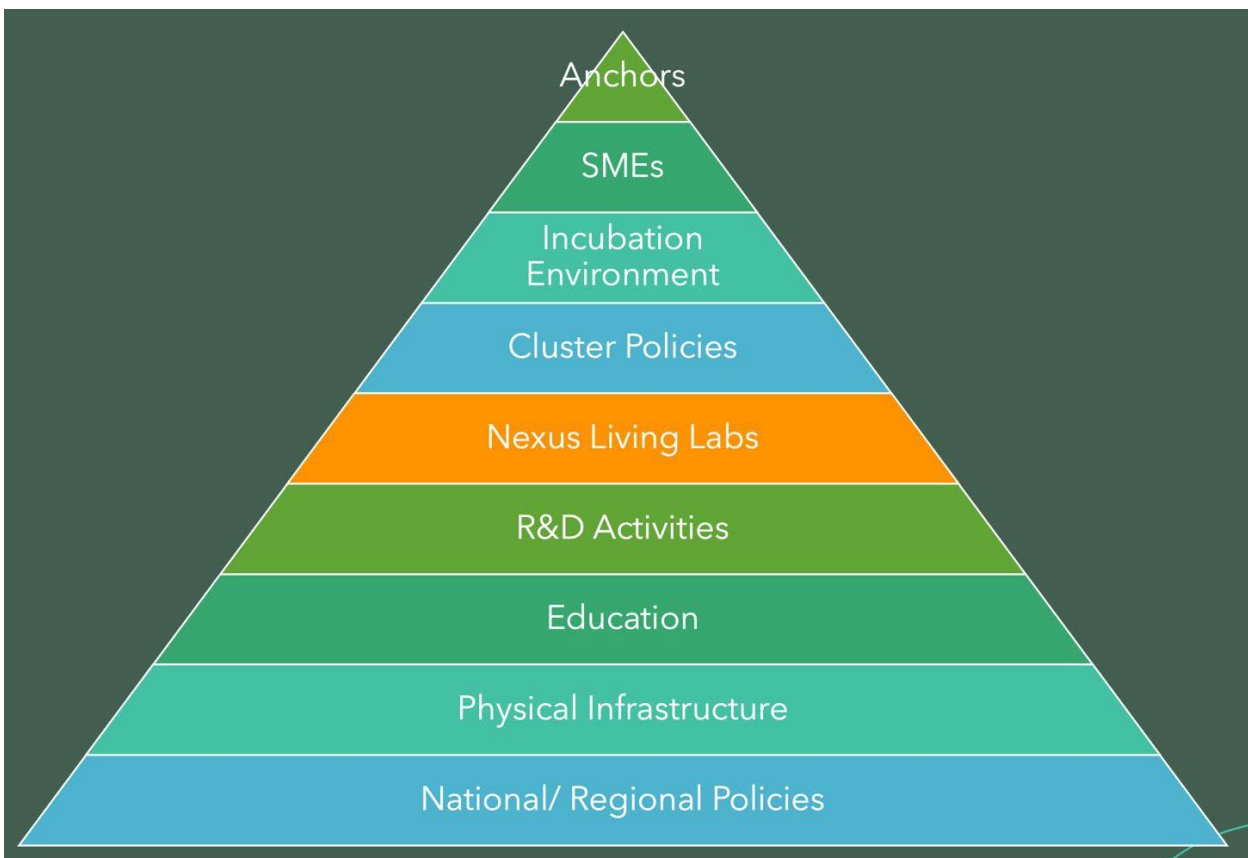


Figure 23: The NELS activities and the results will provide information for policy recommendations and adjustments

8. Participatory Approaches used in the RRI Roadmap

This part of the methodology describes the two participatory approaches that each NEL may use: The World Café and the Structured Democratic Dialogue.

For the RRI Roadmap milestones 1-4, it is most suitable to use the World Café in order to break the ice among the stakeholders, to motivate, engage and create trust. There are many participatory methods that may be used but for programme development with a high level of stakeholder and public involvement at a local/ regional level with basic IT skills and low facilitation skills, the World Café is one of the most suitable participatory methods⁴⁸ for motivating and engaging the stakeholders.

Depending on the progress made in the NELs during milestones 1-4, the Structured Democratic Dialogue participatory method may be applied or to continue with the World Café participatory method. This can be decided on a need basis with the NEL Leader and the WP2 Leader.

8.1 The World Café Participatory Method

World Café is a participatory method for engaging groups, within organisations and in the public sphere. World Café facilitates multidisciplinary collaboration and connection in today's issues. A world café workshop is founded on the assumption that people have the capacity to collaborate and to share knowledge and experiences no matter who they are. The World Café a powerful dialogue format that connects everyone in the room in a light-hearted manner, yet still facilitating deep conversations into a topic and at the same time allows an easy flow of conversation.

A World Café is based on two principles:

1. people want to talk together about issues that matter to them
2. when they do, they may create collective power for change.

The world café method is simple and easy to apply. It is based on the normative assumption that people already have within them the wisdom and creativity to confront even the most difficult challenges⁴⁹.

The objective of applying the World Café method is mainly to achieve programme development and/or project definition and/or research activity and/or policy formulation.

The level of stakeholder involvement is dialogue, consulting, involving, collaborating, empowering and direct decision. In fact, all of these types of involvement are needed for a successful WEFE-Nexus transition.

A World Café workshop is based on seven design principles⁵⁰, which work iteratively

1. *Set the Context:* The reasons and purpose of the world café, must be clear to all stakeholders. This will allow the right selection of the actors. The questions to be treated during the world café must be pertinent to the reason and the purpose. The NEL-Leader or any of the workshop organizer must advocate for a specific outcome.
2. *Create Hospitable Space:* The physical space of the world café workshop must be hospitable to all participants. The workshop must be held in a neutral place where everyone will feel comfortable, safe and invited. The NEL-Leader must pay extra attention when choosing the location of the workshop. When people feel comfortable, then they become creative and ready to share their knowledge and ideas.

⁴⁸ www.actioncatalogue.eu (last accessed 27/7/2021)

⁴⁹ <http://actioncatalogue.eu/method/7402> (last accessed 27/7/2021)

⁵⁰ [World Café Guidelines](#): Seven Design Principles, The World Café Community Foundation, 2015. Under Creative Commons Attribution

3. *Explore Questions that Matter:* Knowledge emerges when people are given compelling and pertinent questions. The NEL-Leader must spend considerable time formulating the question or questions to be treated during the world café. One question or several questions may be explored depending on the time allocated to the workshop.
4. *Encourage Everyone's Contribution:* It is very important to encourage everyone to contribute their perspective, issues, ideas and knowledge. In a world-café there must be no listeners. The NEL-Leader must ensure that all participants feel equal and there is no rank or gender issue that will inhibit all participants from contributing.
5. *Connect Diverse Perspectives:* Each table has one participant designated as Table Host. The table host does not move from the table, whereas all other participants must move to a new table. As participants move from table to table, they carry with them key ideas and themes to the new table where they exchange new perspectives with other participants coming to the new table. There is no sequence how a participant moves from table to table. Participants choose the table where they move to next as long as the number does not go above five participants per table including the table host.
6. *Listen together for Patterns and Insights:* Participants must listen, as much as, they share their opinion, perspective, idea and insights. Shared listening and paying attention to themes, patterns and insights, a common connection starts to build.
7. *Share Collective Discoveries:* As conversations begin to crystallize ideas on the tables, the last phase of the World Café is the “harvest” where the table host shares with everyone the patterns of insights that have emerged from the table conversation rounds. Then, all participants are asked to reflect on the patterns and themes and perhaps formulate new deeper questions. These patterns and insights are recorded and made available in a common area so that they are accessible and visible to everyone.



Figure 24: World Cafe principles and guidelines. Drawing Credit: Anna Ulanova



For a successful workshop, planning and setting up the context are key. Be prepared to extend the world café session allowing the participants to go into deeper discussions. It takes time to learn from each other, feel comfortable before co-creating.

8.1.1 World Café NEL workshop organisation

The NEL Leader is the Café Host, and she/he shall organize the NEL workshops making sure that the natural setting guidelines are followed. As the Café host, everyone is your guest and hospitality is important.

If the NEL workshop is physically held then:

1. Select a neutral space with natural light if possible that feels welcoming.
2. Prepare the Workshop Invitation and Story based on the Workshops Planning Guidelines.
3. Have small round tables that can seat four-five people. Avoid any other table shape so that people cannot sit at the “head of the table”. Arrange the tables in a random manner and not in rows.
4. All participants must have a seat. Five people per table is the best number to allow personal interaction.
5. On each table, place two large **NEXUS-NESS sheet of paper** (for example flip-over paper).
6. Each table has a container with colourful markers. People will use the markers to write their ideas and connect them on the pieces of paper.
7. Arrange to have a table for the Café host and any presenter’s material.
8. Arrange to have refreshments and snacks. Successful workshops have nice food and drinks to make everyone relax and to mingle.
9. Welcome the participants as they enter the room.
10. Explain the purpose of the workshop.
11. Explain the Café guidelines and Café Etiquette and post them on an overhead, an easel sheet or on cards at each table.
12. Explain how the logistics of the Café will work, including the role of the Table Host (the person who volunteers to remain at the end of a round of conversation and welcome new people for the next round).
13. Encourage everyone to participate.
14. Pose the WEFÉ-Nexus Question for the World Café rounds of conversation and make sure that the question is visible to everyone on an overhead, flip chart or on cards at each table.
15. Move among the tables, to make sure that the tables are following the World Café guidelines.
16. Remind people to note key ideas on the paper on the table before moving to the next table when the round is over.
17. Let people know in a gentle way when it’s time to move and begin a new round of conversation.
18. Make sure key insights are recorded visually or are gathered and posted so that are visible to everyone.

Each table must have a table host. Each table host remains at the table when the other participants leave and welcomes the new participants coming to her/his table to complete the next round of conversation.

The table host briefly shares key insights from the prior conversation so others can link and build using ideas from their respective tables. Gently and as appropriate, the table host encourages people to write down key connections, ideas, discoveries, and deeper questions as they emerge. The table host may change from round to round or stay the same depending on the subject matter of the question and challenge treated.

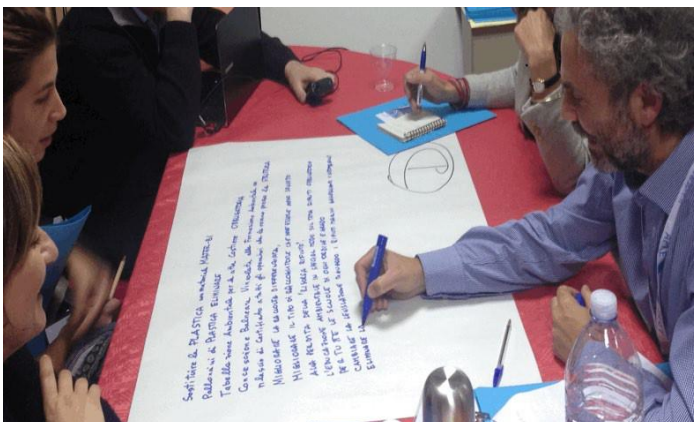


Figure 25: Different forms of recording ideas during a World Café



Figure 26: Presenting a summary of key insights at the end of the last round of a World Café



Figure 27: People vote key ideas at the end of a World Café

List of Materials for a World Café Workshop:

- Round tables (4 or 5 people to a table) and 4 or 5 chairs per table
- 1-2 sheets of **NEXUS-NESS flip chart paper** on each table for participant drawing/notes
- Medium felt tip water-based markers in a variety of darker colors for each table
- Roll of mural paper (for harvesting and posting collective insights)
- Post-it notes blocks. Each table must have a different color.
- Bell or chime to alert participants of timing or to get their attention
- Coffee, tea, water
- Rolling white boards, flip chart tripods or flat wall space for the mural paper or posting table sheets.
- Microphones- portable handheld style

If the NEL workshop is remotely held then:

1. Choose a video conferencing tool such as Zoom or MS Teams, that allows participants to easily switch from a main call into smaller group calls.

2. The World Café participants log in directly via the video conferencing tool to the main room, where the World Café Host will welcome everyone and set the context of the workshop.
3. Take the time to make your Online World Café appealing: your participants should feel comfortable in the online space as well.
4. An online word-café template has been prepared and it must be adapted template to NEL specific World Café setup:
 - a. Add or remove tables or seats according to your number of participants (here ca. 40 - it's recommended to have 4-5 people per table)
 - b. Put your questions for the 3 rounds onto the sticky notes underneath the cover notes labelled "Question Round X" - so you can uncover them later
 - c. Put your participants names in the yellow sticky notes "waiting to be seated" (or let participants put them there themselves)
 - d. You can customize the "tablecloths" - the white sheets on every table and to give more structure by using the "RRI M3-Step 3.1 NEL WEFE-Nexus Grand Challenge Mapping Sheet Template FV NEL-Name.pptx" found in the NEL common drive as shown in Figure 27.



Figure 28: NEXUS Grand Challenge mapping in NELS

Using the "RRI M3-Step 3.1 NEL WEFE-Nexus Grand Challenge Mapping Sheet Template" the participants will start discussing the specific challenge presented by each World Café Host from the four perspectives of WEFE-Nexus. The process of discussion will have **three rounds** during the world café. All table participants will indicate their view and insights on the challenge. At the end of the World Café last round each paper will reveal several discussion issues that will have to be prioritised and treated during the workshop and subsequent NEL workshops. An example showing the discussed subject of "Drought" is shown in Figure 28.

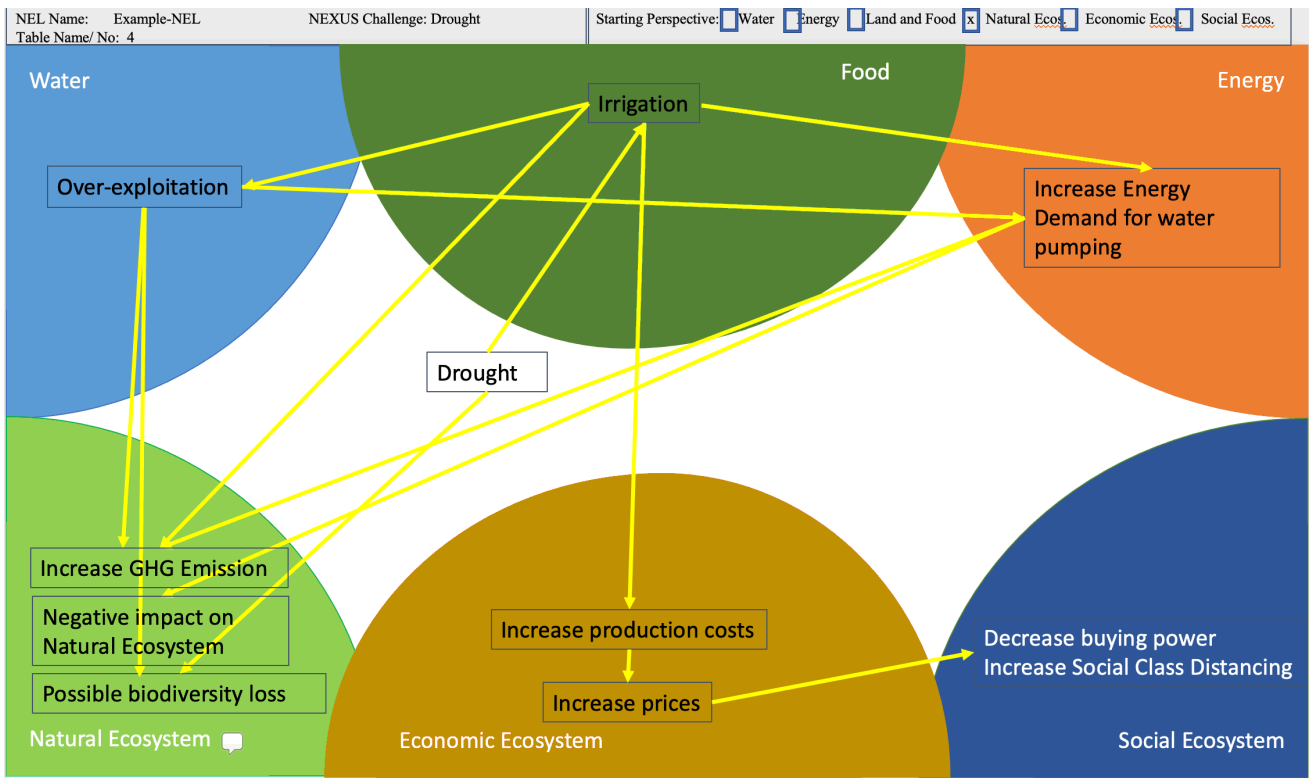


Figure 29: NEXUS Grand Challenge mapping in the NELs: This example shows the effects of drought.

8.2 Stakeholder Ice-Breaker Tool: Spectrogram

Aim of the tool: To break the ice among workshop participants and to discover similarities and differences within a group and get a spectrum of comments on an issue.

When to use it?

At the start of the 1st NEL workshop at the motivation and connection stage of the stakeholders. The Spectrogram exercise is an icebreaker and energizer and at the same time it surfaces similarities and differences in a group of stakeholders. It helps stakeholders to get to know each other fast.

It can also be used later in the WEFE-Nexus transition process to energize the stakeholder group in later workshops.



Figure 30: Human Spectrogram

Picture credit: Wageningen University and Research

How to use it?

In a face-to-face workshop:

- In a human spectrogram, coloured tape is positioned across an open floor to symbolize a spectrogram. On one end of the tape, “strongly agree” is marked on the floor, while the other end is labelled “strongly disagree”. The facilitator shows a statement and participants are asked to position themselves along the spectrogram. Participants can stand in the middle or take in-between positions.
- The facilitator then interviews people along the line to give participants the opportunity to clarify their selected position by first briefly introducing themselves. Participants are welcomed to vividly express their opinion, while listeners can change positions in real-time, whenever their perspective on the topic has changed.
- The NEL-leader observes the process and records how many people changed opinion during the exercise. This feedback will be used by the NEL-Leader to better understand the positions of the stakeholders.


In a remote and hybrid workshop:

- Use the *Stakeholder Spectrogram* found under the NEL common folder to define the questions you wish to ask your stakeholders.
- You can use the meeting tool, provided by your organisation, to display your slides and ask the participants to indicate/ annotate where they stand on the spectrogram. Another possibility is to use the [sli.do tool](#) to help you collect the stakeholders’ feedback and display it. Make sure that you test the tool that you wish to use before the workshop.
- Follow the trainingforchange.org video <https://www.youtube.com/watch?v=iEf7SigQg58> for more ideas how to run it depending on the software you have and the specific needs of the NEL.

Facilitating the spectrogram⁵¹:

1. The facilitator introduces the session and explains the basics:

⁵¹ Adapted from the “Facilitation: Spectrogram Facilitator Notes” of the Aspiration Facilitation wiki!, www.aspirationtech.org (last accessed 13/8/2021)

- “This is an interactive opinion spectrum”: Points to the tape, explains that it represents the full range of opinions on "controversial" matters, from "completely agree" (Point to that end) to "completely disagree" (point to the other end).
 - The facilitator invites all participants to stand up and come close to the line. will be invited to react to statements by standing at the appropriate point on the line for their own opinion
 - All participants take part. No spectators are allowed.
 - Explain that there will be a short demo to clarify the process.
2. The facilitator does the demo:
- Ask the demo team (consisted of the NEL-Leader, the workshops recorder and a couple more from the NEL-leader’s team) to come forward.
 - Push back necessary chairs to make room for people to move on the line.
 - Explain that you are going to make a "very controversial statement", and participants will react.
 - Make the statement and have the demo team move to their positions.
 - Ask each to explain why they are standing where they are standing.
 - Try to keep it light and funny to create a relaxed atmosphere in the room/ meeting.
 - Ask everyone if they now understand the idea.
3. The facilitator gives additional instructions to the participants:
- You should interpret each statement any way you want.
 - When you speak, make exactly one point, not several.
 - Speak to the whole group, not in response to individuals.
 - Please refrain from side conversations, honour the speaker.
 - Please don't interrupt someone speaking to make a counter point.
 - If someone says something that makes you change your thinking, move towards them to indicate that you are evolving your opinion to agree or away if you're disagreeing more.
 - If you want to agree with someone in a silent fashion, then do this sign: 
4. To start the actual session, the facilitator will:
- Invite all stakeholder-participants to stand up and come just behind the line.
 - Remind participants that there are no spectators.
 - Display the spectrogram statement and read it loudly by emphasising each word.
 - Starting at the extremes, ask the participants, one by one at the extremes to clearly state their name and opinion. The workshop recorder writes the name of the participant and his/her statement.
 - Don't let individual participants debate each other too much.
 - Do the second spectrogram, if you have one more statement. Do only two statements and no more.
5. To finish the session, the facilitator will:
- If there are some silent participants, then ask them of their name and opinion.
 - Thank everyone for participating in the human spectrogram and invite them to take their seats.

8.3 Structured Democratic Dialogue Participatory Method

The participatory method of the Structured Democratic Dialogue⁵² (SDD) is suitable for tackling complex multidisciplinary challenges that require multi-sectoral stakeholders. SDD facilitates the co-creation of a common understanding of the different dimensions of the challenge and actions are prioritised depending on their influence over each other.

SDD is a method of discussion and decision making that avoids phenomena such as the "Groupthink" and "Erroneous Priorities Effect". In participatory meetings where no measures are taken to protect the authenticity of all opinions, there is risk that some participants will support views that represent most of the group because they do not want to "go against the group". This results in participants reaching an apparent agreement, which only represents the "most powerful opinion". This phenomenon is known as "Group Think". The SDD method prevents this phenomenon by using the Nominal Group Technique, which requires equal time and equal importance to each idea/ opinion protecting the authenticity of every idea, thus ensuring that the phenomenon "Group Think" does not appear. A complex challenge cannot be solved by solving all individual sub-problems. Instead, it requires exploration and detection of relations among the sub-problems. It is proven that if different stakeholders discuss and propose actions to solve a complex problem, but then choose those actions that the majority sees as important, they are likely to decide to invest in solving sub-problems, which at first seem important (in the eyes of the majority) but they might not be. However, if the same stakeholders were prompted to explore the influence of an action to solve a sub-problem over another action, they may choose different actions. This phenomenon is known as Erroneous Priorities Effect. The SDD method utilizes a so-called Interpretive Structural Modelling, which eliminates the Erroneous Priorities Effect phenomenon, to ensure that the prioritization of ideas is based on the influence they have on each other. The Structured Democratic Dialogue⁵³ method is considered particularly effective in resolving multiple conflicts, interests, and values and to bring the participants closer to agree on a common understanding and strategy for tackling a challenge.

8.3.1 The SDD process steps and method of application in a Nexus-Ness Workshop

The implementation of SDD is performed in 6 steps⁵⁴, where a deeper understanding of the topic is gradually achieved and solutions in the form of actions are co-identified and co-agreed by the participants. Each SDD workshop requires a workshop host, who will be the NEL-leader, an SDD facilitator and an SDD recorder. Both the SDD facilitator and the SDD recorders are trained in facilitating SDD workshops. The number of participants in an SDD workshop must not exceed 20. The ideal number is between 12 and 15 participants.

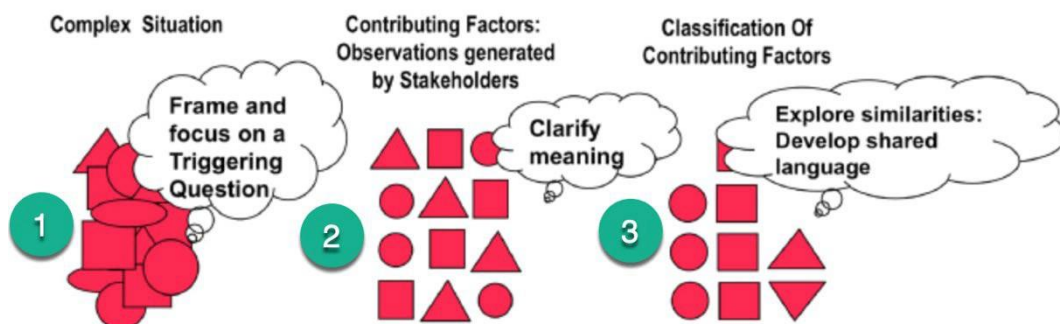


Figure 31: The first 3 steps of the Structured Democratic Dialogue participatory process

⁵² SDD was developed in the 1970s with the initiators Alekos Christakis (Christakis, 1973), John Warfield (Warfield, 1982) and Hasan Özbekhan (Özbekhan, Jantsch & Christakis, 1970).

⁵³ SDD is based on treating complex systems and government (cybernetics) and it has been scientifically documented worldwide (Christakis & Bausch, 2006; Flanagan & Christakis, 2009), (Laouris, 2012).

⁵⁴ Y. Laouris and M. Michaelides, "Structured Democratic Dialogue: An application of a mathematical problem structuring method to facilitate reforms with local authorities in Cyprus", *European Journal of Operational Research*, Volume 268, Issue 3, 1 August 2018, Pages 918-931

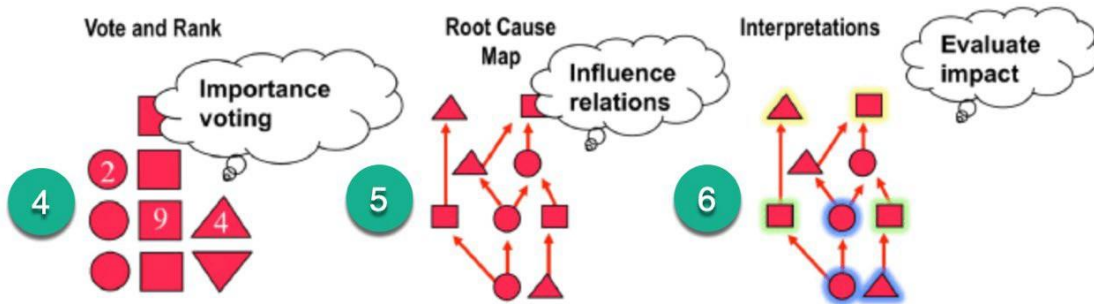


Figure 32: The next 3 steps of the Structured Democratic Dialogue participatory process

Before the start of the Workshop:

1. The complex challenge is described, and a triggering question is defined. In good time before the workshop, the Knowledge Team, which comprises of the Dialogue Host, who is the NEL-Leader, the SDD Facilitator and the SDD Recorder meet to formulate the Challenge and its Triggering Question, which provides an initial frame for the dialogue. The triggering question serves to kindle targeted responses and to assist the facilitator in keeping the dialogue focused. The Triggering Question Template in the NEL Common Drive must be used. **The filled Triggering Question Template must be sent to the WP2 and WP3 leaders for review prior of the workshop.**

The Knowledge Team also examines whether the invited participants meet the requisite variety criterion: i.e., whether they represent a rich spectrum of interests and points of view, which is essential if the consensus to be generated is to be widespread and groupthink is to be tackled.

The workshop takes one or two full days depending on the challenge. The participants must know in advance that are expected for one or two full days. A participant cannot leave and come back in an SDD workshop. If a participant chooses to leave then his/ her ideas will be deleted, because the method does not allow “orphan ideas”.

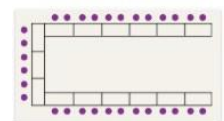
Start of the Workshop:

All participants are sitting in a “U” formation so that they can see each other.

The workshop facilitator stands in the middle of the formation.

The workshop host briefly explains the challenge and the goals of the workshop.

The triggering question is projected so that it is visible to all. The triggering question is not explained to the participants in order not to create bias.



The Workshop begins:

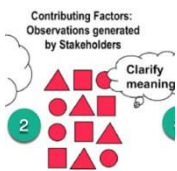
Step 1 and Step 2 have a duration of about 4 hours.



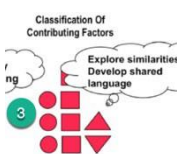
Step 1 Complex Situation: The first step of the dialogue is the generation of observations concerning the challenge in response to the triggering question. The facilitator invites participant in a round-robin manner to contribute one response at a time as a single statement, which should contain only one specific observation. This is important because, when observations are examined for similarity between them or influence on one another, if one statement contains several ideas or is too general, the process is compromised. Giving participants space and time to generate their ideas without criticism from other participants helps to counter groupthink.



Each observation is numbered, and its author is registered by the SDD recorder. The recording of the observation is visible on a screen to all participants.

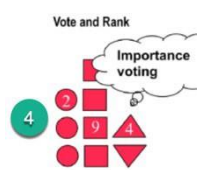


Step 2 Contributing Factors: Once all observations have been collected, the facilitator requests each participant to clarify the idea behind his/her observation. During the clarification process, other participants may ask clarification questions, but no judgment is allowed. This facilitation technique is intended to protect the autonomy and authenticity of participants, so that no participant is discouraged, and no observation is prematurely evaluated and/or rejected.



Step 3 Classification of Contributing Factors: This step involves the categorization of observations into clusters using a bottom-up approach by encouraging discussion among the participants. During this step evolutionary learning takes place as the participants are encouraged to explore how specific aspects of their observations/ ideas might make them similar to other observations/ideas; a process that forces them to draw further distinctions.

The recorder displays on the screen two random participants' ideas. The facilitator asks the participants how these two random ideas may have enough common features to justify placing them in the same cluster (without this cluster yet existing!). This bottom-up process results in evolutionary clusters and participants benefit from an in-depth discussion around the meaning and importance of each idea, enabling the creation of wider consensus regarding the treated challenge. Through this process, participants develop a common vocabulary and a common understanding about the various aspects of the challenge. Through this structured discussion, possible different perceptions are examined, and broad consensus is formed.

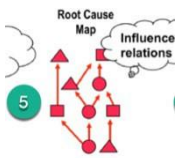


Step 4 Vote and Rank: The participants take a break while all clusters with the ideas are printed and displayed on the wall by the recorder. When the participants come back from their break, the facilitator asks them all to walk towards the wall and discuss among them and agree to give titles to the displayed clusters. This movement creates energy in the room. Then, the facilitator gives to each participant 5 sticky dots, which represent five votes. The participants requested to choose five out of the total set of observations/ideas according to their perceived importance. Their five choices are indicated with the five stickers.



The relative importance of an idea can be understood only when it is compared with the ideas of others (it is rare for people to choose only their own ideas as most important). All the ideas that receive votes (i.e., those that participants consider as the most important) go to the next step, which deals with the Interpretive Structural Modeling (ISM) process. All other ideas without votes are collected and archived at the end of the workshop by the recorder.

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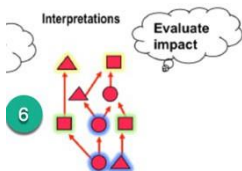


Step 5 Root Cause Map: This step focuses on the Interpretive Structural modeling by

examining two voted observations / ideas at a time. Starting with the ideas that have received the highest votes,

participants are confronted with two observations/ideas at a time. The treatment of the

voted ideas is as follows: two voted ideas are displayed on the screen by the recorder. The facilitator asks all participants collectively to consider how one idea can affect significantly the other idea with the question “If I execute this action/idea will it *significantly* affect the execution of that action/idea?” A discussion takes place among the participants and the participants are asked to vote yes by raising their hands. If the answer is 'yes' with a 75% majority, the impact is recorded and added to the Root Cause Map. When the facilitator asks the participants to vote and the vote is about 50% Yes and 50% No, then the *significance* is discussed in-depth, and the participants are asked to revote. As the exercise progresses the Root Cause Map is formed. The actions at the bottom of the action-roadmap indicate the basic actions that must take place to enable the rest of the actions to be executed. Thus, step 5 encourages stakeholders to prioritize causative factors, which are their observations/ ideas. Meaning and common wisdom and mutual learning are shaped when the participants begin to understand the relationships (such as similarity, priority, influence, etc.) among their different ideas. The Root Cause Map, which is an influence map, reflects the shared understanding and the consensus of the participants. Depending on the workshop time available, the facilitator may choose to treat all votes ideas, even the ones with one vote. Step 5 might require several hours depending on the number of voted observations that need to be treated and the depth of discussion.



Step 6 Interpretations: This step discusses in detail the co-defined Root Cause Map. The observations/ ideas at the bottom of the Root Cause Map correspond to the root causes or actions of the challenge and they are the ones with the greatest influence for tackling the challenge.

Step 7 Co-define actions⁵⁵: The facilitator asks the participants to form teams of three members and to discuss deeper one of the root causes/ actions/ideas at the lowest two or three levels of the Root Cause Map. Each team co-defines specific actions that are SMART (Specific, Measurable, Achievable, Realistic and Time Specific). Each team has 30 minutes. At the end, each team present their co-defined actions to the other participants. Open discussion takes place for improving the co-defined actions. The recorder takes record of all agreed co-defined actions. In this manner, the Root Cause Map becomes into an executable Roadmap because by co-defining the lowest levels it will allow the actions of the higher levels to be consequently executed.



The Workshop ends:

The facilitator thanks all participants and asks them to complete the questionnaire.

After the workshop

Within 4-5 days after the SDD workshop, a report explaining the process is written focusing on all the Root Cause Map results and co-defined actions. This report is sent to all workshop participants with a follow-up schedule.

⁵⁵ This step is not part of the traditional SDD participatory method. It was added by X. Schneider during the MARINA EU-funded process to move beyond causes into co-defining concrete actions for co-creating concrete solutions. The added step was applied to all 45 MARINA workshops with success.

9. *Organising a NEL Workshop*

The NEL-Leader with the support of other partners involved in WP2 will organise the 1st NEL workshop with all the stakeholders identified and mapped. **This workshop will mark the start of the WEFÉ-Nexus transition.**

Organisation of a NEL workshop

Each NEL workshop is pivotal for the success of the NEL and the local WEFÉ-Nexus transition and thus it is important that the NEL-Leader and team invest time in the NEL workshop organisation before, during and after the workshop.

9.1 Preparing a NEL workshop

Each NEL workshop will address the NEL challenge already defined in the NEXUS-NESS project. For more information refer to the Grant Agreement.

Selecting the format of a NEL workshop

Choose the format of your NEL workshop depending on the RRI Milestone and step you are executing:

World Café

Structured Democratic Dialogue

Duration of a NEL workshops

Each NEL workshop will last minimum half a day or one day.

For the first NEL workshop you should plan one day to allow you and all stakeholders to learn to know each other and to allow you to enough time to achieve the necessary results.

For subsequent NEL workshops based on the World Café method the workshop may be shorter.

For workshops using the Structured Democratic Dialogue you need one full day.

Determining a NEL Workshop date

The first NEL workshop must take place at the latest by mid-month M11. This workshop is part of subtask 2.2.2.

The second NEL workshop must take place between months M8 and M15 of the NEXUS-NESS as part of subtask 2.2.3.

Other NEL workshops will take place under WP3, WP4 and WP5. However, these workshops will be organised after the 1st NEL workshop. This is important in order to correctly mobilise, engage and create trust among the multidisciplinary stakeholders.

When setting the date of the NEL workshop, consider community activities that can boost your workshop. Try to avoid conflicts with major school, sports, religious and other community activities and avoid holidays. Weekdays are generally better than weekend sessions. Bear in mind that good planning and preparation may require two months.

Choosing the location

NEXUS-NESS project aims to encourage long-term WEFÉ-Nexus effect through scientific and social learning and mutual mobilisation of researchers, scientists, policy makers, business and industry representatives, farmers, and citizens. Therefore, the location is important because it should encourage open dialogue and mutual learning.

Due to the COVID-19 pandemic carefully consider if the workshop should be face-to-face or remote.

When choosing the location of the workshop, consider the following:

- The room should be large enough to accommodate all participants.
- The room should be neutral and comfortable for all participants.
- A flexible space with extra rooms available is an advantage.
- The facility should be centrally located and easily accessible. An attractive setting is a plus (e.g. a local science centre, a natural history museum...)
- The room should have the required furniture (table, chairs, etc.); sufficient electrical power to accommodate the electronic media, appropriate electric outlets for lights, computers and Internet connections, a cooling/heating system; etc.
- Provide water, tea and coffee for the participants.
- If food is offered, it should be healthy and of good quality.
- Restroom facilities should be available for all genders.

Recruiting participants

Identifying stakeholder representatives and actors, who will be engaged in the NEL workshops, is an important part of the NEL workshop planning process and the key to the overall success of the NELs.

Each NEL-Leader will develop their stakeholder involvement strategy and a recruitment plan according to the criteria and procedures specified in section 7.1.1.2 following the Stakeholder Analysis. It is important that the participants of each workshop are representing all three sectors and types of stakeholders: farmers, representatives of Civil Society Organisations, policy makers, policy implementers, scientists, research organisations, educational organisations, students, industry, local and regional administrations.

It is important that there is a continuity in the participants of the NEL workshops and activities. Moreover, these participants must have sufficient decision power to represent their organisation and to actively participate in the workshops as well as in the subsequent NEL activities. Therefore:

- Based on the Stakeholder Analysis, make a list of stakeholder representatives. Be inclusive and involve participants who cover the whole spectrum of WEF in direct or indirect ways. Don't just reach the usual 'suspects.' Involve both men and women, young and older. Do not exclude opponent groups. Involving them creates ownership and greater commitment.
 - If not already done, communicate with each stakeholder and obtain commitment before the start of the 1st NEL workshop.
 - Contact and invite other potential participants of the NEL workshops by telephone, e-mail, or in person on professional meetings and appointments. Ask them to suggest other stakeholders and link you to them.
 - Do not underestimate the time needed to recruit the participants. Allow 4 weeks of recruitment time especially for the first NEL workshop.
 - Each NEL workshop must have between 18-22 participants.
 - The ratio of participants must be:
 - 25% Farmers and farmer associations, local cooperatives and local leaders
 - 20% Scientists and researchers from all needed sectors water, energy, food, agriculture, environment, biodiversity
 - 25% policy makers and implementers including local and regional authorities representing all above-mentioned sectors.
 - 25% other industry and business representatives.
 - 5% Citizens and others, which must be specified.
 - The recruitment team must ensure that there is gender balance as much as possible aiming at 50% women and 50% men.

Principles of recruiting participants in the NEL workshops and NEL activities

The principles for recruiting participants are the following:

- Unbiased presentation - information on the NEXUS-NESS project, each NEL and NEL workshops will be accurate, balanced, and complete.
- Lack of pressure - The purpose and functioning of the NEL and NEL workshops will be explained to potential participants clearly (with no undue pressure because of the timing) so that they could evaluate their opportunity to participate and to register.
- Respect of person – voluntary participation and informed consent will be the base of recruitment.
- The message of recruitment will include the Informed Consent Form found in the NEXUS-NESS Common Drive that each participant will sign digitally or in handwriting and return to the NEL-Leader. The form will include the explicit intention to participate in the NEL activities and NEL workshops.
- The project does not involve children and young people under 18, who are protected by the data privacy regulations that require parental consent.

Identify inspirational speakers

- Well-chosen inspirational speakers are important to the success of the workshop. Moreover, their presence may motivate and attract participants. Contact the speakers and obtain their commitment.
- Keynote speakers must be briefed. Their speeches must be short of maximum 10-12 minutes, and they must be relating to the WEFE-Nexus challenge of the NEL. Their speeches must be inspirational and promote open and sharing knowledge and information.

Travel and subsistence

Arrangements may need to be made for the following:

- Refreshments and food during the NEL workshop (coffee breaks, lunch);
- Travel arrangements (for inspirational speakers).

Please contact the NEXUS-NESS Coordinator before the workshops to check the eligibility of travel and subsistence costs.

Creating the Invitation

A letter of invitation along with a short presentation of the NEXUS NESS project together with the overall NEL goals and process will be sent to all stakeholders. A standard but adaptable invitation, project presentation and NEL goals will be created by WP6. The NEL-Leaders are expected to use these standard communication tools.

- The topic of the NEL and the goal workshop
- The expected role and contribution of the stakeholder during the workshop.
- Who is hosting the workshop and why.
- The significance of the workshop in the overall WEFE-Nexus concept.
- The Story as an illustrated document or a video or both.
- Information of how to register participation (their name, family name, e-mail, organization, activity sector, interests, etc.),
- Whom to contact in case of questions
- The informed consent form and an explicit intention to participate in the NEL workshop found on the NEXUS-NESS Common Drive
- How to withdraw from the workshop.
- Information that the workshop will be supported by the NEXUS-NESS MSUP platform and that participants are invited to register on the WKSP.
- If the workshop will be held online, then provide how the stakeholders will register, follow and participate in the workshop.

Sending the Invitation

- Before sending the invitation, identify the people in each stakeholder organisation that need to actively participate. These people will be the actors of the NEL, and they must have sufficient decision power in their organisation but also the time to invest in the NEL.
- It may be necessary that you send a written invitation to stakeholders and to be followed by a phone call.
- For some stakeholders, it is sufficient to send the invitation by email.
- It is always beneficial to call and speak with the stakeholders especially the ones that may have high influence on the NEL's work.
- If a stakeholder answers negatively, then ask who else from this organisation may be available to participate.

Promoting the NEL workshop

The promotion of the workshop will begin with the recruitment of the participants. Stakeholder recruitment and promotion methods may differ from NEL to NEL due to cultural and socio-technological differences. The promotion and communication material will be developed in cooperation with the WP6-Leader.

One of the easiest and most effective means of informing and involving the community is through the media and social media. Comprehensive media coverage is one of the keys to success. Promotion may include newspaper and television coverage, radio, advertisements, posters, stakeholder mail-outs, presentations to interested groups, social media announcements and word-of-mouth. Some possibilities for developing public awareness of the event include:

- Contact local, national and regional mass media (newspaper, radio, television)
- Produce and distribute posters and flyers

- Write and publish press releases
- Write and publish articles supporting the NEL workshop and illustrating the hot topic(s)
- Inform organizations and other groups. Make presentations.
- Develop activities that draw attention to the WEFE-Nexus and the NEL goals (e.g. a science show, open- science day, a science picnic, a web photo contest, etc.)

9.2 Carrying out a NEL Workshop

The role of the organising team

The NEL Leader and her/his team will:

- Is responsible for the whole organisation, execution and follow-up of the NEL workshop like with the NEL activities.
- Document all steps of the NEL workshop.
- Prepare all the material for the NEL workshop (invitations, recruitment, workshop material, etc.)
- Assemble and save the supporting material (invitations, videos, posters, documents, etc.) in the NEL common drive.
- Make sure that all results and voting statements are clearly recorded.
- Collect stakeholder feedback statements.
- Record all lessons learned (positive and negative).
- Prepare the report of the NEL Workshop in English to be shared with all WP-Leaders.

The role of the participants

During the NEL workshop participants will:

- Produce a roadmap with proposals of actions to solve the marine and societal challenge(s) related to the hot topic. These proposals should include the dimension of the Responsible Research and Innovation and the contribution it may bring to solving the challenge(s).
- Upload the roadmap on the WKSP with the help of the organiser.
- Assess their needs regarding the functionalities and services provided by the WKSP.
- Commit to the actions listed on the roadmap on a voluntary basis.
- Assess the NEL workshops and the NEL overall process.

The role of the facilitator

The role of the facilitator is essential. Check this role under each specific participatory method as it changes. By facilitating the discussion and activities, they ensure the quality of the results. Some of their tasks may vary depending on the format, the composition of the group, the topic and context. However, in general, the responsibility of a facilitator is to maintain the flow of the proceedings and to keep participants on track and on time.

The facilitator will be flexible, unbiased, empathetic, a good listener and enthusiastic. They will develop a trustful relationship with the participants, be respectful and communicate in a clear and friendly manner.

The facilitator will lead the discussion without dominating it. They will fade into the background as the discussion evolves and participants gain more confidence.

A successful facilitator:

- Listens attentively to each participant.
- Does not give her/his own point of view at any time.
- Seeks to give equal time to all sides of the issue and to all group members.
- Pays attention to see how everyone in the group is doing.
- Encourages everyone to join in the discussion including online participants.
- Helps participants to find common ground. For further discussion.
- Looks for the bright spots (focuses on where and why things are successful).
- Encourages deeper reflection.
- Helps participants prioritize their ideas for action.
- Structures the interactions among participants.
- Clarifies and summarizes both individual opinions and a group position.

Where to find a facilitator:

- Among your staff.
- If you have chosen the SDD participatory method, then the facilitator must be already trained in the method.
- Among science communicators (get in touch with a neighbouring science centre, museum, aquarium or the ECSITE network <http://www.ecsite.eu>).
- Among journalists.
- Among free-lance consultants and advisors.
- By word-of-mouth.

Please contact the NEXUS-NESS coordinator before the workshops to check the eligibility of any facilitation costs.

9.3 Activities after a NEL Workshop

9.3.1 Evaluating the NEL workshop, process, and results

After the workshop the NEL-Leader and organisation team will collect all the results and make them available on the NEXUS-NESS MSUP in the native language and in English.

An evaluation of the workshop preparation, execution and results will be performed by the NEL-Leader and the WP2 Work-package Leader.

The NEL-Leader will complete the reporting forms and templates provided in the NEL Common Drive and uploaded them on the NEXUS-NESS Common Drive and MSUP no later than 15 working days after the workshop is finalised. All reports and schemes will be written in the local language and in English.

All NEXUS-NESS WP-Leaders and task-leaders will consult the workshop results for feedback to the NEXUS-NESS tasks and activities.

9.3.2 Communication and Disseminating the NEL RRI Roadmap Milestones results

The NEL-Leader will dissemination and communicate the results to the actors and their stakeholder organisations. Moreover, the results can be widely communicated at local and regional level.

WP2 and WP6 Leaders will define a detailed communication and dissemination strategy for the NEL RRI Roadmap Milestones results. This strategy will be complemented with communication and dissemination tools that will be made available to the NEL-Leaders.

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