[D5.1] FORESIGHT PROCESS GUIDELINES

IDEALIST

3 INDUSTRIAL ECOSYSTEMS TACKLING SUPPLY CHAINS DISRUPTIONS AND BOOSTING ADVANCED TECHNOLOGIES UPTAKE

DELIVERABLE INFORMATION

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Executive Summary

Funded under the HORIZON-CL4-2023-RESILIENCE-01 call, IDEALIST represents a consortium of 14 partners from across 7 European countries who have come together to enhance the resilience and technological adaptability of SMEs within the European Union.

This deliverable entitled D5.1 Foresight process guidelines is linked to WP5 Beyond Strategic Foresight and discusses the process and outcomes of task T5.1 Foresight needs assessment and toolbox design. The goal of D5.1 was to outline the action plan and a step-by-step methodology for Foresight activities within the IDEALIST project. In addition to that, this deliverable, and final methodology, incorporates lessons learned from Task 5.2. Training the trainers, in which the draft methodology was tested through three editions of a one-day online training session.

1. Introduction

1.1. Project overview

IDEALIST stands for "3 InDustrial Ecosystems tAckLing supply chains dISrupTions and boosting advanced technologies uptake". This ambitious initiative seeks to address the urgent challenges faced by SMEs in the Energy-Intensive Industries, Aerospace & Defence, and Mobility, Transport & Automotive sectors, promoting resilience, sustainable practices, and advanced technological adoption in the face of global disruptions such as the COVID-19 pandemic and geopolitical conflicts.

IDEALIST's core mission is to empower SMEs within these crucial industrial ecosystems to not only anticipate and withstand unexpected global challenges but also to emerge stronger and more competitive. This core part of the project is aimed at identifying supply chain disruptions and opportunities for the uptake of advanced technologies.

The project is composed around the following work packages:

- WP-WP3 Project Management
- WP4 Beyond Matchmaking
- WP5 Beyond Strategic Foresight
- WP6 Beyond Technological Uptake
- WP7 Beyond Supply Chains
- WP8 Beyond Pilot Projects
- WP9-WP10 Beyond Dissemination
- WP11 Beyond Communication

In WP5, in order to increase their organisational resilience, companies targeted by the IDEALIST will be equipped with concrete foresight tools and methodology enabling them to anticipate early signals of change in their strategic environment, to envision impacts of potential disruptions and prepare for future challenges.

The ultimate goal is to empower company representatives to make better-informed decisions by transforming uncertainty into a strategic advantage, enabling them to shape the future. This will be achieved through the development of a step-by-step foresight process methodology, which will be iteratively tested and refined with company representatives throughout the project lifecycle.

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1.2. Scope of work

The tasks associated with the development of a step-by-step foresight process methodology, its testing and implementation within the IDEALIST project to identify supply chain disruptions and opportunities across the three industrial ecosystems - Energy-Intensive Industries, Aerospace & Defence, and Mobility, Transport & Automotive sectors - are taking place within WP5 Beyond Strategic Foresight. WP5 is structured along four main tasks, as follows:

- T5.1. Foresight needs assessment and toolbox design / M1-M6
- T5.2. Training the trainers / M5-M6
- T5.3. Horizon Scanning with the focus groups / M7-M12
- T5.4 Using Horizon Scanning outcomes for decision-making / M13-M36

This deliverable discusses the process and outcomes of task T5.1 Foresight needs assessment and toolbox design, the main output of which is this deliverable D5.1 Foresight process guidelines, a document outlining the action plan and a step-by-step methodology for Foresight activities within the IDEALIST project. In addition to that, this deliverable, and final methodology, incorporates lessons learned from Task 5.2. Training the trainers, in which the draft methodology was tested through three editions of a one-day online training session.

1.3. Goals and target groups

The objective of WP5 Beyond Strategic Foresight is to develop and strengthen the strategic foresight practices of manufacturing SMEs to better identify emerging phenomena, which may potentially disrupt the industrial ecosystems, in which SMEs operate in. It is equally important to reinforce the IDEALIST's clusters organisations' capacity to support SMEs in developing their strategic foresight competences by building methodologies and analytical tools to deal with them.

The goal of this deliverable is to design a detailed methodological process tailored to the needs of 11 clusters (Tab. 1) representing the three ecosystems of the Idealist project, with the goal to implement a learning-by-doing process, which will enhance their future preparedness and resilience.

Table 1. Target groups of IDEALIST project (Source: Authors)

Cluster acronym	Full cluster name	Country
CIMES	Creating Integrated Mechanical Systems	France
COMET	Metal and Mechanical Engineering Cluster of Friuli Venezia Giulia Srl	Italy
EIT Manufacturing	The European Institute of Innovation and Technology - Knowledge and Innovation Community on Manufacturing	France
DITECFER	Distretto per le Tecnologie Ferroviarie	Italy
APPAU	Association Industrial Automation of Ukraine	Ukraine

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ALBATROS	Alliance d'entreprises au Bénéfice des Actions Thématiques De Recherche a Objet Scientifique	France
GKZ	Geokompetenzzentrum Freiberg EV	Germany
POLYMERIS	Pôle de compétitivité dédié aux caoutchoucs, plastiques et composites	France
CAAR	Asociacion Cluster de Automoción de Aragon	Spain
SAC	Silesian Aviation Cluster - Federacja Firm Lotniczych Bielsko	Poland
CCB	Chemie Cluster Bayern Gmbh	Germany
MLK	Moravský Letecký Klastros	Czechia
EURECAT	Fundacio EURECAT	Spain

1.4. Research design

The criteria - taken into account when developing the methodological approach and designing the tools and templates for the participants of the Foresight and Horizon Scanning activities - were the following:

- Applicability of the approach to Horizon Scanning across the value chains of the 3 ecosystems;
- Participatory dimension, which will leverage the power of both individual insights and collective intelligence;
- Usability of the results of Horizon Scanning for strategic and decision-making purposes within a wider group of stakeholders (SMEs);
- Feasibility, scalability and replicability of the HS methodology and tools to other organisational and thematic contexts.

In other words, the main assumptions behind the development of the methodology of Horizon Scanning for the IDEALIST project included three dimensions:

- Dimension 1. Connecting the foresight perspective (Horizon Scanning) with the risk management across the supply chains, to provide a methodology that connects long-term view with the action in the present.
- Dimension 2. Understanding a broader environment and long-term goals within which an industrial cluster operates, to provide a methodology, which is in line with the ambition of each cluster.
- Dimension 3. Understanding operational dynamics and day-to-day activities of the clusters, to provide a methodology, which is usable for each cluster.

In order to develop the HS methodology and tools, which would fully take into account the above criteria, the following steps were undertaken:

- Conducting literature review regarding a.o. the alignment of Horizon Scanning methodologies with the Supply chain risk management methodologies.

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- Conducting interviews with target group representatives (cluster managers and some representatives of cluster membership organisations) to better understand their role in the 3 ecosystems as well as learn more about a strategic and operational landscape, in which each cluster operates.
- Conducting three editions of a one-day online training session, in which the draft methodology was tested with the target groups.

2. Research outcomes

A summary of the key lessons learned from the literature review, the interviews and training sessions is presented below and in chapter 3.

2.1. Key takeaways from the literature

When developing the Foresight process model and Horizon Scanning guidelines the analysis of alignment of Horizon Scanning methodologies with the Supply chain risk management methodologies was carried out. Key takeaways from the analysis are the following.

Takeaway 1. Risk management increases resilience

Supply chain risk management enhances resilience by identifying, assessing, and mitigating potential threats. This process helps companies prepare for uncertainties and adapt to changing environments. Effective risk management fosters a proactive culture, enabling organizations to respond quickly to disruptions and maintain operational stability.

Takeaway 2. Risk management has both advantages and shortcomings (Tab. 2).

Table 2. Benefits and shortcomings of supply chain risk management approaches (Source: Authors)

Benefits of Supply chain risk management	**Shortcomings of Supply chain risk management**
Proactive mitigation: Allows for early identification and mitigation of known risks, reducing the impact of disruptions. Enhanced visibility: Provides a comprehensive view of potential risks across the supply chain. Improved decision-making: Informed decisions can be made based on known risk assessments and data analysis. Increased operational efficiency: Ensures that supply chain processes are optimized and resilient to known disruptions. Regulatory compliance: Helps in meeting regulatory requirements and standards.	Inadequate coverage: Some risks may be overlooked, especially emerging or unforeseen threats. Missing out on opportunities: the approach is designed to exclusively look for risks and negative disruptions; future opportunities simply won't be mapped. High resource requirements and complexity in integration: Implementing SCRM across all levels of the supply chain can be costly, time-consuming and very challenging. Dependence on accurate data: Effective SCRM relies on the availability and accuracy of data, which can sometimes be lacking.

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Takeaway 3. Foresight and horizon scanning enable to address shortcomings of supply chain risk management by:

- Mapping uncertainty: Identifying and understanding emerging trends and potential disruptions, offering a broader perspective on future risks.
- Proactive planning: Enabling organizations to prepare for various future scenarios, ensuring readiness for different possible events.
- Adaptive strategies: Facilitating flexible and dynamic strategies and action plans that can adapt to changing conditions.
- Stakeholder engagement: By involving diverse stakeholders, foresight and horizon scanning ensure comprehensive risk mapping, assessment and contingency planning.
- Early warning systems: These techniques act as early warning systems, alerting companies to weak signals and emerging risks before they become critical.

An overall conclusion was that Foresight and Horizon Scanning help in anticipating changes and integrating this knowledge into traditional risk management frameworks, making organizations more resilient to future challenges. By integrating foresight methods and horizon scanning activities, companies can address gaps in traditional risk management, ensuring a comprehensive approach to navigating uncertainties and leveraging opportunities.

2.2. Synthesis of interviews

Twelve interviews (45-60-minutes long) were conducted online with representatives of 11 industrial clusters, 2 clusters provided their answers in a written form. Each interview was structured along the following key topics[3]:

- Cluster profile - basic information,
- Understanding operational and strategic landscape of a cluster,
- Advanced Technologies and Supply Chains (Disruptions),
- Current strategic planning and risk management practices,
- Challenges, development barriers, resilience.

Through the interviews knowledge was collected about the potential and challenges of the industry the cluster serves, the presence and strengths of competition, the policy environment relevant to the cluster's activities, the technological advancements and emerging technologies that could impact the industry and the cluster's competitiveness; as well as sustainability concerns regarding the need to adopt environmentally and socially responsible practices. Similarly, the analysis of an operational landscape, that is the day-to-day activities and internal dynamics of the clusters was carried out in order to get an understanding of the supply chain, and the value proposition of the clusters.

Table 3 presents key takeaways from the interviews. Each takeaway is transformed into a specific methodological recommendation for the IDEALIST's Foresight and Horizon scanning process.

[3] A full set of questions is presented in the annex.

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Table 3. Key takeaways from interviews with methodological recommendations (Source: Authors)

Current gaps and observations	Recommendations for Foresight and Horizon scanning process
Strategic planning and visioning are not implemented in clusters on a regular basis. When implemented, they often lack participation, are siloed, do not rely on foresight methods, and focus on short-term goals.	Establish a cyclical, participatory strategic planning process that integrates a variety of foresight methods. This approach should not only focus on short-term challenges but also explore longer-term trends and potential disruptions. It should involve all stakeholders (including SMEs, large enterprises, research institutions, and policymakers) to ensure holistic and inclusive perspectives. Stakeholder engagement modalities should include transdisciplinary and transnational cooperation.
Clusters list the importance of the following key drivers and challenges: circularity and resource scarcity, global competition, supply chain transparency, labour shortages and skills gaps, access to funding and research, upskilling & reskilling, leveraging on advanced technologies.	Adopt foresight methods such as drivers and trend analysis, horizon scanning, weak signal analysis. These tools should be introduced to cluster members and used by them regularly to identify emerging phenomena across a number of key drivers shaping the future of the ecosystems in which clusters operate. Cluster members should be able to identify, analyse, assess, make sense and draw strategic conclusions from a number of drivers, trends and emerging signals: economic, environmental, technological, societal, geopolitical etc. Cluster members should be able to prioritise key emerging phenomena, anticipate the many types of impacts these might have on their organisational strategies or supply chain management allowing clusters to imagine a number of strategic options and thus respond to disruptions more effectively.
Focus on technological agility, not just advancement. This means being able to quickly adapt to changing external conditions, make informed decisions, and adjust strategies as needed.	Clusters should invest in training and development programs to enhance the strategic management capabilities of their members. More specifically, cluster members should develop agility by enhancing their future-oriented decision-making, strategic planning, and uncertainty management processes. The training and Horizon scanning process of IDEALIST project should engage a diverse pool of representatives of industrial clusters to build lacking expertise and competences across a number of organisations.
Time constraints: the limited availability of company managers for regular meetings and training.	This constraint has significant implications for the methodological design of the IDEALIST's process, such as: shortening IDEALIST's training from 2.5 to 1 day long activity; ensuring flexible delivery formats (online and offline, individual and collective assignments); focusing on the most essential information and skills, eliminating unnecessary details: incorporating engaging activities, discussions to maximize learning in a short amount of time.

3. Foresight process guidelines

The elements of the IDEALIST's Foresight process guidelines - described in more detail in this section of the deliverable - are the following: key theoretical concepts and methodological process design.

3.1. Key theoretical concepts

The methodology of IDEALIST's Foresight process is based on the Futures Studies theory and takes into account assumptions of the EU's 2020 Industrial Strategy. The key theoretical

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concepts that underpin the methodological approach consists of: Futures Literacy, Foresight, Horizon scanning and the Industrial ecosystems approach.

3.1.1. Futures Literacy

According to UNESCO, Futures Literacy is an important 21st Century skill that can be nurtured and learned. Futures Literacy is not the ability to predict the future, instead, it refers to the capacity to diversify why and how we use futures. By futures we mean the ideas, images, conceptions and feelings we have about a time later than now (Richards et al 2020).

Futures Literacy calls for (Miller 2019):

- being conscious when we use futures;
- being reflective about the futures we use (our ideas, images, conceptions and sentiments about the future); and
- being able to switch between different types of futures (e.g. probable, desirable, strange, transformative etc).

Futures Literacy can be enhanced in the methodological process, known as Foresight, which brings together action learning, collective intelligence processes and cognitive reframing, which together constitute the skill of Futures Literacy (Fig. 1).

Summing up, a futures literate person can answer the question: "What is the possible future and how do I use it?" and has acquired the skills needed to decide why and how to introduce the non-existent future into the present decision-making.

The ambition of the IDEALIST project is to enhance Futures Literacy of manufacturing SMEs representing 11 clusters by offering a learning-by-doing and participatory Foresight process, which will be tailored to the needs of 3 industrial ecosystems addressed by IDEALIST.

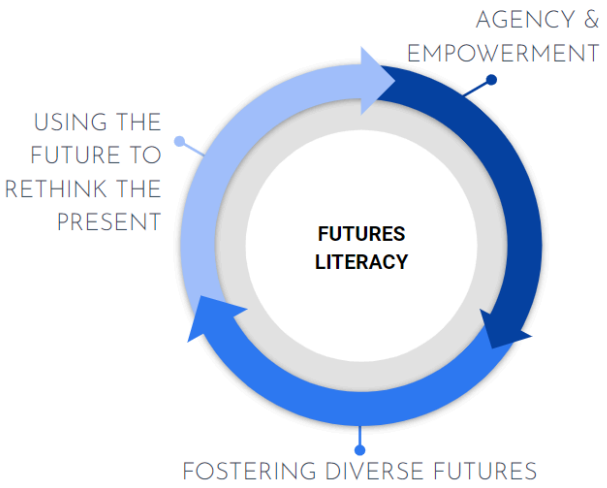

Fig. 1. Futures Literacy skill-set
Source: Authors based on Miller (2019)

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3.1.2. Foresight

Foresight encompasses a spectrum of approaches, strategies, tools, and methodologies that assist organisations in actively examining, shaping, and navigating the future. This involves grasping key factors driving change, envisioning potential future scenarios, and assessing how these changes might impact specific businesses, projects, or contexts. The aim of foresight activities isn't to predict the future with absolute certainty, but rather to facilitate the exploration of plausible future scenarios, drawing on current trends, emerging signals of change, and trajectories.

Foresight employs a diverse array of techniques, spanning from imaginative methods like wildcards or speculative fiction to evidence-based practices such as modelling and bibliometrics. These methods can range from expert-driven approaches, like technology roadmapping and Delphi surveys, to highly interactive or participatory methods like brainstorming and prototyping.
Many of these techniques have roots in disciplines such as social psychology, scientific management, systems theory, probability, and game theory.

In the IDEALIST project, foresight serves as a process that enhances persons' or organisations' abilities to understand all the internal and external factors and alternative decisions that form the space of possible, plausible, probable or preferred futures paths. Thanks to such knowledge, IDEALIST's target groups (SMEs) will be able to identify issues that are of major importance for the future and the present, they have a better understanding of what is relevant and what can be ignored, and they are better informed to make strategic and visionary decisions facilitating their long-term plans and objectives.

3.1.3. Horizon scanning

Horizon scanning supports the process of building organisational resilience and is one part of a suite of tools which can help practitioners understand and prepare for future disruptions, both risks and opportunities.
Thoughtful Horizon scanning is the foundation of foresight (Fig.2.). It involves a structured approach to identifying early indications of potentially significant developments. These may manifest as signals of new, emerging trends, unexpected events (wild cards), or persistent issues and risks, including factors that challenge established assumptions.

Horizon Scanning can either be broad and exploratory, or focused and targeted based on the specific goals of projects or tasks. Its objective is to discern what remains stable, what might evolve, and what is in a state of continual flux within the timeframe being examined. Various criteria are applied during the process of searching and filtering information. The timeframe for analysis can range from short- to long-term perspectives.

In the IDEALIST project Horizon scanning serves as the main method to identify developments that could fundamentally change or disrupt the three industrial ecosystems in unexpected ways.

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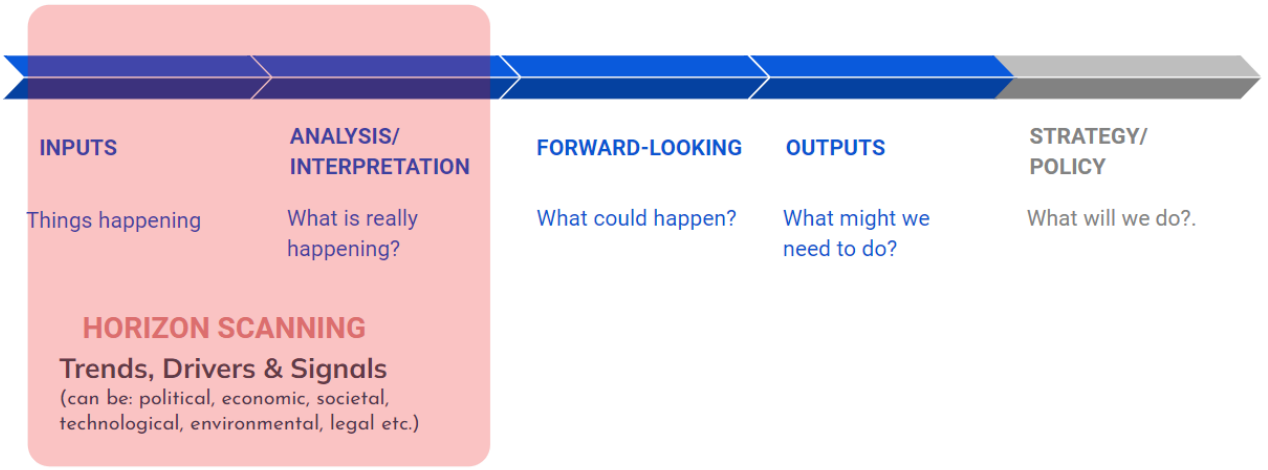

Fig. 2. Generic Foresight framework
Source: Authors based on Voros (2003)

The expected output of the Horizon Scanning process within the IDEALIST project is linked to the main objective, which is to increase resilience of supply-chains addressed by the project. Therefore, the consortium defines resilience as follows: Supply chain resilience refers to the ability of a supply chain to prepare for, respond to, and recover from unexpected disruptions or events while maintaining continuous operations and fulfilling customer demands. It involves having the flexibility and adaptability to adjust to changing circumstances, mitigate risks, and ensure the flow of goods, services, and information throughout the supply chain network (Betz 2023).

3.1.4. Industrial ecosystems approach

Industrial ecosystems encompass all players involved in the achievement of a certain socio economic goal: from the smallest start-ups and the largest companies cooperating to satisfy a new market need, the research activities supporting industrial innovation, the regulators steering economic activity through conducive policies, to the services providers and suppliers. While each ecosystem has its own characteristics, they all evolve against the same background: an integrated Single Market. The ecosystem lens enables a bottom-up analysis of, and exchange on, the opportunities and challenges in the EU economy as the EU embarks on the twin green and digital transition, as well as on boosting its resilience (Annual Single Market Report (2021).

There are 14 key industrial ecosystems spanning across the EU that were singled out based on their economic and technological relevance, and for their expected contribution to the decarbonisation, digitalisation and resilience of the EU economy (ibid.). They represent approximately 70% of the EU economy and 80% of the business economy (as a share of value added). These 14 industrial ecosystems are: 1. Aerospace and Defence 2. Agri-food 3. Construction 4. Cultural and Creative Industries 5. Digital 6. Electronics 7. Energy Intensive Industries 8. Energy-Renewables 9. Health 10. Mobility-Transport-Automotive 11. Proximity, Social Economy and Civil Security 12. Retail 13. Textiles 14. Tourism.

IDEALIST project activities related to Foresight and Horizon Scanning focus on three industrial ecosystems characterised in the table below.

Table 4. General characteristics of the three industrial ecosystems targeted by IDEALIST project

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Ecosystem	Employment	EU value added	Number of companies
Aerospace and Defence	3.92 million people (direct employment)	1.99% of EU value added (EUR 241 billion)	3.2 million firms 99% of SMEs
Mobility – Transport – Automotive	14.6 million people (at least 16 million including indirect jobs)	7.5% of EU value added (EUR 906 billion)	1.8 million firms 99.7% of SMEs
Energy-Intensive Industries	7.8 million people	4.55% of EU value added (EUR 549 billion)	548,000 firms 99.4% of SMEs

Source: Authors based on Annual Single Market Report (2021)
https://commission.europa.eu/system/files/2021-05/swd-annual-single-market-report-2021_en.pdf

Technology generating industrial ecosystems:

- **The Aerospace and Defence** ecosystem covers manufacturing companies in aeronautics, space, and defence; space operators and data and service providers; research institutes.
- **The Mobility – Transport – Automotive** ecosystem covers automotive, rail and waterborne. It is characterised by a long and complex supply chain. The ecosystem is dominated by a few players that became global players.

Technology uptake-oriented industries:

- **The Energy-Intensive Industries (EIIs)** ecosystem covers chemicals, Steel, Paper, Plastics, Mining, extraction and quarrying, Refineries, Cement, Wood, Rubber, Nonferrous metals, Glass, Ceramics. They supply intermediate products to each other and to many downstream sectors of the economy, are closely integrated with energy providers as well as with the waste and recycling industries due to their need for secondary raw materials.

3.2. Foresight Process Design

3.2.1. Methodological assumptions

The key methodological assumptions of the IDEALIST Foresight process stemming from the project proposal were the following:

- Three industrial ecosystems are main topics of the IDEALIST's Foresight activities;
- Representatives of 11 clusters - project partner organisations - are the main target groups, who will participate in the Foresight process;
- Overall, 150 SMEs should participate in the Foresight process;
- Foresighting lasts three years, throughout the lifetime of IDEALIST project;
- In the first year of the IDEALIST project maps of key drivers of all three industrial ecosystems should be developed as a result of participatory Horizon scanning with the involvement of 11 clusters' representatives;
- In the second and third year of the IDEALIST project maps of drivers should be discussed with a large group of SMEs from the 11 clusters, who should be advised on how to use the results of Horizon scanning in their decision-making processes;
- The draft methodology of Horizon scanning should be tested with cluster representatives in the form of an online training session;

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- The final methodology of Horizon scanning should take into account lessons learned from the literature review, from the interviews with cluster representatives and from the training with cluster member representatives where pilot implementation of the Horizon scanning process should take place.

3.2.2. Foresight Process model

Foresight process model developed to address the needs of the IDEALIST project's target groups encompasses the following main phases:

- Pre-Horizon Scanning: Identifying, engaging and training participants,
- Launching Phase 1 of Horizon Scanning: Developing maps of drivers,
- Launching Phase 2 of Horizon Scanning: Communicating maps of drivers and using insights in decision making.

The subsequent phases of the process are presented in more detail in figure 3.

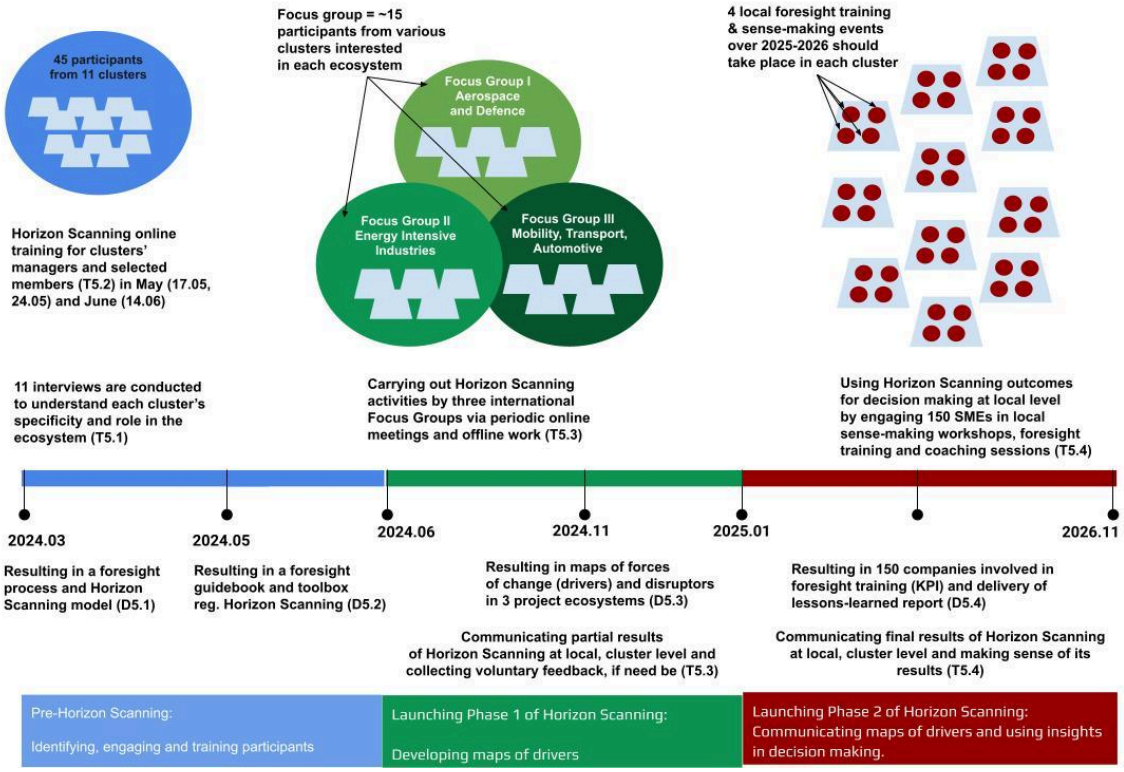

Fig. 3. IDEALIST's Foresight Process Model
Source: Authors

In the following sub-chapters, a detailed description of the main phases of the process are described.

3.2.2.1. Identifying participants

The main target group of the Foresight and Horizon Scanning process of IDEALIST includes the representatives of the 11 industrial clusters and associations.

Three international, cross-cluster focus groups, each implementing the Horizon Scanning process exclusively in its ecosystem need to be activated with the goal to « explore the future » via Foresight and Horizon Scanning. Each Focus Group will be composed of up to 15 permanent

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representatives of selected organisations among clusters' members, mainly SMEs. During the meetings of the Focus Groups, a series of foresight tools will be introduced and activities such as disruptions and driver mapping, horizon scanning, and trend analysis will be carried out.

All in all, three focus groups - one for each of the EII, A&D and MTA ecosystems - a total of about 45 people will be created. If there are clusters that identify themselves as operating in more than one ecosystem, there are no obstacles to such a cluster proposing representatives to more than one Focus Group. A focus groups' composition is shown in the figure below.

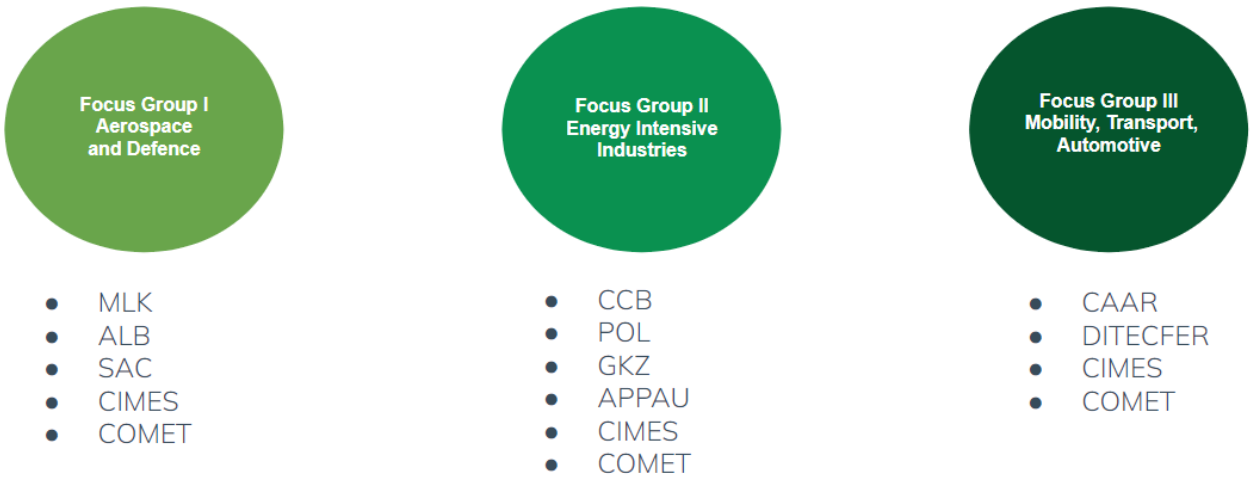

Fig. 4. Focus groups' composition
Source: Authors

In general, Foresight and Horizon Scanning activities are meant for individuals who:

- are responsible for any of the following: strategic & technology management; market analysis; innovation management; research planning; technology & innovation policy planning;
- are experts in Advanced Technologies (AT) and supply chains' functioning of a given ecosystem;
- are curious and would like to expand knowledge of trends, drivers and disruptions of a given ecosystem;
- have a good command of English;
- are available for periodic online meetings and for offline work.

In terms of professional roles, the participants ideally would be:

- cluster management team representatives,
- representatives of SMEs from a given cluster:
- strategists (willing to update their strategies and discuss vulnerabilities),
- C-level representatives of SMEs (including company owners), if they are willing to get involved in foresight adventure and declare their availability in this respect,
- innovation designers (product, process, organizational innovators)
- leaders of R&D projects,
- risk managers.
- representatives of research institutions from a given cluster,

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- representatives of local, regional policymakers from a given cluster.

3.2.2.2. Training of participants

Three training sessions were delivered on 17 and 24 May and on 14 June 2024. Overall, the evaluation of the training was positive. Among the trainees were representatives of SMEs from all three ecosystems of the Idealist project.

- The training on 17 May was attended by 21 participants consisted of 13 representatives of Aerospace & Defence, 4 representatives of Energy-intensive Industries, 4 representatives of Mobility, Transport, Automotive.
- The training on 24 May was attended by 10 participants consisted of 6 representatives of Aerospace & Defence, 4 representatives of Energy-intensive Industries, 0 representatives of Mobility, Transport, Automotive.
- The training on 14 June was attended by 11 participants consisted of 7 representatives of Energy-intensive Industries, and 4 representatives of Mobility, Transport, Automotive.

Conducting three editions of the training session allowed for iterative refinement of the draft methodology. The first edition served as an initial test, gathering feedback from facilitators and trainees. The second edition incorporated that feedback, improving the methodology's effectiveness. The third edition served as a final validation, confirming the methodology's readiness for wider implementation after incorporating refinements from the second edition.

Some modifications and improvements of the materials and methodology concerned: the delivery of more precise definitions and examples of key notions (such as trends, drivers and signals), it resulted in a more comprehensive theoretical introduction to the key topics, in the division of the work into more modules, in a more precise instructions to exercises or in the change of the signals' assessment scale range (replacing -0.1: +0.1 with -1; +1). This approach ensured a robust, user-centric methodology that would meet the needs of the target groups.

Overall, a total of 42 participants took part in the training, of which 19 belong to the Aerospace & Defence ecosystem, 15 Energy-intensive Industries and 8 to Mobility, Transport, Automotive. However, since the distribution of the participants across the industrial ecosystems should be more or less even, there is still room to involve more representatives of the Mobility, Transport, Automotive industrial cluster in the Horizon scanning activities in year 1 of the project.

3.3. Launching Horizon Scanning - Phase 1: Developing maps of drivers

3.3.1. Organisation of work in 2024

3.3.1.1. Rationale

In the turbulent VUCA world, where volatility, uncertainty, complexity, and ambiguity are the norm, resilient supply chains are not just desirable, but essential. Building resilience requires a proactive approach, utilizing foresight and horizon scanning to identify early signals of change and potential disruptions. In the absence of data, mapping signals are the evidence that disruptive change could be underway. By constantly scanning the horizon for emerging trends, geopolitical

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shifts, technological advancements, and other potential disruptors, businesses can anticipate and mitigate risks before they escalate. This allows for agile adaptation and the development of flexible strategies, ensuring the continuity and robustness of supply chains even in the face of unexpected challenges. Early signal detection and a forward-looking approach are key to not only surviving but thriving in the unpredictable landscape of today's global marketplace.

3.3.1.2. Expected outcomes

The expected outcome of Phase 1 of the Horizon Scanning process is an increased understanding of the forces of change that are shaping local industrial ecosystems, discerning critical or highly influential drivers from less influential ones, ultimately leading to a map of drivers and disruptors in three industrial ecosystems: energy-intensive industries, aerospace and defence, and mobility, transport & automotive.

The key challenge, which will be addressed in Phase 1 is to look for early signs of new or signals that change is occurring. Some of the changes, which will be mapped include:

- new scientific or technological breakthroughs
- new intellectual ideas,
- changing societal or cultural practices,
- new business models,
- changing regulations, norms,
- changing consumption behaviours
- and more

3.3.1.3. Participants and timeline

First phase of Horizon Scanning will be carried out by three international Focus Groups resembling the IDEALIST's industrial ecosystems; who will work under the supervision of 4CF, the coordinating institution of WP5. Each Focus Group will be composed of approx. 15 individuals coming from the IDEALIST's industrial clusters.

It is envisaged that each Focus Group participant will devote a maximum of 4 working days in total for Horizon Scanning work over May-November 2024:

- 2.5 WDs (this is approx. 0.5 WD / approx. once a month) - periodic meetings (online) July - August - September - October - November;
- 0.5-1.5 WDs throughout July - November - offline activities (individual reading, online survey).

3.3.1.4. Methods and tools

There are many different ways of setting up the Horizon scanning process, which can be organised in a highly structured manner or in an informal way. In IDEALIST project the methodological process of Horizon Scanning (Phases 1 & 2) consists of the following steps:

1. Scanning and collecting data: collect relevant information about the external environment
2. Interpretation and filtering: analyse, organise and prioritise the findings
3. Sense-making
4. Communicating the results
5. Using the information in decision-making

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Steps 1-3 take place in the first Phase of Horizon Scanning.

This guideline document outlines specific methods, which were selected for the IDEALIST's Horizon Scanning process, while detailed description of the methods, instructions and templates are provided in Deliverable D5.2. Foresight Toolbox.

Table 5. Methods recommended for the IDEALIST's Phase 1 of Horizon Scanning process (Source: Authors)

What method	Rip van Winkle	Desk research	Survey	Consultations
How	Collecting inputs from people who are affected by the future under study in the form of "yes/no" questions via a survey or during a facilitated workshop	Manual scan of relevant sources: websites, recent academic and popular press publications, social media feeds etc.	Collecting inputs from people who are affected by the future under study regarding emerging signals (results of desk research)	Focus group discussions, workshops and participatory foresight sessions, including people who are affected by the future under study
Why	To outline the most uncertain and vulnerable elements of the analysed system To reduce biases in our future thinking	To collect information from a wide range of different sources	To analyse and organise the findings	To interpret and prioritise the findings To validate & make sense of the findings
When	Scanning and collecting data	Scanning and collecting data	Interpretation and filtering	Interpretation and filtering Sense-making

Source: Authors based on Horizon Scan User Manual (2023)

3.4. Launching Horizon Scanning - Phase 2: Communicating maps of drivers and using insights in decision making

3.4.1. Organisation of work in 2025-2026

3.4.1.1. Rationale

To maximise the impact and relevance of the Horizon Scanning's first phase findings, it is crucial to disseminate them to a wider audience of stakeholders; especially SMEs. By understanding the external landscape of their ecosystems and the foresight tools available, they will be able to enhance their resilience in the face of the VUCA world. This strategic dissemination aligns with the project's overarching goal of enhancing industrial and local cluster members with strategic foresight and Futures Literacy skills and fostering proactive and adaptable industrial ecosystems.

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This phase of Horizon Scanning will be implemented through a series of periodic activities in year 2 and year 3, ensuring continuous target groups' engagement and knowledge transfer for sustained resilience.

3.4.1.2. Expected outcomes

The expected outcomes of the second phase of Horizon Scanning consist of:

- Increased awareness of the potential future disruptors in the three industrial ecosystems of IDEALIST project among the project's target groups,
- Dissemination of the IDEALIST's Foresight toolbox among 150 SMEs and showcasing its usability in planning and strategizing activities,
- Increased Futures Literacy and future preparedness of SMEs.

3.4.1.3. Participants and timeline

Second phase of Horizon Scanning will involve a wider group of stakeholders - representatives of 11 industrial clusters. Each cluster will organise local meetings twice a year to discuss the results of the Phase 1 of Horizon Scanning and to brainstorm the implications of these on a local level for traditional & tech savvy SMEs. Draft topics of the meetings are as follows:

- Meeting 1. Validation workshop (2025): Communicating the results of Horizon Scanning to cluster members and replicating a part of the HS process with them to identify additional signals.
- Meeting 2 Strategizing workshop (2025): Making sense of the identified signals by translating their potential implications at organisational level; drawing a list of recommendations.
- Meeting 3 (2026): Individual foresight coaching sessions for SMEs; foresight needs assessment, Futures Literacy Assessment, Foresight Toolbox walk through.
- Meeting 4 (2026): Individual foresight coaching sessions for SMEs; foresight needs assessment, Futures Literacy Assessment, Foresight Toolbox walk through.

3.4.1.4. Methods and tools

Phase 2 of the IDEALIST's Horizon Scanning consists of the following steps and methods (Tab. 6):

4. Sense-making
5. Communicating the results
6. Using the information in decision-making

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Table 6. Methods recommended for the IDEALIST's Phase 2 of Horizon Scanning process (Source: Authors)

What method	**SAnSE Survey for Anticipatory Stance Evolution**	**Validation workshop**	**Strategizing workshop**	**Consultations**
How	Inviting people who are affected by the future under study to evaluate (via online survey) their Futures Literacy before and after taking part in any foresight activity	Inviting people who are affected by the future under study (particularly SMEs from 11 IDEALIST's clusters) to an online working meeting	Inviting people who are affected by the future under study (particularly SMEs from 11 IDEALIST's clusters) to an online working meeting	Inviting SMEs (members of IDEALIST's clusters) to foresight coaching sessions
Why	To capture change in individuals' perceptions about the future as a result of participation in any activity which is supposed to enhance one's futures literacy/future thinking	To communicate the findings of the Phase 1 of HS with a wide pool of stakeholders, to discuss the potential consequences of the signals collected, as well as discover if any relevant emerging issues are missing	To communicate the findings of the Phase 1 of HS with a wide pool of stakeholders and to showcase how they can be used in the company planning & strategizing activities	To analyse organisational foresight needs To establish ways of collaboration after the project ends
		To give a walk through the IDEALIST Foresight Toolbox		
When	Periodically during Phase 2 of Horizon Scanning	Sense-making Communicating the results	Communicating the results Using the information in decision-making	In the last stage of the Horizon Scanning

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5. Annexes

5.1. Needs analysis survey

Cluster profile - basic information

1. Cluster name:
2. What is the cluster's main ecosystem?
3. Does the cluster operate in any other areas besides the one mentioned above?
4. How many companies are members of the cluster? How many of them are SMEs?

Understanding operational and strategic landscape of a cluster

1. Tell us about the companies in your cluster, their business models and the key values they generate in the context of a particular industrial ecosystem?
2. Can you identify which SMEs in your cluster are traditional and which are tech-savvy and why? Could you indicate the criteria and justification for such a division?
3. Do the SMEs in your cluster work together? In what way? What interdependencies, mutual relationships, forms of collaboration and value exchange systems exist in the cluster?

Advanced Technologies and Supply Chains (Disruptions)

1. What advanced technologies used and produced in your industrial ecosystem do you consider the most important or disruptive?
2. What advanced technologies used and produced in your cluster do you consider the most important or disruptive?
3. Could you describe your cluster's supply chain in as much detail as possible (e.g. process, parts, and finished products)? Could you share with us any visualisation (supporting material) depicting the supply chain?
4. At what level (which tier) of the supply chain do the SMEs in your cluster operate?
5. What critical raw materials and components are used by the companies in your cluster?
6. Could you identify alternative sources of critical raw materials used in your cluster?
7. What key drivers of change and trends do you observe in your cluster?

Current strategic planning and risk management practices

1. Do you synchronize or consult your strategic planning and risk management within the cluster? What methods and collaborative working tools do you use for this? What do you consider good practices in strategic planning in your cluster?

Future(s) projections: the industrial ecosystem and the cluster

1. How do you imagine the future of your industrial ecosystem in 2035? What key drivers can shape or radically change your ecosystem? Think, for example, about potential political, economic, social, environmental, legal and ethical factors.
2. How do you envision the desirable future of your cluster 11 years from now in 2035? What role will it play in its industrial ecosystem? What will make it stand out and be its defining characteristic?

Challenges, development barriers, resilience

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1. What are the key barriers hindering the development of SMEs within your cluster? How can these barriers be overcome?
2. What challenges has your cluster faced (e.g., post-COVID and due to current geopolitical circumstances), and what challenges do you foresee emerging in the coming years?
3. What could provide resilience to the companies in your cluster? Considering various unpredictable events that could impact your cluster, how can it be made more resilient to survive difficult times and use them as an opportunity?

5.2. Training evaluation form

IDEALIST Horizon Scanning Training Evaluation Form

This questionnaire is addressed to the participants in the Horizon Scanning Training of IDEALIST project, taking place on 14th of June, 2024.

The questionnaire seeks feedback from training participants to evaluate the organization, management, as well as performing the quality assurance of the session and serving as means of improvement of the following training sessions and the overall Horizon Scanning methodology.

To ensure achieving all the objectives, we respectfully request your comments and suggestions. Candid and honest feedback from all attendees is crucial for identifying key aspects to address/improve.

Your responses will be confidential. There will be no collection of identifying information such as your name, email address or IP address or any other sensitive data.

Thank you all for your cooperation!

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Horizon Scanning Training

- **Ambition:** The ambition of Horizon Scanning work is to increase organisational resilience of entities operating in three industrial ecosystems of the IDEALIST project by providing them with unique tools and knowledge on key factors shaping the future of their businesses.
- **Result:** Horizon Scanning work will generate depictions of key disruptive factors (the so-called "Drivers' maps"), thereby facilitating the comprehension of their anticipated impact on the future of the three industrial ecosystems of the IDEALIST project.
- **Thematic scope:** Participants of Horizon Scanning activities will be divided into 3 Focus Groups, each representing one industrial ecosystem. These are: (1) Aerospace and defence; (2) Energy-intensive industries and (3) Mobility, transportation, automotive.

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Preparation of the Horizon Scanning Training

In this section, we ask you to give your overall evaluation of the training preparation activities.

You can answer the evaluation questions on a scale of 1 to 5, with 1 being *"I do not agree at all"* and 5 being *"I completely agree"*.

The **pre-event activities** (registration, sending invitations) were well organized.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

You were provided with the necessary information about the goal of the training to assess in advance its suitability.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

Do you have any comments and/or suggestions that would have improved the quality of the preparation activities?

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Organization of the Horizon Scanning Training

In this section, we ask you to give your overall evaluation of the HST, organized by 4CF on the 14th of June, 2024.

Please answer the evaluation questions on a scale from 1 to 5, with 1 being *"I do not agree at all"* and 5 being *"I completely agree"*.

The presentation of the agenda has been adequate and the objectives were realistic.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

The introduction of the workshop was clear

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

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The presentation of the training activities and their objectives was clear.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

The Miro environment was easy to navigate.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

The outputs of the group activities were clear, and helped better understand the goals of each activity.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

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The presentation of the next phase of the IDEALIST Horizon Scanning activities and your further involvement in this process was clear.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

Do you have any comments and/or suggestions that would have improved the quality of the sessions? Please be as specific as possible in suggesting potential improvements.

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General evaluation of the Horizon Scanning Training

In this section, we ask you to give an overall evaluation of the HST.

You can answer the evaluation questions on a scale of 1 to 5, with 1 being *"I do not agree at all"* and 5 being *"I completely agree"*.

The workshop has met my initial expectations.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

Horizon Scanning seems to be a very useful method to increase organisational resilience by extending knowledge on key factors shaping the future of an industrial ecosystem.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

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I think the Horizon Scanning outputs may be very useful for strategizing and planning activities undertaken by my cluster/ my organisation.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

I understand how Horizon Scanning can be used to support decision-making processes.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

The sessions have been, generally, easy to follow.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

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The contents were interesting and engaging.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

I am satisfied with the agenda of the sessions and the meeting structure.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

After this workshop, I feel confident on my understanding of Horizon Scanning.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

After this workshop, I understand the role of Horizon Scanning in the IDEALIST project.

	1	2	3	4	5	
I do not agree at all	○	○	○	○	○	I completely agree

Please provide comments and suggestions to improve the workshop sessions or any other aspect of the meeting implementation.

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Do you agree to take part in a short playful test (online survey) to assess your future orientation and futures literacy competence?

If you do, please provide your email below. We shall contact you soon!

Thank you!

IDEALIST Project wants to thank you for completing this evaluation form!

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5.3. Signals collection form

Title (provide a short name of a signal).

Source (Include hyperlink(s) to the source of information on this change (e.g. link to a publication, event page, photo). Alternatively, indicate another source (a personal intuition, conversation etc.)

Description (what?). What is the surprising and potentially disruptive change that has been observed?

How can it change our optics? (How does it change our perception of the future of the ecosystem?
- It shifts attention towards...
- It underlines the importance of...
- It brings a new element to the discussion about...
- It facilitates the understanding of a potential change..)

How can it change the ecosystem? (What impact does a signal have on the elements of the ecosystem? What is this relevant for? If this change was to continue and grow, what are the potential significant and disruptive implications? Think of various technological, economic, societal, environmental implications.
- "This is particularly relevant for..."
- "The significance of this can be seen in..."
- "Ecosystem dynamics are expected to change as...")

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Impact (on a scale from -5 to + 5 individual assessment by the author of a signal)

- ○ -5
- ○ -4
- ○ -3
- ○ -2
- ○ -1
- ○ 0
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5

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ETM (Earliest Time to Mainstream: the minimal amount of time needed for the mainstreaming of a signal. The moment of mainstreaming is defined as the time when a signal is the most impactful on the ecosystem)

- ◯ 2
- ◯ 3
- ◯ 4
- ◯ 5
- ◯ 6
- ◯ 7
- ◯ 8
- ◯ 9
- ◯ 10
- ◯ 11
- ◯ 12
- ◯ 13
- ◯ 14
- ◯ 15
- ◯ 16
- ◯ 17
- ◯ 18
- ◯ 19
- ◯ 20

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Opportunities

Risks

Challenges

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