



European Environment
Information and
Observation Network



Horizon scanning — tips and tricks

A practical guide

Eionet Report

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1 Introduction

1.1 Why a horizon scanning guide?

In its flagship report, *The European environment – state and outlook 2020* (SOER 2020), the EEA concluded that 'Europe faces persistent environmental challenges of unprecedented scale and urgency' (EEA, 2019). Such challenges are deeply linked to economic activities and lifestyles, and addressing them will require a profound transformation of the production-consumption systems that meet Europe's demand for energy, food, mobility and shelter (EEA, 2019). In recognising these challenges, Europe's environmental policy framework is increasingly shaped by ambitious long-term targets put forward by European Green Deal policies.

The context of realising such targets is one of urgency, complexity and uncertainty. We live in a rapidly changing world characterised by interconnected flows of information, resources, goods and services, people and ideas, as well as multiple interrelated crises spanning health, nature, climate, the economy, and the social and political domains. The 2008 global financial crisis, the 2020 COVID-19 pandemic, and the 2022 Russian invasion of Ukraine are some examples. The interaction of novel developments at the global scale related to the intertwined environmental pressures and inequalities, the pursuit of societal transformations, and the rise of polarisation adds new layers of uncertainty and poses new challenges but also provides new opportunities (UNDP, 2022).

In the face of such complex and systemic challenges, EU institutions, governments, businesses and civil society organisations are increasingly turning to the use of foresight. **Foresight studies** are participatory processes that can support environmental policymaking and decision-making by exploring, through a systemic lens, different possible futures and the opportunities and challenges that these might present (EC, 2022). They do not aim to predict or forecast the future. Anticipating some of the issues and decisions that may arise in coming decades can help us future-proof policies and strategies, build resilience and take action now to proactively shape the future. The inclusion of foresight in the revised EU better regulation agenda (EC, 2021; see [Tool #20](#)) illustrates well its importance in EU policymaking, namely in improving policy design, developing future-proof policies and ensuring that short-term actions are consistent with long-term objectives.

Horizon scanning is one of the tools used in foresight to systematically scan or review various sources to detect early (or weak) signs of potentially important developments (EC, 2015). It can support policymakers and other decision-makers in anticipating future developments, managing risks and pursuing opportunities to help build resilience to future shocks and reduce uncertainty.

The future of Europe's environment and sustainability is influenced by developments of a societal, technological, economic, environmental and geopolitical nature that interact in complex and largely unpredictable ways (EEA, 2020). For this reason, it is essential to look broadly when identifying emerging developments of potential relevance to the environment and environmental policy, as many of these new developments will emerge outside the environmental field. These developments can have different origins, natures, likelihoods, significances, geographical scales and timescales. Although some are well established and well known (e.g. global megatrends), others have just emerged, and some are still unknown. This is the

case for emerging issues and trends, which often have implications that are not well understood. The early identification and recognition of emerging developments improves the ability to strategically respond and build preparedness.

The EEA and the European Environment Information and Observation Network ([Eionet](#)) aim to enable a sustainable Europe through trusted and actionable knowledge for informed decision-making on environment and climate priorities and solutions, in line with Europe's policy ambitions.

This practical guide aims to develop capacities and foster a culture of anticipation and preparedness within Eionet by inspiring and supporting practitioners from national environment ministries and agencies to build horizon scanning capabilities. It supplements the publication in 2017 of a toolkit for identifying the implications of global megatrends at the national level (EEA and Eionet, 2017). The guide offers simple, step-by-step instructions on how to frame, run, analyse and communicate the results of a systematic horizon scan with limited resources. It is suitable for practitioners from different professional backgrounds and with different levels of experience and proposes methods that can be conducted without the need for a dedicated budget or expensive tools. For this reason, no automated, advanced tools or time-intensive manual processes are included in the guide. The focus is on practical applications that can be developed and used in daily practice.

1.2 Using this guide

This document provides guidance on how to conduct a structured horizon scanning process to identify emerging developments that could have potential impact in the future, and in particular on the environment. It starts with an overview of the guide (Chapter 1) and an introduction to horizon scanning (Chapter 2) in connection with the concept of futures literacy. It then provides a step-by-step approach for conducting a structured horizon scanning process (Chapter 3), including a variety of diverse sources for spotting signals, different frameworks for signal scanning and several options to unpack and analyse the collected signals and patterns of change through creative methods and exercises. It also proposes a few different and complementary ways of communicating the findings to relevant stakeholders, networks and communities. Lastly, it suggests some tools (Chapter 4) that can be used to strengthen the scanning process. The annexes offer a detailed comparison of such tools and a glossary of terms related to futures literacy.

2 Introduction to horizon scanning

2.1 Horizon scanning versus environmental scanning

Horizon scanning and environmental scanning are methods used to identify changes in the past, present and future. Environmental scanning focuses on current developments, usually by investigating changes in the STEEP (social, technological, economic, environmental and political) categories (Chermack, 2011). Horizon scanning tries to identify early weak signals that may evolve into emerging issues in the future but are not yet present in current-day research or media. Those emerging issues might then become trends over time – following an ‘S’ curve of emergence, growth, maturity, and decline/death (Molitor, 1977) – possibly with transformative consequences, or disappear without further notice (see the glossary in Annex 1 for definitions).

In other words, environmental scanning helps us understand the present and what is already visible by analysing data or pieces of information that already exist, and hence is manifested in the past (Padbury, 2020). By contrast, horizon scanning challenges norms and our current images of the future by searching beyond the mainstream fields or ‘outside the box’ to identify new sources of data and information, often on the fringe. This may include new references from the arts, pop culture, science fiction and non-expert communities. Weak signals give a glimpse into the future but are hard to find. They are signals that mostly only appear in a geographically limited region and, therefore, are only noticed by a small number of people but may become a driving force in the future (Dator, 2018; Miles et al., 2016; Molitor, 1977).

All trends arise from emerging issues, whereas emerging issues can evolve from weak signals, albeit at different development rates depending on the issue and the circumstances (Conway, 2015; Dator, 2018; Molitor, 1977; Schultz, 2006). In the case of megatrends, these do not happen linearly; megatrends develop over a long period, have global effects and tend to stay for the long term.

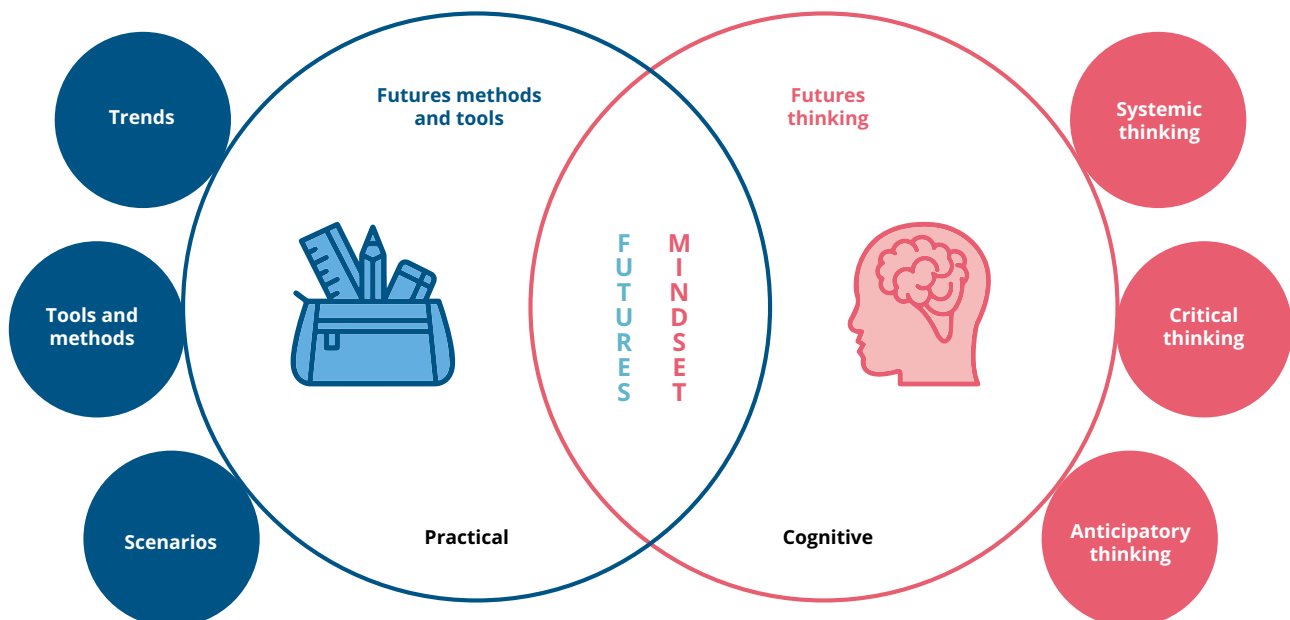
3 Futures mindset for horizon scanning

To create the most impact from any foresight activities, including horizon scanning, practitioners must understand the importance of challenging their current thinking and being able to identify novel, unexpected and expanding signals. Therefore, below we introduce the concept of futures literacy and some of its core ideas, as a foundation for the proposed foresight activities, and summarise its benefits.

3.1 Introduction to futures literacy

Futures literacy is a capability. It is the combination of both cognitive and practical skills such as futures thinking – which includes systems thinking, critical thinking and anticipatory thinking – and futures methods and tools such as trend analysis, scenario development and much more (see Figure 3.1). These two entities, used in parallel, provide both individuals and organisations with the necessary competences to navigate uncertain futures and to act better and more proactively towards achieving preferred futures, or to be better prepared to face (or avoid) undesirable ones.

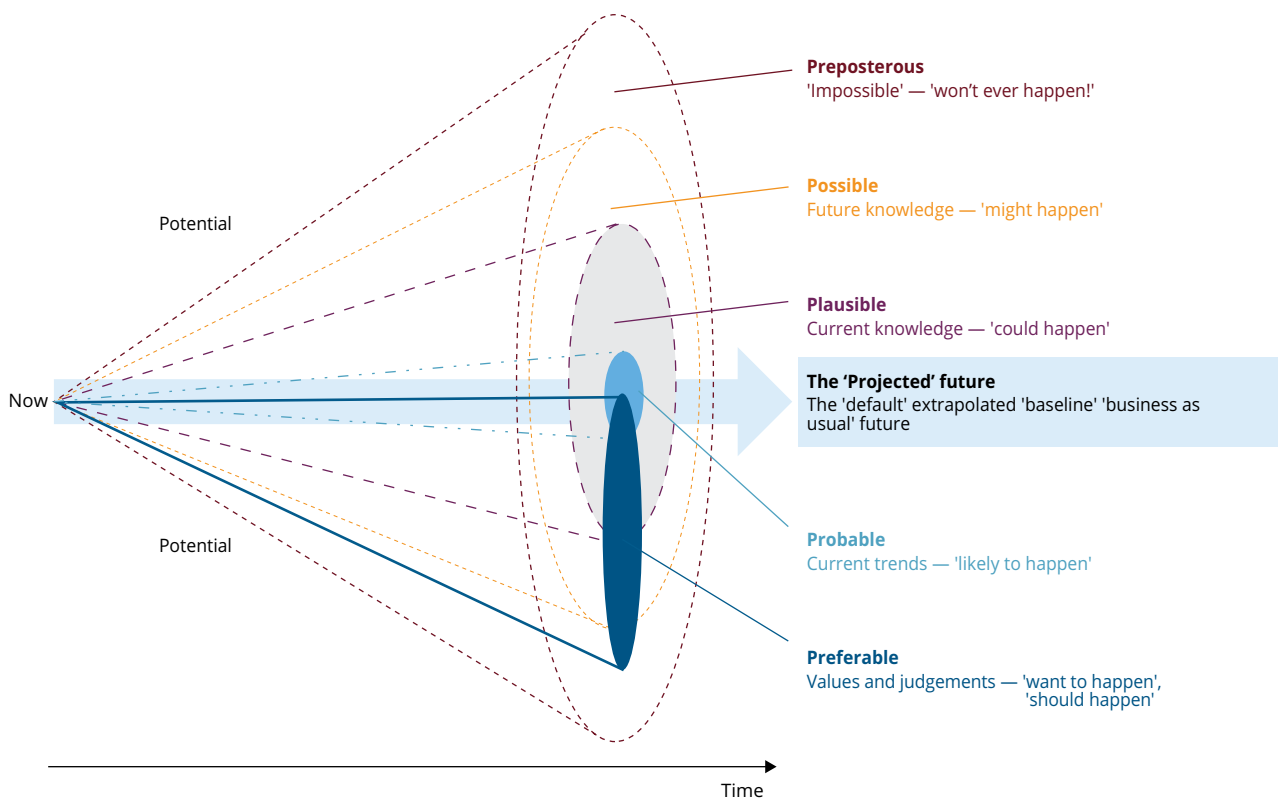
Figure 3.1 The concept of futures literacy as a foundation for building a futures mindset



3.2 Concept 1: One future versus alternative futures

A common mistake is made when thinking about the future; it is usually seen as linear and perceived in its singular form. Instead, the future can be better described as an open cone of possibilities and, with this, opportunities as well as challenges and risks. This leads to the notion that not one future exists but rather multiple or alternative versions of the future co-exist before time binds them together into the present. Joseph Voros revisits this idea of alternative futures by updating the 'Futures Cone' to its current version (see Figure 3.2) (Voros, 2017). Next to the plausible, possible and preferable future, he also describes the potential, preposterous, probable and projected future.

Figure 3.2 The concept of futures literacy as a foundation for building a futures mindset



Source: Adapted from Voros (2017).

The Futures Cone helps to define alternative futures and not only the future that seems most probable. Instead, it creates space to imagine diverse alternative futures and various pathways leading to one or the other. Over time, these pathways may merge into another one, fade away or lead to a dead-end. When we map out each path, we realise that it is hard to reveal all of their possible branches from one's perspective. By combining our experiences and exploration with other actors' points of view, more and more details unfold. That is why a futures mindset always needs to be challenged by other diverse minds.

3.3 Concept 2: Predicting the future versus mapping the future

The biggest misconception about the ‘future’ is that we seek the ability to predict it, to know precisely what will happen tomorrow or in a couple of years. However, the future is not written, which means that, in most circumstances, we still have the power to change course and current pathways to move towards a more desirable future — also, of course, taking into account events that are outside our control. Since the future is not yet fixed, we can learn how to use multiple futures constructively. This is why some describe ‘futures thinking’ and the application of futures methods and tools as a journey and a mapping process that encourages exploration rather than prediction. Hence, the main benefit of futures thinking is that we can learn to manage uncertainty and complexity, so we can be proactive instead of reactive and become more resilient to unpredictable events. ‘Successful foresight is one which promotes action’ (ESPAS, 2019).

3.4 Concept 3: Overcoming biases for diversified scanning

Cognitive biases affect our anticipatory thinking and so need to be challenged if we are to grow a futures mindset. A cognitive bias is a systematic deviation in thinking that appears whenever we process data, and it affects our decision and judgement capabilities (Cherry, 2021). Because our brain is limited to processing only a certain amount of data simultaneously, it tries to simplify this process by building rules of thumb or creating a subjective reality to make sense of the world (Cherry, 2021). Biases help our brains to make decisions faster, but they can prevent us from seeing signals that do not match our predefined categories. They build our belief systems in how we see individuals, judge personalities and perceive culture (Cherry, 2021). A coherent list of cognitive biases has been identified by researchers over time (Benson, 2021). In the following sections, we will highlight those biases that are relevant to a horizon scanning process.

3.4.1 Biases affecting foresight practitioners

While conducting horizon scanning (or any other foresight activity), it is crucial to be aware of your biases and underlying assumptions when identifying weak signals and to avoid placing limitations on how to explore the emerging future, analyse the present and interpret the past. The five most common cognitive biases are as follows (Benson, 2021):

1. Confirmation bias: the tendency to find and trust mostly information that confirms our existing beliefs. This leads to not finding signals that do not fit your current belief system.
2. Hindsight bias: the tendency to overestimate the predictability of an event after it has already occurred — also called the ‘knew it all along’ effect. This underrates the value of foresight as it seems not worthy.
3. Anchoring bias: the tendency to be overly influenced by the first data or piece of information that is found. As the first data are probably mainstream, this limits your capability to find weak signals that are less probable.
4. Ambiguity effect bias: the tendency to favour an option where the outcome is known over an option where the outcome is unknown. This bias limits your ability to imagine new things.

5. Bandwagon effect bias: the tendency to adopt or be more likely to believe data or pieces of information that conform to existing trends or please the mind of the wider population. This bias limits your ability to explore alternatives that are beyond general belief systems.

3.4.2 *How to overcome your biases with futures literacy*

We need to become aware of the existence of our biases and continuously challenge our own assumptions. Futures literacy helps us think in innovative ways instead of using linear models based on our biases. Here are a few tricks to consider for reducing biases within your research team:

- Replace existing biases with curiosity and openness to see the world with different eyes.
- Try to see the future from the perspective of the next generation and the world they will live in instead of the situation we are currently in.
- Increase the diversity of the people involved, and favour different cultural backgrounds and multiple languages. This also brings variation in the set of biases within your group and avoids some of the obvious (Jiménez, 2021).
- Create a mindmap of related ideas and concepts around the research topic to uncover existing gaps and underlying assumptions (Jiménez, 2021).

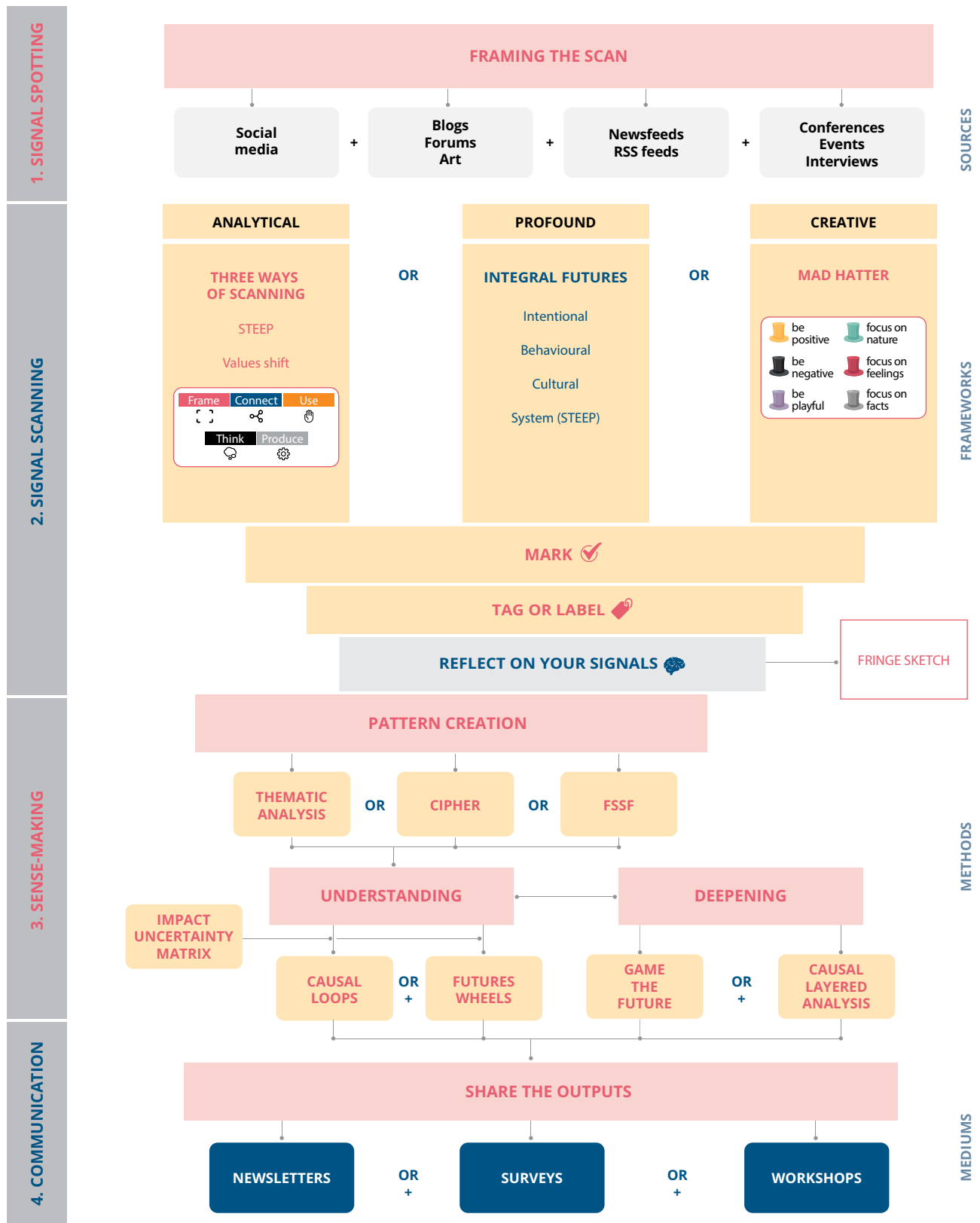
4 Step-by-step scanning guide

The best way to conduct a scanning process is to follow an intentional process of investigation with clear goals. This guide can be used as a personal 'cheat sheet' that leads the reader through a detailed procedure on 'where to scan', 'how to scan' and 'what to scan for', and provides multiple options along the way. The guide consists of four main steps (see Figure 4.1):

- **STEP 1: Signal spotting** is the beginning of the process and focuses on how to frame the scan and where to find signals.
- **STEP 2: Signal scanning** outlines frameworks to use for best scanning results.
- **STEP 3: Sense-making** is about understanding the signals collected and deepening the insights.
- **STEP 4: Communication** is the last step and focuses on how to share the results.

For each step, there are different tools available that can support your scanning process. They range from complex, licence-based tools made explicitly for foresight exercises to freemium and open-source online tools that can be used to perform each task separately. This guide focuses on the latter selection of tools and offers suggestions for each step of the horizon scanning process — please see Annex 2, 'Tools to use', to find out more. You can also find a detailed comparative analysis of those tools in Annex 2.

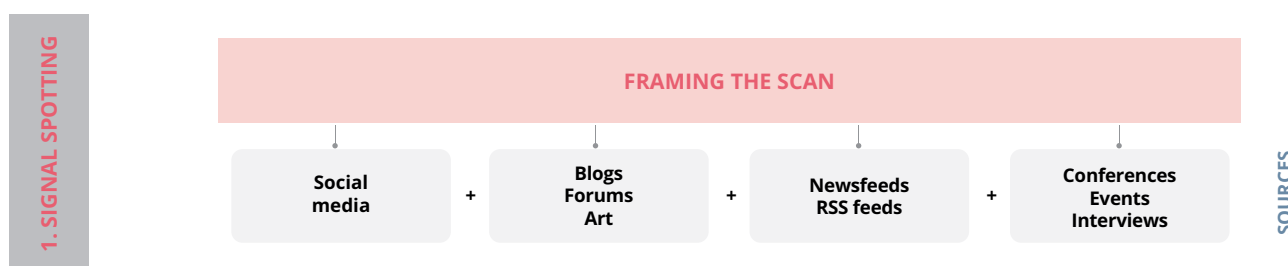
Figure 4.1 Visualisation of the step-by-step horizon scanning guide, including different options and pathways



4.1 Step 1: Signal spotting

The first step of the process focuses on framing your scanning by identifying the focal issue or research question and provides you with an overview of where to find information sources outside the usual sources. These range from mainstream media to news, art, blogs and conferences and social media. The step ends by giving useful tips and tricks on how to improve your scanning capabilities. Figure 4.2 provides an overview of the contents of this step.

Figure 4.2 Visualisation of step 1 – signal spotting



4.1.1 Framing the scan

To spot relevant signals, you first need to establish a focal issue, an area of interest or a research question. These can be somewhat broad as there needs to be room for exploration, but they can also be more specific if there is an area that requires focus at the time. Throughout the process, you can narrow and widen accordingly, keeping it flexible. To find your focal issue, use the following three questions as guidelines:

1. **What keeps you or your organisation awake at night?** Or, if you could ask an oracle, what would you ask?
2. **Which time horizon do you want to explore?** Do not start less than 10 years in the future as you can always bring the future closer, but it's hard to reach further out if you begin too close to the present.
3. **What external matter do you want to know more about?** Make sure your research questions are broad and holistic enough.

Examples of focal issues:

- What is going on that could have an impact on the environment?
- What might be the environmental implications of achieving climate neutrality in the EU by 2050?
- How might the circular economy impact the EU's economy by 2050?
- How might the war in Ukraine affect sustainability transitions in the EU in the long term?

4.1.2 Where to scan?

Once you have selected your focal issue, you need to identify resources online and offline to start the exploration. Since the digital world is now an essential part of our lives, social media and digital magazines are great places to start. Also include discussion forums and blogs, as these are excellent sources of weak signals. Because weak signals often appear in geographically limited regions, it makes sense to include local resources in your search.

4.1.3 Scanning domains and sources

4.1.3.1 Social media

Online media plays a crucial role in our daily lives. It shapes our perception of the world while reflecting social opinions and the zeitgeist⁽¹⁾. The study of narratives and relevant opinion leaders on social media delivers crucial insights into cultural values, social opinions and dynamic transitions. Monitoring relevant events and topics will help you detect new information. Topics live in the form of hashtags, so following a few key ones will help you in your research. In the infobox, we suggest some hashtags and exciting accounts to follow on social media, which tend to show a broad spectrum of opinions and views on different topics.

Suggested social media accounts to follow:

TechCrunch @TechCrunch

The Economist @TheEconomist

BBCNews @BBCNews

The Verge @verge

Futurism @futurism

Slate @Slate

Fast Company @FastCompany

NPR @NPR

Wired @WIRED

Mashable @mashable

WEF (World Economic Forum) @wef

GeekWire @geekwire

Vogue @voguemagazine

CNET @CNET

Suggested hashtags to follow:

#future

#scifiart

#scifi

#futureofwork

#GreenDeal

#ecofriendly

#sustainability

#zerowaste

#sustainableliving

#sustainablefashion

Check the trending hashtags

⁽¹⁾ The general intellectual, moral and cultural climate of an era.

4.1.3.2 Blogs, forums, art channels and crowdsourcing platforms

Looking through blogs and forums will offer you an excellent opportunity to find weaker signals, as these tend to arise more often during recent conversations between people. Additionally, you can start a conversation with such groups by organising open forums or include them in your research by sending out regular surveys. Another excellent spot to look for weak signals is in art, as artists navigate in contrasting environments. They later express, through their work, changes in society they have observed through those interactions. Lastly, by checking out crowdsourcing platforms, you can follow and monitor disruptive innovations and emerging technologies.

Suggested forums, blogs, art channels and crowdsourcing platforms to follow:

Reddit is a network of communities based on people's interests. Find communities you're interested in, and become part of an online community! <https://www.reddit.com>

Quora is a place to gain and share knowledge. It's a platform to ask questions and connect with people who contribute unique insights and quality answers. <https://www.quora.com>

Medium is an open platform where readers find dynamic thinking, and where expert and undiscovered voices can share their writing on any topic. <https://medium.com>

Kickstarter PBC is a funding platform for creative projects — everything from films, games and music to art, design and technology

BBC Culture covers the latest in global arts and culture in all its forms, and gives an international view of film and TV, books, art, music and style. <https://www.bbc.com/culture>

4.1.3.3 Newsfeeds and RSS feeds

Be aware that looking for weak signals in this group of resources is the most challenging. Always be mindful of underlying biases depending on where the information is published and who the author is. The news only reflects the present and past state and needs to be collected with care to avoid falling into confirmation bias. An excellent exercise using these resources is to search for the signal opposite to that stated in the news, by exploring less common and mainstream resources such as blogs and forums. It may also be interesting to explore whether a weak signal is mentioned only by a specific source or whether it appears in different sources, e.g. those with different cultural and social backgrounds.

Suggested web feeds to follow (use RSS feed reader):

Android Authority: www.androidauthority.com/feed

BBC News | World: feeds.bbc.co.uk/news/world/rss.xml

Climate Action News: ec.europa.eu/clima/node/2/rss_en

Digital Trends: www.digitaltrends.com/feed

Futurity: www.futurity.org/feed

The Guardian | Environment : <http://www.theguardian.com/environment/rss>

The Local: feeds.thelocal.com/rss

NASA Breaking News: www.nasa.gov/rss/dyn/breaking_news.rss

Reuters News Agency | Environment: www.reutersagency.com/feed/?best-topics=environment&post_type

ScienceDaily | Top Environment News : www.sciencedaily.com/rss/top/environment.xml

Strategic Culture Foundation: www.strategic-culture.org/feed

TechCrunch: <https://techcrunch.com/feed>

TechRepublic | Articles : www.techrepublic.com/rssfeeds/articles

The Verge: <https://www.theverge.com/rss/index.xml>

Wired: <https://www.wired.com/feed/rss>

4.1.3.4 Conferences, events, interviews and conversations

Conferences and events are places of exchange where people from different fields meet each other and challenge each other's thoughts through their work. As a consequence of such interaction, the conversations that arise inspire transformational thinking and change. Therefore, these are great places to spot signals! Do not restrict yourself to future-related conferences or tech-only panels. Do go to scientific conferences organised by a diverse group of institutions that are presenting their latest research. Also, attend events of smaller, local initiatives and those conferences that are way outside your traditional radar.

4.1.4 Useful tips and tricks

4.1.4.1 Google search filters

Use combinations of keywords and search filters to narrow and customise your search results and find the more relevant and latest articles, e.g. 'published within the last year'.

4.1.4.2 Triggered by emotional reactions

Dismiss the articles that are too similar, too obvious, too mainstream. According to Jim Dator's second law of the future, 'any useful idea about the future should appear to be ridiculous' (Dator, 2019). So, if it doesn't **surprise** you, it's not a relevant weak signal!

4.1.4.3 Draw from multiple languages

An international scanning team can benefit from accessing sources in multiple languages. In addition, as shown earlier, all information is biased regardless of its point of origin. By scanning across different nations and languages, some of the biases mentioned earlier can be counteracted.

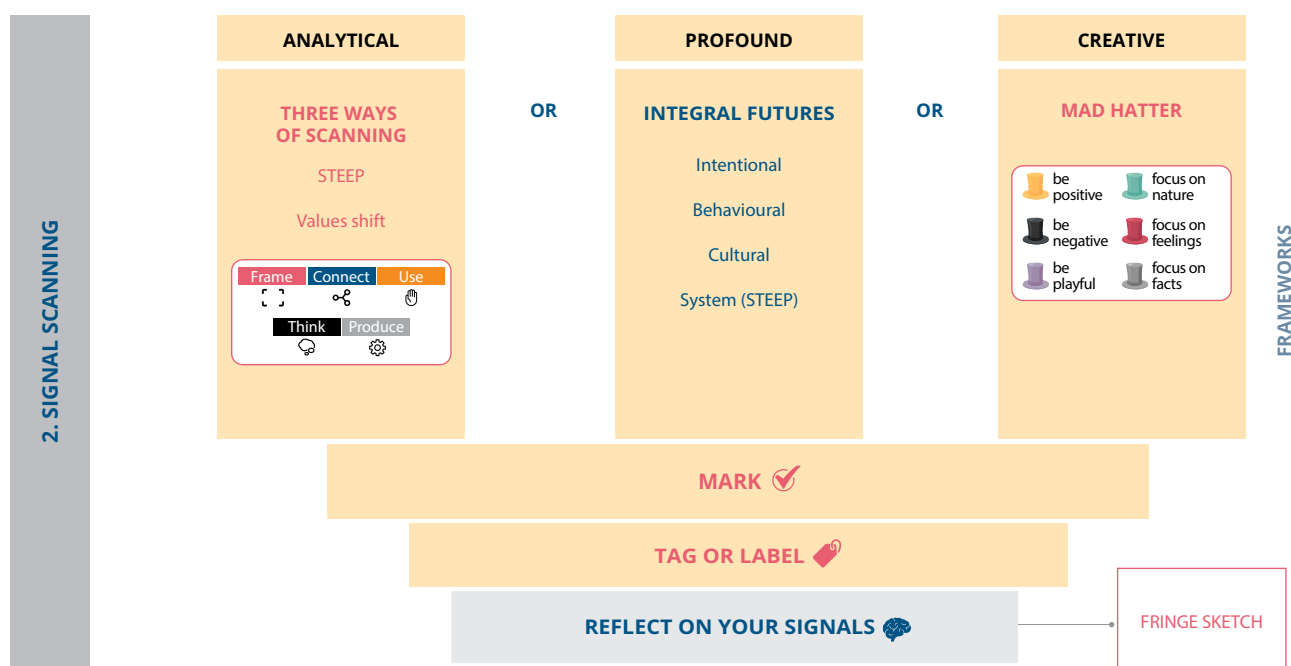
4.1.4.4 Search for trend and counter-trend

Whenever you discover a weak signal, emerging issue or trend, ask yourself what would be the opposite direction of such a shift — look specifically for so-called counter-trends. If you find evidence for opposite developments, note these by tagging or highlighting. Such movements may lead to an alternative future outcome if the impact of a counter-trend increases over time (Jackson, 2013).

4.2 Step 2: Signal scanning

The second step provides three variations of how to scan for weak signals. Each of the scanning frameworks has a slightly different focus and depth and is therefore listed as analytical, profound or creative. You can select the approach that best suits your style of research and data processing. However, we encourage you to explore all of them; forcing yourself to adapt to different types of scanning will shift your focus and balance your bias and assumptions. You can also use the frameworks in combination. Furthermore, we encourage you to ‘hack’ them as you learn more about using them and making them fit your purpose. Lastly, at the end of this step, we provide you with a sketching and mind-mapping method and some reflecting questions that will help you revisit your scanning hits to sort the wheat from the chaff and decide which signals to keep and which are already mainstream. Figure 4.3 illustrates the three different signal scanning frameworks.

Figure 4.3 Visualisation of step 2 – signal scanning



4.2.1 The essence of scanning

In a foresight context, we understand scanning as the continuous monitoring of information about events internal and external to your organisation by systematically investigating, exploring and identifying weak signals. This process involves switching gears constantly and seamlessly, broadening out (diverging in thinking) and narrowing down (converging) throughout the process as new information is collected. This allows you to build a more robust and targeted data set and, thus, insights. It is important to remember that this process is iterative because the environment and the actors are constantly changing, hence creating new signals.

The biggest advantage of human scanning (as opposed to automated trend-spotters) is that humans can read between the lines. Below are six key characteristics of the mindset required for robust scanning.

- **Crave curiosity:** ask 'Why?' more than 'What?' and strive to explore deeper and deeper.
- **Act courageously:** embrace change, ask the uncomfortable questions, challenge the norms.
- **Welcome diversity:** do not limit your imagination by surrounding yourself with the same crowd; invite a diverse group of people to challenge your thinking.
- **Think outrageously:** be edgy and weird; expand your research to resources that are uncommon, not yet mainstream.
- **Connect the dots:** think in systems; each and every element in your system is woven into something else.
- **Think in plural:** explore multiple possibilities of how the future may unfold and keep feeding your imagination.

4.2.2 Using a framework for scanning

Scanning (both horizon and environmental) are key phases of any foresight process and are in themselves continuous exercises. Horizon scanning is also best done frequently as part of an organisation's regular activities and, ideally, conducted by a diverse team. As mentioned, there are many ways to perform scanning; below, we describe three common scanning frameworks. Frameworks allow the scanner to look at the whole picture; following a framework ensures a robust collection and prevents the oversight of weak but necessary signals.

These three scanning frameworks are:

- **Three Ways of Scanning** (analytical)
 - point of manifestation
 - point of origin
 - point of impact
- **integral futures** (profound)
- **mad hatter** (creative).

4.2.2.1 Three ways of scanning – analytical

The Three Ways of Scanning method © Kedge (Spencer and Montero Salvatico, 2019) presents a three-level approach to overcoming our current thinking and biases. Aside from using the more traditional STEEP framework, which focuses on the point of manifestation, it scans for what is called the point of origin (value shifts or V) and the point of impact.

4.2.2.1.1 Point of manifestation (STEEP)

This common scanning framework is used in environmental scanning to uncover present changes in the immediate surroundings. To move into the horizon scanning sphere, we introduce the next two layers.

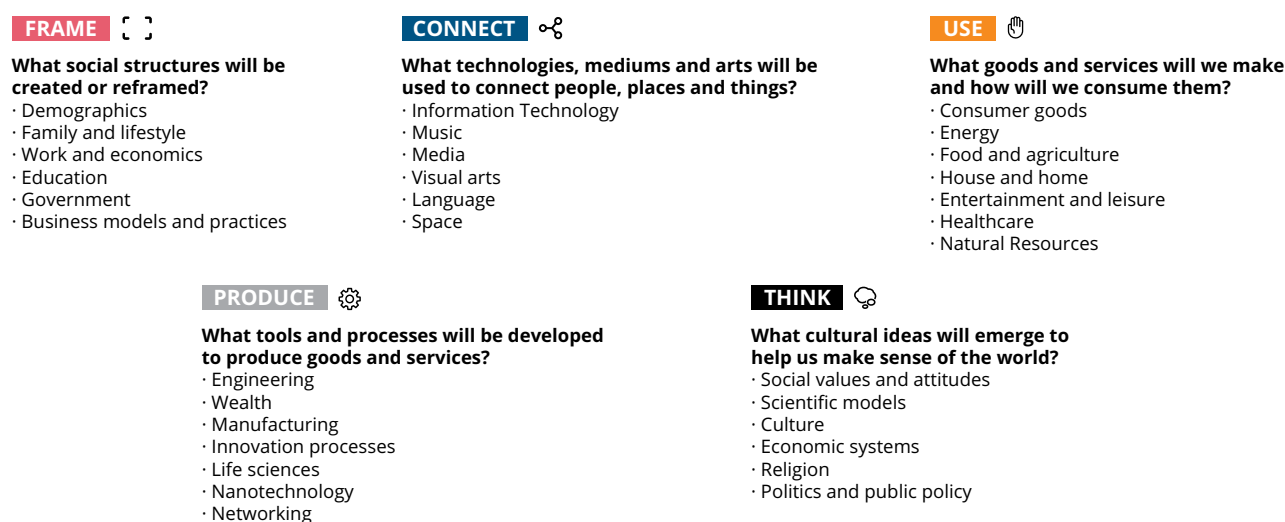
4.2.2.1.2 Point of origin (value shifts or V)

By scanning from the point of origin, we try to identify the underlying biases and assumptions hidden in the resources by searching for the value shifts underpinning such changes in the environment.

4.2.2.1.3 Point of impact

Scanning from the point of impact helps us understand the long-term effects of the signals identified in terms of social change, technology, goods and services, tools and processes, and cultural ideas. This scanning approach provides more depth to each scanning hit and more context for potential impacts and implications. Figure 4.4 outlines the different categories and scanning questions.

Figure 4.4 Point of impact categories and guiding questions



Source: Adapted from Spencer and Montero Salvatico (2019).

How to use the Three Ways of Scanning method

- Start exploring the research area by framing a few guiding questions (research questions) or thinking about a somewhat broad topic to investigate (focal issue).
- Once you have either questions or a focal issue, start scanning.
- Where? As explained above, you can look for signals in social media, blogs, articles, art, news, etc.
- Use all of these sources for the best scanning hits.
- Don't be too specific in your search: remember you are scanning the horizon, so this has to be broad; most disruptions appear outside your immediate and usual field but may have a massive impact on it once they emerge.
- When you find an item that speaks to your focal issue, unpack it by breaking it into smaller pieces using the following framework — you'll get plenty of insights.
- Use the **Three Ways of Scanning method** to help you diversify your thinking: allow yourself to fall into the rabbit hole to get carried away to strange places:
 - Use STEEP as a first lens to guide your scanning; look for interesting articles where social, technological, environmental, economic or political phenomena pop up.
 - Now look for value shifts. Give those sources another go, but now think of the values embedded in those signals: what is changing?
 - Use the STEEP+V questions to guide and reflect your scanning.
 - **Society:** which social changes can you identify?
 - **Technology:** which new technologies are emerging?
 - **Economy:** which factors are impacting the economy?
 - **Environment:** which factors are impacting the environment?
 - **Politics:** which policies or regulations are pushing or holding back the future?
 - **Value shifts:** which value shifts can you observe?
 - In parallel, use the point of impact categories and questions to look for how people connect, what people are using and producing, and how people are thinking and framing. This will help you to search in new areas and to think outside the box.
 - **Frame:** what social structures will be created or reframed?
 - **Produce:** what tools and processes will be developed to produce goods and services?
 - **Use:** what goods and services will we make and how will we consume them?
 - **Connect:** what technologies, mediums and arts will be used to connect people, places and things?

- **Think:** what cultural ideas will emerge to help us make sense of the world?
- Mark these data points, as they will be clustered later on; aim for three scanning hits per week, individually.
- Tag or label your signals. If it was a signal related to social, tag it as such; if it's an object people are using, tag it with Use; and so on.

General

- Take a look at the date the signal was created and where it was published: how does this help you to understand the broader context?
- Check the author, owner or publisher: what biases might be embedded in this piece?
- Start saving the articles, posts and threads that seem interesting, relevant, radical, weird: ask yourself why?

4.2.2.2 Integral futures – profound

The integral futures framework (Slaughter, 1999; Voros, 2001) supports diverse thinking by describing an approach that goes beyond the external world we live in and its social, technological, environmental, economic and political drivers of change and by also analysing our behaviour and underlying mental models.

*'It ain't what you don't know that gets you into trouble.
It's what you know for sure that just ain't so.'*

Mark Twain

When we are too confident about what we think or how the future will develop, we start to see only those signals that support our own beliefs while neglecting information that would prove us wrong (confirmation bias). This framework enables organisations and individuals to understand our interior, exterior, individual and collective world, preparing us for the uncertainty of the future.

Integral futures, therefore, offer a holistic approach whereby we first discover our individual values and belief system and then identify and become aware of the consequences of our actions. Then, we analyse where our mental models are rooted – our myths, traditions and bedtime stories. Finally, we get to the exercise most would jump to straight away – the scanning of our external systems using frameworks such as STEEP or PESTEL (political, economic, social, technological, environmental and legal).

The integral futures approach works as a practical framework to search beyond the usual, using the quadrant model of Ken Wilber as a theoretical basis (Wilber, 1995; 2005). It promotes other ways of knowing to add layers of understanding, such as of value shifts, behavioural change, and how culture and traditions influence future developments. The four quadrants represent parallel processes, intimately linked with another: interior-individual development, exterior-individual development, interior-social development, and exterior-social development; and can be described as follows:

I – Intentional (interior-individual development): intentional and represented by the 'I'. This quadrant reflects our feelings, hopes, dreams and intentions. It is what we think and believe and where our values are rooted.

IT – Behavioural (exterior-individual development): behavioural and represented by the 'IT'. This quadrant describes our individual behaviour, how we act and react due to our education, cultural background or intelligence.

WE – Cultural (interior-social development): cultural and represented by the 'WE'. This quadrant describes our culture, myths and social world, the stories and traditions we know because we grew up in this world.

ITS – System (exterior-social development): social (system) and represented by the 'ITS'. This quadrant describes the system we live in, and it is also where the well-known STEEP analysis takes place.

How to use the integral futures framework

- Start exploring the research field by framing a few guiding questions (research questions) or thinking about a somewhat broad topic to investigate (focal issue).
- Once you have either questions or a focal issue, start scanning.
- Where? As explained above, you can look for signals in social media, blogs, articles, art, news, etc.
- Use all of these sources for the best scanning hits.
- Don't be too specific in your search: remember you are scanning the horizon, so this has to be broad; most disruptions appear outside the usual field but may have a massive impact on it once they emerge.
- When you find an item that speaks to your focal issue, unpack it by breaking it into smaller pieces using the following framework — you'll get plenty of insights.
- Use the **integral futures framework** to search beyond the usual:
 - Map out the **Intentional quadrant** by answering: what feelings, hopes, dreams, intentions, beliefs, thoughts or values have shifted?
 - Now move to the **Behavioural quadrant**: what individual behaviours, actions and reactions due to our education, cultural background or intelligence have changed?
 - In terms of the **Cultural quadrant**: which collective cultural shifts, new myths and worldviews have arisen that influence our stories and the traditions we grew up with?
 - And, lastly, take a look at the **System quadrant**: which social, technological, economic, environmental or political shifts have occurred in our systems?
- Mark these data points as they will be clustered later on; aim for three scanning hits per week, individually.
- Tag or label your signals as Intentional, Behavioural, Cultural, or the corresponding STEEP category.

General

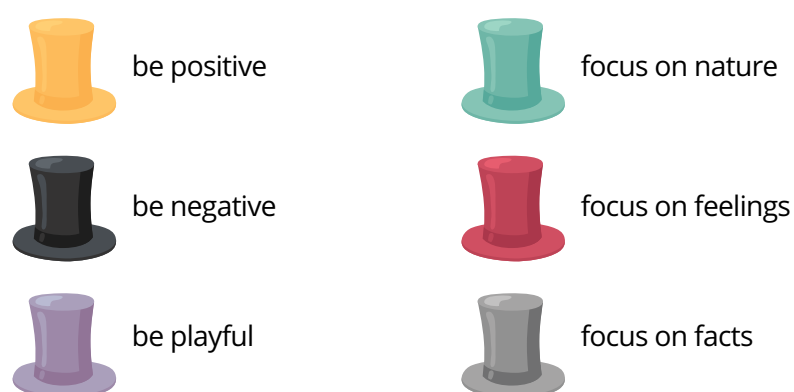
- Take a look at the date the signal was created and where it was published: how does this help you to understand the broader context?
- Check the author, owner or publisher: what biases might be embedded in this piece?
- Start saving the articles, posts and threads that seem interesting, relevant, radical, weird: ask yourself why?

4.2.2.3 The 'mad hatter' – creative

The 'mad hatter' is an adaptation of de Bono's model 'six thinking hats' (de Bono, 1985; de Bono Group, 2021), which creates six artificial contexts for thinking that correspond to the primary thought modes of objective, subjective, critical and creative. It is used to think outside the box in a creative process. The mad hatter is applied here as a way of thinking while conducting scanning activities. As a researcher, you will 'wear' one of the hats described below and use this as a lens or filter to spot signals (e.g. with the yellow hat – optimistic – we will look at signals from an optimistic perspective or point of view, whereas with the black hat – negative/pessimistic – we will search for signals from a negative one).

Each member of one team should wear a different hat at different times to widen the scope and get outside their comfort zones. We tend to look more towards the familiar, thereby perpetuating our very own confirmation bias. The mad hatter is used to prevent the latter and also groupthink (the phenomenon of conformity in a group resulting in a dysfunctional decision-making outcome). The six hats are illustrated in Figure 4.5.

Figure 4.5 Mad hatter categories



Source: Inspired by de Bono (1985).

How to use the mad hatter framework

This framework can be used in parallel with the other frameworks or on its own.

- Start exploring the area of research by framing a few guiding questions (research questions) or thinking about a somewhat broad topic to investigate (focal issue).
- Once you have either questions or a focal issue, start scanning.
- Where? As explained above, you can look for signals in social media, blogs, articles, art, news, etc.
- Use all of these sources for the best scanning hits.
- Don't be too specific in your search: remember you are scanning the horizon, so this has to be broad; most disruptions appear outside your usual field but may have a massive impact on it once they emerge.
- When you find an item that speaks to your focal issue, unpack it by breaking it into smaller pieces using the following framework — you'll get plenty of insights.
- Use the **mad hatter framework** to help you get the right balance of signals:
 - Wear the **white hat** to look for facts, numbers, those signals that are somewhat **neutral**.
 - ▶ Ask yourself: Does this piece of information have a neutral perspective on the issue? Is this telling me facts and numbers?
 - While wearing the **yellow hat**, you should be looking for signals that have a bright connotation, a positive outcome that evokes **hopefulness** and **optimistic views**.
 - ▶ Try to answer: What can I see that is positive, that speaks to a bright situation?
 - When wearing the **black hat**, look into everything that can be **difficult**, **dangerous**, when things can go wrong, all the **negatives**.
 - ▶ Ask yourself: What can go wrong here? What from this issue can be dangerous or create a difficulty?
 - Wear the **green hat** to spot everything related to **nature**, a thriving environment, which may hint at an **environmental balance**.
 - ▶ Try to answer here: How does nature look in this context? Can this hint at an environmental balance?
 - With the **red hat** on, you should be 100% **emotional**, following your intuition and hunches.
 - ▶ Answer here: How does this piece make you feel? How would this make other people feel?
 - While wearing the **purple hat**, you should go outside your comfort zone, be **playful**, joyful.
 - ▶ Be your inner child for a few minutes: What do you see through their eyes?

- Let the clicking take you to strange places.
- Try to wear different hats on each day of your scanning activities.
- Members of the team can swap these hats continuously (every other day/every week) to ensure that the results remain diverse and rich.
- Mark these data points, as they will be clustered later on; aim for three scanning hits per week, individually.
- Tag or label your signals using the mad hatter framework. If it was a signal with a positive twist, tag it with Yellow; if it created an emotion in you, tag it with Red; and so on.

General

- Take a look at the date the signal was created and where it was published: how does this help you to understand the broader context?
- Check the author, owner or publisher: what biases might be embedded in this piece?
- Start saving the articles, posts and threads that seem interesting, relevant, radical, weird: ask yourself why

4.2.3 Reflect on your scanning hits

After collecting a fair number of signals, it's essential to reflect on how novel and relevant they are to your focal issue. Below is a quick and fun way to assess whether your signals are worth keeping or you need to leave some behind.

4.2.3.1 The fringe sketch

The fringe sketch is a structured form of brainstorming that presents the results of a horizon scanning process as a visualised map (Webb, 2016). Amy Webb described the process as follows (Webb, 2017):

'First, flare at the fringe. Keep an open mind as you cast a wide enough net and gather information without judgement. This involves creating a map of what you observe at the fringe. This map should show nodes — or key concepts, companies, places, and people — and the relationships between them. Think of it as rounding up the "unusual suspects." You're brainstorming, making a fringe map, forcing yourself to think outside the box and consider radically different points of view.'

The fringe sketch acts as a visual map of scanned results and their relationships with each other concerning the research questions or focal issue, so it will not reveal patterns or trends. It does not work as a full narrative but instead outlines the horizon by showing interconnections.

How to use do a fringe sketch

- Make a fringe sketch to map your scanned results and their relationships. Place your research question or focal issue in the centre of the map.
 - Draw three circles around the centre representing the now, soon and far.
 - Position your scanning results around the research question within the estimated time-frame.
 - Start building nodes and connectors among the items.
- While creating the map, consider the following:
 - Include theoretical or even insufficient information.
 - Assume that a present-day obstacle might be overcome in the future.
 - Assume that, if something can be hacked (or adapted for a slightly different use), it will be.
- After completing a fringe sketch, try to separate your **assumptions** from your actual **knowledge**.
 - Where did some of your cherished beliefs influence your thinking?
 - What are the assumptions you've made versus the knowledge you have?
 - Code your fringe sketch to reflect your assumptions (mark in red) versus your knowledge (mark in blue).

4.2.3.2 Fringe to mainstream

In her book *The signals are talking*, Amy Webb makes an interesting observation, namely that any technology, new product or innovation that has made its way from 'fringe to mainstream' had to go through what she calls the 'seven stages of acceptance' (Webb, 2016). Before moving to any further evaluation of your scanned signals, you should look at the questions below and ask yourself what reaction you have to each scanned signal.

Use this questionnaire from time to time to challenge your scanning routine.

The seven stages of acceptance (Webb, 2016)

1. I've never heard of it. Why would I try it/advise it/legalise it? Why should I care?
2. I've heard of it, but I think it's preposterous/dangerous/frivolous/unethical/will never work. It's a horrible idea.
3. I understand what it is, but I don't think it's useful/beneficial/helpful for me, my organisation or the broader context.
4. I think it's potentially useful/beneficial/helpful. I'd like to start gathering data to see what traction there is.
5. I've started to accept it as useful/beneficial/helpful, but I still think of it as a novelty. I'd like to see some research on how early adopters are using it.
6. I now use it all the time; it's part of my daily routine! I'm participating in similar projects. I'm looking for ways to collaborate.
7. It's indispensable. How did we ever manage without it? I'm looking forward to the initial implementation. I'm thinking about making a sustainable project. Damn — why didn't I think of that sooner? How did I miss it?

If you reacted almost always as in stage 5 onwards, your current scanning routine is leaning towards mainstream instead of fringe, and thus your scanning might need to get more provocative. You may want to remove some of the mainstream scanning hits from your fringe sketch.

4.2.3.3 Scanning checkpoint

After the previous reflection exercises, check whether your fringe sketch is incomplete or in which areas you can see gaps:

- either decide to continue with your scanning, to fill the gaps;
- if you are satisfied with your scanning results, move on to the sense-making steps.

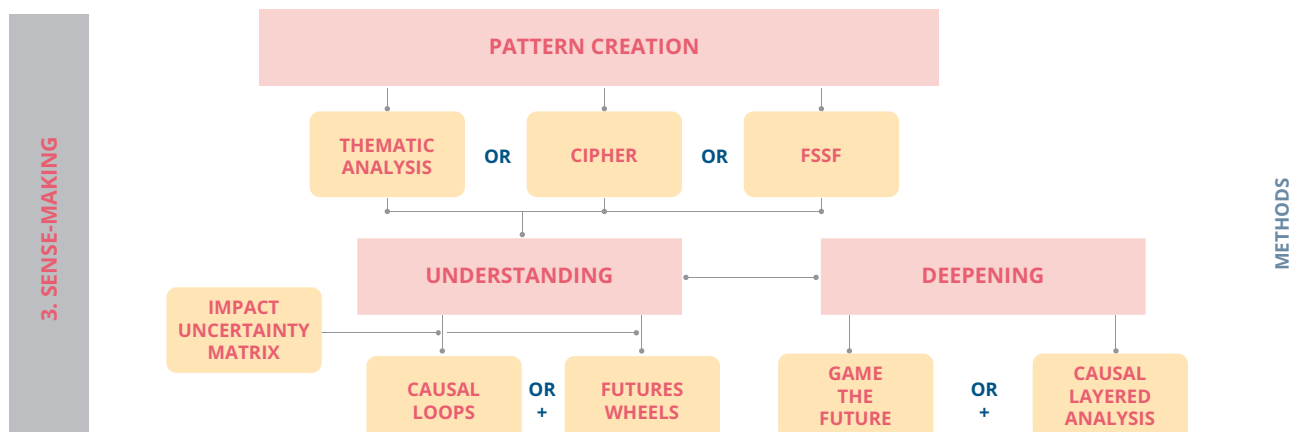
4.3 Step 3: Sense-making

The sense-making phase is where the magic happens; there is a lot you can do with continuously collected signals. Sense-making is then a process of multiple activities, as described in Figure 4.6. The first one is pattern creation, whose goal is to cluster the collected signals into patterns of change.

The second activity identifies potential impacts by determining what these might be, how they might act and what they might influence. In other words, we analyse the consequences of the manifestation to better understand these changes; these can be both positive and negative and observable in many areas, such as those of STEEP+V/PESTEL. The third activity is about gaining deeper insights, which involves going into the roots of the issues and imagining alternative futures.

The three stages of sense-making are:

- **pattern creation** ► clustering signals
- **understanding** ► identifying potential impacts
- **deepening** ► gaining new insights.

Figure 4.6 Visualisation of step 3 – sense-making

The methods presented below range from creative to analytical and can be used separately or iteratively to close the loop. They can be performed at different intervals – weekly, quarterly or every 6 months – and each has a different depth of analysis. As explained above, horizon scanning is not a linear process but instead requires iterations and continuous follow-up. Because of the scanners’ development, their changing surroundings and the shifts in other actors in the field, the possible futures, patterns and signals will always change.

4.3.1 Pattern creation

Our brain continually categorises data and tries to match them with past experiences or knowledge. In his book *Subliminal: how your unconscious mind rules your behavior*, Leonard Mlodinow states that 95% of all of our thinking processes are unconscious (Mlodinow, 2013). By categorising all the information and data into clusters, we are able to speak new languages, learn new skills or come up with new ideas. It is our unconscious mind that automatically connects those dots, creating patterns (Webb, 2016).

In horizon scanning, if you zoom out and look at your data from new angle, you are likely to discover new patterns over time (Webb, 2016).

Below you will find various methods for training your pattern recognition skills. Most of them work best in a workshop environment, where the other participants can challenge your biases and assumptions.

4.3.1.1 Thematic analysis

Thematic analysis is a method of identifying and organising signals by finding commonalities that in turn allow us to create patterns (Braun and Clarke, 2012). This is done by extracting ‘codes’ from the source itself in the form of words, statements or sentences, and then grouping them based on whether they share some common characteristics described in the codes. These groupings are called patterns, which become emerging issues. Continue by giving each of them a specific name.

Thematic analysis can be done in either of two ways or as a combination of both:

1. as an **inductive approach**, driven by what is in the source; codes and patterns derive from the content of the signal itself;
2. as a **deductive approach**, in which the researcher brings their experience, concepts, ideas or topics to interpret the signals.

4.3.1.2 CIPHER framework

The CIPHER framework was developed at the Future Today Institute ⁽²⁾ to uncover hidden patterns by clustering signals from scanning activities with the help of six pattern identifiers (Webb, 2016). After clustering signals using those identifiers, you will be able to see specific themes. These themes are the patterns that become emerging issues. Give each of them a specific name.

The identifiers are based on the acronym CIPHER (contradictions, inflections, practices, hacks, extremes, rarities) and are described as follows:

- **Contradictions:** things are succeeding at the time when they would normally fail (or converse). Something is happening opposite to the way it normally would.
- **Inflections:** decisive moments in the development course of a company, research, technology, social movement or other situation marking significant change.
- **Practices:** changes to the way an entity (people, localities, affinity groups, businesses, industries or governments) would normally operate, behave, react or conduct itself.
- **Hacks:** developing off-label uses for existing products or services.
- **Extremes:** pushing a concept, idea, service or technology well beyond established boundaries such that doing so creates something new (behaviour, service, product, expectation) and noteworthy.
- **Rarities:** true outliers; 'black swan' events.

4.3.1.3 Futures signals sense-making framework

The futures signals sense-making framework (FSSF) was developed by Tuomo Kuosa to analyse and categorise weak signals, wild cards, drivers, trends and other types of data (Kuosu, 2010). It can be used as a tool for gathering, analysing, sense-making and clustering data relevant to the focal issue (see Figure 4.7). The process can be challenging but will generally become easier over time. Once done, it helps to identify signals of change, hidden key factors, and drivers of and barriers to change. **The framework consists of three levels of futures knowledge:**

(A) weak signals, (B) drivers, and (C) trends. Each level is divided into two types: '(1) a disrupting type of information which brings up the non-linear implications of, e.g., immergence (fading) or emergence of new structures, trends, phenomenon, processes, values or cultures, and (2) a promoting type of information which enhances our understanding of linear development in the future.' (Kuosu, 2010)

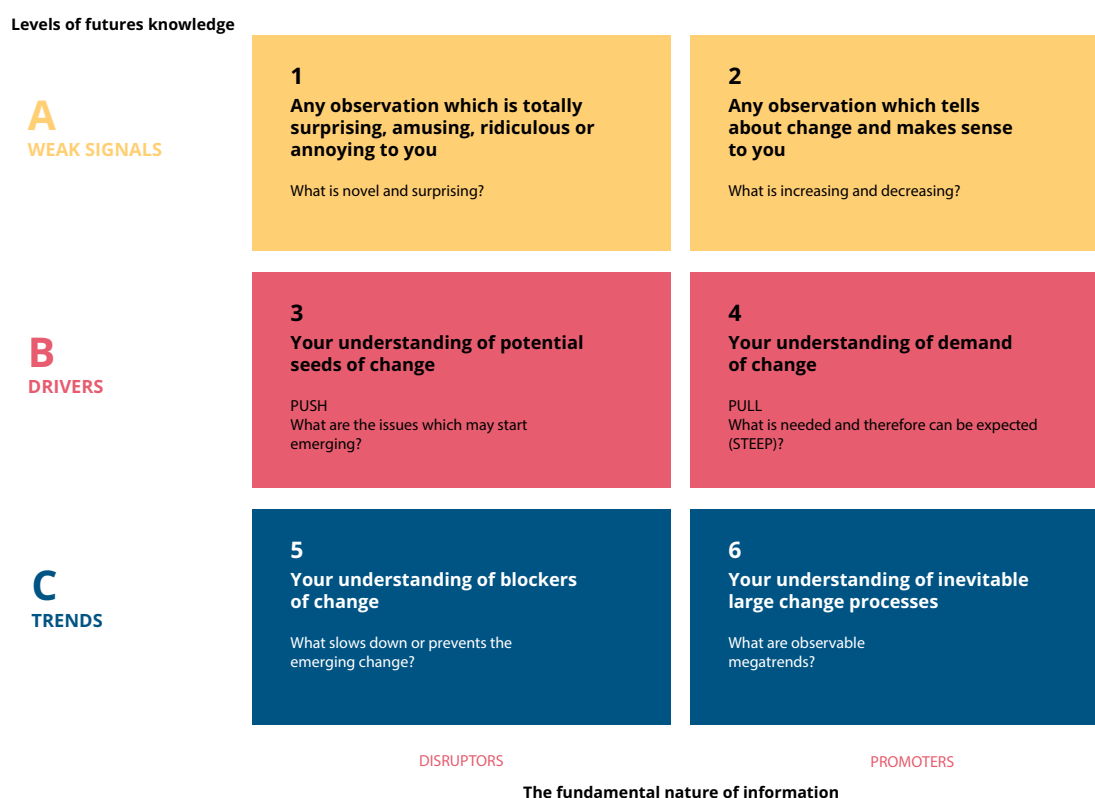
⁽²⁾ <https://futuretodayinstitute.com>

Level A focuses on analysing single observations or groups of statements related to the research question. Once you've scanned a new piece of information, you need to decide whether it is related to an existing but changing trend. If it is, you place it into level A category 2. If the data are surprising, disruptive and non-linear, you put them into category 1.

At **level B**, you have a closer look at your research question and the data collected. If this is a pushing driver, then you place it under category 3. 'A pushing driver may be any seed of change, novel idea/meme, threat, opportunity, emerging technology, etc., which has the potential to be a trigger of change' (Kuosa, 2010). Place any data that describe a pulling driver — 'strong demands on something' (Kuosa, 2010) — relevant to the research question, such as increasing customer demand, under category 4.

Level C identifies trend-like factors from your scanned data. All trends should have a connection to your research question. Assign data that you can locate as a considerable disruption or a shift in values to category 5. Lastly, place data that can be described as a linear 'flowing river of change' (Kuosa, 2010), such as megatrends, which are very difficult to influence, under category 6.

Figure 4.7 Futures signals sense-making framework



Source: Adapted from Kuosa (2010).

The FSSF process consists of three phases:

1. Phase 1: Review the scanned data and select the most exciting pieces.
2. Phase 2: Make sense out of them by clustering them according to the six categories of the FSSF.
3. Phase 3: Identify patterns across the categories (main themes that occurred during the process) and give each of them a specific name.

4.3.2 Understanding

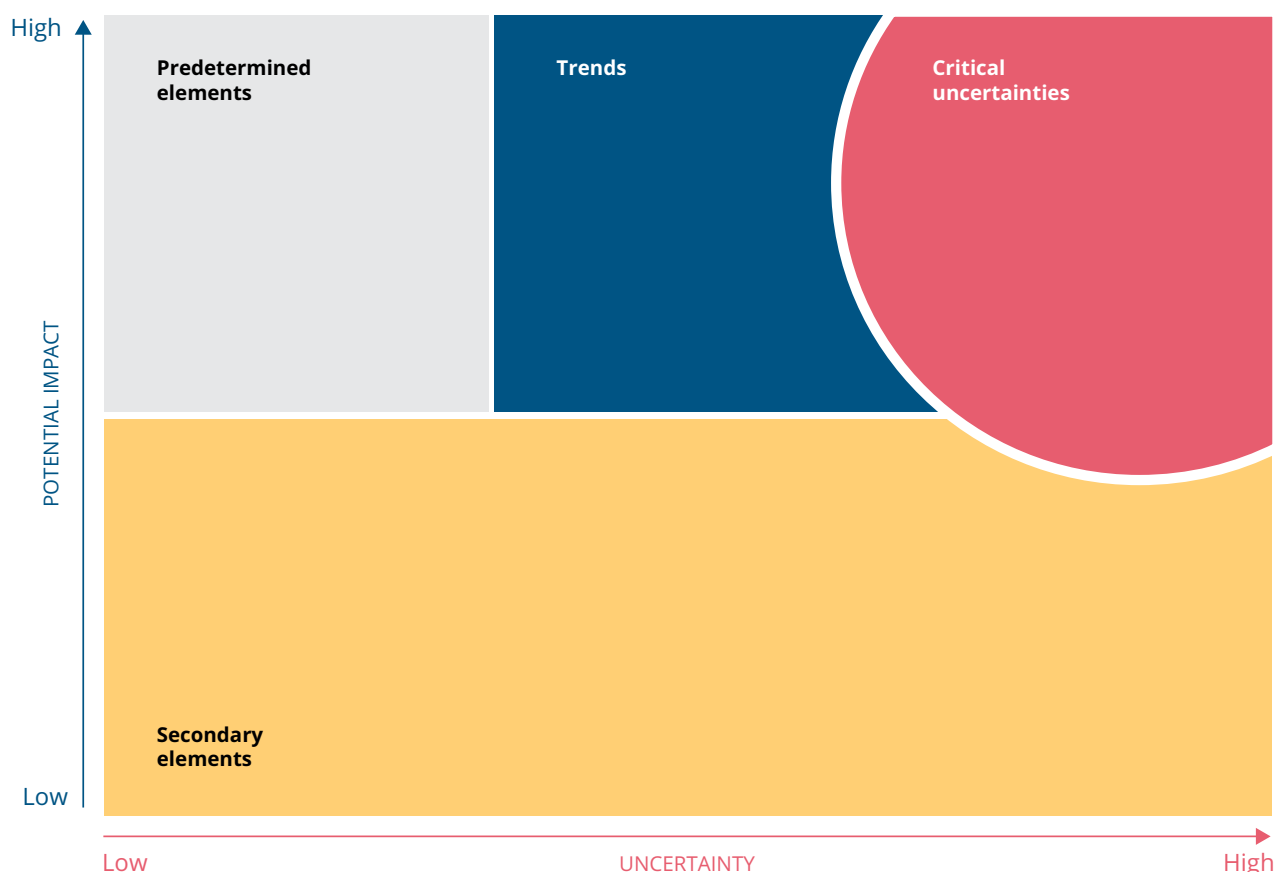
If you have all your patterns created, this step helps to improve your scanning and pattern recognition capabilities. When searching for research questions that focus on 10 or more years ahead, we do not find for each pattern enough relevant data in the present, and such data from the future do not exist yet. Hence, we need to bridge the gap to the future by exploring and expanding the current findings into more distant time horizons. The exercises below will help you expand your scanning to new horizons by exploring long-term impacts and their significance in the present.

4.3.2.1 Impact/uncertainty matrix

The 'impact/uncertainty matrix' shown in Figure 4.8 is a fundamental tool used to identify critical uncertainties that need further exploration by, for example, creating a causal loop diagram or using Futures Wheels (Brands et al., 2013).

The tool is used to rate each identified pattern (e.g. emerging issue or trend) in terms of its importance to the research question and its uncertainty on a scale from 1 (= low/weak) to 10 (= high/strong).

Figure 4.8 Impact/uncertainty matrix



Source: Adapted from Brands et al. (2013).

With this in mind, it is vital to differentiate between the terms uncertainty and probability. Whereas probability tries to anticipate whether an issue appears or not, uncertainty defines whether you have a clear vision of how the pattern evolves in the future, i.e. its direction, strength or variation. A high level of uncertainty, therefore,

describes a sizable potential variance in how the pattern may develop. On the contrary, if you evaluate a pattern to have a low level of uncertainty (which equals a high level of certainty), it means you have a clear and precise understanding of how the pattern will unfold in the future.

Example pattern: autonomous driving

1. Low uncertainty (high certainty): you are very sure that autonomous driving will occur in 2050 only on highways and away from complex cities.
2. High uncertainty (low certainty): you believe that autonomous driving will play a significant role in 2050, but you have no idea or certainty if this will be only on highways, in cities or in a combination of both

Pro tip

- It may help to ask a group to evaluate the certainty of a pattern instead of the uncertainty. For further analysis using the matrix, you would then invert the numbers to obtain a certainty score.

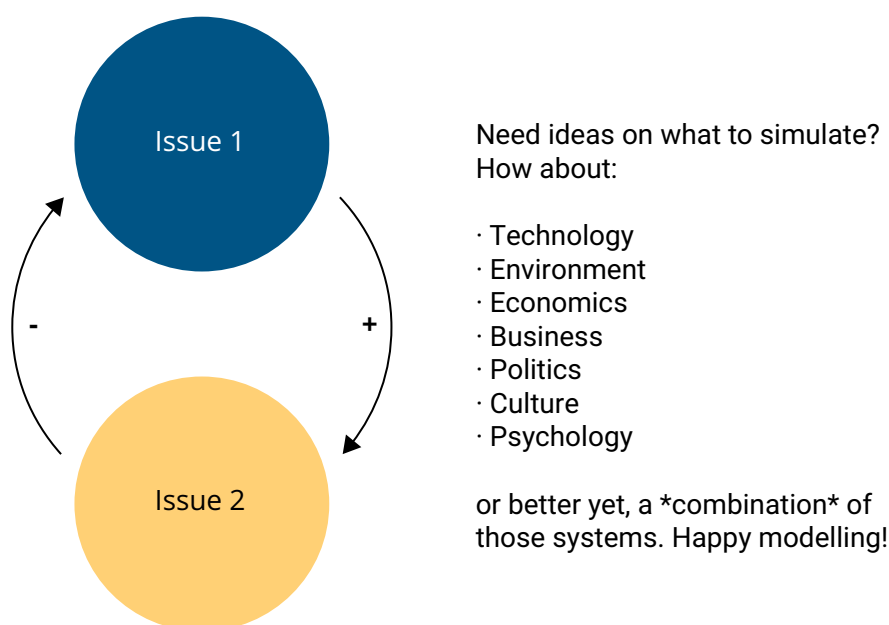
How to use the impact/uncertainty matrix

- Place the relevant patterns on the matrix according to your evaluation of their impact on the research question and their uncertainty in terms of future developments.
- When doing this exercise in a group, let every participant rank the pattern by placing it on the matrix, and then start a conversation about where you want to put it as a group.
- As a next step, cluster the relevant patterns into groups according to their location on the matrix.
 - **Secondary elements** (lower area of the matrix = low impact): these elements can usually be ignored since they have only a minor impact on the research question.
 - **Predetermined impacts** (medium to high impact and low uncertainty): these elements are highly certain and should always be considered during strategic/ policy planning processes.
 - **Trends** (medium to high impact and medium uncertainty): the future direction of these trends is relatively certain, and they can have a high impact on the research question.
 - **Critical uncertainties** (medium to high impact and high uncertainty): these elements have a high impact and are highly uncertain. These are the most important items on the grid, as they are the most difficult to manage. How a pattern will develop, i.e. positively or negatively, is unknown and needs further evaluation. Hence, sometimes it is worth clustering these elements further into wild cards and black swans. All of those elements should be explored further, e.g. through a scenario exercise.
- As the last step, look for commonalities among the critical uncertainties to identify new meta-categories.

4.3.2.2 Causal loop diagrams

Causal loop diagramming falls under the discipline of systems thinking, which focuses on unpacking and describing complex issues in a way that ignites discussions around them (Lannon, 2012). This diagramming method helps to map the relationships between the different focal or emerging issues and specific factors or patterns. Causal loops have four key elements: the variables in the system, the links between them, the direction of the action or effect, and the sign (+ or -) of the loop representing whether something is increasing or decreasing in the system. Figure 4.9 shows a simple loop using all key elements.

Figure 4.9 Simple loop using all key elements



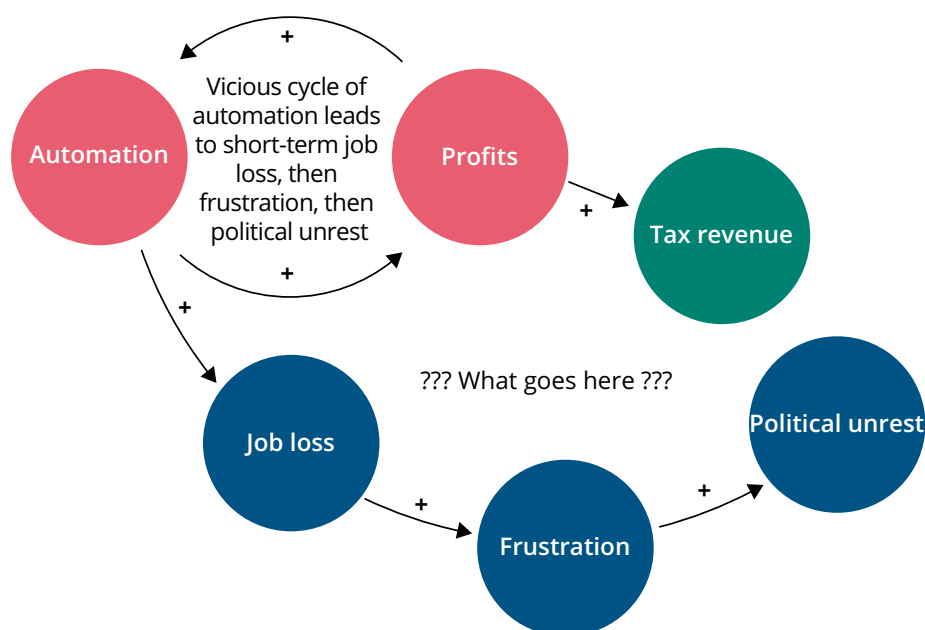
By understanding the dynamic interactions between loops and linking together more than one loop, you can create a full story around the focal issue or research question. Figure 4.10 shows an advanced causal loop diagram. One of the benefits of this diagramming method is that it helps visualise the unintended consequences of issues and their impacts on the environment that may not seem related but have strong interconnections.

How to use causal loop diagrams

- Identity and name the variables to analyse:
 - Remember, these are those emerging issues or patterns that can vary over time.
- Draw the links, the arrows connecting one variable/issue to another, and another one:
 - Identify the direction of causality, the head of the arrow.
- Add a plus or minus sign depending on how much one variable/issue effects change in the other one:
 - If more of variable X creates more of variable Y, add a + (plus) sign. If the effect is the opposite, add a - (minus) sign.

- Continue with as many issues or patterns as you wish.
- Discuss and find connections between as many issues or patterns as there are.
- Use one of the tools suggested in Annex 2, 'Tools', for virtual simulations or simply use good old pencil and paper!

Figure 4.10 **Advanced causal loop diagram**



CHALLENGE:

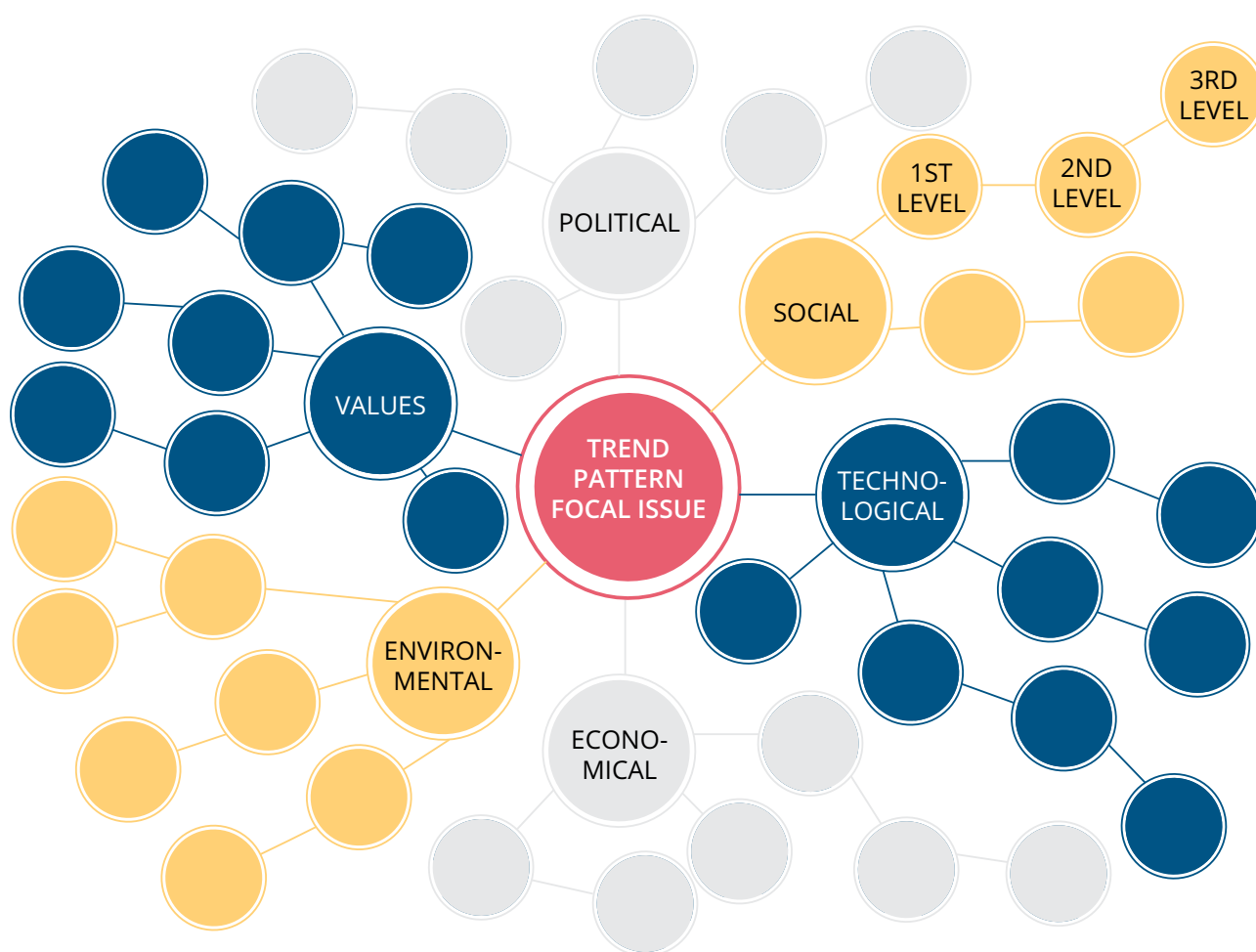
Think up and model your own solutions to this problem! (hint: what tax-funded programmes could mitigate job loss due to automation?)

4.3.2.3 Impact analysis through futures wheels

Once patterns are created, it is critical to identify and map the potential impacts or consequences of each pattern of change, the areas in which these might unfold, and what they might look like over time. Futures wheels is a method invented by Jerome C. Glenn in 1971 (Glenn, 2009). It is a form of structured brainstorming that helps us to visualise how and to what extent certain changes may affect a particular organisation, society or area. It is beneficial for identifying and mapping connections and casualties and it also helps us think far into the future. It can be great for exploring an issue and for mapping broad and robust first-, second- and multi-level implications. In a broader context, it's a great tool to work with before moving towards scenarios, as it can act as inspiration for the development of multiple images of the future. Below, two slightly different futures wheels are presented: the 'drivers wheel' and the 'point of impact wheel'.

4.3.2.3. Drivers wheel

An advanced version of a futures wheel is called the **drivers wheel** (Spencer and Montero Salvatico, 2019). In addition to the structured brainstorming, you add the STEEP+V framework on top of the wheel for the first round to get a more diverse starting point (see Figure 4.11).

Figure 4.11 Drivers wheel

Source: Adapted from Glenn (2009) and Spencer and Montero Salvatico (2019).

How to use the drivers wheel

- Select an emerging issue, trend or pattern to work with — try to break it down and make it precise, as this makes it easier to find impacts.
- Explore implications for the stakeholders involved — the organisation, government body, target group or society as a whole — assuming that the issue has already occurred. Question: what benefits or threats can result from the new situation?
- Use the STEEP+V framework to diversify your thinking.
- Once a new circle or impact is created, brainstorm the second-order implications — i.e. the impact of the impact. In the second round, you can leave the STEEP+V framework behind.
- When there are disagreements, create a new impact line and a new circle using a different colour. Please note that differences make the process more robust; they enrich the future.
- Continue to discuss the issue, the thinking and the implications for an extended period (even weeks) if possible. It is a great thing to come back repeatedly to a shared digital version, or to a printed version hanging on the wall of your working space.

Pro tips

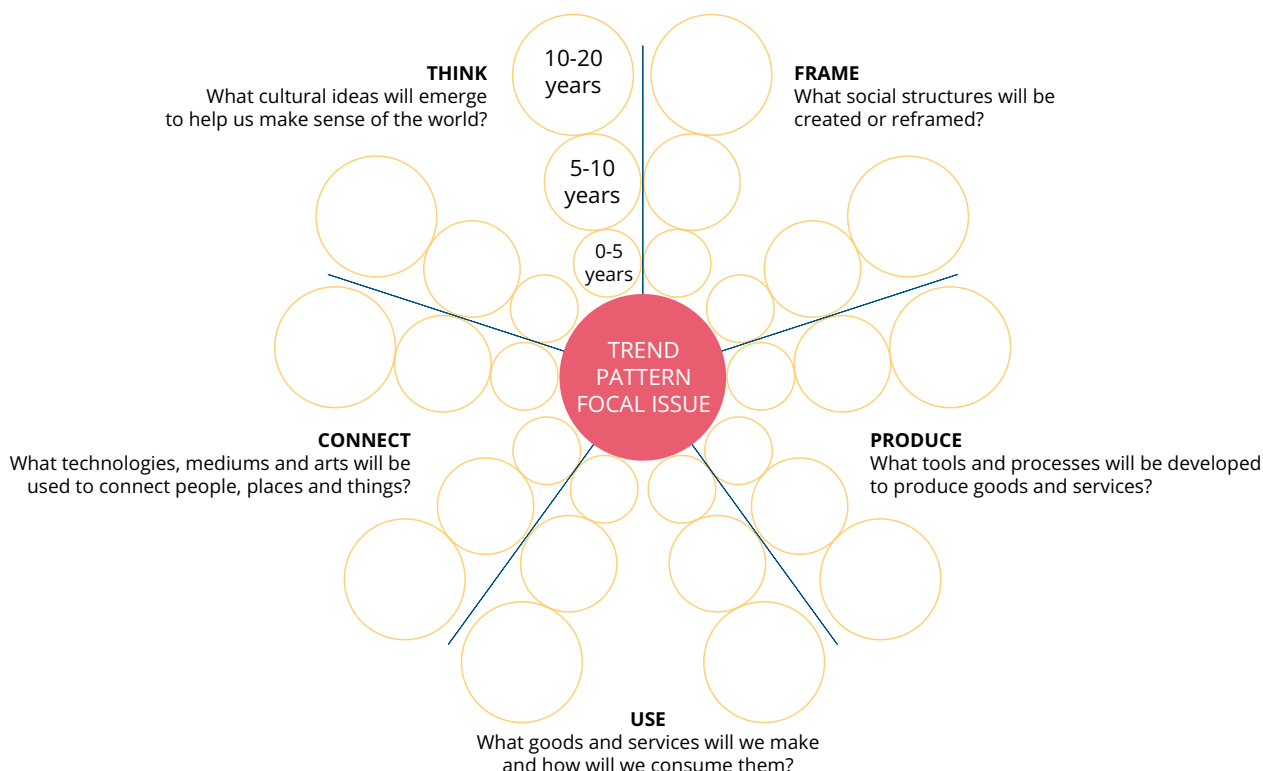
- Ask people to imagine the situation – what does this new pattern look like?
- Use the STEEP+V or PESTEL framework to make sure all impact areas are covered.
- Use elements of the mad hatter framework to make sure you get the right balance of impacts, positive, negative, etc., and do not stay within the same range.
- Try to work on the futures wheel not only during a workshop but for several weeks, as many implications can take time to emerge in your mind.

4.3.2.3.2 Point of impact wheel

The **point of impact wheel** is used to discover the short-, mid- and long-term implications of the emerging issues, trends and patterns we have identified through the previous exercises (Spencer and Montero Salvatico, 2019). This wheel includes the additional dimension of the point of impact framework (see Section 4.2.2.1.3) and ensures the mapping of broad and robust implications (see Figure 4.12).

How to use the point of impact wheel

- Select a trend, pattern or focal issue to work with.
- Think about its implications now and in 5 years. Diversify your thinking; use the point of impact categories to fill out each one of the sections. Try to answer each question, as shown below:
 - **Frame:** what social structures will be created or reframed?
 - **Produce:** what tools and processes will be developed to produce goods and services?
 - **Use:** what goods and services will we make and how will we consume them?
 - **Connect:** what technologies, mediums and arts will be used to connect people, places and things?
 - **Think:** what cultural ideas will emerge to help us make sense of the world?
- Once a new circle or impact is created, brainstorm the second-order implications – the results of the impact – and go further in time from 5 to 10 years.
- For the third-order implications, try to go even further in time, from 10 to 20 years in the future.

Figure 4.12 Point of Impact Wheel

Source: © Kedge, LLC (2019).

4.3.3 Deepening

The last activity of the sense-making step trains your skills of identifying new signals by imagining alternative futures through gaming. Furthermore, it helps you to deepen your understanding of the research question or focal issue by conducting a causal layered analysis (CLA).

4.3.3.1 Imagining the future through gaming

The 'Thing From the Future' is a card game designed to push people to think outside the box about the future (Candy and Watson, 2015). It is meant to help participants imagine alternative futures by describing a 'thing' in a particular future, assisted by a large number of prompts from the combination of four different cards. The main goal is to come up with a thought-provoking artefact and start a conversation about alternative futures. The scanning activities that you've performed before will help you to imagine different futures, and the futures you create will help broaden your scanning activity to explore new pathways.

How to use the Thing From the Future

There are four types of cards in the deck ⁽³⁾: **Arc, Terrain, Object, and Mood**. At its core, the game uses Jim Dator's generic images of the future, the ARC cards (Dator, 2014). The Arc cards provide the lens with which you see the world that your thing is situated in; these cards describe different types of possible futures, providing both the archetype and the time horizon. These four worlds are growth, collapse, discipline and transform.

⁽³⁾ Download the card deck: <http://situationlab.org/project/the-thing-from-the-future>

- **Growth** is a kind of future where everything and everyone keeps climbing, e.g. population, production, consumption.
- **Collapse** is a kind of future in which life as we know it is falling or has fallen apart.
- **Discipline** is a kind of future in which things are carefully managed by concerted coordination, perhaps top-down or perhaps collaboratively.
- **Transform** is a kind of future in which a profound historical transition has occurred, whether spiritual or technological in nature.

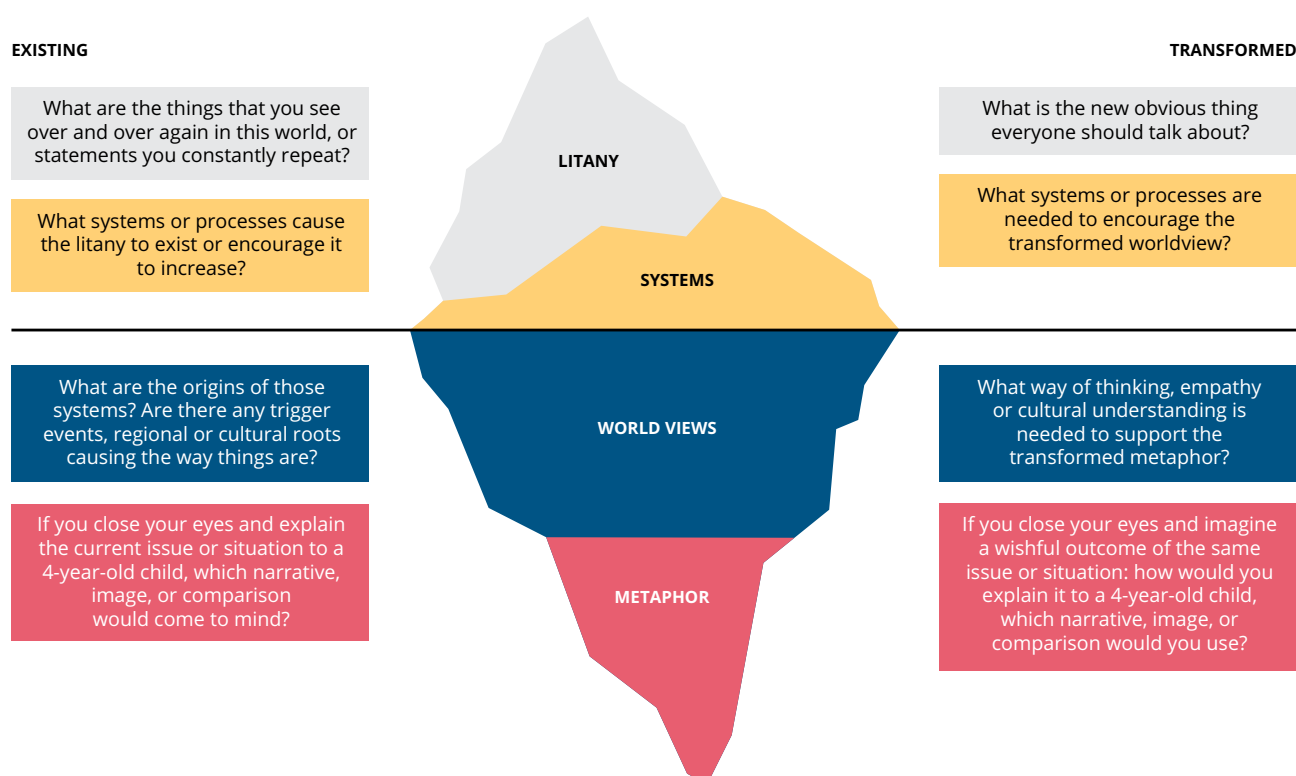
The other three cards are as follows: **Terrain** is the context the thing is in, **Object** describes the form of the thing, and **Mood** is the prompt for the emotions the thing evokes.

This game is very flexible and can be played with a large number of people, split into groups of four or five, with as many rounds as you want and with winners or not. You either shuffle or pick one card of each type, and, with that combination, describe, draw or model the thing. Share it with your group, big or small, and talk about the crazy ideas your colleagues come up with.

4.3.3.2 Transforming through causal layered analysis

Created in the late 1980s by Sohail Inayatullah, CLA is a futures method of imagining and creating the future more effectively (Inayatullah, 2017). It can be used to identify and analyse different levels of understanding about existing systems before creating new futures. It helps identify the root cause of a problem by peeling back issues layer by layer to understand the system. The four levels are the litany, the social/systemic causes, the worldview/discourse and the myth/metaphor that is rooted deeply in existing culture, traditions or long-term history.

Figure 4.13 Iceberg model and structure of a CLA



Source: Adapted from Inayatullah (2017).

The causal layered analysis can be used as:

- an exploration to identify and understand the deeper levels of present and future issues;
- a stand-alone methodology to unfold diverse perspectives of an issue, as well as to set a future transformational vision;
- a part of a foresight process, e.g. to create scenarios;
- a method that works well in groups of 5-10 (or smaller groups for more extensive workshops).

To better understand the concept of a CLA, it helps to imagine it as an iceberg (see Figure 4.13). Just like in real life, you can only see the tip of an iceberg above the water: this is the litany — often a phrase overused but visible to everyone. However, the real threat of an iceberg starts underneath the surface, as it triples in size and extends under water. If we do not take a close look at what is happening beneath the surface, we miss the actual threat of the situation or issue.

How to use the causal layered analysis

A CLA unfolds several layers to discover levels deeper than the litany, which can also be seen as the headline of a current newspaper. It tries to uncover which processes, hierarchies or systemic causes feed the litany at the systems level. Below the systems level, a CLA searches for indicators that support the systemic layer through the worldviews of diverse stakeholders. Each underlying level reveals a deeper understanding of the issue until it finds a metaphor, e.g. an image or comparison that mirrors the reality (see Figure 4.13).

A CLA starts at the top left of the present litany and follows a U-shaped path down to the present metaphor before continuing past a transformative metaphor and up to a new litany.

Important: Do not jump across the layers!

Each level can be explored by answering the following questions:

- **Existing litany:** presents the obvious issue in plain words as it would be stated in a newspaper headline.
What are the things that you see over and over again in this world or statements you constantly repeat?
- **Existing social/systemic causes:** social, technological, economic, environmental and political systems, processes or hierarchies feeding the litany.
What systems or processes cause the litany to exist or encourage it to increase?
- **Existing worldview/discourse:** deeper, unconscious ideologies, biases, traditions and assumptions.
What are the origins of those systems? Are there any trigger events or regional or cultural roots causing the way things are?
- **Existing myth/metaphor:** the unconscious dimensions of the issue, often stated in an image, a saying or a narrative.
If you close your eyes and explain the current issue or situation to a 4-year-old child, which narrative, image or comparison would come to mind?

After the group has agreed on a current metaphor or image, move to the right side and find the transformed equivalents. Start from the metaphor this time and make your way up to the top:

- **Transformed myth/metaphor:** the wishful dimensions of the issue, often stated in the desired image, saying or narrative.
If you close your eyes and imagine a wishful outcome of the same issue or situation: how would you explain it to a 4-year-old child? Which narrative, image or comparison would you use?
- **Transformed worldview/discourse:** the mindset needed to create or understand the new metaphor.
What way of thinking, empathy or cultural understanding is required to support the transformed metaphor?
- **Transformed social/systemic causes:** social, technological, economic, environmental and political systems, processes or hierarchies reinforcing the new mindset/worldview.
What systems or processes are needed to encourage the transformed worldview?
- **Transformed litany:** the desired vision that could be stated in a future newspaper headline.
What is the new obvious thing everyone should talk about?

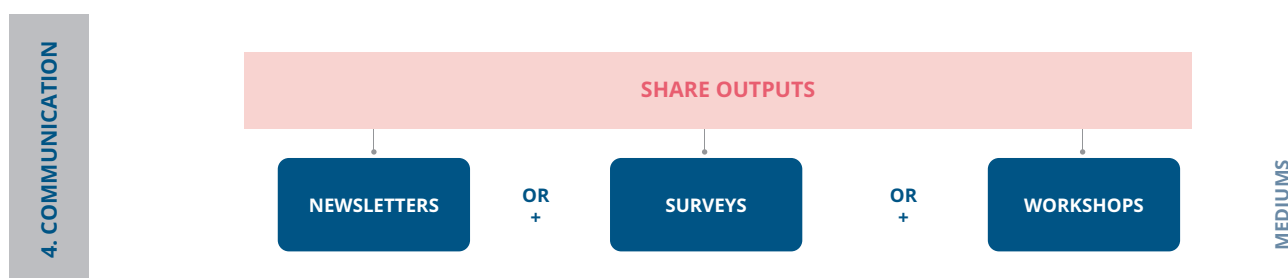
Pro tips

- **Litany:** agree on one issue to focus on.
- **Systems:** brainstorm and collect as many systemic causes as possible or needed.
- **Worldviews:** ask yourself if you would see things differently if you were born in a different part of the world. If so, why? Which characteristics, biases and assumptions let you know the issue in this specific context?
- **Metaphor:** try a visioning exercise in which the participants have to close their eyes and imagine the current situation or find a transformed metaphor.

4.4 Step 4: Communication

The last step of any scanning activity is to communicate the results in an engaging and informative way. Figure 4.14 shows a few different ways of sharing findings, including some media you can use to get feedback and even more insights from your broader community. To share your outputs, we suggest using a variety of the following tools, media and formats.

Figure 4.14 Visualisation of step 4 – communicating the outputs



4.4.1 Newsletter

A modern HTML newsletter offers the possibility to include survey modules and gaming elements to present the scanning results (e.g. signals in the spotlight) as well as insights gained during the sense-making process. It also promotes engagement within your network or community and offers the potential to communicate your results to a broader audience. Through regular events promoted in the newsletter, your scanning motivation can be kept high and new insights constructed regularly.

4.4.2 Surveys

Surveys are an excellent opportunity to include a broader audience in the sense-making process, e.g. by asking for an impact and uncertainty evaluation or identifying weak signals and emerging issues. Additionally, new insights can be gained by creating an ongoing real-time Delphi process that for every round recreates a new survey with deepening questions.

4.4.3 Games and workshops

We encourage you to facilitate ongoing 'Gaming the Future' sessions that increase your network's creativity and pattern recognition capacities. Furthermore, a biannual deepening workshop on conducting a CLA can help reframe the research questions and keep motivation high among the research team; the results of these sessions can be included in the newsletter.

5 What's next

We have come to the end of this guide, and you have read several times that horizon scanning is only one part of a holistic foresight process, albeit an enjoyable and important one. Horizon scanning is in many cases the first step of a foresight process and is followed by several different phases, steps and exercises. The next logical step could be to start a scenario development process to design alternative futures; however, this is only one direction in which to continue. We encourage you to review the frameworks below to identify possible next steps for your team on how to further use the results of a horizon scanning process:

- **generic foresight process framework** (Voros, 2003);
- **six pillars approach** (Inayatullah, 2008);
- **Natural Foresight® Framework** (Spencer and Montero Salvatico, 2019);
- **APF competency model** (Hines et al., 2017);
- **FTI forecasting model** (Future Today Institute, 2021).

Remember, the critical part of any foresight exercise is the conversations that happen throughout and in between. Do not dismiss that: always dig deeper and enjoy the journey!

6 In summary

This practical guide aims to develop foresight capacities and foster a culture of anticipation and preparedness within Eionet through horizon scanning. It offers step-by-step guidance on how to frame, run, analyse and communicate the results of a systematic horizon scan for practitioners with different professional backgrounds and levels of experience. Aside from offering a process, methods and tools, the guide introduces the concept of futures literacy and how to foster a futures mindset, and it provides guidance on how to avoid biases in the approaches and analyses. It emphasises the importance of adopting a systemic view when identifying emerging developments of potential relevance to the environment and environmental policy, since many of these emerge outside the environmental field. It also explores options for communicating your findings and the types of tools you can use to support your scanning activities.

Even so, remember that there are no fixed rules on designing and running a horizon scanning process. We encourage you to adapt the process to your needs by experimenting with the methods presented and 'hack' some of them to fit your purpose. Lastly, remember that all foresight activities are always best run in teams to welcome diversity and balance your own biases and assumptions about the future.

We hope that this guide has awakened your curiosity and that you and your team feel better equipped to explore the future – and remember:

'The best way to predict the future is to create it.'
Abraham Lincoln

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Annex 1

Glossary

Horizon scanning versus environmental scanning	Environmental scanning focuses mainly on current developments in STEEP factors and in our immediate environment that are outside our control but with which we live now. Horizon scanning tries to identify the early weak signals that may evolve into emerging issues in the future but are not yet to be found in current-day research or media. Those emerging issues can then become trends over time, possibly with transformative consequences, or disappear without further notice (Chermack, 2011).
Weak signal	Weak signals are emerging phenomena in the form of data points that indicate that significant change is under way (Kuosa, 2009; Forward Thinking Platform, 2014). These can be changes caused by society and by demographics as well as technology, environmental changes, the economy and, of course, human behaviour. These are changes that have not become trends but could become an emerging pattern or a major driver. In other words, they are those instances of change that are perceived when looking beyond our immediate context. Weak signals are not obvious to the naked eye but have the potential to create significant changes, both directly and indirectly, in the environment.
Emerging issue	An emerging issue is the result of an organic grouping or clustering of weak signals that, together, are gaining strength (Forward Thinking Platform, 2014). However, emerging issues are not yet trends and can die off easily, as they are highly uncertain, but can also easily become mainstream.
Trend	A trend is the tendency or direction of a movement or change over time; it is an emerging issue that has manifested itself enough to become a trend, as it is having an impact on its surroundings (Forward Thinking Platform, 2014). Trends have a life cycle with different maturity levels. These can start strong or weak, increase over time and eventually decrease; some are stable, while others have a short life. Trends are events that are already occurring or have faded away, and therefore have emerged either in the present or in the past.
Pattern	A pattern in the context of signals of change, scanning and foresight should be understood as a phenomenon made up of a manifestation of signals (Forward Thinking Platform, 2014). Also called a pattern of change, this is mostly an intangible development of transformation. Bundling weak signals into a pattern leads to an emerging issue. A set of emerging issues can be clustered into a trend, and finally a group of trends are categorised into either a megatrend or a trend cluster.
Drivers	Also called drivers of change, a broad term for any force that causes change, whether brought about by people, organisations or conditions (environmentally or otherwise) (Forward Thinking Platform, 2014). Drivers are factors that cause change, that affect or shape the future. These developments can be direct or indirect depending on their influence on or contribution to the outcome in the environment and in the system(s). This is why they can also be called contributing drivers.
Wild card	A wild card is a highly unlikely yet highly impactful event (Forward Thinking Platform, 2014): one that is surprising and unpredictable, and whose appearance will have tremendous consequences that can significantly change the present and the future. Wild cards should not be dismissed in a foresight process, as they push the out-of-the-box thinking that is necessary to address the new challenges and design new trajectories.

Black swans, grey rhinos, etc. (Sardar and Sweeney, 2016)

Black swans are events that are extremely rare but will have severe consequences that cannot be predicted and seem impossible until they occur. The difference between these and wild cards is that black swans are not even on the radar, so they are truly unforeseeable.

Black elephants are those events similar to the 'elephant in the room' that nobody wants to see or talk about.

Black jellyfish are visible and known risks that unexpectedly escalate until the situation is out of control.

Grey rhinos are events that move slowly and are obvious but often ignored. Unlike black swans, they are visible but somehow tolerated.

White leopards are hidden or camouflaged risks that are unpredictable but have large impacts with severe consequences — after they appear, people assume they were predictable (hindsight bias).

Megatrend

A **megatrend** is, simply put, a major trend or cluster of trends on a global or large scale (Forward Thinking Platform, 2014). Megatrends are large forces that form slowly but, once manifested, have a **substantial influence** over a wide range of areas. They are a force with the potential to affect the future in the long term, i.e. over the next 10-15 years.

Annex 2 Tools available and comparative analysis

A2.1 Tools to use ^(*)

To enrich and support your scanning practice, you may want to use available digital tools. There are comprehensive and licensed all-in-one tools explicitly designed for foresight exercises on the market. However, in this section, we focus on freemium and open-source online tools that can be used to perform each task separately and make suggestions to help you with each step of the guide. You can find a detailed comparative analysis of these tools, including some additional premium or paid version tools, in the table in Section A2.6.

A2.2 Tools for signal spotting

A2.2.1 RSS feed readers

- **Factr FREE** brings together the best features of collaboration tools, social media, bookmarking, file-sharing and news aggregators into a single platform, uniquely designed to give you control over your content, for whatever you need to do with it. Factr makes it easy to stay on top of what matters by allowing you to organise all your files, links, news feeds, and conversations into streams that you can share or keep private. It's up to you. <https://factr.com>
- **Flipboard FREE** was founded as one place to find all the stories for your day, bringing together your favourite news sources and social content, to give a deep view of everything from political issues to technology trends to travel inspiration. <https://www.flipboard.com>
- **Feeder FREE** lets you add content sources to get your very own customised news feed. Through advanced RSS integrations, you can connect to almost any source on the web – blogs, news, weather, government databases, job boards, Twitter, newsletters and more. Just pick and mix. <https://feeder.com>

A2.2.2 Social media analyses

- **Hootsuite FREE** lets you enhance your social media management with the leading social media dashboard. <https://hootsuite.com>
- **TweetDeck FREE** is your personal browser for staying in touch with what's happening now. <https://tweetdeck.twitter.com>

A2.2.3 Trend databases

- **WEF's Strategic Intelligence FREE** gives you strategic insights and contextual intelligence from the World Economic Forum. Explore and monitor the issues and forces driving transformational change. <https://intelligence.weforum.org/>

^(*) Please note that this list represents a snapshot in time of the freemium and open-source online tools available in 2021 when the guide was developed. Moreover, it is each institution's responsibility to check whether the tools listed meet national and/or organisational IT requirements.

- **Google Trends FREE** is a service from Google that shows the number of search terms actually entered over time and shows them in relation to the total search volume.

A2.3 Tools for signal scanning

- **Factr FREE** brings together the best features of collaboration tools, social media, bookmarking, file-sharing and news aggregators into a single platform, uniquely designed to give you control over your content, for whatever you need to do with it. Factr makes it easy to stay on top of what matters by allowing you to organise all your files, links, news feeds and conversations into streams that you can share or keep private. It's up to you. <https://factr.com>
- **Flipboard FREE** was founded as one place to find all the stories for your day, bringing together your favourite news sources with social content, to give a deep view of everything from political issues to technology trends to travel inspiration. <https://www.flipboard.com>
- **Pearltrees FREE** lets you to save everything: web pages, files, photos, videos, notes. Create your collections and organise them. <https://www.pearltrees.com>
- **Padlet FREE** is familiar and fun, even if you've never used any kind of productivity software before. Add posts with one click, copy-paste, or drag and drop. <https://padlet.com>
- **Airtable FREE (Web Clipper only premium)** is a low-code platform for building collaborative apps. Customise your workflow, collaborate and achieve ambitious outcomes. Get started for free. <https://airtable.com>

A2.4 Tools for pattern creation and sense-making

- **Padlet FREE** is familiar and fun, even if you've never used any kind of productivity software before. Add posts with one click, copy-paste, or drag and drop. <https://padlet.com>
- **Miro (workshop/whiteboard) FREE** lets you experience the power of the no 1 visual collaboration platform. Create, collaborate and centralise communication across your company. <https://miro.com/app>
- **Mural (workshop/whiteboard) (paid only)** lets you combine different ideas and disciplines with your team to create something great. Mural enables innovative teams to think and collaborate visually to solve problems. <https://www.mural.co>
- **Zapier FREE** (connect tools with each other) lets you automate processes without a developer. Workflow automation for large and small teams. <https://zapier.com>
- **Loopy FREE** lets you model systems by simply drawing circles and arrows, like a small child, and remix others' simulations. <https://ncase.me/loopy>
- **Kumu FREE** is a powerful visualisation platform for mapping systems and better understanding relationships. <https://kumu.io>

A2.5 Tools for communicating the outputs

A2.5.1 Newsletter

- **Mailchimp FREE** is an all-in-one marketing platform that helps you manage and talk to your clients, customers and other interested parties. Our approach to marketing focuses on healthy contact management practices, beautifully designed campaigns and powerful data analysis. <https://mailchimp.com>
- **HubSpot's FREE** CRM platform provides you with the tools needed to build and grow remarkable customer experiences that help spin your flywheel faster. <https://www.hubspot.com>

A2.5.2 Presenting results

- **Padlet FREE** is familiar and fun, even if you've never used any kind of productivity software before. Add posts with one click, copy-paste or drag and drop. <https://padlet.com>
- **Airtable FREE** (gallery view) is a low-code platform for building collaborative apps. Customise your workflow, collaborate and achieve ambitious outcomes. Get started for free. <https://airtable.com>
- **Stacker (paid only)** lets you turn spreadsheets into software – the most user-friendly platform for creating software without code. Create the tools you need from the data you already have. <https://www.stackerhq.com>

A2.5.3 Surveys

- **Typeform FREE** helps you turn data collection into an experience. Well-designed, easy to use, gives high completion rates and mobile friendly. <https://www.typeform.com>
- **SurveyMonkey FREE** is a cloud-based survey tool that helps users create, send and analyse surveys. Users can email surveys to respondents and post them on their websites and social media profiles to increase the response rate. <https://www.surveymonkey.com>

A2.6 Comparative analysis

Scanning					
Tool	Features	Pros	Cons	Free version	Open source
Factr	Add website feeds and set filters to see only the most relevant news from sources you trust	Share important information once, knowing it will reach everyone who needs it	Add most information manually or as RRS feeds	YES	NO
Brandwatch	Media analysis. Crawls through websites, forums, social media based on written queries and keywords	Access to a great number of data, many forms of visualisation, very flexible with individual queries, API connections	Crawls only websites stored in the system, many unfiltered data, not intuitive, requires training	NO	NO
Strategic Intelligence (WEF)	Collection of publications, interactive data on over 250 topics, regions and SDGs from several research institutions	Offers a good start for scanning and research in new topics, intuitive and nicely structured	Focuses on existing and proven data which thus contain less weak signals	YES	NO
FSC	Media analysis (monitoring) with pre-written queries. All-in-one foresight software	Easy to use, reduced and filtered data, more qualitative data, comparable visualisations	Selection of sources (websites), less flexible regarding queries and visualisations, historic data only up to 2018	NO	NO
Collecting					
Tool	Features	Pros	Cons	Free version	Open source
Factr	Gather and organise news, research, documents, and conversations into streams, instantly save links, images, files and more to read later, annotate and share	Discuss issues and share things with family members or community, create archives of anything with as many or as few people as you like		YES	NO
Pearltrees	Collaborative board for URLs, photos, files, notes. Elements can be organised and clustered freely	Easy to use, responsive for collecting and sharing data	Lack of browser add-ons	YES	YES
Padlet	Team collaboration software teams. Allows people to contribute anonymously. Admins can review the contributions before publishing	Easy to use, commenting and rating features for collected data, besides data collection, it can be used as a whiteboard, multiple ways to share and embed boards	In the free version, only five padlets are included, no browser add-on	YES	NO
Airtable (web clipper)	Browser add-on to create records from your browser/web pages with a few clicks	Many customisation and visualisation options for data, integration with other tools	Firefox not supported; most features are in the paid version	YES	NO
FSC (web clipper)	Browser add-on to create information (weak signals) from web pages with a few clicks	Firefox and Chrome supported	Only available with a FSC licence	NO	NO
Flipboard	Social news service for collecting articles and news in the form of magazines. Users can connect their Facebook, Twitter or Instagram contacts, follow feeds and share content with their followers	Great for collecting news and RRS feeds in magazines. These can be shared and embedded in websites	Does only support certain feeds and news	YES	NO

Sense-making					
Tool	Features	Pros	Cons	Free version	Open source
Miro (workshop/whiteboard)()	Collaboration platform for teams offering a white board to visualise processes, integrate external content (i.e. Airtable databases)	Real-time collaboration with many users, different levels of abstraction can be nicely visualised. Intuitive interface	Free version offers only public boards	YES	NO
Mural (workshop/whiteboard)	Digital workspace for visual collaboration. Offers a wide variety of different templates. Integrations for Typeform, Zapier, Airtable	Real-time collaboration with many users, different levels of abstraction can be nicely visualised. Intuitive interface	No free version	NO	YES
Zapier	Connects different tools with each other, even those without official integration support			YES	NO
Padlet	Allows non-registered users to comment and rate a collection of entities (e.g. weak signals). New signals can also be added	Easy, broad collaboration possible since no registration is required.	No filters, i.e. for metadata. Thus, confusing with a large amount of signals	YES	NO
FSC (foresight methods)	Creation of individual rating criteria and additional attributes to assess and analyse weak signals, clusters and in between connections	Powerful filters and sortings to support large amounts of data		NO	NO
Loopy	Tool for modelling systems by simply drawing circles and arrows, remix others' simulations	Easy to use, intuitive tool to visualise complex causal relationships and share these with others		YES	YES
Kumu	Organise complex data into relationship maps with built-in metrics and clustering of elements	Easy to use and highly customisable	Free version limited to public projects	YES	NO
Communicating					
Tool	Features	Pros	Cons	Free version	Open source
Stacker	View and comment on the Airtable data. A user portal can be set up for accessing, viewing, adding or commenting on the pre-selected data. Surveys or other external URLs can be embedded	Airtable integration and visualisation of data on a dedicated platform	No cookie policy	NO	NO
Airtable (gallery view)	Provides a gallery view to share via a newsletter, which provides the option to filter (without registration) and to copy and comment the data (after registration)	Share your weak signals via the gallery view or embedded on a website	No commenting functionality for visitors	YES	NO
Typeform (interaction + survey)	Survey tool with options for integration of various sources (i.e. Airtable integration)	Offers various integrations, e.g. within newsletter	Limited to 10 questions in its free version	YES	NO
Mailchimp	All-in-one marketing platform to manage and talk to clients or customers	Create beautifully designed newsletter campaign	Free version limited to a few templates and Mailchimp branding	YES	NO

Communicating (cont.)					
Tool	Features	Pros	Cons	Free version	Open source
Hubspot (marketing hub)	CRM platform with tools and integrations for marketing, sales, content management and customer service	Create beautifully designed newsletter campaign, CRM, marketing and website builder in one	Complex settings and less intuitive than Mailchimp	YES	NO
SurveyMonkey	Online survey tool for various use cases, i.e. customer feedback, including integrations and plugins	Intuitive administration of and participation in surveys	Currently no Airtable/Miro/Mural support (only through Zapier)	YES	NO
FSC (reporting, visualisation, survey)	PDF and DOCX reporting of signals, trends, etc. Different visualisation types (e.g. radar, portfolio) and survey methods to include external users	Combines the assessment, rating, visualisation and communication of weak signals and trends in one software solution	Less flexible than single software solutions	NO	NO

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