European Commission

JRC CONFERENCE AND WORKSHOP REPORTS

Workshop on Horizon Scanning: from Interesting to Useful, from Practice to Impact.

JRC and EKLIPSE,*

Brussels,
13-14 December 2017

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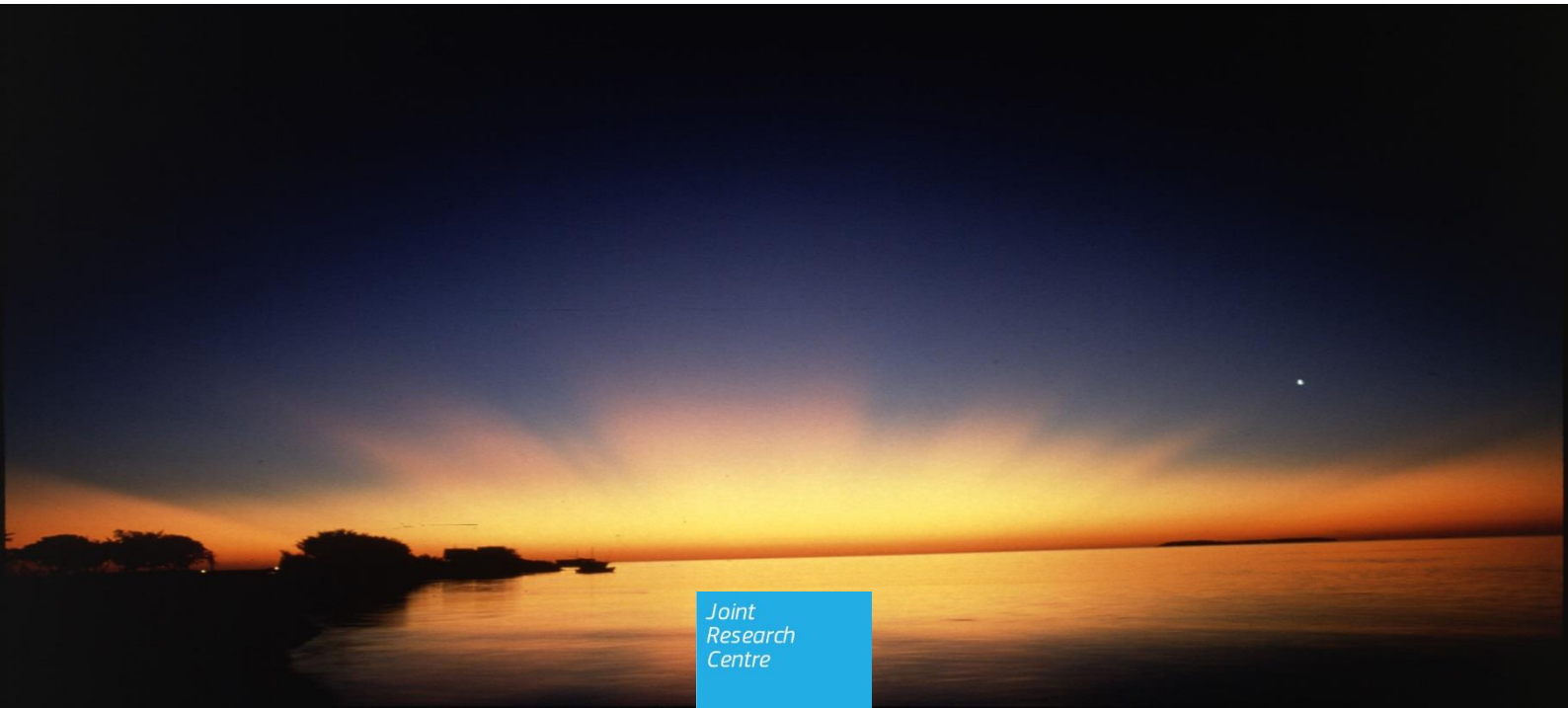

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Contents

Acknowledgements

The workshop has been conducted by the JRC together with the EKLIPSE project.

EKLIPSE is a H2020 funded project that aims to develop an innovative and self-sustainable EU support mechanism for evidence-based and evidence-informed policy on biodiversity and ecosystem services. A major function covered by EKLIPSE is the identification of research needs and emerging issues.

In 2016, EKLIPSE conducted an analysis of barriers and best practices in effectively engaging various actors from science, policy, and society in interdisciplinary and transdisciplinary approaches to identifying research priorities (both current and future research needs). Certain challenges were identified in current practices of engagement and consultation of science, policy, and society actors, related to: resource availability (particularly lack of time but also financial resources); organisation of the process (including lack of communication and proper dissemination about the opportunity to engage); trust in usefulness of the involvement process (particularly lack of confidence that results will be taken up); and questions about personal competence (particularly lack of knowledge on the specific topic addressed).

http://www.eklipse-mechanism.eu

EKLIPSE
Knowledge & Learning Mechanism
on Biodiversity & Ecosystem Services

Setting up a horizon scanning activity - insights from practitioners

DEFINE THE **PURPOSE**

- ✓ Horizon scanning provides timely awareness of what is upcoming, new, or changing.
- ✓ It is used as radar to identify challenges, failures, obstacles… but also opportunities.
- ✓ It helps bridge the gap between anticipatory thinking and informed decision-making.

DEVELOP THE **METHODOLOGY**

- ✓ What should I look for? Novelty, unobvious, uncertain.
- ✓ Where do I look? The more diverse the better.
- ✓ How do I look for valuable information? Combination of automated tools and human intelligence.
- ✓ What do I do with what has been found? No set method – choose the best approach for you.
- ✓ When do I stop? Pre-determined point when there are sufficient results.

SET UP THE **ORGANISATION**

- ✓ Find a champion who takes ownership, who can convince, and who involves stakeholders.
- ✓ The team should combine people with specific HS skills, as well as a wide group of scanners and stakeholders. The process is iterative and involves everyone from beginning to end.
- ✓ The process and infrastructures will be specific to each organisation.
- ✓ Horizon scanning activities should be embedded into the organisation's processes.

PREPARE THE **COMMUNICATION**

- ✓ A clear communication strategy should be established from the start, explaining the purpose, benefits, and objectives of the HS activity, and defining the targeted audience groups.
- ✓ The messages should be:
    - well explained by the researchers/scanners to the communicators
    - tailored to the target audience
    - of appropriate format and well-referenced
    - sent through suitable channels that convey them correctly
- ✓ The stakeholders involved at the very beginning of the process can act as "ambassadors".
- ✓ There are sufficient resources allocated to communication/dissemination.

REACH OUT TO **DECISION-MAKERS**

- ✓ The broadest possible range of stakeholders and experts should be included to ensure diversity.
- ✓ The HS activity should be incorporated into current priorities.
- ✓ Timing is crucial (not too early, not too late).

1 Horizon scanning: a practice in need of recognition

On December 15, 2017, the EKLIPSE project[1], together with the EU Policy Lab (Foresight Team) of the Joint Research Centre organised a workshop on "Horizon Scanning: from interesting to useful, from practice to impact". Its purpose was to gather insights from practitioners across different fields and sectors on how to run a horizon scanning exercise. The experiences that were shared have been collected here in the form of a guide for those wishing to develop a horizon scanning activity.

The objectives of the workshop were:

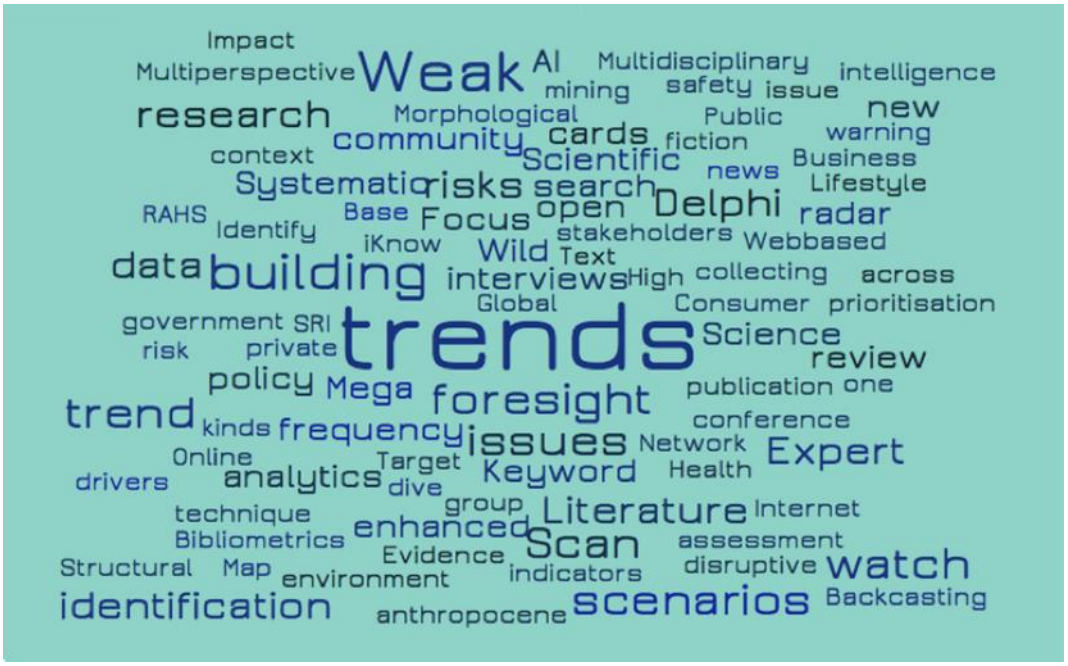
- to bring together diverse perspectives and practices around the concept of horizon scanning to show the diversity of methodologies and activities it encompasses as well as the commonalities
- to identify the various methodologies used and the challenges to address when implementing horizon scanning initiatives in order to discuss ways to overcome these challenges
- to discuss ways to improve the use and take up of horizon scanning results by decision-makers and end-users: how to communicate the results, ensure a follow-up to identified emerging issues/phenomena, to help horizon scanning to have more impact
- to create a community of practice around horizon scanning/networking.

[1] http://www.eklipse-mechanism.eu/

2 What is horizon scanning?

Horizon scanning is an activity of systematic and systemic review of recent developments to try and spot emerging issues that would require a change in behaviour, strategy, policy. Depending on the purpose, there can be different approaches to horizon scanning. Figure 1 brings together the words used by the participants in the discussion to evoke what the term 'horizon scanning' means to them. This word cloud is a witness to the diversity of perspectives on horizon scanning but the detection of 'trends' comes to the fore as a common area of focus.

Figure 1: Word cloud with the aspects of horizon scanning mentioned by the participants



After a first brainstorming an attempt was made to identify what are the more common uses and types of horizon scanning and their specificities. Table 1 below summarises what emerged from the discussions.

Table 1: Main types of horizon scanning identified by participants

Trend watching	Weak signals identification	Emerging technology watch	Risks/threats identification	Foresight scenario building
Identifying early stage trends	Searching for unknown unknowns	Potentials and threats of emerging technologies	Early warning for anticipating, preventing, and framing risks and threats	Preparing the ground for further foresight work.
Isolating canalised information from broad range of data	Looking for unconnected issues, involve diverse people,	Expert polling, technology analysis,	Assessment of probability and impact, indicators monitoring	Identification of weak signals and drivers of change
Prioritisation of new developments through trends	VUCA (1) – change happens faster than we can conceptualise	Explaining technology, showing implications	Timeliness, carefully framed language	Getting support of people for the foresight

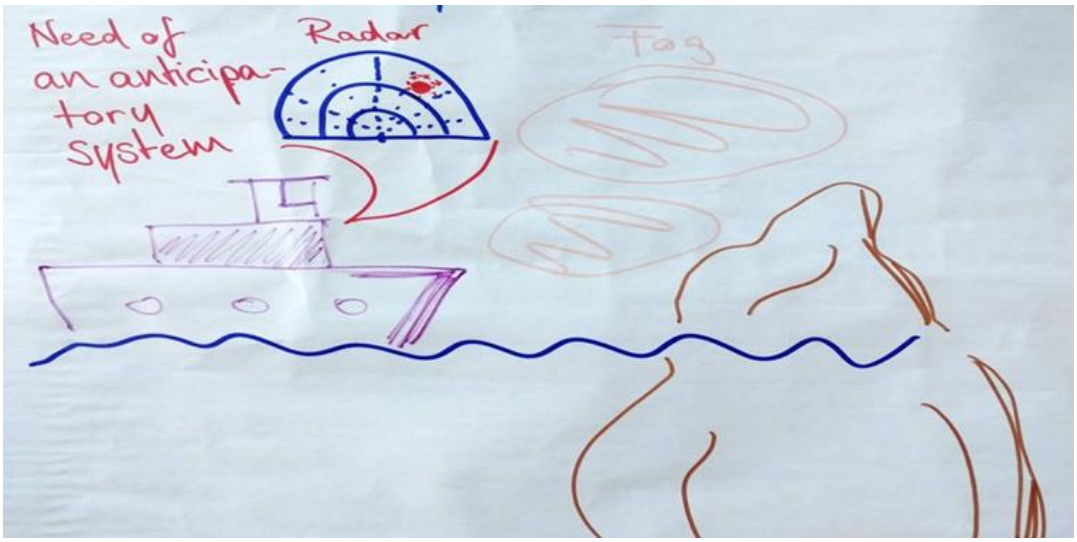
(1) VUCA: Volatility, uncertainty, complexity, ambiguity

However, regardless of the particularities of individual horizon scanning exercises, it soon became clear that there are common characteristics across all types of horizon scanning. The next sections summarise common issues and suggestions regarding four key aspects of horizon scanning activities: purpose, methods, organisation, and communication. What follows are the ideas extracted from the discussions between the participants in the workshop.

2.1 Purpose

The overarching purpose of horizon scanning is to provide timely awareness of what is new or changing – to identify risks, as well as opportunities, that these phenomena can create. Systemic failure often comes from what people don't see or are unable to respond to. To take a navigation metaphor, as illustrated in Figure 2, it is the radar on the ship that helps identify an iceberg (of which only a small part is visible anyway) in the fog.

Figure 2: How not to wreck a ship.



Source: Drawing generated during the workshop.

Horizon scanning also allows early discussions to start on the intended and unintended effects of these developments. It is the preliminary set of evidence that allows bridging the gap between evidence-informed decision-making and anticipatory thinking.

But if horizon scanning is potentially so valuable, why do so many organisations find it so hard to implement and even more to keep it going? Three main issues have to be addressed to make the project successful: justify time and resources on the long-term, align diverse interests, and manage expectations.

Conducting a horizon scanning activity requires time and resources that could be allocated to other activities. Therefore there is a need to show that it can deliver significant benefits, e.g. give a competitive advantage, allow formulating a pro-active strategy, etc. However, this requires a culture of pro-activity, anticipation and thinking beyond planning.

One way to illustrate the potential benefits of horizon scanning is to look at past emergence of issues and to highlight warning signs that could have been detected to build thinking based on prevention. Another is to develop a quantitative assessment and evidence base from such activities elsewhere. Yet another way to show the benefits of horizon scanning is to make people realise that it (and other forms of anticipation) is practiced much more often than people realise (even if it is not called horizon scanning).

Once managers have realised the potential benefits of the exercise, the diverse interests of users would need to be managed. The diversity of purposes and interests in such an exercise has to be aligned or at least be made compatible. Fortunately, horizon scanning is flexible regarding its scope and the activity can be presented easily as a service for different projects and activities. The reply to the recurring question of "what is in it for me?" needs to be personal and specific.

The last issue relates to the responsiveness and take up of the horizon scanning output. This requires addressing the widespread fear of uncertainty and avoiding expectations that will produce predictions. Therefore, building foresight literacy in the target or user group and being specific in framing the horizon scanning is necessary.

Box 1. Purpose of horizon scanning

UK Environment Agency has been using horizon scanning internally to develop a wider anticipatory thinking, beyond the short-term forecasts in particular domains. One such activity was developed for incident management, where understanding the purpose of the exercise and what it could bring was a process in itself.

Initially, the team provided a list of potential issues that could affect incident management in the longer term, which was too broad. The focus was then on refining the results using expert judgment and prioritisation. The reaction has been positive and the process was repeated in the following year. As the collaboration developed and there was better understanding what horizon scanning could bring, new demands emerged and new ways of addressing them were created.

2.2 Methodology

No single horizon scanning methodology can be applied "off the shelf". However, there is a set of issues that have to be addressed in order to create a robust methodology.

What should I look for?

The amount of information available to any organisation is overwhelming. Without some clarity on what to look for, it is easy to drown in meaningless data (see Figure 3). Some of the characteristics of the information useful for horizon scanning are those that: attract attention in some way; put existing scenarios under pressure; are potentially disruptive; are bifurcation points; show how existing things evolve; give parallels from other sectors (synergies) and new applications for existing technology and ideas; indicate change OR no change when other developments would have raised expectations of change; are against conventional wisdom; seem ridiculous, etc.

Figure 3: The multiplication of sources and how to process them

Source: "Everyone has their own chimney" (Drawing generated during the workshop)

Where do I look?

As hinted at by the term 'horizon scanning', diversity and breadth of information are important to its effectiveness. “Scanning the scanners”, crowdsourcing information, social media and alerts from different fields are some of the methods that can support diversity. Useful sources include: newsletters, publications, scientific reports, patents, archives, models, start-ups, associations, scientific reports, but also conversations and debates and many more. Intuition should be used to identify the most relevant and not necessarily obvious sources and make sense of what comes out.

How do I look for valuable information?

Most methods use a combination of automated tools and having people as scanners adapted or specifically designed to the information that is sought after. In spite of the progress of AI and other 'smart' software, automated searches still provide “lots of garbage vs few little gems”. As, by definition, scanners do not know what they are looking for when engaging in horizon scanning, keyword based searches pre-filter information, thereby potentially eliminating interesting information a priori. Also, restricting oneself to scanning only one domain (e.g. food safety) because it is the main domain of activity of the organisation should be avoided as the main issue of interest can be affected by developments elsewhere (e.g. in this example, technology, economics, trade issues, social trends, etc.).

'Intelligent' filtering tools (language monitoring, images, semantics) are needed to address this issue. Human 'intelligence' is needed to refine the pool of useful information. Pointed consultations with experts (practice and science) through interviews/questionnaires, focus groups etc. can be used to refine the exercise further. A pool of permanent scanners (the question here is developing the right culture and mind-set) can also be relied on to perform the data collection.

What do I do with what has been found? What does it mean?

Once enough relevant material has been collected, it needs to be analysed. This can be done using criteria/taxonomies (keeping in mind the mandate and purpose of the exercise), adopting the right analytical approach and putting it in the larger context of the system of interest. The overarching question to answer is: 'how do these pieces of information relate to each other in a way that could affect the issue or system of interest?' The next step is making sense of the analysis. What are the consequences of the emerging issues that were identified, what is their salience? What can the customer do with these insights?

Finally, as the scanning and analysis often provide a lot of potentially relevant information, a decision has to be taken on prioritising what is most important (using e.g. best/worst scaling, Delphi with relevant criteria – e.g. EFSA criteria – novelty, impact, severity, etc.). One can then dedicate more attention to investigate the selected issues more in depth to check whether the first impression can be confirmed.

When do I stop?

With every new development, there will be new information, new insights, new connections made – in this sense the horizon scanning never ends. Therefore a point has to be chosen when the results are deemed of sufficient value and quality to be communicated to the relevant contacts. At the same time, if the process is sufficiently embedded in the structure, these results will be analysed and deepened in other parts of the organisation.

Box 2. Choosing horizon scanning methods

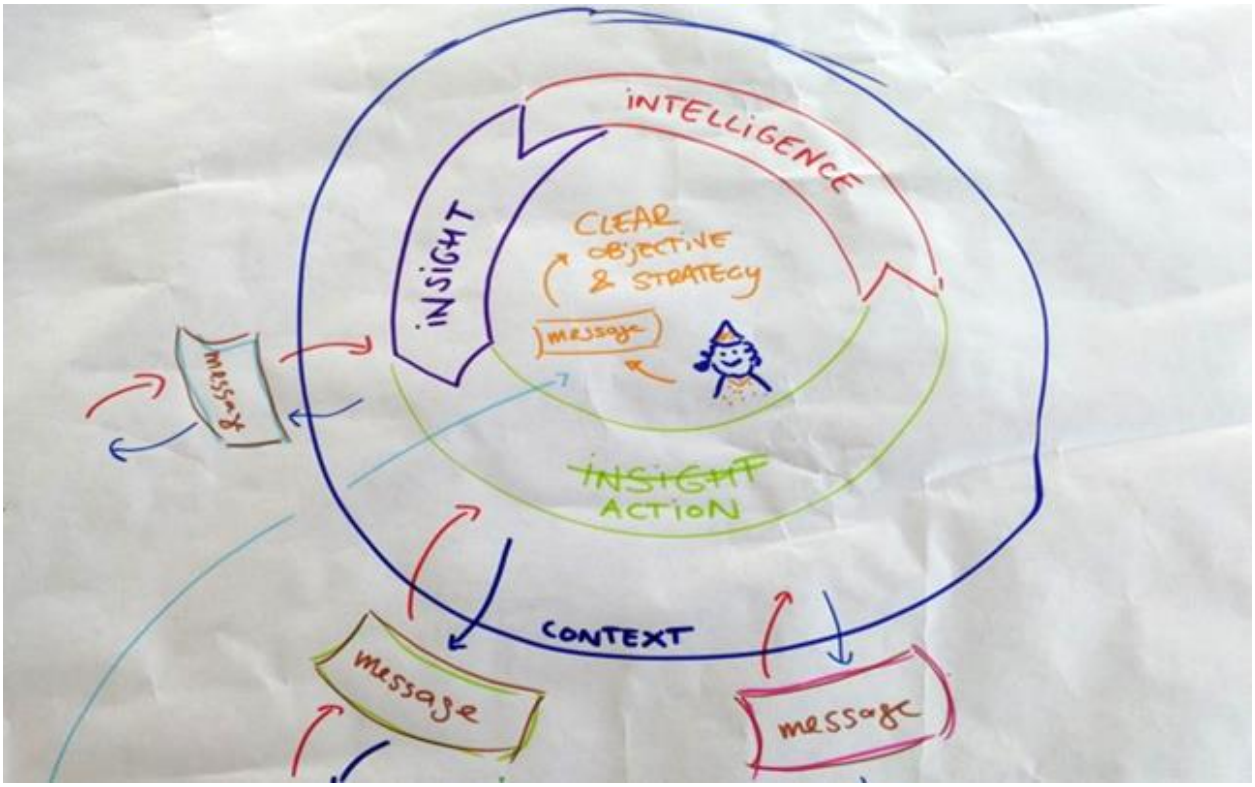
The European Parliamentary Research Centre is the European Parliament's in-house research centre and think tank. The Scientific Foresight Unit (STOA) has undertaken a horizon scanning study, conducted by experts in the use of data-analytics, consisting of 2 parts: (1) a horizon scan of 'trendy' techno-scientific topics, combined with a controversy analysis between the stakeholders involved in these topics; and (2) an in-depth analysis of eight trending topics, to get an insight into the different perspectives, perceptions and viewpoints of the diverse stakeholders involved in the technology, its applications and its consequences.

The controversy analysis helped prioritise issues which were more polarising and politically salient. However, using sentiment analysis on social media data was a challenge with regard to understanding the role of bots on twitter and not biasing the analysis. The issues that were prioritised were often combined to form a bigger topic or linked to other issues of interest for policymakers to come up with new, less obvious approaches to the particular topics.

2.3 Organisation

How the horizon scanning activity will be organised highly depends on the purpose and the methods used. As an early warning system it should lead to insights that result in action being taken by the organisation. Therefore the way the activity is organised will impact whether it can mobilise a wide range of stakeholders and influence the decision making. Figure 4 illustrates the Intelligence-Insight-Action cycle within which horizon scanning should be organised.

Figure 4: The Intelligence – Insight – Action cycle, set in context, to steer organisation and communication.



Source: Drawing generated during the workshop.

Organisation of the horizon scanning activity should take into account the following:

- Driver/champion – having a high-level champion of horizon scanning, who will take ownership of the process, is very useful at the stage of setting up the activity. It should be someone who can convince others of the value of horizon scanning and assure that a broad range of stakeholders is involved.
- Team (core and stakeholders) – The activity is usually conducted by a core team with skills specific to horizon scanning and broader groups of scanners and stakeholders involved in sense-making. A broad range of stakeholders is needed to have sufficient insights into developments in different domains and thus the credibility of the results. Another important aspect to take into account is the principle of iterative process: stakeholders should take part in the horizon scanning from the beginning and should be re-consulted later on, after other results came up. The focus should be on people interested in discussing change and being involved.
- Process and infrastructure – The process will be very different, depending on the expected results, available resources and methods chosen. Each horizon scanning activity has to think about how to collect the information (templates, etc.), where to keep it (databases) and how to involve a broad range of people (virtual collaboration, workshops).
- Embedding – for the process to be sustainable over the long term, it should become embedded in the organisation, it should be included in the broader processes of the organisation and in long-term partnerships with other projects/departments. The product should have recognised value and be useful for decision-making.

Box 3. Organisation of horizon scanning

Futures Platform is a web-based strategic foresight tool for regular horizon scanning. The tool was used in the Finnish National Agency for Education's foresight project.

Five different foresight radars were built and during the two years that the project lasted, 26 different working groups used them as a tool for mapping out the scenarios of future professions. Involving many groups of experts gave the project the required breadth of expertise but was quite challenging. There was a varying level of motivation and engagement - clear instructions and training had to be provided and inevitably some of the groups were much more involved than others. The visual radars provoked fruitful discussions in both face to face and online workshops.

2.4 Communication

Horizon scanning identifies new and emerging issues and as such is always challenging the recipients' currently held views and assumptions. A clear communication strategy, including a clear and well defined explanation of the objectives of the activity, should be developed at the beginning of the process, and it is necessary to make sure that adequate resources are available. A clear communication strategy from the beginning is also crucial to ensure that clear target audiences are identified (age group, personality profiles…) so that messages can be tailored to each group based on their needs and interests. The stakeholders that were involved in the process of horizon scanning are an asset also at the communication stage; they can act as "ambassadors" for the process and results.

The message should:

- be fit for the target audience - Clear differentiation of target audiences and targeted messages to each of them (different format, contents…). Additionally, in terms of communication of results of horizon scanning exercises, the barrier of

language and cultural differences can sometimes be problematic when results are translated into foreign languages.

- be framed properly - Building mutual understanding between those who produce the research and those who communicate on it is crucial. Indeed, the language used by researchers can be very different from that used by communicators. Yet, it is very important that these two understand each other. It is therefore worthwhile allocating time and resources to have a clear dialogue between the research team and the communicators; therefore ensuring more accurate messages communicated to external audiences. A good way to proceed is to hook the attention with a few important points and continue communication at regular intervals to keep the interest of targeted audiences.
- have the appropriate format - Decision-makers often look for 3 to 4 key points that they can draw as conclusions of the horizon scanning exercise but sometimes, it is very difficult to draw just a few points from such complex and extensive research. The credibility of the source of information is also important for decision-makers and should therefore not be disregarded (therefore, clear track records of the process are important).
- have many formats - The diversity of formats can help convey the message and professionals can help with identifying the best format to communicate the results. There is also an issue in how to stay agile in big organisations: often, there are regulations in terms of format, of communication practices, etc. that sometimes hinder the creativity of how results of horizon scanning exercises can be presented.
- use suitable channels - Use media as a channel to share the results (but important to keep it ethical).

The ethical aspect of the horizon scanning should also not be forgotten, whether from the perspective of what kind of horizon scanning is being conducted, or on the aspect of communication. For instance, there are some cases where media take up some results of the horizon scanning to make a headline, but at the same time, disregard most of the other conclusions of the horizon scanning. Therefore, even though attracting media is an important element, the ethical aspect should nonetheless be carefully protected.

Box 4. Communicating horizon scanning

The Federal Environment Agency (UBA) is Germany's central environmental authority. Horizon scanning activity is part of the scientific advice to policy that the Agency provides. The project started with a concept study, mapping out different horizon scanning approaches and methods. On the basis of this an approach tailored to the needs of the Agency was created and piloted. Initially the project came up with a long list of emerging issues but that was impossible to bring to the attention of policymakers. However, further prioritisation efforts and work with policymakers helped develop some of the ideas into downstream projects.

The experience of the pilot suggested that in a successful project about 50% of efforts should be put on the scanning and analysis and 50% on transferring the information to relevant policymakers and stakeholders – convincing people, starting initiatives and making sure it is taken up further.

3 Conclusions

3.1 How to bring emerging ideas to decision-makers?

Horizon scanning focuses on identifying new and emerging phenomena that are likely to have significant future impacts. Its purpose is to inform and influence decision making in the present to take future advantage or avoid future risks created by these phenomena. However, many decision makers are not used to practice future thinking consciously and prefer to stick to the issues they are familiar with and deal with what exerts pressure on them here and now, disregarding what might happen in the future.

More generally, there is often a cultural gap between decision making based on more or less certain evidence about the current state of the systems being dealt with and forward-looking decision making that uses foresight (based on distributed intelligence, knowing the systems of interest and how they could evolve to be able to chart a course towards the future). We need to connect three distinct 'pillars' common to both horizon scanning and evidence-based decision making: (1) building intelligence; (2) developing insights about the future (i.e. when presented with uncertainty); (3) formulating and delivering action.

Some characteristics of horizon scanning can have a positive influence on decision-making:

- Inclusiveness: the outcome of horizon scanning is often the result of a collective sense-making process and not just an individual opinion: this shows the importance of including a broad range of expertise/people in the process and of creating a community and a common reflection process;
- Incorporation in current priorities: horizon scanning should show how emerging issues relate to current thinking/strategies/problems;
- Timeliness: if the issues are too early, they are not treated as a priority; if they are too late – they are already known.

3.2 More in common than expected

A review of what is happening around us and how it will further develop and impact us - horizon scanning – is something that most people would do, to the extent possible, before taking a decision. An increasing number of organisations now do perform this exercise consciously, systematically, and collectively. Regardless of the variety of applications and diversity of practical methodologies, they have many common points and a similar language to describe them.

There is scope for learning from each other about the practicalities of setting up processes, the communication, and the organisation of horizon scanning activities. However, as systemic approaches to the analysis of our environment are more prevalent, the new phenomena on the radar of very different organisations are the same ones. Therefore, potential next steps would be to start sharing the insights from different exercises and talk about sense-making.

List of boxes

List of figures

List of tables

Annexes

Annex 1. Some of the participants' horizon scanning activities

Foresight Courses provided by the Univeristy of Manchester

Effie Amanatidou, Manchester Institute of Innovation Research/University of Manchester

The Foresight Executive Course is aimed at professionals looking to develop their skills in the area of Foresight and Horizon Scanning.

Another foresight training is provided under the ERA-LEARN 2020 project (www.era-learn.eu). The aim of this training course is to empower management structures of Public-Public-Partnerships in their endeavor to develop, align and update their Strategic Research (and Innovation) Agendas in the trans-national context of Joint Programme Initiatives.

http://www.research.mbs.ac.uk/innovation/Study/Professional-Development-Short-courses/Foresight
https://www.era-learn.eu/events/era-learn-training-course-using-foresight-in-public-public-partnerships-p2ps-3

JRC Horizon Scanning

Elisa Boelman, Laurent Bontoux, Maciej Krzysztofowicz, Amalia Munoz Pineiro, JRC

In line with the JRC Strategy 2030 that calls for the development of a stronger anticipatory culture, the EU Policy Lab, with the active involvement of the Knowledge Management Units, has launched a horizon scanning pilot project that complements the other forms of monitoring that the JRC conducts through observatories and knowledge networks. The purpose of the JRC HS pilot is to identify weak signals of change, emerging issues and events that might have significant future implications for the EU but are not yet on the policy radar or addressed adequately. This HS system is being designed specifically to increase the JRC's anticipatory capacity, to build coherence among future policies and setting priorities.

Mapping of emerging technologies and techno-societal trends

Adrian Curaj, Institutul de Prospectiva, UNESCO Chair on Science and Innovation Policies at SNSPA

The institute combines gamified human evaluation and machine learning for the selection of relevant news from a flow of 30000+ news each month. Natural Language Processing is used for the clustering of news and other sources. The institute applies collaborative procedures for the elaboration of tech briefs and Dynamic Argumentative Delphi for assessing the impact and prospects of emerging technologies.

www.prospectiva.ro

Looking for signals of change that could impact on the UK Environment Agency's remit to improve resilience to risk and openness to opportunity.

Jason Dinsdale, UK Environment Agency

Horizon scanning is used to look for signals of change that could impact on the Environment Agency's ability to fulfil its role. The horizon scanning team currently consists of 2.2 full-time equivalents. Our main method of horizon scanning is using a broad range of web based sources. Article summaries are stored in a bespoke searchable database and publishing platform. The database content provides content for most outputs. Bespoke outputs tend to be targeted toward decision makers, e.g. senior management. We also produce futures material with a wider remit for general access. Facilitating futures discussions to help develop longer term thinking. We also collaborate with partners outside of the Environment Agency on futures work, such as Natural England, Defra, Parliamentary Office Of Science and Technology (POST) and University Of Cambridge.

http://www.cell.com/trends/ecology-evolution/fulltext/S0169-5347(17)30289-6. (Collaboration on a recent paper: A 2018 Horizon Scan of Emerging Issues for Global Conservation and Biological Diversity)
www.horizonscanning.net Horizon Scanning Database (password protected), holds over 14,000 articles of horizon scanning intelligence

Technology and regional foresight projects

Joanna Ejdys, Katarzyna Halicka, Bialystok University of Technology, Poland

(1) preparation of the future studies; (2) methodology of mapping key and priority technologies; (3) choosing technologies for the economy of Podlasie Voivodeship; (4) preparation of a strategy for the development of nanotechnology in the Podlasie Voivodship until 2020. STEEPVL analysis is used to identy factors influencing future events (e.g. nanotechnology development at regional level). The two axes method is used to build up scenario of nanotechnology development at regional level and the MIC-MAC method (open source software) is applied to structural analysis which makes it possible to identify key driving forces. Weak signals of nanotechnology development are then identified and included in scenarios. Identification of weak signals of the Chinese New Silk Road initiatives to study the perspectives of development Podlaskie region.

Ejdys, J., New Silk Road – a Weak or a Strong Signal? „Procedia Engineering" 2017, Volume 182, p. 182-188, doi: 10.1016/j.proeng.2017.03.159

Halicka K., Innovative Classification of Methods of The Future-Oriented Technology Analysis, Technological and Economic Development of Economy 2016, 22 (4), p. 574–597, [ISSN 2029-4913, e-ISSN: 2029-4921], doi:10.3846/20294913.2016.1197164

Using an internal innovation radar to inform researchers

Verena Fennemann, Fraunhofer-Institute for Material Flow and Logistics, Germany

We are scanning the logistics research sector and the market developments as information for our researchers' activities. We aim for internal innovation radar as source of information for the researchers and basis for new strategic initiatives in the sector.

So far, we haven't used a specific approach/method for a constant and steered Horizon Scanning. The work is mainly driven by colleagues active in the field of strategic initiatives who mainly use the information for their own daily business (strategic development, new cooperation, etc.). The methods used include literature/news scanning/desk research; pictures of the future/scenario techniques for the development of strategic initiatives.

Our target audience are IML researchers and management staff and the main channels are: direct communication to the researchers, internal workshops, publication via social intranet of Fraunhofer IML, and the IML internal "Innovation Radar Database" (under construction).

Cranfield University's horizon scanning approach

Kenisha Garnett, Cranfield University

Cranfield University's categorisation of insights including potential future risks and opportunities has been developed to inform policy discussions. Our approach has emerged from a structured three-year programme of horizon scanning for a UK pan-government futures partnership led by the Department for Environment, Food and Rural Affairs (Defra). We have integrated horizon scanning and risk prioritisation, using a qualitative weight of evidence framework, to create a systematic process for identifying all signals of potential future change with significant impact for the strategic mission and underlying values of policy actors. Our approach encourages an exploration of factors out of the control of organisations, recognising that resilience depends on the flexibility of management strategies and the preparedness to deal with a variety of unexpected outcomes.

Garnett, K., Lickorish, F.A., Rocks, S.A., Prpich, G., Rathe, A.A. and Pollard, S.J.T. (2016). Integrating horizon scanning and strategic risk prioritisation using a weight of evidence framework to inform policy decisions. Science of the Total Environment, 560-561: 82-91.

http://www.cranfield.ac.uk/courses/short/environment/enviro-strategic-foresight - Our Strategic Foresight short course offers training in horizon scanning

'Environmental futures: Hungary for 2050'

Éva Hideg, Corvinus University of Budapest

The project, under the umbrella of the Hungarian Academy of Sciences Centre for Ecological Research, was 1) to map the possible changes in natural and human ecological systems until 2050 in Hungary; 2) to present cross-cutting future issues; 3) to further develop the participative. In the questionnaire procedure the practitioner futurists had to classify the future statements in certain kinds of future categories and to use the Osgood's semantic differential scale to estimate impacts and the probability of future statements. A paper about research activity is under publication in a Hungarian periodical and in Hungarian language, and a small book for the Hungarian Academy of Science and governmental organizations of the Hungarian scientific policy.

The European Medicine Agency's 'Observatory' for Future Challenges'

Earl Philip Hines, European Medicines Agency

The aim of this observatory is to identify potential challenges arising from innovative scientific developments that may require an integrated regulatory science response across the development lifecycle of future medicines. It is targeted towards the agency itself and Member States agencies Methodology: Signal detection (e.g. Stakeholder+ acedemic +industry interactions) and a modified DELPHI method.

Early identification of research priorities for social-ecological scenario studies

Jan Kuiper, Stockholm Resilience Centre

Scenarios are increasingly developed and applied for various purposes. The community of researchers and practitioners is fragmented, unorganized and growing fast. We are assessing what people within this community think are priorities for research to better understand where this field is heading and to help organize and focus the community.

We used a modified Delphi method to identify and rank research priorities using Google Forms to retreive input from experts in the community. We used Twitter and the Future Earth Open Community Forum to reach people in the community as well as email-lists from different sub-communities (e.g. IPBES working group on scenarios, the Natural Capital Project, the Stockholm Resilience Centre).

We first asked experts from all around the world what they think are the key research questions that will signficantly further this field in the next couple of years. In the second stage we asked the experts to rate the importance of each of the research question (using the scores to rank them) and to suggest key questions that were missing. The updated list will be used for a final iteration where experts get another opportunity to rank the questions, ultimately revealing the top 10 research priorities for social-ecological scenario studies.

www.pecs-science.org/research/workinggroups/scenariodevelopmentfortransformativepathways

The 'seeds of a good anthropocene' project

Jan Kuiper, Stockholm Resilience Centre

The 'seeds of a good anthropocene' project develops a global database of 'seeds' or 'bright spots': local and unknown initiatives that have the potential to be making a substantial contribution towards creating a future that is just, prosperous, and sustainable. Basically the team is conducting a horizon scan to detect and collect signals of positive change. A website is used where people from all around the world can contribute a seed. Among other things, the seeds will be used for scientific analysis (e.g. how are seeds related to meeting the SDGs) and for developing novel scenarios.

https://goodanthropocenes.net/
https://doi.org/10.1002/fee.1309 Bennett et al 2016 Bright spots: seeds of a good anthropocene. Frontiers in Ecology and the Environment 14, 8, 441-448

General Horizon Scanning

Bianca Müller, Philips

Horizon Scanning in various fields and techniques, fields are mainly health related areas, but could also be traditional consumer electronic businesses. The techniques used very much depend of the scope of the project. I make use of techniques such as literature scanning, scenario scanning, weak signal analysis/ seeds, mind mapping, wild cards/ curve balls, key word literature research, envisioning impact, driver identification, and for bigger projects also expert interviews/ focus groups.

https://www.90yearsofdesign.philips.com/article/87

Horizon Scanning as a business

Carl Telford, Ricardo

We offer a training course in setting up / practical elements of horizon scanning service (based on my 15+ years' of practical experience at a previous company). Method: data collection by scanner network (news, literature, web, conversations), clustering, regular sense-making workshops, prioritisation, and reporting. Currently setting-up a Horizon Scanning pilot in Ricardo. Related activities: scenario planning (esp. for energy & automotive sectors), strategic and technology roadmapping.

https://ricardo.com/news-and-media/ricardo-quarterly-magazine/2017/ricardo-quarterly-q4-2017 (See pages 11-15 of this publication for an overview)

Horizon Scanning System at the Federal Environment Agency

Sylvia Veenhoff, German Environment Agency

The task of the Horizon Scanning System at the Federal Environment Agency is to identify these changes that could have a significant impact on the state of the environment and on the environmental policy-making processes. In our horizon scanning we systematically examine trends (and also megatrends), new and unexpected events (so-called "wild cards"), persistent problems as well as emerging trends ("weak signals"). The aim is to align environmental policy with these new topics, so that the long-term and strategic planning and action capability can be improved in a timely and forward-looking manner. We are currently executing the first "official" Horizon Scanning Process, the second is planned for 2019. Before that, we tested the approach in a pilot process. We are working with a mix of several software solutions e.g. rss-reader, online-survey tool, automatic text analysis tool, etc.

At the end of our horizon scanning processes we publish the 10 most relevant new developments in a horizon scanning report. Furthermore, we use trend analysis to analyse one especially highly priortised trend in all their direct and indirect effects on the environment in order to identify political options for the Ministry of the Environment and further demand for research.

Concept study of the German Environment Agncy:
https://www.umweltbundesamt.de/publikationen/horizon-scanning-trendmonitoring-als-ein-instrument
Article from the German Environment Agency on trend analysis
https://www.umweltbundesamt.de/horizon-scanning-trendanalyse

Annex 2. Other suggested readings/resources

- European Foresight Platform (EFP) - horizon scanning.
- European Forum on Forward Looking Activities (EFFLA) - Policy Brief N° 13 - Strategic Intelligence Methodology
- Amanatidou et al - On concepts and methods in horizon scanning: Lessons from initiating policy dialogues on emerging issues
- European Commission - Models of Horizon Scanning. How to integrate Horizon Scanning into European Research and Innovation Policies.
- Center for Security Studies - Horizon Scanning in Government.
- Patton - The role of scanning in open intelligence systems.

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