A FORESIGHT FRAMEWORK FOR INFORMATION AND DOCUMENTATION PROFESSIONALS – HOW TO FIND INFORMATION ABOUT THE FUTURE

Lieve VAN WOENSEL
Head of the Scientific Foresight Service in the European Parliamentary Research Service, the internal research service and think tank of the European Parliament.[1]

■ This paper explores foresight practices that can be implemented by information and documentation (I&D) professionals to search for information about what might happen in the future to widen the scope of their analyses and hence enhance the quality of their work. First, I define foresight and outline the advantages that foresight methods can confer on I&D professionals. Next, I delve into a more detailed background on foresight education and training, and foresight networks and organisations. I then explain what foresight implies in practice and how one can investigate the future through reflections on desirable and undesirable futures, possible intended and unintended consequences and the concept of hard and soft impacts of developments in society. Next, scenario-based foresight and foresight-based policymaking are explained. Following this, I address the core idea of the paper, which comprises real-world foresight practices as well as tips and tricks to enhance the quality and 'future-proofing' of I&D professionals' work. I describe four rules: (1) grasping the broader picture by drawing the ecosystem of the analysed topic; (2) applying 360-degree thinking through what I call 'STEEPED'; (3) investigating possible biases, including one's own; and (4) asking 'what if' questions to deepen the analysis of possible challenges in the future. I conclude with some reflections about questions one can ask to explore the possible 'new normal' after COVID-19.

■ Cette contribution explore les pratiques de prospective qui peuvent être mises en œuvre par les professionnels de l'information et de la documentation (I&D) pour rechercher des informations sur ce qui pourrait se passer à l'avenir afin d'élargir le champ de leurs analyses et donc d'améliorer la qualité de leur travail. Tout d'abord, je définis la prospective et j'expose les avantages que les méthodes de prospective peuvent conférer aux professionnels de l'I&D. Ensuite, j'approfondis le contexte de l'éducation et de la formation à la prospective, ainsi que des réseaux et organisations de prospective. J'explique ensuite ce qu'implique la prospective dans la pratique et comment on peut étudier l'avenir par des réflexions sur les futurs souhaitables et indésirables, sur les éventuelles conséquences intentionnelles et non intentionnelles et sur le concept d'impacts durs et doux des évolutions de la société. Ensuite, la prospective fondée sur des scénarios et l'élaboration de politiques fondées sur la prospective sont expliquées. Ensuite, j'aborde l'idée centrale de l'article, qui comprend des pratiques de prospective du monde réel ainsi que des conseils et des astuces pour améliorer la qualité et la "pérennité" du travail des professionnels de l'I&D. Je décris quatre règles : (1) saisir la vue globale en dessinant l'écosystème du sujet analysé ; (2) appliquer une réflexion à 360 degrés par le biais de ce que j'appelle "STEEPED"; (3) étudier les biais possibles, y compris les siens propres ; et (4) poser des questions "et si" pour approfondir l'analyse des défis possibles à l'avenir. Je conclus par quelques réflexions sur les questions que l'on peut poser pour explorer la "nouvelle normalité" possible après COVID-19.

■ Dit artikel exploreert de mogelijkheden van foresight- of toekomstverkenningspraktijken voor informatie- en documentatie (I&D) professionals bij het verzamelen van informatie over wat mogelijk kan gebeuren in de toekomst, inclusief het weinig waarschijnlijke. Planmatige toekomstverkenning kan helpen een breder beeld te krijgen van huidige situaties en ontwikkelingen, alsook hun mogelijke impact in de toekomst, en aldus bijdragen tot het verhogen van de kwaliteit van het dagdagelijks werk. Deze paper schetst de mogelijke functionaliteit van foresight methodes voor I&D professionals en geeft informatie over foresight-opleiding en -training, foresight-netwerken en -organisaties. Vervolgens beschrijft de auteur praktische aspecten van foresight, zoals het bestuderen van gewenste en ongewenste mogelijke evoluties, beoogde en ongewilde consequenties van ontwikkelingen en beslissingen, alsook de concepten van 'harde' en 'zachte' impact van nieuwe wetenschappelijke ontwikkelingen op de maatschappij. Verdere secties zijn gewijd aan praktische richtlijnen voor een toekomst-bestendige I&D aanpak, onder de vorm van vier aanbevelingen: (1) steeds het brede plaatje zien; (2) systematisch elk onderwerp analyseren in een 360 graden-benadering, waarvoor de STEEPED methode een handige richtlijn is; (3) het exploreren van mogelijke vooroordelen bij de analyse van beschikbare informatie, en (4) het stellen van 'Wat als...?' vragen om een dieper inzicht te krijgen in uitdagingen voor de toekomst. Tot slot bevat deze paper enkele reflecties over het verkennen van het 'nieuwe normaal' na COVID-19.

Introduction

For this paper, I was invited to write about scientific foresight/future studies and COVID-19: getting info and data for the post-corona times. I do not focus on the information and data itself, but rather on the methods for I&D professionals to retrieve them to help prepare for the possible future developments.

What is foresight?

Foresight is the ability to see what might happen in the future and to use this to be prepared for that. It is not about predicting the future but minimising surprise.

Even though foresight is a rather new and fascinating analytical approach, focusing on reflecting about the future, the interest in the future has been present for centuries. In 'A brief history of futures', Wendy Schultz (2015) presents an overview of the development of futures thinking and futures studies.

Foresight is an interdisciplinary branch across the boundaries of management, economics, social sciences and technology. Foresight, being the study of the future, is also referred to as future studies, futures research, or futurology. A foresight practitioner is sometimes also called a futurist.

Note: 'Futurism' in the context of foresight in this paper has no relation of any kind to the avant-garde movement called 'Futurism', which was founded in Italy in the early 1900s by the poet F. T. Marinetti and rejected artistic and cultural tradition in favour of a technologically oriented speed. It admired speed, machines, youth and violence.[2]

Writing this paper for the readership of Belgian I&D experts, I add possible translations of the term 'foresight' in the three official Belgian languages:
- Dutch: toekomstverkenning
- French: études prospectives
- German: Zukunftserforschung

Within foresight, I distinguish two main streams:
- strategic foresight, which is planning-oriented
- anticipatory or explorative foresight, which aims at anticipating and preparedness for what could happen in the future.

This paper focuses on explorative foresight, which is highly relevant for the I&D sector.

Foresight for information and documentation professionals

When I was invited to write this paper, I was somewhat surprised, as information about the future is of a completely different nature than data, facts and references, which I expected information officers to collect for their clients. On further consideration, I began to feel excited about the potential power of foresight study for I&D professionals. I describe foresight for the I&D sector as the aptitude to investigate – on whichever topic – what might be relevant for the future and collect such information to help their clients prepare for the best and broadest insight in the topic of their work.

The way foresight can be relevant depends – like for any tool – on the purpose of its use, and there is definitely a purpose for the various types of I&D professions.

Foresight education and profession

Foresight is a booming business and seems rather hyped. However, it is an efficient approach for thinking about the future, applicable in a wide variety of areas (geo-political, technological, societal, etc.), such as, business, politics, economics, science and engineering. In addition, it is not dependent on specific techniques: foresight is a framework for thinking about the future. Foresight practitioners can use specific methods of their choice. Common sense, a basic understanding of what is foresight (and what is not) and some tips and tricks bring it within reach to everyone who might benefit from working in a future-proof way. However, professional training can speed up the process of becoming a foresight expert.

The next section elaborates on how one can become a 'foresighter' or futurist.

How to become a foresighter?

Futures studies are offered at various levels, including university degrees. Foresight is a rather new academic branch integrated into various departments such as economics, business studies, sociology or engineering in Australia, Canada, the USA, South Africa and Europe (Denmark, Finland, Germany, Malta, Poland, Spain, Sweden, Switzerland, the Netherlands and the UK). Well-known examples in Europe include the universities of Turku (Finland), Manchester (United Kingdom), Potsdam (Germany), Malta, Aarhus (Denmark) and Maastricht (The Netherlands).

Within the frame of the project 'becoming future-oriented entrepreneurs in universities and companies' (beFORE), which aimed to develop and release a set of Futures Literacy e-learning courses, a list '*Where to learn futures studies?*'[3] has been published. It records a wide array of courses devoted to future thinking as well as commercial foresight courses.

Specific courses are offered by specialised foresight companies and consultancies.

A special initiative worth mentioning for boosting foresight literacy is by UNESCO called '*Futures Literacy: A Skill for the 21st Century*'[4], with Riel Miller as a driving force who edited the book *Transforming the Future: Anticipation in the 21st Century* (Miller 2019).

Foresight networks and organisations

Nowadays, foresight is applied intensively at many other organisations such as the OECD, the Word Economic Forum, NATO, the European Commission and the European Parliament.

Several professional futurists associations exist. The main ones are as follows:
- Association of Professional Futurists[5]
- World Futures Studies Federation[6]
- World Future Society[7]

Membership by I&D professionals can be beneficial in enlarging their network with experts in various disciplines as well as for accessing non-traditional information. However, first some training and foresight practice is required to be accepted as a member. For I&D professionals, access to their platforms, networks, news, training sessions and publications can be interesting when they focus on tasks or clients with an inclination to be prepared for the future.

Key features of foresight

The essence of foresight is systematically exploring predictions and possibilities about the future. Foresight methods are practices supporting being pro-active in view of possible events that might happen in the future, for example, horizon scanning or scenario techniques.

Horizon Scanning

Horizon scanning entails 'scanning useful information', which includes information from the present as well as monitoring and analysing trends. Trends are defined as developments or changes that can be geo-political, global or technological. Some specific trends are drivers of change. These are developments or forces that trigger changes such as demographics (e.g. population growth and migration), climate change, technological developments (e.g. artificial intelligence, genetic engineering and 3D printing) and financial and geo-political developments.

Scenario planning and analysis

Scenario planning and analysis are based on scenario thinking, which can be both long-term and shorter-term. Scenarios are descriptions of how things might happen in the future – stories about (possible) futures. Scenario thinking includes scenario analysis and connecting possible future scenarios with the present. In practice, this connection of the present and the future can lead to the description of pathways from the present situation to possible future ones. And the possible futures can be either desirable or undesirable. Thus, these pathways can describe how to avoid an undesirable future or how to reach a desirable one.

Ways of looking into possible futures

Foresight is a methodology for systematically thinking about the future by envisioning a wide range of possible futures, from likely to very unlikely and desirable to undesirable, and mapping paths that are likely to lead to or away from them. Foresight analysis investigates the possible impacts of trends, which can be of various natures:
- Desirable/aspirational or undesirable
- Intended or unintended
- Hard or soft

Desirable and undesirable futures

For boosting preparedness regarding what could happen in the future, it is important to not only focus on desirable scenarios but also the undesirable. In the context of policy foresight, considering possible undesirable impacts of certain developments can alert policymakers about what may happen, thereby prevent crises.

The level of 'desirability' of a possible event is a subjective issue. What is desirable and undesirable depends on the perspective from which you consider events. For instance, the impact of COVID-related confinement measures might be desirable for virologists and politicians as they help fight the coronavirus crisis, while they can be undesirable for many citizens because of their high impact on social life.

Intended or unintended impacts

We are all familiar with side effects of medicinal drugs, i.e. the unintended consequences associated with their usage. However, these are not negative

per se; for instance, aspirin, originally used as a pain and fever reliever, is also an anticoagulant that can help prevent heart attacks and reduce the severity of and damage from thrombotic strokes. However, a measure can sometimes lead to adverse effects. An example of this is the drastic reduction of electricity consumption in lighting systems via the introduction of LED lights. It was expected to reduce the energy usage per household, which it does; however, because of the substantially lower electricity consumption, often more lighting is installed, reversing the expected benefits.

Hard or soft impacts

Soft impacts are especially relevant for analysis related to scientific or technological developments. Scientific or technological foresight investigates both practical risks, on which the technology developers and regulators tend to focus, and social and ethical risks, which typically concern philosophers of technology and the public (Swierstra and Molder 2012). As Swierstra and Molder (2012) explain, typical hard impacts pose risks to safety, health and the environment. For instance, something may potentially explode or be poisonous. However, technologies do much more than perform their functions; they also shape how we live, experience the world and what we value. For instance, smartphones push us to rethink certain norms: how we use them politely in the presence of others, how we respond to the extreme desire to check them constantly and the pressure of always being reachable. These are soft impacts. Another example illustrates a soft adverse impact, namely the reduction of tar in cigarettes. Since low-tar cigarettes are less harmful (per cigarette), smokers might use this as a pretext for smoking more. Soft impacts are not easy to identify nor quantifiable and are not harmful per se. Furthermore, it is not always clear who, if anyone, is to blame for them. A technology does not directly cause its soft impacts, for it depends on how it is used.

Some examples of concrete foresight applications

Scenario-based foresight

Scenarios are stories about the future and are not a new concept.

The first well-known scenario-based foresight study is the so-called report of the Club of Rome: *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (Robinson et al. 1973) and the update *Limits to Growth*: *The 30-year Update* (Meadows et al. 2005)[8,9]. Scenarios also can be entirely fictional, such as George Orwell's famous novel, *Nineteen Eighty-Four*[10]. Other examples are some of the books of Jules Verne (1828-1905) such as *De la Terre à la Lune* or *From the Earth to the Moon*, written in 1865, describing the Apollo 11 mission to the moon in 1969 in a visionary rather than an accurate way, and *Vingt Mille Lieues sous les Mers* or *Twenty Thousand Leagues Under the Sea*, which closely describes today's nuclear-powered submarines[11].

Strategic foresight is usually based on desirable scenarios, while anticipatory foresight focuses on possible scenarios, including undesirable ones and even extreme scenarios.

I advocate scenario-based foresight in preparing future-oriented I&D tasks as scenarios are a good way to envision how today's developments might impact the future. Scenarios are stories about the future and their purpose is to form better views and opinions in the present.

Scientific foresight

Scientific foresight - or technological foresight - is a foresight-based method of executing Technology Assessment (TA). TA is the study and evaluation of novel technologies. While it was initially practiced in the 1960s, with the growing importance of new technologies, it has gained wider acceptance as a form of policy research to address the short- and long-term consequences of applications of new technology. Foresight-based TA, or scientific foresight, is a method of conducting TA with an emphasis on learning about the future of scientific and technological developments and the possible impact of their applications on society. It is especially relevant for informing policy when dealing with uncertain, complicated or controversial issues.

Policymaking is about making choices. At the European Parliament (EP), scientific foresight is deployed as a tool to prepare information that members and committees of the Parliament might require to choose from possible courses of action and make decisions in relation to a science or technology-related topic. The European Parliament's *Panel for the Future of Science and Technology* (STOA[12]) has applied scientific foresight methods in its activities since 2015. Established in 1987, STOA is administered by the EP's secretariat. A total of 27 Members of the European Parliament, who are nominated by ten parliamentary committees, now sit on the panel. In practice, scientific foresight studies assess a policy-driven question and its outcome; similar to TA study, it is a policy briefing describing a selection of options for courses of policy action, along with

their assessment, supported by detailed technical report(s).

Scientific foresight usually assesses the applications of new technology in an extended time frame of 10 years or more, incorporating a systematised approach to a technology's societal effects. In essence, it is TA with a heavy foresight component, extending the scope of knowledge and vision of the future and bringing new actors into strategic debates, i.e., applying a participatory and multi-stakeholder approach.

Foresight practices for I&D professionals – tips and tricks

This section elaborates on practical guidelines for I&D professionals, proposing four elements in critical thinking about the subject of a given job. I describe the four following rules:

- grasping the broader picture by drawing the ecosystem of the analysed topic;
- applying 360-degree thinking, for which I offer a simple scheme called STEEPED;
- investigating possible biases, including one's own;
- asking what if questions to deepen the analysis of possible challenges in the future.

I recommend these four thinking rules as tips and tricks to enhance the quality and future-proofing of I&D professionals' work.

Rule 1. See the broader picture: Analyse the system and draw the ecosystem.

Before dealing with an I&D task, taking a step back can help you see the bigger picture. This is important at the beginning of any foresight exercise. It involves first exploring the scope of the topic, then outlining the ecosystem with all stakeholders and actors. Systems analysis is a technique that breaks up a system into its component parts to study how those parts function and interrelate to accomplish the system's purpose. One way to conduct a systems analysis for sketching the ecosystem is to elaborate on the 'what', 'who', 'why', 'where', 'when' and 'how' questions (mnemonic: 'five whiskeys and a hangover'). Reiterating these questions can help gain further insight. This helps in not only detailing the topic in focus into all its possible components but also producing a rough stakeholder analysis, including all those involved or possibly affected.

This phase essentially helps to view the entire ecosystem of the issue being investigated.

Rule 2. Look from all perspectives: the STEEPED scheme helps in a 360-degree approach.

A key parameter in the quality of work of I&D professionals is completeness and absence of gaps. Therefore, I encourage systematic exploration of the topic from a wide range of perspectives, i.e. a 360-degree view. This can be achieved using the STEEPED scheme that lets one scan the related topics to obtain the overall picture.

Different institutions working in different environments use similar schemes to achieve this, such as STEEP, STEEPLE and PEST[13], all of which are comparable with a SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. Since 2015, we, at the European Parliament, have used the STEEPED scheme that we have further developed for the foresight investigation of science and technology issues. The simplified version (Fig. 1) can be used for any purpose. It organises an analysis along seven dimensions. In other words, it is a checklist that specifies seven lenses to examine a topic with, including its components, context, possible relations, interactions and impacts on other areas. The seven lenses are as follows:

- *Societal*
- *Technological*
- *Economic*
- *Environmental*
- *Political and legal*
- *Ethical*
- *Demographic*

Fig. 1: The STEEPED scheme.

This scheme can be particularised in more detail for specific working areas. Thus, it is not to be considered an authoritative list but a guide for inspiration to be applied with common sense. It will help avoid blind spots when analysing a topic and might broaden the scope. Further, ensuring a vision of the broader picture might make your output of the collected information or documentation more credible and inspiring for the client.

Rule 3: Bias investigation

A bias is a tendency to allow our opinions, perceptions and beliefs to influence our conclusions in systematically prejudiced ways, which may result in systematically distorted perceptions of facts and opinions. Thus, bias interferes with critical thinking and thereby the rationality of conclusions and decisions. Biases may hinder us from reflecting on new evidence or facts with an open mind.

Everyone in the ecosystem is subject to biases, prejudices or preconceptions. Biases can systematically distort our perceptions of facts, affecting how we make up our mind, weigh evidence and make assessments. They can even mislead and fool us.

I argue that by understanding your own and others' biases, I&D tasks can gain quality. Bias awareness helps us be more open-minded and reflective when dealing with facts and evidence, especially when there can be emotion-based opinions while working on controversial issues such as genetic engineering, nuclear technologies, use of chemicals, vaccination or climate change. This wheel is a practical tool to check one's own and others' thinking.

There are dozens of biases, many of which are relevant to dealing with the selection, synthesis and analysis of information. For purposes of scientific foresight, I have categorised these biases into six sets, which also are relevant for I&D professionals, presented below:

- **Research biases**: They affect the generation of evidence or influence the availability of evidence. Research biases can occur during the sampling or in the process of producing the research conclusions as the scientists performing the research can influence the results. This also includes publication bias.
- **Culture and value biases**: They include ideological, in-group, confirmation and stereotype biases. An important one for I&D professionals (especially at the client level) is the confirmation bias, which is defined as the tendency to favour or selectively seek information that confirms one's core values, beliefs or hypotheses, dismissing or selectively ignoring information that disconfirms them. Though it is natural to want to confirm one's beliefs and counterintuitively look for evidence that falsifies them, the proper way to overcome confirmation bias for I&D professionals is to take this evidence and include it in the output.
- **Attention biases**: This includes tunnel vision and blind spots, which is the tendency of letting one's present concerns affect their assessment of evidence. In my personal opinion, for I&D professionals, the blind spot bias must be avoided as it can lead to systematically overlooking relevant facts or information. A simple way to avoid attention bias is to look at the broader picture, undertaking a simple system analysis and sketching the overall ecosystem of the issue being investigated.
- **Interest biases**: These include the self-serving bias and biases toward issues one supports as well as tactical bias – deliberate selective usage of evidence to defend one's views – and the conflict of interest bias, which arises when one's financial or other interests compromise one's assessment of facts or evidence.
- **Availability biases**: These biases limit the evidence that one has access to, pays attention to or trusts. An important one is the knowledge bias, often termed 'the curse of knowledge', which involves considering only the evidence that one understands or falsely assuming that one's interlocutors have the background knowledge needed to understand the evidence that one is presenting. Availability biases involve the tendency to consider examples that come readily to mind or are easily available and more representative than they actually are. Further included here is the authority bias, which consists of accepting what a trusted authority says, even when one lacks the technical background needed to understand it, or when the authority speaks about matters outside their expertise.
- **Associative biases**: These biases occur when associative thinking links otherwise unrelated concepts. For example, emotions can associate concepts in ways that interfere with reflective thinking, thus activating attention biases (such as tunnel vision and blind spots). Association biases that can influence one's assessment of evidence are nature bias, which includes the bio or organic bias. For instance, what is 'natural' could easily be associated with 'good'. This might explain a lack of public acceptance for genetically modified food or the nurturing of the antivaxxer movements. Another one is what I call a 'romantic bias', which might make us ignore evidence related to greenhouse gas emissions and particulate matter generation linked to wood-fire places in houses.

In sum, biases affect the generation and the availability of evidence as well as our assessments of facts and evidence and, by extension, the decisions we make based on them.

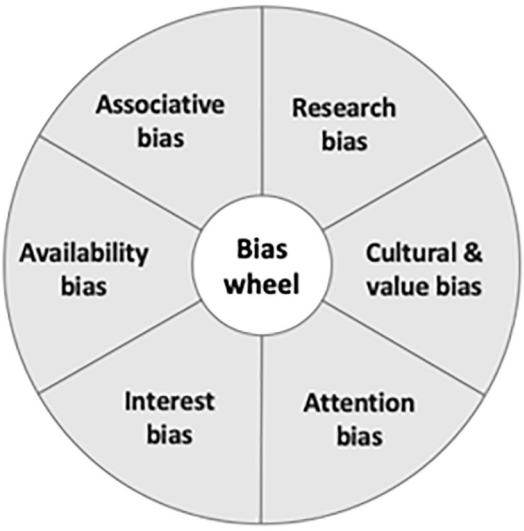

Figure 2: Bias wheel (simplified version).

The simplified bias wheel in Fig. 2 will be adequate for I&D professionals to critically reflect on their own possible biases as well as those of clients and other parties. Furthermore, this wheel can serve as a tool to enhance the bias awareness of anyone who wishes to sharpen their critical thinking. This might help their I&D work to be conducted in a more partisan way and therefore enhance the quality.

Note: In my book (Van Woensel L. 2020), I arrange these six biases into a more detailed bias wheel focusing on scientific advisors working for policymakers. This book *A Bias Radar for Responsible Policy-Making* devotes an entire chapter on biases.

Rule 4: Ask what if questions

To understand the challenges for the future, questions pertaining to 'what', 'who', 'why', 'where', 'when' and 'how' could be supplemented with a series of 'what if' questions. What if questions are a powerful tool for thinking about the future from various perspectives. Ravetz (1997) also advises systematically posing such questions in conversations on science and its applications to policy problems. These questions can serve as leading questions to deepen the analysis of possible challenges in the future. A what if question lends itself to open enquiry and to participative reflection. It also expresses the *Precautionary Principle*[14], which applies to policy actions on issues involving uncertainty – which is increasingly important in policymaking for the environment and technologies that involve uncertainties (e.g. genetic engineering) or are possibly socially disruptive (e.g. robotics and artificial intelligence). Thus, what if questions prevent taking points of view too hastily.

The previously suggested steps (drawing the ecosystem, analysing the issue from all perspectives and assessing possible biases) can be used to generate a list of concerns about the future issues regarding the topic being researched by the I&D and, for their basis, prepare some what if questions to further guide the analysis. They draw one's attention to a broader range of possible effects in wider environments and longer time frames. By incorporating these broadened perspectives on possible future developments, the I&D products could be ensured to be more future proof.

Preparedness for the new normal after COVID-19

While it is not possible to predict what the new normal after COVID-19 will be, applying the approaches explained above can provide an overview of the important factors to consider.

This paper does not focus on an analysis of the possible post-coronavirus crisis scenarios as that extends beyond its scope. However, as the pandemic has demonstrated the importance of preparedness, this paper focuses on the methods to understand what might happen and what we must anticipate. Below, I itemise a few questions that might be worth asking:

- What if another new Coronavirus manifests tomorrow?
- What if tele-education became the new normal? Will we still need schools? What does a corona-proof school look like? What if universities did not require a physical structure?
- What if telework became the new normal? Will we still need office buildings? What will the office of the future look like? Will houses be designed differently? Will houses in the future accommodate a teleworking space?
- What if tracing apps were the norm? What about our privacy?
- What if urbanisation (population shift from rural to urban areas) ends and the population relocates back from urban to rural areas? What if there were no benefit to moving from rural to urban areas?
- What if digitalisation was boosted further? How do we ensure the requisite basic and advanced digital skills for teleworking and tele-education? What about the increase in the digital divide? What if the internet collapses? What if a massive cyberattack hits us?

- In terms of the hardware for digitalisation, what about our dependency on rare minerals for components of devices?
- How do face masks affect our communication? Will facial recognition algorithms still recognize us in masks? How are face masks polluting our environment?
- What about the sudden changes in etiquette? Since handshakes (a common global tradition for meeting, greeting and congratulating someone) are disappearing, how will we adapt?

Conclusion

Foresight is the ability to gauge what might happen in the future and employ this to prepare ourselves for the future. It is not about predicting but minimising unpleasant surprises in the future. In practice, they can integrate a foresight framework including the four considerations in their work methods to approach their tasks in a holistic, future-minded way:

- Taking a step back to observe the broader context of the issue in question and the actors and stakeholders involved;
- Exploring the topic of the project from all perspectives (STEEPED wheel);
- In addition to the collection and synthesis of available evidence, understanding opinions and exploring biases of all stakeholders identified. Foresighters should be particularly aware of possible biases held by their clients and themselves (bias wheel);
- Asking what if questions.

Adopting a foresight-based thinking reflex will be beneficial for I&D professionals, contributing to the overall quality, impartiality, trustworthiness and future fitness of their work.

Lieve Van Woensel
Scientific Foresight Unit
European Parliamentary Research Service
European Parliament
Office KOHL 02Y015
B-1047 Brussels
lieve.vanwoensel@ep.europa.eu
www.europarl.europa.eu/thinktank/

September 2020

References

Miller, Riel. *Transforming the future: Anticipation in the 21st Century*. Unesco; Routledge, 2019.

Ravetz, Jerome. The science of 'what-if?. *Futures*, 1997, 29 (6), p. 533-539.

Schultz, Wendy. A Brief History of the Future. *World Future Review*, 2015-12, Vol.7 (4), pp. 324-331.

Swierstra, Tsjalling; Hedwig Frederica te Molder. Risk and Soft Impacts. In: Sabine Roeser, Rafaela Hillerbrand, Martin Peterson, and Per Sandin (Eds.), *Handbook of Risk Theory: Epistemology, Decision Theory, Ethics, and Social Implications of Risk* . Dordrecht: Springer, pp. 1050-1066.

Van Woensel, Lieve. *A Bias Radar for Responsible Policy-Making. Foresight-Based Scientific Advice*. Palgrave, 2020.

Notes

1. Disclaimer: The author is writing in a personal capacity and any views expressed do not represent an official position of the Parliament.
2. Ian Buchanan. *A Dictionary of Critical Theory*. Oxford University Press, 2018.
3. Where to learn futures studies? <http://futureoriented.eu/where-to-learn-futures-studies/> (consulted 5 September 2020)
4. Futures Literacy: A Skill for the 21st Century. <https://en.unesco.org/themes/futures-literacy> (consulted 5 September 2020)
5. The *Association of Professional Futurists* is a global community of futurists, dedicated to promoting professional excellence and demonstrating the value of strategic foresight and futures studies for their clients and/or employers. <https://www.apf.org/>
6. The *World Futures Studies Federation* (WFSF) is a UNESCO and UN consultative partner and global NGO with members in over 60 countries. They bring together academics, researchers, practitioners, students and futures-focused institutions. WFSF offers a forum for stimulation, exploration and exchange of ideas, visions and plans for alternative futures, through long-term, big-picture thinking and radical change. <https://wfsf.org/>
7. The *World Future Society* (WFS) is an international community of futurists and future thinkers. Through publications, global summits and advisory roles to world leaders in business and government, WFS members are credited with establishing the foundations of futures studies. <https://www.worldfuture.org/>
8. Robinson, Warren, Donella H. Meadows, Dennis L. Meadows, Jørgen Randers, and William W. Behrens. *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*. New York: Universe, 1973.
9. Meadows, Donella H., Jørgen Randers, and Dennis L. Meadows. *Limits to Growth: The 30-year Update*. 3rd rev., expanded and updated ed. London: Earthscan, 2005.
10. George Orwell. 1949. *Nineteen Eighty-Four*. Secker & Warburg.
11. Jules Verne (1828-1905), about his books *De la Terre à la Lune*, and *Vingt Mille Lieues sous les Mers*, <https://www.thenewatlantis.com/publications/jules-verne-father-of-science-fiction> (consulted 6 September 2020)
12. Panel for the Future of Science and Technology (STOA). European Parliament (online) <https://www.europarl.europa.eu/stoa/en/about/history-and-mission> (consulted 6 September 2020)
13. What is a STEEP analysis? Explanation of STEEP, STEEPLE and PEST. UTS Design Index (online) <http://www.utsdesignindex.com/researchmethod/steep-analysis/> (consulted 20 July 2020)
14. Bourguignon, D. *The precautionary principle: Definitions, applications and governance*. European Parliament, 2015.