D2.1 – Foresight Screening and Benchmarking Analysis

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1 Executive Summary

The purpose of this report is to provide a screening and benchmarking analysis of existing foresight programs, as well as provide recommendations for future programs in the context of European civil security. Due to the emphasis on research and innovation regarding Cluster 3 civil security topics, the EU has advanced projects on civil security through Horizon Europe, including AHEAD "Toward Sustainable Foresight Capabilities for Increased Civil Security." This project involves the development of a capability-based foresight framework, made for and by civil security agencies to better anticipate technology evolutions and the contextual elements (e.g., legal, ethical, societal, economic) that further impact the future of civil security. The content of this deliverable includes an introduction to civil security research and foresight methods, a synthesis of ten selected foresight programs, and the discussion of recommendations for future foresight programs.

42 foresight programs were identified through a literature review. 10 foresight programs were selected for analysis on the bases of large-scale government involvement, deliberate rationale for the execution and methodology of foresight activities, ease of access to the public, and prior internal or external methodological evaluation. Scale, rationale, accessibility, and evaluation were deemed to be most useful selection criteria due to the potential benefit for researchers seeking to conduct future foresight activates. Existing knowledge of foresight programs based on the expertise of the AHEAD Steering Committee members, which consists of law enforcement practitioners and academic researchers, was also applied to the foresight selection. The 10 selected foresight programs discussed in the report were developed by various nations and international institutions, namely Finland, Japan, Austria, the United States, Norway, the Netherlands, the United Arab Emirates, Australia, the European Commission, and the European Defence Agency. These programs represent a wide range of foresight methods, including Delphi surveys, scenarios, megatrends, games, and workshops. These foresight programs share similar overarching goals of aggregating expert knowledge, increasing future-framed thinking, and informing public policy decision-making.

Based on the synthesis of foresight programs, individual involvement and subsequent impact were found to be the strengths across foresight methodologies. Individual involvement was a strength of many foresight programs, particularly those that demonstrate the competence, diversity, and engagement of individuals involved, including experts, participants, and facilitators. Subsequent impact was also a notable strength of foresight programs. Impact on individuals and the community occurred by increasing foresight efficacy and informing decision making. Yet, limitations to the current state of foresight research emerged. Science-based practices, such as evaluation procedures and research transparency, were limited. This, it is recommended that evaluation of foresight methods should be conducted, explicitly stated, and shared. Five evaluation criteria are suggested based on existing foresight assessment procedures evident in the

literature review, namely accuracy, reliability, validity, individual impact, and community impact of foresight methodologies.

Based on the review of foresight programs, further recommendations for law enforcement agencies and civil security practitioners seeking to pre-empt the emergence of potentially disruptive technologies were provided. Foresight methods are often chosen based on available resources; thus, a general three-prong approach that can be integrated into various foresight methodologies was recommended. The recommended foresight framework includes information gathering on megatrends, followed by scenario development, and preceded by a capabilities assessment. The overarching goal of the suggested framework is to enhance future thinking through an evidence-based and creative approach.

Foresight involves working on the future without knowing what the future will look like. As the future is uncertain, foresight programs cannot predict the future, but can seek to exercise and strengthen the ability to be adaptable and open-minded, thus better prepared to handle unforeseen and complex situations when they occur. This review of foresight programs demonstrates that foresight is flexible, adaptive, and creative method that can be used to develop quantitative or qualitative data for informing decision making. Most importantly, foresight is notable in that it can be used to prompt foresight participants to think about the future differently. In complex times with high-stakes conflicts and devastating crises, foresight can be a proactive method for preparing for the future.

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Key Terms

Foresight
The systemic study of potential futures and their implications.

Scenarios
Evidence-based narratives about possible futures

Delphi Survey
A semi-quantitative method developed by the RAND Corporation in which experts are administered a two-part survey to collect opinions and establish consensus on future topics.

Megatrends
Long-term forces or patterns of change that may significantly shape the future.

Back-casting
A foresight technique that involves envisioning an ideal or desired future scenario, then working backward to identify the steps needed to reach that future state.

Weak signals
Early signs that indicate the emergence of significant changes or disruptions in the future

Capabilities
An organization or institution's abilities and resources to address situations towards an intended outcome.

POSTEDFIT
A framework used by defence agencies to assess capabilities in terms of readiness People, Organization, Support, Training, Equipment, Doctrine, Facilities, Information, and Technology.

World Café
A structured conversation for facilitating knowledge sharing, in which a few people sit at a table together to discuss a topic, as would be done in a café.

STEEPLE
An analysis of how Social, Technological, Economic, Environmental, Political, Legal, and Ethical factors may interact to influence the future.

RAND
A think tank created by the U.S. government in the 1940s responsible for developing the Delphi survey method.

Nominal Group Technique
A structured decision-making process that involves developing and ranking ideas in a focus group setting.

List of Acronyms

Abbreviation	Description
AI	Artificial Intelligence
AIT	Austrian Institute of Technology
CSIRO	The Commonwealth Scientific and Industrial Research Organization
EDA	European Defence Agency
EU	European Union
JRC	Joint Research Centre
NIC	National Intelligence Council
NISTEP	National Institute of Science and Technology Policy
NRC	National Resources Committee
POSTEDFIT	People, Organization, Support, Training, Equipment, Doctrine, Facilities, Information, and Technology capabilities
RCN	Research Council Norway
SES	Scenario Exploration System
STEEPLE	Social, Technological, Economic, Environmental, Political, Legal, and Ethical factors
US	United States

2 Introduction

Civil security refers to the common safety and well-being of individuals, nations, and global systems (Rothschild, 1995). Common security is maintained through political, economic, social, and environmental stability by various international institutions, governments, and non-government bodies, such as the press and financial markets (Rothschild, 1995). Within the European Union (EU), five research areas have been identified as "Cluster 3" civil security priorities, namely crime and terrorism, border management, disaster and infrastructure resiliency, and cybersecurity. These security concerns will likely be exacerbated by rapidly growing and potentially disruptive technologies (Hoijtink, 2014). Law enforcement agencies may need to critically assess and adapt police capabilities (i.e., police abilities and resources; Stojković & Mitić, 2015) to be better prepared for rapidly changing technologies and evolving civil security concerns. The aim of this report is to assess how law enforcement agencies can increase civil security capabilities through the use of foresight for the technological evolution that lies ahead.

The advent of rapidly growing technologies makes it necessary to estimate the impacts of new inventions and devices, particularly regarding civil security. We can anticipate the growth of potentially disruptive technologies, such as artificial intelligence (AI), quantum technology, big data analytics, and advanced materials (Clapp, 2022). However, it remains difficult to predict exactly how the future will look and to apply existing knowledge towards meaningful policy advancements. Across continents, foresight has been used by governments as a tool to better anticipate possible futures (Dreyer & Stang, 2013). Within the context of European civil security, foresight methods can help law enforcement agencies determine possible threats, assess their own capabilities, and inform the development of threat response policies.

The term "foresight," is simply defined as looking forward (Oxford English Dictionary, 2023). It involves the ability to foresee and prepare for what may happen in the future (McIntosh, 2013). In the context of civil security, foresight is generally considered to be the systematic study of exploring potential future outcomes, particularly regarding changing trends in science and technology, and often with consideration for public policy implications (Miles, 2010). This type of research has also been referred to as "future studies," "forecasting," and "anticipation" (Miles, 2010). The idea of foresight can be linked back to H.G. Wells, who wrote a book on the topic in 1901 and argued for the study of consciously shaping society for a better future (Wells, 1901; Miles, 2010). Early systemic approaches to applying foresight were first undertaken in 1937 by the United States National Resources Committee (NRC), in their report on technology trends, implications, and policy (NRC, 1937). "Foresight" as a term to refer to futures methods regarding science and technology policymaking began to appear in the 1980s with the work of John Irvine and Ben Martin at the Science Policy Research Unit at Sussex University (Irvine & Martin, 1984). Their studies introduced foresight to describe broad programs of study in research and innovation priorities informed by potential long-term future developments (Martin, 2010; Miles, 2010). Contemporary foresight studies involve a broad range of research methods, from systemic surveys to expert panels, workshops to scenarios. Significant foresight

projects are undertaken by nations across the globe, including Japan (National Institute of Science and Technology Policy, 2019), Finland (Poussa et al., 2021), Austria (Aichholzer, 2001; Hörlesberger et al., 2015), Australia (Taylor et al., 2019), Norway (Gunashekar et al., 2021), the Netherlands (Ministry of Defense, 2020; Walker et al., 2001), United Arab Emirates (Dubai Future Foundation, 2023a), and the U.S. (National Intelligence Council, 2021; Office of the Director of National Intelligence, 2023), as well as international organizations, such as the European Commission (Bontoux et al., 2020) and European Defence Agency (European Defence Agency, 2021), which are described in further detail in this report.

Foresight is important for governments to undertake (e Cunha et al., 2006). Foresight exercises and workshops can enable academic experts, industrialists, practitioners, and policy makers to collaborate and think meaningfully about the future. Not only does foresight include the synthesis of major trends in science and technology but enables consideration of current decisions on long-term outcomes. This is necessary for effective prioritization of resource allocation and public policy agendas by governments (Irvine & Martin, 1984; Vos & Balfoort, 1989). Through an informed forum of participation and consideration of potential consequences of current decision making, foresight can help shape an ideal future (Martin & Johnson, 1999).

Due to the emphasis on research and innovation regarding Cluster 3 civil security topics, the EU has advanced projects on civil security through Horizon Europe, including AHEAD "Toward Sustainable Foresight Capabilities for Increased Civil Security." This project involves the development of a capability-based foresight framework, made for and by civil security agencies to better anticipate technology evolutions and the contextual elements (e.g., legal, ethical, societal, economic) that further impact the future of civil security. The first aim of the current report is to analyse the strengths and weaknesses of a selection of key foresight methods. Based on the analysis, the second aim of the report is to provide recommendations for the development of a new foresight framework within EU civil security. We also assess the transparency of information available about existing foresight programs of significant importance, as availability of information is necessary for the replication and validity of science-based foresight methods.

The remainder of this report is structured as follows. First, we discuss the methodology of our literature review, highlighting our search strategies and selection criteria. Next, we discuss a selection of key foresight programs from across the globe, that were purposively selected to include publicly accessible programs with significant rationale, government involvement, prior evaluation, and diverse methods. We present an analysis of key strengths and weaknesses identified in discussed foresight programs with a view of providing a synthesis of commonly used foresight methods. We end this report with a set of recommendations for the development of future foresight programs to support improved civil security in anticipation of future technological disruptions.

3 Contemporary Foresight Programs

A literature review was conducted to synthesize and evaluate contemporary foresight programs in their sociohistorical contexts for the purpose of developing

recommendations to design future foresight programs. Ten foresight programs were selected from a range of nations and international institutions, including Finland, Japan, Austria, the United States, Norway, the Netherlands, the United Arab Emirates, Australia, the European Commission, and the European Defence Agency. These programs are representative of a diverse range of foresight activities, from general foresight workshops that can be adapted to fit different needs, to technology foresights for identifying megatrends, to large-scale government programs for national intelligence.

Table 1: Foresight Program Synthesis

Country	Program	Method
Finland	Futures Frequency	Workshop
European Commission	Scenario Exploration System	Gaming system
Japan	Science and Technology Foresight	Delphi survey
Austria	Delphi Austria	Delphi survey
Austria	Austria Materials Foresight	Scenarios
United States	Annual Threat Assessment	Trend Analysis
United States	Global Trends	Scenarios
Norway	Research Council Norway	Scenarios
Netherlands	Technology Radar	Trend Analysis
Netherlands	Defence Vision 2035	Trend Analysis
United Arab Emirates	Dubai Future Research	Trend Analysis
Australia	Strategic Foresight for Regional Australia	Scenarios
European Defence Agency	Technology Watch & Foresight	Scenarios

Literature was identified through a combination of search engines and academic databases (i.e., Google; Google Scholar; ProQuest) from September to December 2023. Article titles, abstracts, and subject lines were searched using a logical combination of search terms (“foresight” or “future studies” or “anticipation” or “technology foresight” or “strategic foresight” AND “capabilities” or “government” or “defence” or “megatrends” or “scenarios” or “strategy”). Reference lists of selected literature were also searched to identify other potentially relevant sources. We identified 42 programs, listed in

Appendix A. The final selection of ten foresight programs was based on four criteria. We sought foresight programs that are large-scale with ample government involvement, have deliberate rationale for the execution and methodology of foresight activities, are easily accessible to the public, and have prior internal or external methodological evaluation. Scale, rationale, accessibility, and evaluation were deemed to be most useful selection criteria in a review of foresight programs due to the potential benefit for researchers and those seeking to conduct foresight themselves. We also applied our existing knowledge of foresight programs based on the expertise of the AHEAD Steering Committee members, which consists of law enforcement practitioners and academic researchers.

3.1 Finland

Sitra, the Finnish Innovation Fund, is an independent public foundation which operates under the Finnish Parliament. Their Futures Frequency workshop is a three-hour workshop for groups of eight to 20 people. It is accessible online and can be delivered remotely or in-person. Developed in 2020, the workshop includes scripted lecture sections accompanied by individual and group assignments and can be adapted to incorporate megatrends and weak signals (Poussa et al., 2021). The main goal of the workshop is to introduce and encourage creative, open-minded thinking about possible futures and individual agency to impact the future. The workshop has three sections in which participants challenge their assumptions about the future, imagine preferred futures, and make the link to actions for shaping the future (Poussa, 2021).

Foresight researchers from Sitra have published thorough descriptions of the development process, including assessment procedures with participant and facilitator feedback (Poussa, 2021). Following release of the foresight workshop, Futures Frequency was assessed by evaluation professionals from VTT Technical Research Centre of Finland (Halonen, et al., 2022). They utilized a multi-criteria evaluation model to assess individual, community, and society agency levels, as well as conditions and obstacles in experience, applicability, and culture. Evaluation data was collected on leaders, developers, individuals who participated in various workshops, and potential users through multiple evaluation methods, including self-assessment, interviews, participatory assessment workshops, surveys, and workshop observations. In general, Sitra has a highly robust evaluation framework (Varaja et al., 2019).

Based on the evaluation, there were many notable strengths of Sitra's Futures Frequency. The method was considered highly engaging and easy to understand. Further, it was found to create a safe and equitable discussion atmosphere, promote voices of differing perspectives, increase future thinking efficacy, and add to a future-thinking culture (Halonen, et al., 2022). There are a few especially unique characteristics of Futures Frequency in comparison to other foresight methods. First, the workshop looks to the past. In an exercise, participants fill a timeline to identify phenomena and events that have shaped the past one hundred years. By looking at the past, participants can conceptualize how historical and contemporary developments occur through unexpected and nonlinear factors (Poussa, 2021). Second, the workshop has an educational purpose. The goal of the workshop is to introduce participants to foresight, particularly those without prior foresight experience, and empower individual

agency for shaping the future. Futures Frequency was developed to complement, rather than replace, other, more quantitative or scenario-based foresight approaches (Poussa, 2021).

However, the evaluation indicated potential weaknesses of the method as well (Halonen, et al., 2022). For example, the benefits of the online and adaptable nature of the program also lead to issues, such as the tendency of some participants to come and go during remote workshops, which is not ideal for fostering active engagement. The evaluation also indicated that the timing of the program – being two to three hours – was considered both too long and too short by participants. Some wished for a shorter workshop method whereas others reported discussions left unfinished, feeling rushed, and the goal of the workshops being too ambitious for the time allotted. Lastly, it is questionable whether the method has been well-adopted by the community or whether the method provides an avenue for participants to move from theoretical to applied future thinking (Halonen, et al., 2022). Yet, a separate internal evaluation indicated that Sitra has high public discourse engagement and is well cited across publications (Varaja et al., 2019). As it is publicly accessible, it has been downloaded approximately 10,000 times between January 12th and June 30th of 2021 (Poussa, 2021).

Detailed information about "Future's Frequency" is publicly available through the Sitra website: https://www.sitra.fi/en/projects/futures-frequency/#

3.2 European Commission

The European Commission's Joint Research Centre (JRC) has many foresight tools, including their Horizon Scanning and Megatrends Hub, which are updated regularly. The JRC developed a foresight method called the Scenario Exploration System (SES) for applying future thinking to policymaking (Bontoux et al., 2020). First developed in 2013, SES is a foresight gaming system aimed at exploring alternative futures on specific issues through a long-term perspective. The game involves four or five participants who take the roles of different stakeholder groups. They are first presented with megatrends on a predetermined topic. To encourage strategic priority setting, participants are given limited resources to spend over the game and are expected to take actions towards their long-term objective across three time horizons starting from the present. At the end of the game, all actions are scored.

In 2013, the JRC team performed and tested the SES with 150 participants. Their evaluation of the method is based on participant surveys and informal conversations. They report many potential strengths of the SES foresight method. First, it is adaptable, in that it can accommodate a wide range of scenarios across topics. The objective of the foresight game can be a mental exercise or to develop concrete ideas about specific issues. It can also be used with a diverse group of participants of various ages, genders, cultures, professions, and geographical origins, as well as with homogenous or heterogeneous groups (Bontoux et al., 2020). Second, the game format creates a safe space in which discourse can occur between unlikely individuals. A majority of participants indicated that they enjoyed the foresight game. Participant engagement and intellectual creativity fostered by this foresight method allows a pleasant experience for obtaining serious objectives. Third, a majority of participants reported that the SES helped them take a long-term, strategic perspective. The game format

creates an environment useful for addressing real-world challenges. The SES is not a zero-sum game, reflecting real-world complexities that allow for subsequent reflection and conversation. Lastly, the method is consistent across participants. Four parallel sessions were conducted on the same issue, roles, objectives, scenarios, and sequences with similar results. The only weakness reported was that it is difficult to hold a full session in less than three hours.

Information about the JRC's foresight tools can be accessed through the European Commission website: https://knowledge4policy.ec.europa.eu/foresight_en

3.3 Japan

The Science and Technology Foresight by Japan's National Institute of Science and Technology Policy (NISTEP) is considered one of the most robust foresight frameworks (Cuhls, 2010; Martin, 1995). Their first Delphi study was published in 1971 and repeated every five years, with the most recent being in 2019 (NISTEP, 2019). The Delphi approach is a semi-quantitative method, first developed by the RAND Corporation (Gordon & Helmer, 1964), in which a diverse group of experts are administered a two-part survey to collect opinions on future topics and develop consensus. The topics to be surveyed are created by high-level specialists in each field (Cuhls, 2010). Surveys are mailed to selected experts on specific topics and asked to predict the future of technology, including the estimated degree of importance, expected time of realization, and goals needed to be set (Cuhls, 2010; Martin, 1995). After answering the first round of questions, the survey is repeated in which they are presented with the opinions of other experts and given the chance to change their original opinion or maintain their position with an explanation.

NISTEP conducts an internal evaluation on the reliability and accuracy of foresight cycles after 15 to 20 years (Kondo, 1992). They assess and publish the percentage of expert opinions that were fully or partially realized. In 2011, Tatsuro Yoda also measured perceptions on the impact of foresight studies on policy making in Japan with those involved with the foresight process, including key members of panel committees, survey respondents, and workshop participants. Many researchers have given commentary on the process and effectiveness of the Japanese foresight framework throughout the years. For example, in 1983, Irvine and Martin conducted a review of foresight methods for the British government (Martin, 1995). Through a literature review and interviews, they evaluated the efficacy of foresight programs, including foresight in Japan, at identifying emerging areas of research with industrial impacts. These evaluations provide assessment for the strengths and weaknesses of the foresight method.

The use of the Delphi survey method in Japan has many benefits; namely, accuracy, reliability, and impact. A notable strength of the Delphi method is the ability for assessing the "accuracy" of expert opinions. Over 60% of Delphi topics were fully or partially realized (Kondo, 1992). For example, experts in Japan successfully anticipated the advent of the fax machine in the 1971 Delphi survey, albeit their estimate of the exact year of development and usage were not fully realized (Cuhls, 2010). Further, the reliability of foresight in Japan can also be attributed to the careful selection of diverse experts (Kondo 1992). Foresight output can be more nuanced when the knowledge and

perspectives of experts from various fields are combined (Martin, 1995). Reliability is also inherent in the Delphi method due to the communication and consensus created between experts (Kuwahara, 1999; Martin, 1995). As Japanese foresight is integrated into the national system, there is also greater possibility of impacts to decision making and priority setting (Cuhls, 2010; Kuwahara et al., 2008). The Delphi surveys can serve to promote technological development and expert opinions can become self-fulfilling prophecies (Kondo, 1992).

Yet, there are potential limitations to foresight in Japan (Yoda, 2011). Contradictory to other assessments, the majority of those taking part in the evaluative study considered the impact of the foresight studies to be insufficient. Some reported that the Delphi method does not produce concrete proposals and most reported that the government has problems utilizing the results for policy making. Further, a limitation of foresight is that some topics cannot be predicted at all. For example, Japan is in an earthquake zone; thus, earthquake prediction is always included as a foresight topic in the Delphi surveys (Cuhls, 2010). Although earthquakes cannot be successfully predicted or avoided, the inclusion of important topics in Japan's Delphi surveys can contribute to further research in those areas (Cuhls, 1998). Rather than successfully predicting the occurrence of earthquakes, foresight has been used towards the call for technological solutions that mitigate the damage of earthquakes in Japan, such as strategic building materials, and provide a national network for advanced warning of earthquakes, such as advanced sensory technology.

Reports on Science and Technology Foresight can be accessed on the NISTEP website: https://www.nistep.go.jp/en/?page_id=56

3.4 Austria

Following national financial issues during the mid-twentieth century, foresight in Austria emphasized increasing economic stability through strategic planning and priority setting regarding emerging technologies (Blind et al., 1999). Austria's first systemic foresight program "Delphi Austria" was completed between 1996 and 1998, using the Delphi survey method on a range of topics (Aichholzer, 2001). The methodology involved preparatory studies, expert panels, megatrends, and Delphi surveys on technology, society, and culture. For each topic, expert panels consisted of two dozen members within decision-making in science and research, business, public administration, and other organizations. Rather than priority setting, the goal of the foresight program was to "mobilize innovation awareness" through facilitating engagement and consensus among stakeholders in the national innovation systems. The results indicated opportunities for innovation and identified major problem areas needing further attention, such as greater collaboration between sectors (Aichholzer, 2001). Three years after the conclusion of the study, "Delphi Austria" was evaluated to have resulted in direct and in-direct impacts in shaping technology policy. For example, the foresight is credited with influencing the start of new targeted programs in the field of sustainable development, the creation of a technology policy instrument, called "K plus," and for promoting competence centres.

Detailed information about "Delphi Austria" is publicly available through the Austrian Academy of Sciences Institute of Technology Assessment:

https://www.oeaw.ac.at/en/ita/ita/projekte/abgeschlossene-projekte/1998/delphi-austria

More recently, much of foresight in Austria is promoted by the Austrian Institute of Technology (AIT). One such foresight program, "Materials Foresight," began in 2013 to develop scenarios for Austrian manufacturing (Hörlesberger et al., 2015). The methodology includes an advisory board, expert team, and workshops toward the development of future scenarios, which are accompanied by an environmental analysis. The engineers and material scientists involved in the project were considered engaged and creative in their work. However, the diversity of the expert pool was limited.

A brief on "Materials Foresight" can be accessed through the European Foresight Platform:
http://foresight-platform.eu/brief/efp-brief-no-259-austrian-materials-foresight/

3.5 United States

The Unites States has a long history with national foresight efforts, with the first systemic foresight approaches taking place in 1937 (Miles, 2010; NRC, 1937). Following the September 11 terrorist attack, foresight was considered an increasingly necessary tool for informing policymaking (Burrows, 2021). Beginning in 2006, the U.S. intelligence community releases annual threat assessments to Congress and the public. The threat assessments are unclassified summaries of national security risks based on global threats, such as cyber and technological threats, terrorism, weapons of mass destruction, crime, environmental and natural resources issues, and economic issues. However, there is no information as to how the threat assessments are conducted (Office of the Director of National Intelligence, 2023).

The annual threat assessments can be accessed through the Office of the Director of National Intelligence website: https://www.intelligence.gov/annual-threat-assessment

Beginning in 1997, the United States' National Intelligence Council (NIC) also releases comprehensive "Global Trends" reports every four years, with the most recent being published in 2021 (NIC, 2021). The reports provide scenarios on key trends and uncertainties in the coming two decades, with the purpose of assisting policymakers early in each administration as they develop national security strategy. To create the report, NIC evaluates previous editions, conducts consultations and data collection, commissions research, and solicits internal and external feedback. The process is large-scale, but little descriptive information is published on the development and evaluation of the foresight process, such as which data is collected and precisely how it is analysed. Based on available information, analysis is conducted on demographics, environment, economics, and technology, followed by assessment of how these factors interact to impact individuals and society, states, and international systems. NIC focuses on identifying the key emerging dynamics at each level, including what is driving them and how they might evolve over time. After identification of several key uncertainties, five future scenarios are created. The focus is on global, long-term trends that are likely to shape communities, states, and the international system. The scenarios of the Global Trends report are striking, in that they evoke emotion, are U.S.-centred, and political, indicating anxieties about international relationships between global superpowers. Being a government report, Global Trends is well situated to lead

to actionable strategy making. Yet, whether the large-scale foresight method has positive policy impacts is contested (Burrows, 2021).
The Global Trends reports are publicly accessible on the Director of National Intelligence website: https://www.dni.gov/index.php/gt2040-home

3.6 Norway

The Research Council of Norway (RCN) recently conducted a mixed-method, scenario-based foresight to help inform funding priorities and internal decision making, as well as manage risks regarding the economy and environment (Gunashekar et al., 2021; Norwegian Ministry of Education and Research, 2019). In 2021, RCN published detailed information about their four-step foresight framework, including an explanation of the purpose and theoretical background. In the first step of the foresight process, information and evidence is gathered regarding five main research areas: oceans; green transition; health and welfare; technology and digitalization; and globalization and cohesion. This trend analysis allows for greater baseline understanding of complex issues, their trajectory, as well as uncertainties and impacting factors. In the second step, future scenarios were developed using systemic scenario development approach. This entails identification of key factors and differentiating scenarios based on their projections of how these factors will evolve in the future. Factor identification and projection development was based on evidence from desk research, interviews, surveys, and expert judgement. A scoring approach, described as cross-impact analysis, consistency analysis and cluster analysis, was reportedly employed for transparency, reproducibility, and bias mitigation. These were undertaken by the study team, supplemented by external advisers and experts to ensure that a range of relevant views were included. In the third step, scenarios were used to identify priorities. The fourth and final step involves triangulating evidence collecting during preceding phases of the study to identify key findings.

The main evidence and data collection activities undertaken in the research include substantial stakeholder interviews, a literature review of approximately 450 articles, a large public survey, focus groups involving 10 ministries, expert crowdsources, and futures workshops (Gunashekar et al., 2021). Over the course of the study, diverse stakeholders are involved from academia, government, industry, the non-profit sector, RCN, and the public. Detailed limitations of the foresight process were reported, which is necessary but not often seen in foresight research. A limitation of desk research was that it may not have been exhaustive. Interviews and focus groups were semi-structured and therefore not consistent across groups and facilitators. A limitation of the survey was that it may not have been representative of the public. For example, the average age of respondents was 56 years old, despite publishing the survey on social media. There may have been further sampling bias, as those with better understanding of research and innovation in Norway may have been more likely to participate in the survey.
Further information about the foresight methodology report can be accessed through the RAND Corporation publisher site:
https://www.rand.org/pubs/research_reports/RRA966-1.html

3.7 Netherlands

Foresight activities in the Netherlands began in the 1970's and flourished in the 1990's (Blind et al., 1999; van der Meulen, 1999). In 1997, the Dutch Ministry of Economic Affairs, responsible for technology policy in the Netherlands, asked RAND Europe and Coopers & Lybrand Technology Consultants to conduct a technology trend analysis. 'Technology Radar' was developed to engage business and the public research community to achieve greater technology innovation in the Netherlands (Walker et al., 2001). The report identifies technology fields likely to be important to Dutch business and industry within ten years and to investigate whether sufficient knowledge build-up is occurring in these fields. Information was obtained through interviews and expert opinions by contacting representatives of Dutch business and industry, involving 100 representatives of private companies, universities, and research institutes. There was differing opinions and no attempt to force consensus; yet the report states overarching themes emerged. The results were subsequently discussed with experts who were not part of the interview process as a verification measure. The first phase of the analysis involved identifying technologies believed to be important to the Dutch economy and technologies necessary for addressing needs, problems, and solution directions of different industry sectors. The second phase of analysis was to compare the supply and demand of knowledge supporting these technologies.

The detailed report with rational, methods, and results can be accessed through the RAND Corporation publisher site:
https://www.rand.org/pubs/rand_europe/RE98004z1.html

In 2020, the Netherlands' Ministry of Defence published the "Defence Vision 2035" threat assessment, based on a trend analysis produced through scientific reports and interviews with experts, as well as an analysis of possible deployment scenarios (Ministry of Defence, 2020). The goal of the threat assessment is for the defence ministry to be better prepared to respond to future threats during complex, uncertain, and rapidly changing times. Particularly, the trend analysis and scenarios are intended to aid in improving the application of scarce capacities toward diverse situations. The threat assessment is notable, in that it thoroughly describes the problems faced by the defence organization, particularly being inadequately equipped for addressing changing threats. The report describes the trend analysis, deployment scenarios, and capability objectives in detail, but provides little information as to how the foresight materials were developed.

The Defence Vision 2035 threat assessment can be accessed through the Ministry of Defence website:
https://english.defensie.nl/downloads/publications/2020/10/15/defence-vision-2035

3.8 United Arab Emirates

Dubai Future Research, a branch of the Dubai Future Foundation of the United Arab Emirates government, publishes in-depth foresight reports on trends. The foresight research aims to inform government policymaking, provide recommendations, and engage the private sector. Dubai Future Foundation state their rationale for using foresight is that individuals and societies do not apply foresight until after a problem or

crisis has occurred; thus, the goal of the government is to use foresight as an optimistic and proactive tool. (Dubai Future Foundation, 2023b). The Dubai Future Foundation identified 10 megatrends, which were selected based on their global significance (Dubai Future Foundation, 2023a). Analysis of megatrends was conducted but is not reported. An additional resource is the Future Foresights report on technology trends in the coming 20 to 30 years (Dubai Future Foundation, 2020). It focuses on how trends might impact the seven themes in the United Arab Emirate's National Innovation Strategy, namely space, transportation, water, health, technology, education, and renewables. The trends were developed through interviews with global technology experts and government staff across various fields. Unlike other foresight programs, information on individuals interviewed for each topic is published along with the trend analysis, demonstrating significant transparency. The report includes nuanced description of the current state of each theme, expectations for the changes in the future, and what is needed to reduce challenges. The resources published by the Dubai Future Foundation are accessible, clearly communicated, demonstrative of rationale, and emotionally engaging.

The foresight reports can be accessed at the Dubai Futures Foundation website: https://www.dubaifuture.ae/initiatives/future-foresight-and-imagination/dubai-future-research

3.9 Australia

The Commonwealth Scientific and Industrial Research Organization (CSIRO) is Australia's national science agency, which has been conducting foresight activities for decades (Martin, 2010). The Australian Government Department of Infrastructure and Regional Development collaborated with CSIRO in undertaking a strategic foresight project for regional Australia (Taylor et al., 2019). Looking to 2040 Australia, the project examines the future of 34 trends, five megatrends, identifies four scenarios, and explores implications to decision making. CSIRO developed a generic strategic foresight process created through multiple projects delivered over the past six years. The foresight process begins with establishing the scope, focal questions, and timeframe. The initial stage is to increase understanding of current and historic conditions that shape present issues. 34 sub-trends were developed and informed by social, economic, institutional, environmental, and technological change identified in prior CSIRO reports and datasets. The trends were reviewed through semi-structured interviews with the Project Advisory Group and informed the development five megatrends. A small workshop was organized with government representatives and other stakeholders to identify unsubstantiated or irrelevant trends.

Four scenarios were developed to represent simple models for addressing complex futures. It was considered more useful to explore multiple plausible futures, rather than predicting the most likely future, to encourage deliberative dialogue and reflection on existing assumptions. The scenarios were framed by axes of change, which were on a spectrum of either vast or limited technological process and connectivity, as well as economic diversity and human capital. Trends were incorporated into the scenarios, such as climate change, natural resource scarcity, and migration to cities. The development process involved a two-day scenario building

workshop with 31 expert participants. In this workshop, experts collaborated in small groups to develop narratives of what living, working, and investing in regional Australia might look like in 2040 and to identify needed planning, investment prioritization, and government strategies to increase benefits and mitigate risks associated with each of the scenarios. Lastly, eight key implications for policy and stakeholder decision making were communicated with the goal of securing future opportunities, reducing risks, and encouraging stakeholder deliberation. The key implications were validated through further feedback from workshop participants and supplemented by 16 interviews with experts in business and industry.

Further information on "Strategic foresight for regional Australia: Megatrends, scenarios, and implications" can be accessed through the CSIRO website: https://publications.csiro.au/publications/publication/PIcsiro:EP175665

3.10 European Defence Agency

The European Defence Agency (EDA) is an intergovernmental agency of the Council of the European Union that supports 27 Member States in improving their defence capabilities. In 2015, the EDA began development on Technology Watch & Foresight, which they published in 2021 with the goal of facilitating creative thinking and informing future defence policies. The exercise involved back-casting, scenario building through a virtual world café discussion, and a futures-backward method of technology identification. Over 200 people participated from various areas of expertise (e.g., sociology, ethics, economy, medicine, history, international relations, defence capabilities and operational needs, philosophy, biosciences) in government, academia, industry, and civil society. The exercise began with two back-casting activities to assess predictions of past defence-related technologies. The two back-casting themes included assessment of predictions in 1970's-1990's science fiction movies, as well as the 2007 survey of EDA research and technology priorities. The experts collaborated to draft four scenarios, described as TechUtopia, Business as usual, Darwinian Games and Humanity versus the Hungry Beast.

During following "divergent" and "convergent" exercises, experts took different roles, including general participants, moderators, "future shapers" who provide future-framing, and "red team" to challenge assumptions. The divergent thinking exercise was organized to apply the scenarios towards consideration of "key aspects" (e.g., biotechnology as a threat and challenge), their relevance for the European defence sector, and the likelihood and frequency of their potential occurrence. The event was organized as a "virtual world café" to foster discussions around the different topics. Although the structured conversation process is typically done in-person, the event was held online with a VIIMA virtual whiteboard due to pandemic restrictions. Participants were given access to the exercise website and all related materials, such as presentations, agendas, and meeting links. The event started with the proposed four future scenarios arranged around dimensions of (1) social and ethical, (2) environmental, (3) geopolitical and economical, (4) technology and technical, and (5) defence specificities. Possible drivers and shocks were also included in relation to the dimensions (e.g., disrupting technical breakthroughs, natural/man-made catastrophes). 14 key aspects were summarized based on 92 ideas generated across 8 days with 160

expert participants across sectors. Lastly, a futures-backward method was used to identify current changes that need to occur for certain futures to take place. Starting with future scenarios and going backwards, participants identified how technology may impact the future of defence and capabilities. To guide the exercise, four time horizons were used to map potential turning points in the scenario, being the present, 2025, 2035, and 2040. This exercise, in tandem with survey results, were analysed to identify potentially disruptive technologies. The exercise resulted in 10 final scenarios (e.g., Software based battlefield).

4 Conclusions

This review of foresight programs synthesized ten programs from various nations (i.e., Finland, Japan, Austria, the United States, Norway, the Netherlands, the United Arab Emirates, Australia) and international institutions (i.e., the European Commission, the European Defence Agency). These programs represent a wide range of foresight methods, including Delphi surveys, scenarios, megatrends, games, and workshops. Most foresight programs share similar overarching goals of aggregating expert knowledge, increasing future-framed thinking, and informing public policy decision-making. Yet, there are some limitations to the current state of foresight research. Thus, we will synthesize best practices evident among the reviewed foresight programs and recommend changes needed in foresight literature in general.

4.1 Synthesis

Individual involvement and subsequent impact were two general themes of effective foresight programs that emerged from the literature review. However, these characteristics vary largely based on the context and methods used, thus are not applicable to every foresight program. Individual involvement refers to the competence, diversity, and engagement of individuals involved, including experts, participants, and facilitators. Those who participate and facilitate foresight activities should be competent in the topic to ensure thoughtful and nuanced foresight output (Rijkens-Klomp & Van Der Duin, 2014). Although many foresight programs report the involvement of knowledgeable experts and facilitators, little information is offered regarding prior knowledge or competency regarding the foresight topic. Experts involved in foresight programs should also represent diverse perspectives from various sectors. Many programs, such as those in Japan, Norway, and the Netherlands, indicate that experts came from a wide range of expertise areas, within and outside technology sectors, in government, academia, and industry. Yet, more nuanced expert diversity could be improved. For example, in Austria's "Materials Foresight," materials experts in government, industry, and science were involved, although inclusion of social scientists and youth would have been an enriching as well (Hörlesberger et al., 2015). Experts from neighbouring fields can also be included, as they may be uniquely equipped to foresee potential innovations and concerns from a broader perspective (Martin, 1995). The involvement of younger, junior-level experts is uncommon but also needed to account for awareness of novel innovations in a quickly evolving technology culture (Weigand, 2014). Individuals involved in foresight activities should also demonstrate

active participation and engagement. This is one of the most important aspects of effective foresight (Georghiou & Keenan, 2006), as seen in programs in Finland and by the European Commission in which emotional engagement can spark more open-minded deliberation of the future.

Subsequent impact is another important characteristic of effective programs. Impact on individuals and the community can occur by increasing foresight efficacy and informing decision making. Foresight efficacy can prompt future-forward thinking, deepen participant knowledge of relevant topics, and establish networks of experts for foresight (Georghiou & Keenan, 2006; Halonen et al., 2022). For example, foresight in Finland measured the impact of the Futures Frequency program on participant foresight efficacy. Participants indicated that they felt more equipped to think about the future and to promote foresight within their own organization after taking part in the program (Halonen, et al., 2022). These facets of foresight efficacy can impact attitudes about the future and prompt agency prepare for the future. Another aspect of effective foresight programs is the impact on decision making, which is often considered one of the most meaningful foresight results (Georghiou & Keenan, 2006; Yoda, 2011). To impact decision making, foresight programs must often communicate results clearly and with sufficient quantitative information to assist decision makers. Cycles of policy making should be considered and recommendations should account for existing resources, funding, and capabilities (Georghiou & Keenan, 2006; Yoda, 2011). Impacting policy and decision making is no small feat; thus, significant government involvement is often required to tie foresight output to public policy. Foresight in Japan demonstrates how foresight can bridge the knowledge of experts with national policy making through the large-scale involvement of the government.

4.2 Recommendations

Based on the review of foresight programs, we present a set of recommendations for law enforcement agencies and civil security practitioners seeking to pre-empt the emergence of potentially disruptive technologies. Foresight methods are often chosen based on available resources; thus, we offer a general three-prong approach that can be integrated into various foresight methodologies. First, we suggest information gathering on megatrends, followed by scenario development, and preceded by a capabilities assessment.

1. Information gathering on megatrends. The first prong, information gathering on megatrends, involves a technology trend analysis to determine areas of potential future disruptions. We suggest using Delphi surveys as a reliable and systemic method for compiling expert opinions. Alternatively, foresight researchers may conduct a meta-analysis of existing megatrends developed by national intelligence and defence agencies. With any method for information gathering on megatrends, STEEPLE analysis should be incorporated to better facilitate consideration of how Social, Technological, Economic, Environmental, Political, Legal, and Ethical factors interact to influence the future (Richter et al., 2022).

2. Scenario development. The second prong, scenario development, should be informed by megatrends. The scenarios should be developed with the goal of sparking creative thought. They do not necessarily need to reflect the most likely futures but can

include seemingly implausible futures as well. Nominal Group Technique (NGT) can be utilized to develop and decide on scenarios (Van de Ven & Delbecq, 1972). In this process, members of a group independently generate ideas and share them one at a time without discussion. This is followed by a facilitated discussion to clarify ideas and a ranking activity for group members to score the most favourable ideas (Vander Laenen, 2015). The technique allows for all participant scenarios to be considered.

3. Capabilities assessment. The third prong, capabilities assessment, involves exploring capabilities currently available and those needing further development to efficiently address the future scenario. We suggest the incorporation of the POSTEDFIT framework (Oosthuizen & Roodt, 2008) to assess law enforcement readiness regarding People, Organization, Support, Training, Equipment, Doctrine, Facilities, Information, and Technology.

The overarching goal of the suggested framework is to enhance future thinking through an evidence-based and creative approach. Foresight involves working on the future without knowing what the future will look like. As the future is uncertain, many foresight programs (i.e., Futures Frequency, Scenario Exploration System) do not seek to predict the future, but to exercise and strengthen the ability to be adaptable and open-minded, thus better prepared to handle unforeseen and complex situations when they occur.

4.3 Evaluation and Transparency

Foresight methods are used by governments, yet increased uptake of foresight methodologies by academics and social scientists may also serve to increase knowledge of civil security issues and create greater impetus for policy changes. However, foresight may be perceived as lacking in evidence, empiricism, or scientific methods. This is largely due to the lack of publicly available information about foresight materials and processes, as well as how they were developed and evaluated. Transparency and assessment of limitations regarding foresight methodologies is necessary for understanding and replicating existing foresight programs. Therefore, we strongly recommend that future foresight research develop accessible evaluation measures and transparent research practices.

The literature review revealed many issues related to transparency and evaluation methods. For example, evaluation criteria are inconsistent across studies or lacking in meaningful details that allow for critical assessment. Most foresight programs claim to utilize diverse groups of stakeholders in their methods, yet few programs publicly list the individuals involved in the foresight process. Without further explanation of actors involved, it is not possible to critically evaluate whether the stakeholders involved were indeed representative of diverse perspectives. Further, there is little information about foresight expert selection procedures, beyond convenience sampling by foresight facilitators and advisory board members. Evaluation of foresight methods should be conducted, explicitly stated, and shared. We recommend five evaluation criteria based on existing foresight assessment procedures evident in the literature review, namely accuracy, reliability, validity, individual impact, and community impact of foresight methodologies.

1. Accuracy. Some foresight methods, though not all, seek to create accurate future predictions. Science and Technology Foresight in Japan is an example of a program with accuracy-based evaluation. The long-running use of the Delphi method in Japan allows for assessment of whether predictions came to fruition. Internal assessment determined that 60% of expert opinions on technology foresight were fully or partially realized in the 15-to-20-year period following the survey (Yoda, 2011). Further, due to multiple rounds of surveying, the nature of the Delphi method allows for the assessment of accuracy through consensus. Consensus can be used as a criterion for foresight evaluation; however, consensus may not be necessary for an effective foresight. Dissenting opinions and unconventional perspectives are often useful in sparking creative and open-minded foresight.

2. Reliability. Reliability refers to the ability for a particular method to produce the same or similar outputs across different settings. This can be tested by assessing the adaptability of foresight methods and the replicability of foresight output. The European Commission's Scenario Exploration System is a prime candidate for reliability-based evaluation. The SES is considered adaptable, in that it was successfully utilized for a wide range of topics. It is also replicable, in that foresight output was found to be similar across different groups utilizing the same topic.

3. Validity. It is important to test how well foresight methodologies meet their intended purpose, both without bias (i.e., internal validity) and within real-world contexts (i.e., external validity). Validity can be assessed on the basis of information saturation, facilitator knowledge, participant collaboration, and participant selection. In assessing foresight topics, foresight organizers may assess whether they have reached saturation, being whether sufficient information has been collected so that further collection will not yield a deeper knowledge. This evaluation may be particularly relevant for the development of megatrends. Validity can be further assessed by testing the assumptions and knowledge of facilitators, both on the foresight topic and method. The inclusion and collaboration of diverse participants may also be evaluated to test for validity. Foresight in Finland exemplifies the assessment of participant collaboration and intersubjectivity, reflecting the creation of a safe environment for discussion between individuals. Ensuring collaboration between varying perspectives can serve to mitigate potential bias and assumptions that may impact the foresight exercises. Foresight facilitators should also assess the selection and collaboration of participants from within and outside technology sectors and across fields within government, academia, industry, and civil society. Evaluation criteria may also include whether there is a sufficient number of participants and whether they represent a holistic range of expertise, including those in neighbouring fields, such as history, social sciences, and economics. Foresight in Japan and Austria exemplify foresight programs that critically assesses the diversity of fields of expertise represented by participants. Evaluation of validity may also include whether participants are representative varying levels of organizational seniority, and of many ages and cultural backgrounds to mitigate potential bias and increase the real-world applicability of foresight output.

4. Individual impact. The ability of a foresight method to have an impact on the individuals involved is perhaps the most important measurement of a foresight method (Georghiou & Keenan, 2006). Individual impact can be assessed in a variety of ways. For example, the Finnish Innovation Fund, Sitra, published evaluation of their Futures

Frequency method in which participants were surveyed on how the foresight program impacted them. They were asked whether their knowledge of the topic increased or changed, whether their efficacy to think about the future increased, whether they feel more capable to conduct foresight themselves, and whether they felt emotionally impacted by the foresight exercises (Halonen, et al., 2022).

5. Community impact. The influence of foresight activities on subsequent policy and decision making is also considered one of the more important characteristics of an effective foresight program (Georghiou & Keenan, 2006; Poteralska & Sacio-Szymańska, 2014). Therefore, the ability to impact the community should be part of foresight method assessment. This can include effective communication of results,

Table 2: Recommended Evaluation Criteria

Criteria	Example	Evaluation Question
Accuracy	Realization of predictions	-What percent of predictions were realized or partially realized within the time horizon?
	Expert consensus	-What is the percentage of consensus in expert opinions?
Reliability	Adaptability	-Can the foresight method by adapted to different topics?
	Replicability	-Is the foresight output similar across different groups?
Validity	Saturation	-Has sufficient information been collected?
	Organizer competence	-Are foresight organizers knowledgeable about the topics and methods used?
	Expert selection	-Is the participant pool sufficiently sized, diverse, and collaborative?
Individual impact	Knowledge	-Did the foresight method increase knowledge of the topic?
	Foresight capacity	-Did the program increase future-thinking and foresight efficacy?
	Engagement	-Were participants actively engaged?
Community impact	Result communication	-Is communication of results clear, accessible, and useful to decision makers?
	Appropriate recommendations	-Are recommendations appropriate to available capabilities and funding?

	Government involvement	-How involved is the government in the foresight program?
	Network establishment	-Are networks of foresight engagement established?
	Policy impact	-Does the foresight program influence policy?

appropriateness of recommendations regarding available funding and existing resources, scale of government involvement, establishment of foresight networks, and resulting policy impacts. Science and Technology Foresight in Japan and Delphi Austria have both been assessed for impacting the promotion of further research and innovation.

Foresight programs vary widely across quantitative and qualitative methodologies; thus, foresight programs may not need to meet each evaluation criteria. Rather, it is important that the program sets and meets its own purpose (e.g., promoting future thinking, identifying evidence-based trends), develops a methodology to test whether the program has met its purpose (e.g., target questionnaires for participants), and employs sound science-based practices (e.g., transparency). Yet, as most foresight development is qualitative, we recommend the pre-registration of the goals, development procedure, evaluation criteria, and final materials through open science repositories, such as the Open Science Framework (OSF). For example, foresight programs relying on expert interviews may publish interview transcripts or interview questions asked. It is important that foresight activities are evaluated, not only for greater transparency and replicability, but so that foresight can be improved and better meet the needs of civil security practitioners (Vataja et al., 2019). Evaluation is necessary for researching complex issues in which uncertainty is the norm and simple, definitive answers may not be possible (Mayne 2006).

Foresight is both an art and a science – there is no one “right” way to conduct foresight (Taylor et al., 2019). This review of foresight programs demonstrates that foresight is flexible, adaptive, and creative method that can be used to develop quantitative or qualitative data for informing decision making. Most importantly, foresight is notable in that it can be used to prompt foresight participants to think about the future differently. Foresight in Finland exemplifies how foresight can increase a sense of optimism about the future, as well as individual agency in shaping the future. Foresight in Japan demonstrates how a long-term concerted effort between experts and government can lead to positive policy impacts that benefit civil society. In complex times with high-stakes conflicts and devastating crises, foresight can be a proactive method for developing a desired future.

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6 Appendix

Appendix A: Identified Foresight Programs

Foresight Program	Website
Academies of Arts and Science, TA-SWISS	https://www.samw.ch/en/Projects/Swiss-Academies-of-Arts-and-Sciences.html
Anticipation and Foresight Programme	https://www.unesco.org/en/search?category=UNESCO&text=Anticipation+and+Foresight+Programme
Austrian Institute of Technology (AIT)	https://www.ait.ac.at/en/
Brazilian National Council for Scientific and Technological Development	https://www.chistera.eu/cnpq
China Five-Year Plan	https://en.ndrc.gov.cn/policies/202105/P020210527785800103339.pdf
Colombian Technology Foresight Programme (CTFP)	https://www.redalyc.org/pdf/2250/225014905002.pdf
CSIRO's Future Scenarios, Australia	https://www.csiro.au/en/research/environmental-impacts/climate-change/state-of-the-climate/future-climate
Cyprus Research & Innovation Foundation (RIF)	https://www.research.org.cy/en/
Danish Board of Technology Foundation	https://tekno.dk/?lang=en
Dubai Futures Centre	https://www.thefuturescentre.org/
ENISA's European Union Agency for Cybersecurity's	https://www.enisa.europa.eu/
European Commission Joint Research Center	https://knowledge4policy.ec.europa.eu/foresight_en
European Defence Agency	https://eda.europa.eu/

Finnish Innovation Fund	https://www.sitra.fi/en/
Flanders Innovation & Entrepreneurship (VLAIO)	https://www.vlaio.be/en
France Stratégie	https://www.strategie.gouv.fr/
Fraunhofer Society's Futures Studies	https://www.isi.fraunhofer.de/en/competence-center/foresight/geschaeftsfelder/zukuenfte-gesellschaft.html
Hungary Technology Foresight Programme (TEP)	http://pdc.ceu.hu/archive/00002690/01/evaluation_HU_TEP.pdf
Indian Department of Science and Technology's Foresight Initiatives	https://dst.gov.in/joint-programme-electric-mobility-and-technology-foresighting
Interpol	https://www.interpol.int/en
Irish Council for Science, Technology and Innovation	https://enterprise.gov.ie/en/publications/publication-files/forf%C3%A1s/technology-foresight-ireland.pdf
Israel Innovation Authority's Foresight Division	https://innovationisrael.org.il/en/report/activities-israel-innovation-authoritys-divisions/
Italian National Research Council (CNR)	https://www.cnr.it/en
Japan National Institute of Advanced Industrial Science and Technology	https://www.aist.go.jp/index_en.html
Joint European Disruptive Initiative (JEDI):	https://www.jedi.foundation/
Korean Institute of S&T Evaluation and Planning (KISTEP)	https://www.kistep.re.kr/eng/
Latvia Ministry of Education and Science	https://www.izm.gov.lv/en
Manchester Institute of Innovation Research, PREST	https://www.mioir.manchester.ac.uk/
Millenaire3	https://www.millenaire3.com/
Netherlands Ministry of Defence	https://www.gfar.net/organizations/national-council-agricultural-research
Netherlands Ministry of Economic Affairs "Technology Radar"	https://www.rand.org/pubs/rand_europe/RE98004z1.html
OECD Government Foresight Community	https://www.oecd.org/strategic-foresight/ourwork/OECD%20GFC%20Annual%20Meeting%20Report%202020.pdf
Research Council of Norway	https://www.forskningsradet.no/siteassets/om-forskningsradet/foresight-report-methodology.pdf
Rosselli Foundation	https://www.rosselli.org/
Singapore Ministry of Trade and Industry (MTI)	https://www.mti.gov.sg/

Slovakia National Investment Plan (NIP)	https://mirri.gov.sk/en/sections/investment-division/strategic-planning-department/
South Africa National Planning Commission (NPC)	https://www.nationalplanningcommission.org.za/
Swedish Technology Foresight 2004	https://www.nistep.go.jp/IC/ic030227/pdf/p3-6.pdf
UK Government Office for Science	https://www.gov.uk/government/organisations/government-office-for-science
U.S. National Intelligence Council Global Trends	https://www.dni.gov/index.php/gt2040-home
U.S. National Intelligence Annual Threat Assessment	https://www.whitehouse.gov/ostp/ostps-teams/nstc/
Vinnova, Sweden	https://www.vinnova.se/en/