SUMMARY

The idea that policy-making can benefit from being based on ‘evidence’ is widely accepted. Evidence-based policy needs to address a fundamental contradiction between the nature of "evidence", which comes from the past and the nature of "policy", which is about the future. Foresight is a means of addressing this contradiction, not as a "sixth sense" but rather as a systematic process of strategic intelligence which combines an appreciation of information about the past and intuition about the future with structured methodologies that improve the anticipatory capacity of policy-making and thus the efficiency, effectiveness and legitimacy of policy choices.

Within the framework accepted by the EC’s DG RTD, Strategic Intelligence is the part of the foresight and strategy cycle that relates to information gathering and analysis. While easy-to-anticipate business-as-usual scenarios unfold predictably and involve policy adjustments and improvements, strategic intelligence goes into anticipating potential disruptions, opportunities and challenges, analysing their implications and preparing responses.

This brief starts from a classification of methods, and their suitability in identifying different types of factors – trends, drivers, weak signals and wildcards¹. It should be read in conjunction with Policy Brief 11 on "sense-making" in the context of the overall approach for Foresight activities described in Policy Brief 2.

¹ This Policy Brief draws on four studies supported by the Commission: A comparative overview of horizon scanning activities (Williams 2013); A horizon scanning study of the security field using advanced web-mining tools (Spiegeleire 2013); A horizon scanning of disruptive developments relevant to Horizon 2020 using manual scanning techniques (Schultz 2013); A systematic conceptual paper on disruptive Emergencies (Reynolds 2013)
We make five recommendations:

EFFLA recommends a strengthening of strategic intelligence elements in the implementation of H2020 and European Foresight to underpin the proposal for the next Framework Programme.

The Foresight Hub in DG RTD should promote the use of tools for horizon scan data analysis which minimise the effect of cognitive bias.

The Foresight Hub in DG RTD should maintain an electronic list of sources, with web links for each, and provide information on each as to the focus of the source.

DG RTD should be conscious of the need for experts in horizon scanning activities covering both personal interactions and automated search.

When choosing the methods for forward looking analysis consider the suitability of the methods (or combinations thereof) to the objectives, the area, in which it is supposed to be applied, and the relevance of, or the potential for disruptive emergencies and opportunities.

1. Background and Context

H2020 was developed through the institutional decision-making system of the EU with all its consultations and the negotiations, and being informed by the mid-term evaluation of FP7 and an ex ante impact assessment exercise. **EFFLA recommends a strengthening of strategic intelligence elements in the implementation of H2020 and European Foresight to underpin the proposal for the next Framework Programme.**

Strategic Intelligence fits within the framework to be implemented by DG RTD as shown in Figure 1. It is primarily an information gathering stage, at which a wide range of data is gathered, but it involves also some analysis of that data to turn them into absorbable intelligence.

Figure 1: Elements of a strategy process
Strategic Intelligence is based on a process of Horizon Scanning: the monitoring of change, its sources and origins, across all disciplines, sectors, and geospatial systems.

Strategic Intelligence can be used to pursue objectives such as:

- **Explorative Outlook**: identifying chances that are lying ahead
- **Identifying problems and challenges** lying ahead and ensuring that the right questions are asked
- **Identifying new dimensions of existing challenges**: different drivers and signals occur at the same time or converge so that they form a new challenge
- **Find new solutions** to long-lasting existing and well-known problems
- **Identification of the tipping points** where an ongoing development might change direction
- **Identification of weak or strong signals of change**
- **Identification of blind spots**: by looking at what is relatively well known or clearly set on the agenda, Strategic Intelligence can be used to identify what is still unknown. Although it is impossible to identify the “unknown unknowns” (those developments one cannot ask for because there is no hint at all), in next steps a search for solutions in the blind spot fields can start.

The resulting scan data are usually classified into four basic groups according to their evolution and maturity as waves of change: weak signals; trends and developments; drivers; and wild cards.

- **Weak signals** of sources of change, e.g., the first instance of new consumer behaviour; the original idea or invention; the watershed event; the social outlier expressing a new value. A weak signal is a sign of change that exists presently in only a few scattered instances, which might multiply into enough data points to constitute a trend. In epidemiological terms, this would be patient zero.

- **Trends and discontinuous developments**: a pattern of change over time in some variable of interest (trend). Having trend data for some variable implies multiple instances of that variable. For example, one revolution in the Middle East is an event; two or three revolutions would call for comparative case studies; a dozen revolutions in countries across the Middle East and Africa within a year constitute a trend. Other developments, not as continuous as trends, nevertheless occur with a certain – sometimes sudden – impact. They develop from weak signals and can already be called “strong signals”.

- **Driver (or megatrend)**: commonly used to indicate a widespread (i.e., more than one country) trend of major impact, composed of sub-trends which are themselves capable of major impacts. A cluster of related trends which reinforce each other and together form a ‘megatrend’. Globalisation is such a megatrend: a cluster of related trends in production, infrastructure development and linkage, labour mobility, capital mobility, worldwide IT capabilities, etc., all of which reinforce each other’s growth through a complex system of interrelationships.

- **Wild cards**: low probability but high impact changes – like a global plague, or the awakening of the internet as an AI – usually described as events rather than gradually unfolding changes.

Understanding and interpreting these different kinds of scanning help better anticipate and prepare for the kinds of future challenges ahead. However, the dynamics of such future challenges may be of different nature, and their underlying logic influences the interpretation of the scanning data. It is thus important to know what kinds of future challenges we may be confronted with. Figure 2 outlines a typology of future transformations, in terms of how they might occur and be addressed.
Wild cards, for instance, may be particularly instructive for anticipating disruptive transformations, with regard to which a defensive strategy of devising options for how to best cope with the undesirable consequences of such a shock is suggested. Climate change can be regarded as an example of an ongoing process of transformation, implying a long-term adaptation and mitigation strategy. The analysis of trends is particularly important for informing and underpinning such a long-term strategy for handling a continuous change process. The other two types of change processes are not driven by external developments, but are purposefully set in motion by society and/or government. The reshaping of our social security models is an example of a rather gradual, but intended change process, underpinned by a combination of trends (e.g. demographics), weak signals (e.g. regarding behavioural changes in an ageing society), and wild cards (e.g. major waves of migration).

**Recommendation:** Be aware of the different types of future problems / future uncertainty you may be able to address with the means of Horizon Scanning, and what types of future developments you will miss when following a specific HS approach.

### 2. Methodologies for Horizon Scanning

**Horizon-scanning** is a structured evidence-gathering process that forms a basic ‘building block’ for most FLAs. The steps in a typical scanning exercise include:

- Gaining an understanding of the ‘audience’s’ requirements and perspectives
- Compiling and reviewing/analysis existing scanning databases (of which there are many), and undertaking supplementary scanning to get additional data and fill gaps, using any description and categorisation methodology
- Reviewing the data, often including a working or online consultation.
- Identifying and asking the “right questions” for analysing and interpreting the findings.

Horizon scanning methodologies can be usefully classified along two axes:

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3 For an example of such methodology see PESTLE (http://pestleanalysis.com/)
- One axis relates to the extent to which they use the participation of actors who may be important in thinking and shaping the future (participative or non-participative), professional scouts or ad-hoc participation.
- The other axis relates to the extent it uses machines for communication, analysis, etc. (manual vs. automatic).

The methodologies for scanning are evolving very quickly. Automation increases the ability to run analyses quickly, reliably and cheaply. However, the quality of the analysis depends to a large extent on the technical and data infrastructure. Despite the recent launching of many projects aiming to develop such infrastructure, expert human judgement remains a key input into foresight processes in both the policy and the corporate worlds.

In Figure 3 the more we move from bottom left towards the top right, the cost of analysis increases. However, in the current state of development of foresight techniques and resources, apart from very specific areas where systems are very well understood and represented by robust scientific models (e.g. meteorology), automated or semi-automated methods are used to support and supplement "manual" and "participative" methods, rather than as substitutes, in connection with trends and drivers.

Things are likely to change radically through developments in pattern recognition technologies and big data. One reason is that automated tools are more likely than humans to spot weak signals, through pattern matching, and may provoke useful trains of thought to develop wild cards or identify classical trends.

Figure 3: A classification scheme for Horizon Scanning methods


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4 Participation can be more or less systematic. Methods may include professional scouts or ad-hoc participation in particular study-settings.
Recommendation: DG RTD should be conscious of the need for experts in horizon scanning activities covering both personal interactions and automated search.

Recommendation: the Foresight Hub should promote the use of tools for horizon scan data analysis which minimise the effect of cognitive bias.

3. Horizon Scanning data – trade-offs and analyses

In attempting to choose horizon scanning databases, it is important to understand that any list or database comes with caveats and questions which need to be answered before it is used:

- **Sell-by date**: robust evidence loses freshness fast – rolling updates are critical: scanning *must* be an on-going process.
- **Ubiquity and diversity**: change erupts everywhere, and most surprisingly from the fringes – so including the outliers, marginalised voices, and tail ends of the bell curves is a must, even if embarrassing. Learn to manage the risk of the ridiculous, because you need the ridiculous.
- **Downside of density**: constantly refreshed scan data from broadly diverse perspectives, coupled with conceptually robust analytic tools, is an ideal – but too much data is indigestible without analytic tools which often render the scan usable only to experts.
- **Curation is critical**: people create sense, and triage and sense-making, performed continuously, can help manage data density via triage and pattern formation – provided the theoretical and conceptual tools are explicitly designed into the scanning and futures process.
- **Training, training, training**: this is the only path to consistent, high-quality scan input – and output. After all, what does the ‘expert’ in ‘expert model’ mean – topic expert, or futures expert? The greater the topical expertise, the less likely that someone is a useful futures thinker – disciplinary blinkers get in the way. Scanning requires mixed discipline teams coordinated and trained by a futures researcher.
- **Interface management**: it is also important to think about the interface to sense-making: how do the results have to look like to be of further use in next steps of the strategic process.

### The Metafore database

The Metafore database maintained by the Hague Centre for Strategic Studies uses a set of meta-data terms to structure codified foresight information.

The database includes systematically collected publicly available foresight studies on the future of the international security environment, coded in relation to potential future security challenges in ways that make it amenable to existing text-mining techniques (detailed description in Annex). While the Metafore database has obvious limitations because of its scope, it can provide relevant insights and its way of structuring and coding of the data can be used as an example for similar databases outside the security domain.

The implementation of a horizon scanning process and methodology involves the need to address three dimensions of trade-offs:

- **Consistency vs. culture shift:**
  - Using a trained team of futures researchers is most likely to achieve consistently annotated, high-quality scan hits – but disconnects scanning – and futures and foresight – from the organizational culture.
  - Embedding a solid foundation for futures and foresight within an organization by distributing the scanning function across departments and people can create organization-wide
learning and culture shift, but risks inconsistencies in scanning and annotation unless the volunteers are well-trained. This might however ameliorate lack of futures-awareness among policy-makers.

- **Data density vs. hits and misses:**
  - Crowd-sourcing scanning can produce massive data densities and granularities quickly and regularly – but risks data to be too dense to absorb, requiring triage and curation, as well as more misses than hits for specific topics due to the wide scatter of input contributed.
  - Expert-generated, issue-focused scanning produces leaner scan sets that are easier to digest and disseminate – but risks misses in data identification due to experts’ cultural and paradigmatic biases and filters, unless the process incorporates conceptual tools (e.g., Verge\(^5\), Causal Layered Analysis (Inayatullah, 1998)\(^6\), Three Horizons (Curry and Hodgson 2008)\(^7\), etc) specifically designed to prevent this.

- **Image vs. capacity to spot surprises:**
  - Scanning – and futures and foresight – is designed to spot emerging change and potential surprises, for good or ill. The greater the capacity to spot truly transformative change – the category of surprises popularly known as ‘black swans’ – the greater the probability that some of the scan data is perceived as ‘ridiculous’ – especially by uninformed laypeople and the popular press, to the distress of policy-makers and politicians.
  - The more authoritative the data on which a scan report is based, the more likely it is to be outdated vis-à-vis emerging change; the more authoritative the topic experts contributing to the scan, the more likely the scan will be constrained by academic credits – the people within the current paradigm, not the people challenging and transforming it. This can only be addressed by including perspectives from the margins, fringes, and frontiers.

**Recommendation:** The Foresight Hub in DG RTD should maintain an electronic list of sources, with web links for each, and provide information on each as to the focus of the source.

4. **Strategic intelligence and disruptive emergencies: the need to combine methods**

Unforeseen events of major consequences are often called disruptive emergencies. Disruptive emergencies may result from slower or faster build-up of combinations of trends and events. Their character is as much a result of them being “unforeseen”, as it is a result of the lack of planning and lack of appropriate mitigation and adaptation response strategies.

There are different methods for dealing with uncertainty, including methods of identifying opportunities which often include ways of stimulating creativity. These methods allow the formulation of qualitative impressions of likelihood and impact of events that do not conform to patterns of classical risk management. In classical risk management the first stage in any risk management effort is to draw resilience planning assumptions based on a reasonable worst case scenario. Those assumptions should combine an analysis of the risks (likelihood and impact) with methods of managing emergencies.

Figure 4 below presents an analysis of the importance of different ways of dealing with uncertainty and types of risk for policy according to the likelihood and impact of different scenarios:

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\(^5\) [www.forwiki.ro/images/6/64/3HorizonsEFF.ppt](www.forwiki.ro/images/6/64/3HorizonsEFF.ppt)
Strategic Intelligence can benefit the management of high-likelihood, high-impact risks but it cannot substitute for preparedness exercises.

When it comes to uncertainty and even disruptive emergencies, strategic intelligence methods have different levels of predictive ability, knowledge about things to come (foresight / foreknowledge) and different levels of implication in shaping future developments.

- Systems analysis and modelling have a great deal of predictive potential in identifying risks, but are less suitable for handling uncertainty. However, they depend on the completeness of systemic understanding and their results can change behaviours thus precipitating or mitigating risks. Where possible, systems analysis and modelling can form an important part of strategic intelligence.
- Complexity science is believed to be promising in strengthening the capacity of systems analyses and modelling.
- Data-mining can strengthen the analytical possibilities of modelling and systems analysis, and increase the ability to analyse low likelihood risks. Data-mining may also contribute to unearthing qualitatively novel patterns, and thus allows handling certain aspects of uncertainty. Methods of mining text, pictures, video and any other data form continuously enrich the analytical possibilities that become available for strategic intelligence.
- Scenario building is also important in risk management, especially in analysing potential impacts of low likelihood events. Creative scenario techniques also allow dealing with future developments to which no reliable probabilities can be assigned;
- Portfolio analysis is key to better understanding which options might be suitable for dealing with the “risks and uncertainties” under the conditions of different scenarios;
- Delphi is a specific technique of strategically approaching the timing of potential high impact developments and can help in the assessment of different issues so that the information gained can be used for e.g. planning of mitigation and adaptation strategies for disruptive emergencies.

While different methods have advantages and disadvantages, and are developed in different degrees in the different fields strategic intelligence is benefiting from an increasingly powerful toolbox for addressing potential disruptive emergencies, which offers important opportunities for combining methods and improving the use of results.

**Recommendation:**

When choosing the methods and their combinations for forward-looking analysis consider the suitability of the method to the objectives, the area, in which it is supposed to be applied, and the relevance of, or the potential for disruptive emergencies.