NetStrategics

HORIZON SCANNING

- A comparative analysis

Report to
European Forum of Forward Looking Activities

Report produced by

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January 29, 2012

EXECUTIVE SUMMARY

This report is the output from a short study commissioned by the European Forum for Forward Looking Activities (EFFLA), a body which seeks to enhance collective intelligence and help devise better European policies, in particular research & innovation policies, which need a long term perspective.

The study is intended to generate evidence on different approaches to Horizon Scanning which can be used by EFFLA to make recommendations on a framework for Horizon Scanning within the EC.

The study takes a model of Horizon Scanning approaches defined by the SESTI consortium (Scanning for Emerging Science and Technology Issues), then reviews five approaches to Horizon Scanning from Singapore, Australia, Mateafore, iKnow and Sigmascan against this model, and finally makes suggestions about the implications for an EC Horizon Scanning framework.

The key recommendations to EFFLA on HS tools and databases in the EC DG R&I context are:

a) Hub – characteristics and location
There is a tension between the "quality" of the scanning – in the sense of originality, depth etc – and its integration with the policy agenda. Horizon Scanning should be the responsibility of a **"Node"** of dedicated staff within DG Research & Innovation. These staff would be required both to access a wide range of sources in a neutral manner, and remain sufficiently connected to the sense-making and other stages of the Foresight process to be influential.

Although there will a formalised structure of information gathering, it is important that the "Node" also engages with experts and policy-makers informally and frequently. The node must not become an organisational silo.

b) Relation to Strategic Foresight Processes
Careful consideration should be given to what communication "products" are produced. There is a need to balance information overload with pertinent and timely inputs. "Products" should range from very brief daily email news feeds that people can sign up for, through to major set-piece conferences.

c) Role and characteristics of HUMINT
We can expect an increasing use of semi-automated tools within the HS process, as they permit a wider scope of information search and a degree of avoidance of expert bias. But throughout the study, interviewees have been consistent that deciding what signals will emerge from the noise has to come through debate and conflict. Ideally, the overall HS process should include both manual and semi-automated techniques and both participatory and non-participatory activities.

HORIZON SCANNING – A COMPARATIVE ANALYSIS

1.   BACKGROUND

This report is the output from a short study commissioned by the European Forum for Forward Looking Activities (EFFLA) – a body set up within the "Innovation Union" Initiative, adopted by the European Commission, and positioned with the DG Research & Innovation.

EFFLA will contribute to enhance collective intelligence and help devise better European policies, in particular research & innovation policies, which need a long term perspective.

The study is intended to generate evidence on different approaches to Horizon Scanning (HS) which can be used by EFFLA to make recommendations on a framework for HS within the EC.

The study takes a model of HS approaches defined by the SESTI consortium[1], then reviews a number of approaches to HS (through desk research and interviews with relevant experts) against this model, and finally identifies ways in which an EC HS framework could be structured.

The Terms of Reference for the study are at Annex A.

## 2. STAGES OF HORIZON SCANNING

2.1 Horizon scanning
Horizon scanning can be defined as: ". . . the systematic examination of potential (future) problems, threats, opportunities and likely future developments, including those at the margins of current thinking and planning. Horizon scanning may explore novel and unexpected issues, as well as persistent problems, trends and weak signals." (Van Rij, V. (2010a)). The key element of this definition is "systematic", implying an ordered process linked to an objective.

Horizon scanning places great emphasis on building a holistic framework whereby the output of scanning can be effectively incorporated into building the vision and into strategic planning. EFFLA's Policy Brief #2 defines a four-stage strategic process (Figure 1), in which Horizon Scanning is a key task of the first phase, Strategic Intelligence.

Thinking outside the box. Wide scope. Non-judgemental

Figure 1 – Necessary elements of the future EU strategic process (EFFLA Policy Brief #2, September 2102)
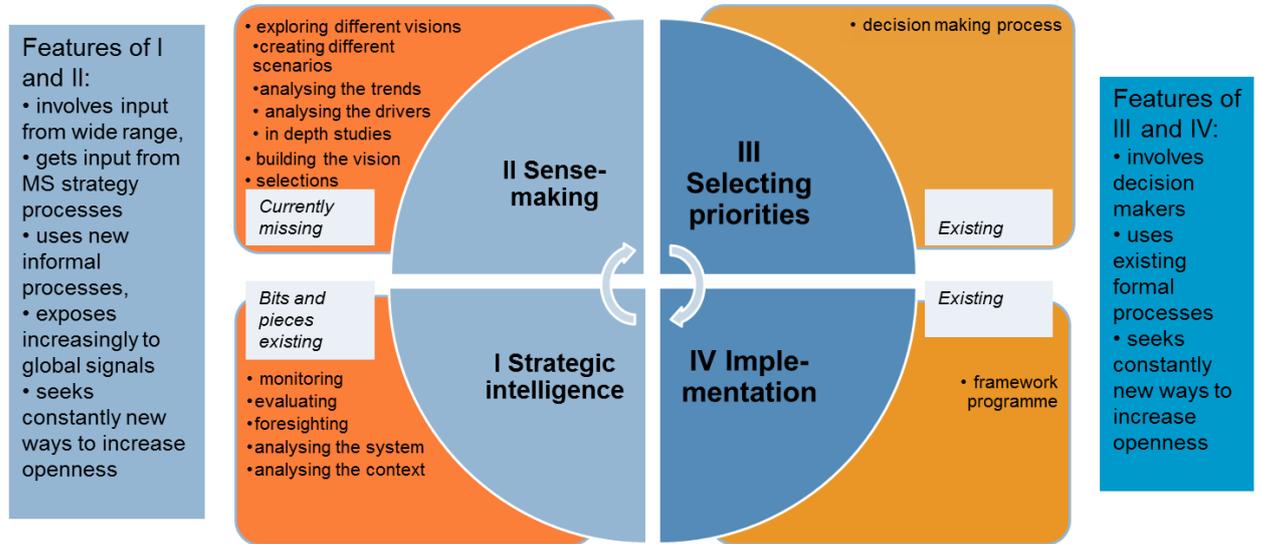
Horizon Scanning can be used in all phases: however this study focuses on the first of these 4 phases.

2.2 Scanning for Emerging Science and Technology Issues model

SESTI is a consortium funded by the EU Future Programme 7, consisting of:

- Austrian Institute of Technology
- Institute for Prospective Technological Studies: one of the seven scientific institutes of the European Commission's Joint Research Centre (JRC).
- Malta Council for Science and Technology
- Manchester Institute of Innovation Research
- TNO Innovation Policy group

The SESTI research project has as its main subject area focus Energy and Health. It also explores different methods of Horizon Scanning, and has run interesting methodology workshops.

A paper delivered at a SESTI workshop (Amanatidou et al 2012), suggested a categorisation of Horizon Scanning tools in two ways (see Figure 2):

- by the level of participation
- and by the means of processing information.

This study uses this categorisation to compare the five approaches studied: RAHS in Singapore, AJASN in Australia, Metafore, iKnow and SigmaScan.

Figure 2 – Horizon Scanning matrix (Amanatidou et al 2012)
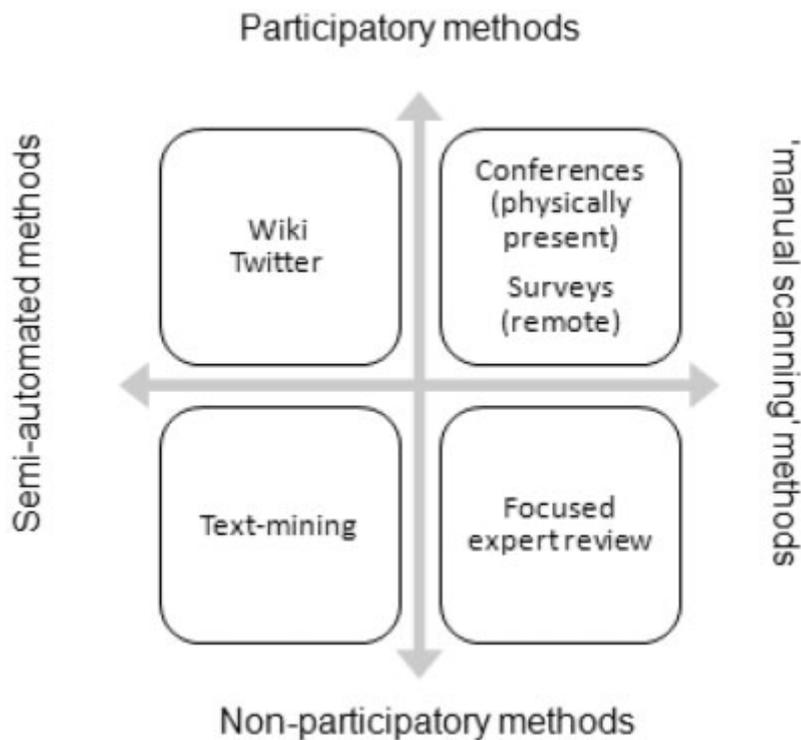
In one of the interviews carried out, it was suggested that a third dimension of "Evidence-Based" vs "Creative" could be added. This approach is used by the European Foresight Monitoring Network. However this study was already well-advanced at that point, so this extra dimension has not been fully explored here.

2.3 Elements of Horizon Scanning
Another paper presented at the SESTI methodology workshop (Butter et al 2010) proposed the following definitions for elements of Horizon Scanning. The approaches reviewed in this study were examined to determine which elements they covered.

In practice it appears to be difficult to sustain a strict terminology for the elements, but the approach does offer a helpful way of thinking about scanning.

2.3.1 Early warning signals (EWS)
A frequently used term for an important element of Horizon Scanning is "early warning signal" or "faint" or "weak" signals. Citing from Igor Ansoff, Hiltunen (2007) defines weak signals as "warnings (external or internal), events and developments that are still too incomplete to permit an accurate estimation of their impact and/or to determine their complete responses".

These are by nature ambiguous and controversial, and typically hidden among the "noise" in the prevailing sense-making paradigm. Most HS approaches attempt to capture a wide range of EWS in an effort to ensure that what may emerge as significant issues are not overlooked.

A further refinement is to consider two types of EWS:

- Physical (observable) EWS: this is an evidence-based approach which identifies past events which signal a likely future event; an example is minor cracks in an aircraft wing have been shown over time to signal likely catastrophic metal failure in future.

- Societal (subjective) EWS: these generally signify strong interests or emotions and may be precursors of self-fulfilling or self-denying prophesies. Although based on observed phenomena, these are "weak" signals in the sense that causality has yet to be established.

The societal EWS naturally are the more contentious - HS approaches should make clear the degree of common agreement or dispute.

Early warning signals are meaningful as long as they are evaluated in the context of both their emergence and their evolution as a part of a pattern along with other early warning signals. They can be viewed them within a structure such as "Three Horizons" (Curry & Hodgson 2011), with a 5 year context for many technological EWS, but typically a longer one for societal ones.

2.3.2 Wild Cards[2]
Wild cards are high impact, low probability events. They may be physical events (meteorite impact), or social ones (fall of the Berlin Wall). They may be preceded by EWS, but generally if so the signals are very weak indeed. Wild cards generally alter the fundamentals, and create new trajectories.

Wild cards are closely linked with the "Black Swans" concept popularised by Taleb. The distinction is simply that a Black Swan is an event that could not be predicted in advance, whilst a wild card by definition is identified if not actually predicted.

By their nature, wild cards may occur in any time horizon.

2.3.3 Trends
Trends are extrapolations of historical data to the future by using statistical/mathematical models. Being based on statistical information, trends are relatively predictable and predetermined. They could generally be regarded as "the base case" forecast, which may be thrown off course

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[2] Drawing on Saritas, O. and Smith, J. (2010).

by wild cards and EWS that come to pass. Over-reliance on trends is a major cause of forecasting failure, sometimes known as "driving by the rear-view mirror".

Social trends may be less deterministic, and require a judgement as to whether a new trend is emerging – eg in fashion, politics or lifestyle choices. Again societal trends are typically over a longer horizon than technological ones.

2.3.4 Hypes
"Hypes" are over-enthusiasm, or excessive publicity around a certain topic, excessive advertising or making exaggerated claims (ie can be genuinely believed or deliberately misleading). Gartner Group defined a "hype cycle" – Figure 3 below. Gartner suggest that the Hype Cycle methodology gives a view of how a technology or application will evolve over time.

Figure 3 – Gartner "Hype cycle"
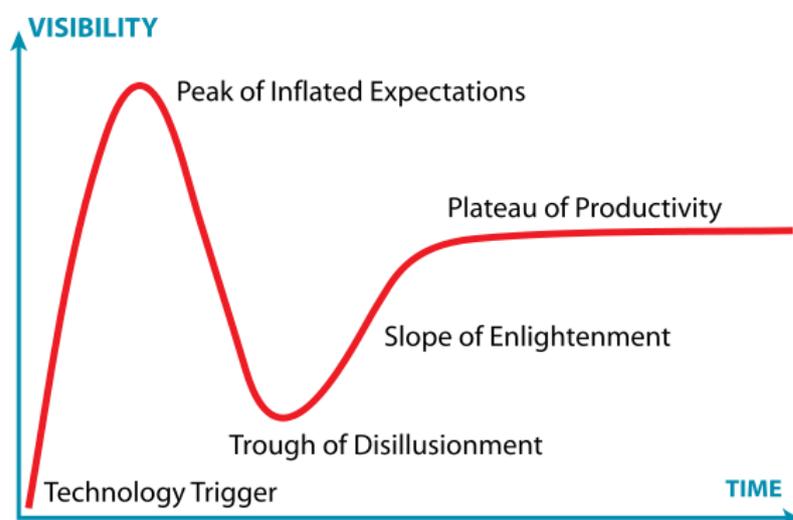
It is unclear how the approach helps distinguish "technology triggers" that meet or exceed expectation and those that do not; forecasting errors could occur in either direction. It may however be helpful to recognise that despite failing to achieve the hyped expectations, an innovation may in fact be perfectly useful in a more niche role.

Hypes are typically short-term horizon issues.

2.3.5 Emerging issues
The concept of "emerging issues" is less well-defined. It is more often context-dependent, being related to specific policy concerns. Generally these are taken to represent more fundamental, deep-seated changes operating over a long time horizon.

2.3.6 Discourse

Discourse tells something about the level on which the topic is discussed within the relevant community. In particular we can distinguish between:

- the severity of controversy, which may also tell us something about the uncertainty
- how large a part of the target community is actively involved.

The time horizon will depend on the community under consideration – for experts and futurists, it may be a 10 years; for more general discourse, rather shorter.

3. EXAMPLES OF HORIZON SCANNING

The study addressed five different examples of horizon scanning activities, as specified in the terms of reference.   For each, desk research – predominantly into the organisations' websites – was supplemented by interviews with experts in each with the aim of:

a. discussing their experience of what works and what does not in horizon scanning, using the vocabulary above and

b. understanding the problems specific to the communication and use of each element of horizon scanning

See Annex B for a list of interviewees.

3.1 Singapore (RAHS)[3]

The Singapore Government Horizon Scanning Centre is part of the "Risk Assessment and Horizon Scanning" (RAHS) programme, itself part of the National Security Coordination Secretariat at the Prime Minister's Office.

The RAHS Programme Office (RPO) is structured into:

RAHS Think Centre:
which carries out Horizon Scanning to identify emerging risks and opportunities, and Research and analysis on emerging and cross-cutting issues;

RAHS Solutions Centre:
which focuses on Capabilities building and engagement with agencies on policy projects and exploring new concepts that enhances policy making and to develop associated processes and tools;

RAHS Experimentation Centre:
which experiments with new technological tools to enhance policy making and enhances and maintains RAHS system through systematic upgrade.

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[3] http://app.hsc.gov.sg/public/www/home.aspx

Figure 4 – RAHS Programme Office

The Risk Assessment and Horizon Scanning Programme was set up in 2004 to complement scenario planning. RAHS scans the horizon for weak signals of potential future shocks, and detects emergent threats and opportunities through a suite of technology-based methods and software.

The RAHS system provides end-to-end capabilities to collect and classify data, analyse and understand relationships, and anticipate as well as discover emerging issues that could have a strategic impact on Singapore.

There are 3 main capability blocks in the RAHS system
• Research and Analysis:
> tools which allow analysts to closely examine signals collected from environmental scanning. It helps analysts to process large amounts of structured and unstructured data from a range of sources.
• Perspective-Sharing:
> tools which allow analysts to offer insights on pieces of information they receive and to analyse these perspectives for convergence and divergence as well as for possible outliers or even wild cards
• Modelling:
> these tools allow analysts to build system maps and ranking models, and to examine various scenario and strategy options.

RPO has activity in all 4 segments of the HS matrix:
- RPO organises the International Risk Assessment and Horizon Scanning Symposium (IRAHSS) each 18 months, gathering experts together in person. RPO team members also attend other conferences;
- RPO will identify issues within areas like "Emerging Technologies" such as 3-D printing. A report is written and if there is interest (as there was for 3-D printing) the issue will be explored further and a proposal for research produced. If accepted this moves on into a workshop with a wider range of participants, some from a regular common network of futurists and some with specific knowledge of the issue. In this way issues can be explored in an on-going

process, deepening understanding. Similarly the impacts on Social changes and Economic systems will be explored.
- Text mining is used as an important enabling technology to extract and analyse themes from articles that the analysts have already categorised into the relevant domains on a quarterly basis. Lexalytics is the information extraction engine used and other visualisation tools are then used to analyse these extracted information.
- Not much use is currently made of WiKis, but Twitter is used as a participatory tool within the technological community to ubiquitously share articles of interest. They use a Twitter hashtag to allow the members to tweet articles relevant to RAHS related technology and subsequently analyse these tweeted articles for future technological trends.

The use of technology allows many more articles to be searched and to expand the reach and scope of the research.

"Early warning signals" has a specific meaning in Singapore, especially within the intelligence community, so the term "weak signals" is more often used. The challenge is that from different perspectives, weak signals may not be distinguished from noise. RPO does not attempt to quantify the strength of weak signals, as it is a matter of perception which will vary across the different agencies involved.

The value proposition of RAHS is that it addresses cross-cutting issues and those that might fall into the gaps between agencies and departments. RPO is there to provide an alternative perspective rather than the usual views of departments. This can lead to disagreements and some sensitive issues, occasionally criticism and tension. RAHS tries to present the issues dispassionately for policy-makers to consider, trying to avoid confrontation, and does not make policy recommendations. Instead it raises awareness of issues and seeks to get others to integrate them into the foresight process.

There is a 6-phase Foresight to Strategy Process: Defining Focus, Environmental scanning, Sense-making, Developing Possible Futures, Designing Strategies, and Monitoring. RPO engages divisional experts in projects. It produces a very brief daily scan product which is distributed to 3000 civil servants from Permanent Secretaries to the working level. Their aim is to "excite policymakers" who do not have time to read a 20-page report, so RPO produce short summaries with links to sources and articles should the reader wish to follow up. In this way they can plant the seed of an idea which may develop over time.

RPO is currently seeking to enhance its monitoring capabilities. The challenge here is that for cross-cutting issues it can be hard to identify who is in charge. And in the complex environment that we live in, it is difficult to think purely in terms of setting thresholds and triggering alerts. The steps to take and the technology to use are still being explored.

3.2   Australia (AJASN)

The Australasian Joint Agencies Scanning Network (AJASN)[4] was set up in 2005 to support four different government agencies who had each been planning a one-off scanning exercise. From being a trial network with these four agencies, it has now expanded to serve 22 agencies at Australian Commonwealth and State levels and in New Zealand. These include central agencies at Prime Minister/Cabinet level in the Commonwealth and Victoria State. The agencies cover a wide range of subjects: environment, infrastructure, industry and social. Also some universities and research groups are involved.

The AJASN consists of a database of some 10,000 articles shared by the agencies, which is reviewed quarterly by them to identify anomalies and developments to produce a quarterly report. This report is socialised within the agencies by the AJASN representatives. There also an annual report incorporating issues over the last 3 or 4 years.

The papers in the database range from peer-reviewed articles to general media. They are selected by experts and representatives of the agencies, with each agency identifying 20/25 items per quarter – so about 300 papers per quarter. These cover early science developments, issues under debate rather than "settled" science. AJASN adds a "synthesis" of these issues and a "so what?" comment. Other scanning sources such as the UN Millennium scan and the Australia and New Zealand Health Scanning Network (see below) are drawn upon. There is also a twice yearly report back to a co-ordinating committee on science, which has senior people from the agencies on it.

There is little automation currently within the process. There have been discussions about using text mining and Twitter searches, and there is a little of this through the media departments feeding in issues. There could be more text mining in future, but the issue will be finding – the network runs on just $50k pa.

A key issue identified by the interviewee is how scanning affects policy. This depends on the "cultural conditions" – there is a claim of "evidence-based policy" but this is often interpreted narrowly with fringe issues disregarded. In the view of the interviewees, a good scanning/ policy system requires:
- Policy-makers and strategic decision-makers to be clear about their assumptions
- For them to be open to challenge, to avoid being locked in to one view
- To encourage a diversity of views in the process in order to identify weaknesses in the prevailing view

Policy is not purely evidence-based - it depends on who has influence and whose advice is listened to. So the key is getting the scanning process trusted by the decision-makers. Ultimately this is all a political process.

For example there can be no "right" view on indigenous peoples' disadvantage.

The Australia and New Zealand Horizon Scanning Network (ANZHSN)[5], is one of the feeds into AJASN. This horizon scanning program was established to provide advance notice of significant new and emerging technologies to health departments in Australia and New Zealand, and to exchange information and evaluate the potential impact of emerging technologies on their respective health systems

3.3   Metafore[6] ("Meta")

Metafore began at The Hague Centre for Strategic Studies (HCSS) in 2007, focussed on security foresight for Dutch government agencies. Keen to avoid the failure of pundits as documented by Tetlock (2005), which demonstrates the failure of pundits to do better than the average, the team looked for ways to avoid inherent expert bias. The implication was that consensus forecasts do best ("wisdom of crowds"), so web-crawling and text-mining are preferred approaches.

The traditional manual approach was supplemented by "Sema-Dyson" (semantic innovator) which permanently scans a variety of different online sources for foresight-related studies and insights using targeted searches (with general search terms such as "trends", "scenarios") set up on Google News, EU Media Monitor etc.

These results are fed into the Metafore-database on a regular basis. A combination of both manual and semi-automated analytic methods then allows one to identify emerging strategic issues from these various sources and to synthesise and present the bandwidth of views on these issues in a visually intuitive way. The database has now grown to some 4000 studies.

The manual scanning side continues with manual coding for a strategic monitoring of the futures of conflict. This covers a smaller set of studies, but looks at those in Chinese, Arabic, Russian as well as English. Studies are coded showing origins as well as content. This is labour intensive but maintains important cultural differences.

The weaknesses of the semi-automated approach include:
- o There is no way to assess the representativeness of the sample, so it is hard to exclude bias completely; there is a need to include more private sector studies
- o coding reliability:
  - ▪ manual coding -
    - ▪ very time-consuming
    - ▪ inter-coder reliability/consistency issues

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[5] www.horizonscanning.gov.au/
[6] http://www.hcss.nl/

- automated coding (text mining)
  - with ontologies - ontologies are very domain-specific
  - without ontologies – the capability is still not quite there, with signal-to-noise ratio issues remaining

Set against that, the main strengths are:
- avoids expert-bias – data is collected on the basis of the search algorithm, not the presumed authority of the source
- avoids weeding out uncertainty early because of normative biases (cultural, ideological, theoretical); this is multilingual, as non-biased as possible
- the output is presented in a way which maps uncertainties rather than presenting (quasi)-certainties
- the presentation shows the conventional 'wisdom', but also the outliers[7]
- it is more efficient at processing large amounts of data

There is an increasing range of visualisation tools which can capture the changing importance of various topics over time.

3.4   iKNOW[8]

iKnow - the Innovation, Foresight & Horizon Scanning Community - is one of six Blue Sky foresight research projects funded by the European Commission's Seventh Framework Programme for Research and Technology Development (FP7). The project is aimed at interconnecting Knowledge on issues and developments potentially shaking or shaping the future of science, technology and innovation (STI) in Europe and the world. Its key objective is to develop and pilot conceptual and methodological frameworks to identify, classify, cluster and analyse wild cards and weak signals (which they term "WI-WE").

iKNOW's international and multi-disciplinary team is led by Dr Rafael Popper of the University of Manchester. The team consists of eight partners with high-level expertise in foresight, technology transfer and STI policy support and significant IT experience:

1. PREST Manchester Institute of Innovation Research, The University of Manchester
2. Finland Futures Research Centre
3. Z_punkt (Germany) - is an independent think tank and consultancy, founded in 1997.
4. RTC North (UK) - Core expertise lies in the management of change and the delivery of a broad range of services related to the innovation life cycle.

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[7] NB "outliers" is a preferred term than "weak signals" which may be weak for a reason; "outliers" are coherently held views

[8] www.**iknow**futures.**eu**/

5. Technology Centre of the Academy of Sciences (Czech Republic) analytical and strategic studies particularly in the area of R&D, science, technology and innovation.
6. Interdisciplinary Centre for Technology Analysis and Forecasting (Israel) **-** technology foresight, technology assessment and policy-support research.
7. Mindcom Ltd (Finland): software and content production industry, specialized in network applications for education technology.
8. CyberFox (Czech Republic) - information systems, e-shops, content management systems (CMS) and customer relationship management (CRM). Also specialized applications – internet auction hall, incident report system or questionnaire system.

iKnow began is 2007 (it is now closed awaiting the next cycle) and records over 2000 papers (focused on Wild cards and weak signals) mapped by its active members in its **"iBank"** of issues, also called WI-WE Bank

iKnow uses some crowd-sourcing techniques to generate content, but it can be hard to manage the quality of this. The perception of the interviewee is that its web-based approach tends to be inward-looking – debates within the scanning community - and it is hard to get decision-makers directly involved. Generally it is more junior people who seem to access the site.

3.5 Sigmascan[9]   (UKSS)

The Sigma Scan was set up in 2005 at the same time as the UK Government's Horizon Scanning Centre, to be the embodiment of the new centre, a tangible product. It was aimed at policy-makers across government. The motivation was twofold: to identify factors affecting long-term decisions; and to "stop bad things happening" after the BSE and foot and mouth outbreaks. It is a searchable set of brief papers exploring potential future issues and trends over the next 50 years which may have an impact on UK public policy. The papers cover a wide range of subjects, from climate science to social science, space exploration, economics and human rights.

To produce the Sigma Scan, the Foresight Horizon Scanning Centre has drawn on material from more than 6000 document sources – from scientific journals to futurists' blogs – and interviews with 300 leading thinkers. This has been condensed into unique insights on the issues policymakers will face in the future, as around 250 Scan Papers. The Scan Papers are used in workshops and projects to promote better awareness of different potential futures in government policy-making.

Material is refreshed on approximately an 18 month to 24 month cycle. A major review and refresh exercise was carried out with the support of

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[9] www.sigmascan.org

RAND Europe in May 2011, when over a quarter of Sigma Scan papers were redrafted to reflect new source material, or merged and refocused. A further review is now due.

Papers are classified in a standard way (political, economic, social, technological, environmental) with sub-classifications (eg values), though the sub-classifications are not used much.

Criteria such as Impact, Likelihood, Controversy, Where, When and How Fast are scored. Papers are searchable by criteria and keywords.

Each paper has the following sections:
- Summary
- Discussions
- Implications
- Early Indicators
- Drivers and Inhibitors
- Parallels and Precedents

Papers are written by experts – originally Outsight and IPSOS MORI – sifting through published papers, and pulling out themes and issues and mapping them. The emphasis is on identifying multiple sources. Papers are then reviewed by workshops with senior government officials and gurus.

There is no automation within the process. It is a judgement based approach with feedback; a systematic inductive process. There is a good breadth of generalist input, synthesising the views of experts.

There are no filters or limits to the scope of the reviews; so they may include "wacky" ideas, and are typically stimulating. The papers are well-written in a journalistic style that is easy to read for non-experts. Authors stand apart from the subject, assessing the multiple sources for each paper. Sigma Scan covers most of the elements of HS SESTI defined (eg wild cards, EWS).

The interviewee felt that the relationship between Horizon Scanning and Foresight Processes is challenging. If they are too far apart, then policy-makers may miss issues that were flagged; but if they are too close then the scanning may become limited by the policy-makers perceptions. There needs to be a "firewall" between the two, but with good communication.

The Sigma Scan papers include a section on "early indicators". It was felt that this could be used more effectively as a genuine means of flagging issues that are beginning to move more mainstream.

4   ANALYSIS

4.1   Mapping of tools against dimensions

Each of the approaches was mapped onto the SESTI model described in section 2.2 and illustrated in Fig 5 below.

Figure 5 – Mapping of approaches onto HS matrix
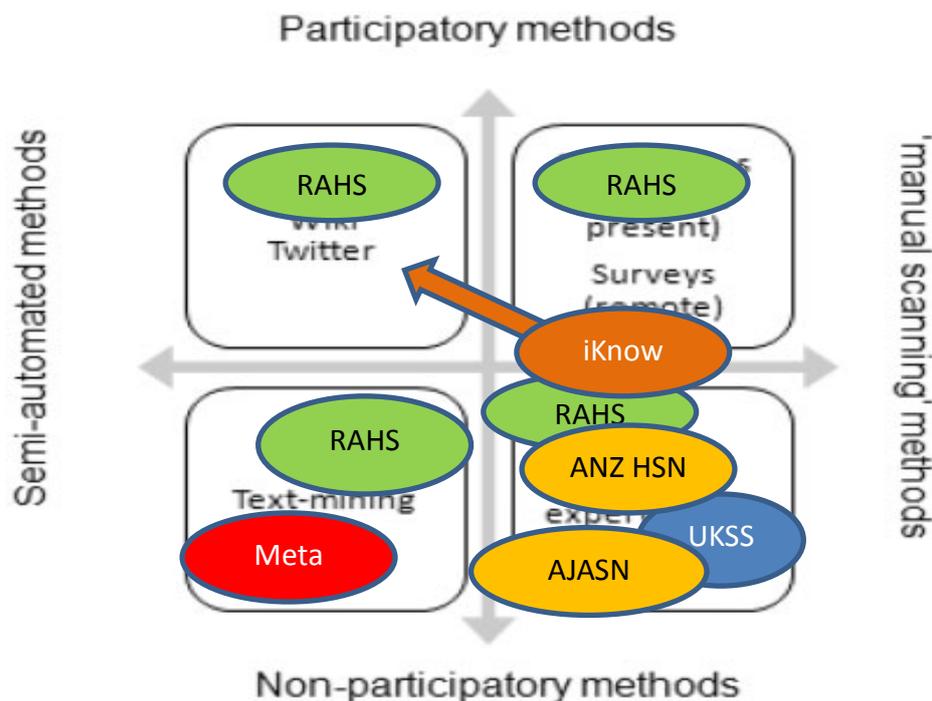
From the interviews it appears that "Expert-based" HS approaches currently predominate. Semi-automated methods are emerging and are likely to extend to cover wide range of developments, signals and patterns more cost-effectively. These include text-mining, language parsing, and visualisation tools. RAHS is unique in operating in all four segments.

Wiki and Twitter scanning are surprisingly currently under-developed. More developments can be expected here, probably using generic search tools.

The manual scanning element will remain important to:
  –   focus on high-value issues and integration with policy;
  –   identify relevance to decision-makers
  –   bring imagination and creativity

4.2 Mapping of tools against elements

	RAHS	ANJASN	Metafore	iKnow	Sigmascan
Early warning signals	Yes	Yes	Yes	Yes	Yes
Wild cards	Yes	Yes	Yes	Yes	Yes
Trends	Yes	Yes	Yes	Some	Yes
Hypes	Yes	No	Yes	No	(Not discussed)
Emerging issues	Yes	Yes	Yes	No	Yes
Discourse	Yes	No	Yes	No	No

As mentioned above in section 2.3, in practice it is difficult to maintain the distinctions between some these elements. An important point to note, however, is the fact that RAHS and Metafore (and potentially other semi-automated approaches) is more suited to identifying issues in the general discourse.

4.3 Other observations from the interviews

Most of the interviewees commented on the problems of communicating with policy-makers and decision-makers. Getting sufficient engagement in the process is a challenge, because of time constraints and policy focus. Some distance is required to ensure that sufficiently novel ideas are considered (and value added), yet ideas that are too far from the mainstream can be seen as irrelevant.

Ways suggested to overcome this included:

- Better structured papers which flag "trigger" issues or alerts

- "Co-creation" of future vision

- Addressing internal policy advisors so that external scanning networks become more trusted

- Getting diversity into the discussions, rather than have them dominated by one view – transparency is essential

- Explicitly accepting that the implications for resources makes this inherently a political process

- Making HS a more publicly visible activity, commenting on issues openly and broadly eg in the media; talking with the public and stakeholders, who then will themselves influence policy in a complete information circuit.

5. OTHER INPUTS

5.1 EFFLA meeting feedback

An interim presentation of the study was given at the EFFLA meeting on 23rd November 2012. Key comments from this meeting were:

- to help with communication issues, make sure scan can be contextualised
- need to factor in the effects of decisions already taken
- link the tools to short (1 year) medium (3-5 year) and long term (10 years plus) drivers (see section 2.3)
- explore the range of commercial scanning and foresight activities (eg Volvo), especially the German experience, though there is a danger that confidentiality issues may limit their usefulness.
- consider the relationship between big data & foresight
- The importance of space design – a place (like future focus @ dti) for meetings, provoking ideas, images of the future etc – and visualisation tools (video)
- it can be hard for HS people to balance external reputation and internal communication; they tend to drift into consultancy or line roles. So if there is a NODE of PEOPLE need to plan for THROUGHPUT

5.2 Concepts and ideas from other papers
A bibliography of papers suggested by interviewees and others, and a list of useful contacts is at Annex C.[10] Some comparisons of different approaches are discussed below.

5.2.1 *"International Cross-Comparison of Horizon Scanning Projects and Processes", Infinite Futures (2012)*

This well-researched and academically sound presentation explores several fundamental trade-offs and tensions in the approach to Horizon Scanning. First, it suggests an inherent tension between the "*Quality*" of a scanning process, in the sense of the rigour and novelty of concepts and their underlying theories of social change and its "*Design*" which implies a directed the integration of HS into a wider policy process. Academic rigour in terms of foresight may produce complex, provocative output difficult to communicate and use effectively. On the other hand, too great a focus on user comfort, culture, and expectations may undermine the core purpose of scanning and thus its effectiveness

The work also identifies an essential tension between the need to control content production to assure quality, and the need to absorb data from diverse perspectives to assure timely identification of change as it emerges and to minimise blind spots. **Content control** calls for robustness of evidence; experts as scanners and annotators; credited

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contributions; and a content focus specified for/by policy-makers; often resulting in definitive reviews of the state of change relevant to a topic. Whereas, *perspective diversity* implies stimulus and provocation for transformed assumptions; socially networked or crowd-sourced scanning; near anonymity of contributions; and content available for a broad audience and multiple functions; often accessed as a rolling update of emerging change.

The presentation goes on to compare six different Horizon Scanning approaches by their characterization on a radar diagram of 8 different "dyads" (dimensions). From these, three specific design tensions emerge:

Consistency of information gathering	vs	*Culture shift*
Data density – the range of information gathered eg through crowd sourcing	vs	*Hits and misses* – the advantages and problems of expert inputs with their inherent bias
Credibility – the perception of the work as "serious"	vs	*Challenging* - the freedom to be unconventional

The report concludes with some observations:
- *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
- *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
- *Training*: a critical path to consistent, high-quality scan input – and output. Scanning requires mixed discipline team coordinated and trained by a futures researcher.
- *Where's it going?* Scanning only makes sense in the context of an integrated futures process – scan data exist to generate impact cascades, cross-impact matrices, transformations to systems maps, scenarios, visions, strategies, and innovations. If the scanning system doesn't have throughput to all of these tools built in, it will not succeed.

Another key issue identified is the need for practicality of the ongoing process of Horizon Scanning – one-off exercises have limited value, so review and updating is essential.

5.2.2 "Practising Strategic Foresight in Government – the cases of Finland, Singapore and the EU" – Tuomo Kuosa, RSIS Monograph No 19, 2011

Kuosa describes the first phase of a foresight process as comprising the collection and collation/summarisation of available information.

Collection covers identifying future themes, trends, early signs and wild cards. These are collected from a wide range of sources including experts, universities, business networks, personal networks, customers, suppliers and other research. The major characteristic of this stage is its sheer volume – its broad scope, its overlaps and its contradictions.

Collation/summarisation is about giving this information a structure and form, without losing relevant parts so it can be presented in a manageable form. A challenge here is to determine what is or is not relevant to the policy under consideration.

The second part of Kuosa's book presents a few public strategic foresight systems or processes from a number of countries that aim to contribute to strategic policymaking.

FINLAND:
There is no single unified top-down steered foresight national system in Finland: foresight functions are fragmented among many actors, public and private. This gives flexibility and the ability to penetrate the whole society, involving many decision-makers in different spheres.

There is however a Government Programme including a Government Foresight Report, which links the work of a number of bodies. Each time there is a new Government it sets out its political Programme which should shape the decisions of government departments. The Government Foresight Report is prepared by the Prime Minister's Office's Policy Analysis Unit, with inputs from departments and outside experts. The Report is then discussed with Parliament and more widely in regional citizens' discussions seminar.

In addition, there is a Government Foresight Network which draws on experts in ministries and sector-research institutes, and which is tasked with addressing major-impact change factors, development trends and weak signals.

Thus scanning is in effect an expert-led process, with the later opportunity for input from politicians and citizens.

SINGAPORE:
Singapore by contrast has a tightly-linked strong centrally steered foresight system with high-level civil service involvement reporting into the PM's office. Scanning activities are carried out with RAHS (see 3.1 above), whilst other groups such as the Centre for Strategic Futures and the Strategic Futures Network add to and interpret the scanning input.

EUROPEAN COMMISSION:
The EC Joint Research Centre, comprised of seven joint research institutes, provides independent scientific and technical advice to the Commission and Member States. One of these institutes, the Institute for Prospective Technological Studies (IPTS) in Seville merges Horizon Scanning into funnelling the emerging issues into trends which should be tackled in policy-making. Their focus is "techno-economics - policy challenges that have both a socio-economic as well as a scientific/technological dimension.

The European Forecast Monitoring Network, and ongoing project, in 2009 identified nearly 2000 foresight activities in EU area. One of these is iKNOW, which described itself as Horizon Scanning 2.0: a participatory and bottom-up approach (see 3.4)

Kuosa cites Graham H May (2009) as suggesting that the EC foresight activities are seen mainly as additional activities to policy-making leaving little real imprint directly on EU policies.

EU MEMBER STATES:
UK: The Foresight Programme and the Horizon Scanning Centre (HSC) created SigmaScan (see 3.5). The HSC established the Future Analysts Network (FAN) as a forum for those with an interest in horizon scanning to exchange new ideas, innovative thinking and best practices.

FRANCE: Along with the Strategic Analysis Centre and DATAR which look at economic issues, Futuribles research and consulting is a research network of some 200 experts which focusses on foresight, research and consulting and provides an online databank.

GERMANY: Germany does not have any centrally steered systems for co-ordinating foresight activities. Instead it has fragmented collection of publicly supported organisations and many federal ministry activities.

NETHERLANDS: The Central Planning Bureau is a standing central planning organisation whose objective is to make independent economic analyses relevant to policy-making. A major initiative was the Horizon Scanning 2007 project under the Commission of Sector Councils. This was a very broad and valuable input for policy making by identifying, assessing and clustering future trends, issues and developments

5.2.3 Final Report: Approaches to Early Warning & Best Practice Recommendations, Oxford Analytica, 2009. Prepared for National Security Coordination Secretariat, Singapore Government
This extensive report includes a discussion of the conceptual framework and organisational set-up of scanning and early warning. It begins with a review of current practice and then makes recommendations on best practice.

One of the most critical problems with current practice in early warning reported by interviewees in this study was closed-mindedness. People often remain constrained by a particular environment or locked into a

particular disciplinary approach in part due to dulled pattern recognition ability.

Another reported problem is the belief that it is possible to quantify the future. All interviewees agreed that this is simply impossible and that EWS should be developed on the assumption of alternate futures not a single forecast future.

Organisationally, the choice of people to involve was held to be key. The future-oriented thinking necessary for an EWS requires a different sort of person, and indeed a mix of people from different backgrounds. Many interviewees commented that experts in their field can sometimes be so blinded by their own ideas and the detail of their knowledge that they miss new developments. A group of people with diverse expertise and cultural diversity is best to collect a range of opinions and a range of worldviews.

A second issue is that of the credibility of the experts and communication lines between different levels of the organisation. The majority of interviewees emphasised that an EWS team cannot be an isolated group. A frequent failing of EW systems is a reliance on a small team of researchers and strategists, rather than a truly organisation wide system. There must also be strong links to decision-makers and policymakers: one interviewee commented that decision-makers tend not to know how to use information. For their involvement to be most effective, they need to be closely involved in developing techniques and methods used in the system, and also understand the strengths and limitations of emerging issues analysis.

Working with networks of experts was identified as a good way to prevent inward focus in the early warning team. By drawing on multiple information and expertise networks, an organisation can access cross-disciplinary sources and more accurately depict the complex, interconnected nature of its environment. One possible structure includes a core team to design and maintain scanning activities; an in-house network of interested staff to contribute to scanning on a part-time basis; an external network of stakeholders and topic experts; and links to other organisations' scanning initiatives.

Oxford Analytica's recommendations on organisational set-up are:
- Employ a multi-disciplinary team
- Involve a range of different personalities
- Integrate decision-makers into the EWS team
- Build networks into the team
- Train EWS staff in systems thinking and communications skills, and decision-makers on listening skills
- Define the scope of the research
- Transparently identify sources
- Simplify language
- Put in place a holistic MIS

5.2.4 "The Big Picture – trends, drivers, wild cards, discontinuities and weak signals" – Saritas and Smith (2011)

In this paper the authors also propose a terminology for scanning elements, similar to that discussed in section 2.3. Their elements were:

- Trends: including mega-trends (long period), potential trends and branching trends
- Drivers of change: factors with strong stakeholder support
- Wild cards
- Discontinuities: rapid change that quickly changes underlying assumptions
- Weak signals

The paper then analyses the Big Picture Survey – a review of over 100 surveys conducted by members of the Future-oriented Technology Analysts Conference in 2008 – against each of these elements.

The paper does not deal with the organisational issues of scanning.

5.3 Corporate scanning activities

EFFLA requested a review of corporate scanning activities as an adjunct to the report. It has not been possible to complete this within the December timeframe, so a supplementary report will be issued during January.

The companies who have so far agreed to be interviewed or provide information are:

- Pepsico
- Daimler-Benz
- Allen & Overy
- Arup

Other companies approached include:
- Volvo
- BT
- Ericsson

6. IMPLICATIONS AND SUGGESTIONS

6.1 Content

6.1.1 Collection

a) There is clearly a lot of scanning activity already happening, so there is no real need to duplicate it in DG R&I. Instead it would be valuable to request that Member States notify the scanning activities they are carrying out, and to create a way of accessing all these sources in an integrated fashion.

b) Corporates appear to be well-disposed to sharing information about their scanning activities. There may well be confidentiality issues, but it would be useful to involve them in some information sharing sessions, say annually.

c) Technology has a valuable role to play in gathering information together, as do networks of experts (eg the UK Future Analysts Network).

d) There are always challenges in ensuring that information is objectively neutral – there may be some inherent political bias even at the scanning phase. This fact must be accepted and the impact minimised through a transparent by identifying all the sources.

6.1.2 Collation

a) Putting structure onto the information risks the content becoming goal-oriented (ie relating to a specific issue defined) as opposed to being neutral.

b) The structure should ideally allow the identification of "early indicators" or triggers to issue alerts. Overlaying this structure on existing sources, however, may require significant effort.

c) The structure of EC decision making, with three well-defined timelines - long term, mid-term and annual- should be reflected in the structure of the content.

6.2 Technology

a) The use of some semi-automated tools permits a wider scope of information search. This study identified two approaches (Metafore and Lexalytics), but there are likely to be many more, which should be researched.

b) Wiki and Twitter are only just beginning to be used in the scanning community – there is scope to exploit these tools more.

c) There are many developments in analytical tools around what is known as "Big Data". The extent to which these could assist scanning should be

explored. Similarly, graphical presentation of information through GIS could add an extra dimension to the presentation of content.

c) Social networks generally will become more influential. Crowd sourcing will emerge as a way of engaging a wider range of experts.

d) Better visualisation tools will emerge.

6.3 People/organisation

a) There needs to be a central "Node" of people in DG R&I, neutral enough to draw on the wide range of sources of information, yet well connected to the sense-making and other stages of the foresight process.

b) Although there will a formalised structure of information gathering, it is important that the "Node" also engages with experts and policy-makers informally and frequently.

c) Attention should paid to the on-going management of the individuals within the "Node" so that they may have development paths, whilst ensuring that their knowledge is captured.

d) As wide a network of "knowledge stakeholders" as possible is needed. It is crucial that the Node does not become part of an organisational "silo".

This "node and network" approach is similar to that recommended by Oxford Analytica in their Singapore report (see 5.2.3)

6.4 Communication

a) Careful consideration should be given to what communication "products" are produced. There is a need to balance information overload with pertinent and timely inputs. "Products" should range from daily email news feeds that people can sign up for, through to major set-piece conferences.

b) The key, as RAHS suggest, is to "Excite policymakers". That requires making the output mean something to the audience.

c) Alternative forms of communication such as video, music and immersive environments will enhance engagement with the content. The design of the physical space used is important for meetings, provoking ideas, images of the future etc: for example, a place like future focus @ dti.

6.5. Summary

The Terms of Reference of the study sought recommendations to EFFLA on HS tools and databases in the EC DG R&I context.

a) Hub – characteristics and location

In each of the interviews and in many of the papers reviewed, the tension between the "quality" of the scanning – in the sense of originality, depth etc – and its integration with the policy agenda is identified. The general view is that Horizon Scanning should be the responsibility of a **"Node"** of dedicated staff within DG Research & Innovation. These staff would be required both to access a wide range of sources in a neutral manner, and remain sufficiently connected to the sense-making and other stages of the Foresight process to be influential.

Although there will a formalised structure of information gathering, it is important that the "Node" also engages with **"Networks"** of experts and policy-makers informally and frequently. The node must not become an organisational silo.

b) Relation to Strategic Foresight Processes

Careful consideration should be given to what communication "products" are produced. There is a need to balance information overload with pertinent and timely inputs. "Products" should range from very brief daily email news feeds that people can sign up for, through to major set-piece conferences.

c) Role and characteristics of HUMINT

It is clear that we can expect an increasing use of semi-automated tools within the HS process, as they permit a wider scope of information search and a degree of avoidance of expert bias.

But throughout the study, interviewees have been consistent that deciding what signals will emerge from the noise has to come through debate and conflict. The human involvement will remain key to focus on high-value issues and integration with policy; to identify relevance to decision-makers; and to bring imagination and creativity.

Ideally, the overall HS process should have activities in each of the four segments of the HS matrix (fig 2): both manual and semi-automated techniques and both participatory and non-participatory ones. Each adds its unique value to the overall process.

ANNEX A – TERMS OF REFERENCE

The mission of the European Forum on Forward Looking Activities (EFFLA - http://ec.europa.eu/research/era/partnership/expert/effla_en.htm) is to enhance collective forward looking intelligence, to help the EU in tackling upcoming societal challenges and to devise comprehensive and pro-active European Research & Innovation Policies.

EFFLA have commissioned a study to provide the EC with a framework for implementing horizon scanning. The study:

a) uses the SESTI[11] work to define the stages of horizon scanning

b) analyses the use of tools and HUMINT in Singapore, Australia, Metafore, iKNOW and Sigmascan

c) makes recommendations to EFFLA on HS tools and databases in the EC DG R&I context:
   a. Hub – characteristics and location
   b. Relation to Strategic Foresight Processes[12]
   c. Role and characteristics of HUMINT

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[11] Scanning for Emerging Science and Technology Issues http://www.sesti.info
[12] EFFLA Policy Brief #1

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ANNEX C – REFERENCES, BIBLIOGRAPHY AND CONTACTS

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OTHER CONTACTS
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http://www.youtube.com/watch?v=YKJ5x68N5jw and http://youtu.be/V2nXZZZOiK8

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