EFP Deliverable 2.3 – WP 2 – SUPP – Public

1st EFP Mapping Report: *Practical Guide to Mapping Forward-Looking Activities (FLA) Practices, Players and Outcomes*

Towards a Fully-Fledged Futures Mapping

Date: September 2011

Authors: Rafael Popper (MBS, The University of Manchester)

Thomas Teichler (Technopolis Group)

With contributions from the following interviewees:

- Domenico Rossetti (European Commission)
- Fabiana Scapolo (European Commission)
- Perla Srour-Gandon (European Commission)

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European Foresight Platform

The European Commission is providing the means to continue the important networking activities of foresight initiatives. Setting out on the previous work of the European Foresight Monitoring Network and For-Learn the new European Foresight Platform resumes its work.

About the Practical Guide to Mapping Forward-Looking Activities (FLA)

This Guide presents the 1st EFP Mapping Report, i.e. deliverable D2.3 of the EFP project. The guide explains the frameworks, indicators and procedures used in the EFP Mapping by: (1) discussing the opportunities and challenges of Mapping FLA; (2) describing the indicators and methodology used in the Mapping FLA; (3) demonstrating the usefulness of the methodology with a pilot case; (4) drawing lessons from the practical application of the methodology; and (5) introducing the logic and structure of the web-based EFP Mapping Environment.

Date: September 2011

Authors: **Rafael Popper** MIoIR/University of Manchester rafael.popper@mbs.ac.uk

Thomas Teichler MIoIR/University of Manchester thomas.teichler@mbs.ac.uk

About the European Foresight Platform (EFP)

The EC under its Seventh Framework Programme for Research and Technology Development (FP7) is providing the means to continue the important networking activities of foresight initiatives. The Coordination and Support Action "EFP European Foresight Platform – supporting forward looking decision making" aims at consolidating the information and knowledge base on foresight in Europe and internationally. The ultimate purpose of EFP is to better exploit foresight as a resource to support policy-making. The knowledge hub will be used in a series of national and European policy workshops, geared towards major future challenges to Europe. For more information about EFP please visit http://www.foresight-platform.eu.

About the EFP Consortium

The EFP Consortium consists of four partners: Austrian Institute of Technology (AIT), Institute for Prospective Technological Studies (IPTS), Netherlands Organisation for Applied Scientific Research (TNO) and Manchester Institute of Innovation Research (MIoIR) of the Manchester Business School (MBS) at The University of Manchester.

About the EFP Mapping Work Package (WP2)

The EFP Mapping Work Package (WP2) is aimed to monitor, analyse and position (MAP) forward-looking activities (FLA) in Europe and the world. WP2 results can be found in a fully independent Mapping Environment available online at http://www.mappingforesight.eu. This is a dynamic web space where visitors can access and share knowledge on forward-looking research and innovation initiatives associated to one or more of the following future-oriented approaches: foresight, horizon scanning, forecasting and impact assessment. EFP WP2 leader and the Mapping Team at The University of Manchester will continue developing the Mapping Environment beyond EFP.

European Foresight Platform

The European Commission is providing the means to continue the important networking activities of foresight initiatives. Setting out on the previous work of the European Foresight Monitoring Network and For-Learn the new European Foresight Platform resumes its work.

About European FLA

The following text provides a good 'snapshot' introduction to European FLA. It is based on the Foreword that Jean-Michel Baer – Director or Science, Economy and Society of the European Commission Directorate-General for Research – signed for the EC brochure on "European Forward-Looking Activities: EU Research in Foresight and Forecast" (EC, 2010).

> Forward-looking activities (FLA) covering mostly foresight and forecasting are used for the preparation and the formulation of EU policies. FLA represent a standard practice in the European Commission and good European governance is usually underpinned by such forward looking exercises. In particular, foresight is very useful for the elaboration of long-term visions and forecasting for impact assessment of policies.
>
> Other methods like horizon scanning and technology assessment can also help to identify risks and opportunities of different strategies and involve policy-makers and citizens in the choices of different technological options.
>
> FLA's main objectives are to inspire new European policies, provide fresh insights and identify major future societal challenges. In order to achieve such goals, the European Commission, DG Research, financed around twenty research FLA between 2007 and 2010. [1] These initiatives were supported from the Seventh Research Framework Programme, Socio-economic Sciences and Humanities programme.
>
> These FLA cover four main themes:
>
> - Globalisation, Europe and neighbouring countries;
> - European Research Area, science, technology and innovation;
> - Evaluation of policies and modelling of post-carbon society;
> - Mapping, preferences, visions and "wild cards".
>
> Most of the methods used in FLA - such as new indicators, modelling, Delphi, technological roadmaps, scenario approach, scientific surveys, participatory workshops and social platforms - are represented in these research initiatives … Analysing the past and projecting the future in order to shape a better present is the main purpose of the European forward-looking activities.

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[1] The following forward-looking activities have been supported by the EC between 2007 and 2010:

1. AUGUR
2. CIVISTI
3. DEMETER
4. ECPIST
5. EFP
6. EUROMED-2030
7. FARHORIZON
8. GLOBAL EUROPE 2030/2050
9. IKNOW
10. INFU
11. MAPPING THE PAST
12. MEDPRO
13. PACT
14. PASHMINA
15. SANDERA
16. SESTI
17. SUSTAINCITY
18. THE WORLD IN 2025

Acknowledgements

We wish to thank those experts and colleagues who have supported us in the preparation of this report. In particular our thanks are due to Domenico Rossetti, Fabiana Scapolo and Perla Srour-Gandon for sharing with us their insights on forward-looking activities, which are specifically reflected in the section on rationales of FLA.

Sincere thanks to our colleagues from AIT, IPTS and TNO for their invaluable comments on drafts of this report, in particular to Annelieke van der Giessen, Bas van Schoonhoven, Dirk Johann, Elisabetta Marinelli, Joachim Klerx, Matthias Weber and Susanne Giesecke, as well as to the design elements and the royalty-free license our IT subcontractor (Cyber Fox) received from Futures Diamond in order to use its Background Intellectual Property (mapping and content management system) for the purpose of delivering an independent Mapping Environment supporting the EFP Mapping Work Package (WP2). We also wish to thank Ian Miles for contributing the Foreword.

Finally we would like to acknowledge the use of Flickr for the images we have adapted for the sections about Interfaces and applications; Interactivity and Intensity.

Foreword

The European Foresight Platform (EFP) is the continuation and extension of the very successful EFMN (European Foresight Monitoring Network) mapping exercise. While EFMN mapped over 2000 foresight cases, EFP will extend this approach in two ways. On the one hand, it will explicitly include more types of forward-looking activities (FLA). While EFMN focused on mapping work described as foresight, EFP will also deliberately cover horizon scanning, forecasting studies and different forms of technology and impact assessment. (Some of this work have been inadvertently captured by the EFMN database, but was difficult to differentiate.) On the other hand, EFP will map many more dimension of foresight activities. In the past EFMN focused on foresight practices and players, now EFP will also systematically provide information about the outcomes of forward-looking activities.

To this end this EFP Mapping report outlines a methodology to map forward-looking activities. The "SMART Futures Jigsaw" is a striking visual representation of the more than thirty dimensions used to map FLA. A wealth of data will be provided. We intend to develop evidence-based analyses of the contours of FLA work, and how they are changing, based on these data.

This sort of work is not just of academic interest: it should also be of value for FLA practitioners and decision makers who commission studies and use their results. The former will benefit from the mapping pointing to what has and has not been attempted in the field, and what results and impacts have been obtained. Thus redundancy can be avoided, and fruitful avenues for further exploration suggested; benchmarks and guides to good practice can be established. Moreover, they will be able to use the mapping for linking up with other experts and for collaborating with stakeholders on their projects.

Policymakers and other decision makers who are interested in the contents of FLA should be able to benefit from mapping in several ways. The mapping can provide a basis for scoping, interpreting and evaluating FLA. Moreover, it can be used to improve FLA research agendas, as ongoing mapping of the activities will allow for analyses of "hot" topics, emerging issues and potential areas where further research and cooperation may be needed. Most obviously, perhaps, the outcomes of numerous FLA studies will be accessible through a single entry point; decision makers and their advisors can readily locate and consult them for their own missions. As the first systematic library of FLA worldwide, EFP Mapping will provide a unique platform for the information, analysis and exploitation of players, practices and outcomes of forward-looking activities.

Professor Ian Miles
Manchester Institute of Innovation Research (MIoIR)

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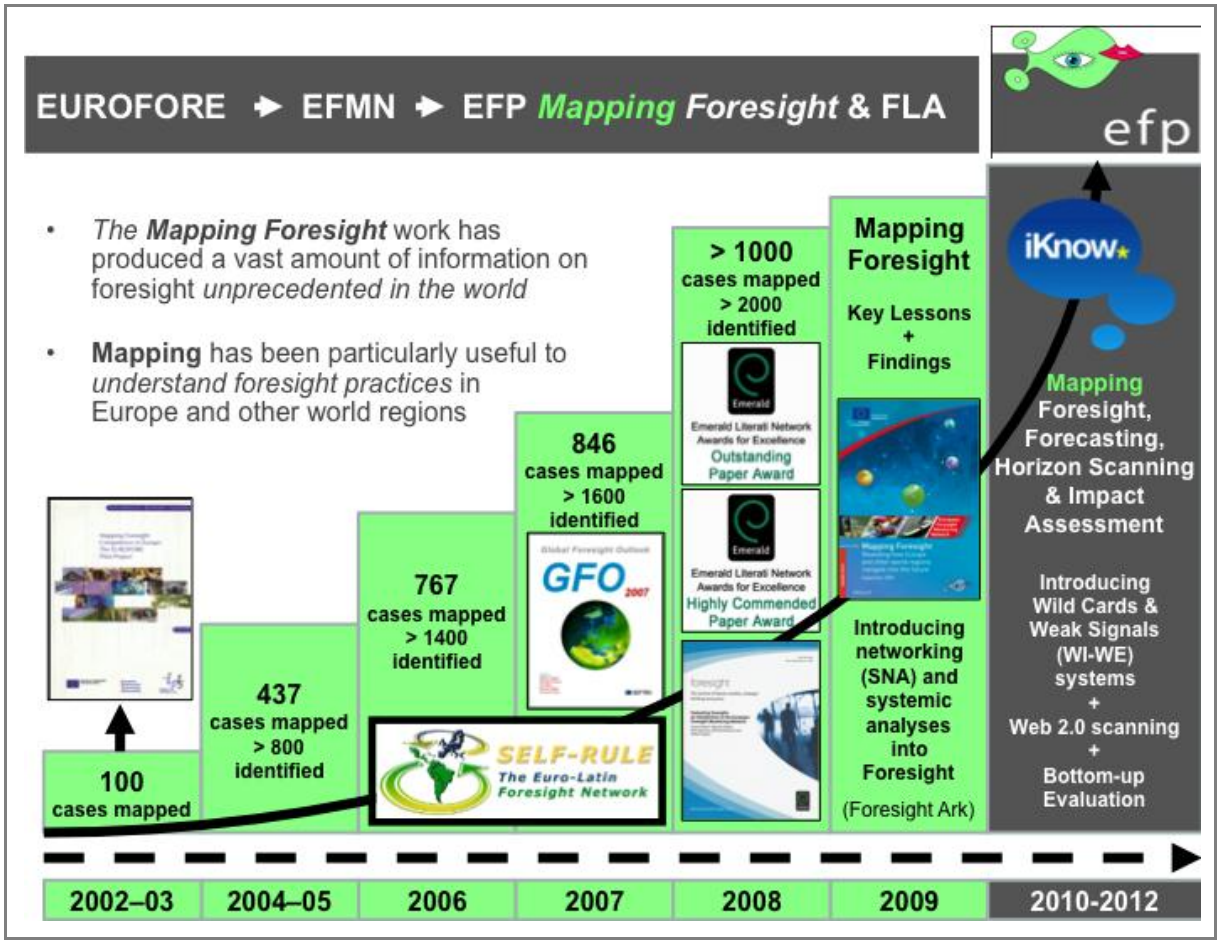
1 Introduction

For over a decade the European Commission has systematically supported the so-called **mapping** work in an effort to monitor and analyse *foresight* activities in Europe and the world (Figure 1). The first of such activities was the *EUROFORE Project*[2] which ran between 2002–03 and analysed some 100 "foresight studies" in the *Mapping Foresight Competence in Europe: The EUROFORE Pilot Project* report. This pilot was instrumental for the elaboration of basic templates and indicators to better understand foresight *practices*.

Figure 1: The Evolution of the Mapping Activities



Based on the lessons from this pilot the EC supported the European Foresight Monitoring Network (EFMN)[3] between 2004–08. Several publications were produced based on the analyses of the EFMN Mapping database, which reached over 2,000 "foresight studies". As Professor Ian Miles put it in his Foreword to the 2009 *Mapping Foresight* report:

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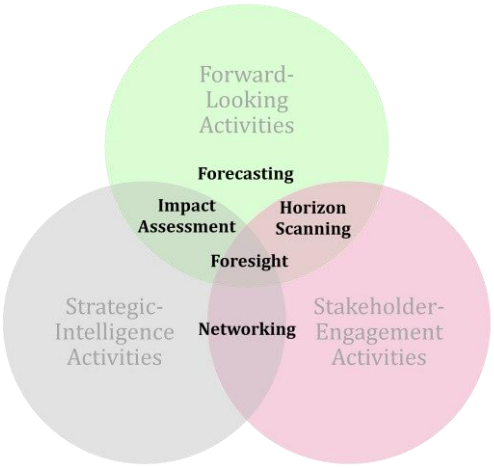
2 The EUROFORE Project was led by MIoIR (formerly PREST) at the University of Manchester (UK) in collaboration with IPTS (Spain), FhG-ISI (Germany), VDI (Germany), Futuribles (France), VTT (Finland), Fondazione Rosselli (Italy), AIT (Austria), VITO (Belgium), TNO (Netherlands) and Tubitak (Turkey). MIoIR and IPTS were responsible for the Mapping activities. See Keenan *et al.* (2003).

3 The EFMN Project was led by TNO (Netherlands) in collaboration with VDI (Germany), AIT (Austria) and MIoIR (formerly PREST, UK). MIoIR and TNO were responsible for the Mapping activities. See Popper *et al.* (2005, 2007); Keenan *et al.* (2006); Popper (2008); Keenan & Popper (2008); Popper (2009).

> What is particularly encouraging about the present moment is that we are simultaneously seeing the major steps in foresight mapping that this report embodies – and the move away from self-promoting accounts of how one or other expert conducted foresight, towards better-explicated "warts and all" accounts of actual cases of foresight practice … practitioners will be able to draw upon various resources accumulated in recent years, to demonstrate the scope for applying foresight and the tools and practices that have been employed successfully in recent exercises. The mapping work of EFMN will certainly be one of the main resources that will be used.

Against this background, the European Foresight Platform (EFP) broadened the scope of its **mapping** activities in other to study main practices, players and outcomes of selected *foresight*, *forecasting*, *horizon scanning* and *impact assessment* (e.g. technology assessment) studies. The following chart (see Figure 2) illustrates how *forward-looking*, *strategic-intelligence* and *stakeholder-engagement* activities relate to the four types of FLA considered by EFP Mapping and supported by a wide range of *networking* activities.

Figure 2: Types of Forward-looking Activities (FLA) Mapped by EFP



Foresight is a systematic, participatory, prospective and policy-oriented process which, with the support of environmental/horizon scanning approaches, is aimed to actively engage key stakeholders into a wide range of activities anticipating, recommending and transforming (ART) technological, economic, environmental, political, social and ethical (TEEPSE) futures (Popper, 2011).

Horizon Scanning (HS) is a structured and continuous activity aimed to monitor, analyse and position (MAP) "frontier issues" that are relevant for policy, research and strategic agendas. The types of issues mapped by HS activities include new/emerging: trends, policies, practices, stakeholders, services/products, technologies, behaviours/attitudes, "surprises" (i.e. wild cards) and "seeds of change" (i.e. weak signals) (ibid.).

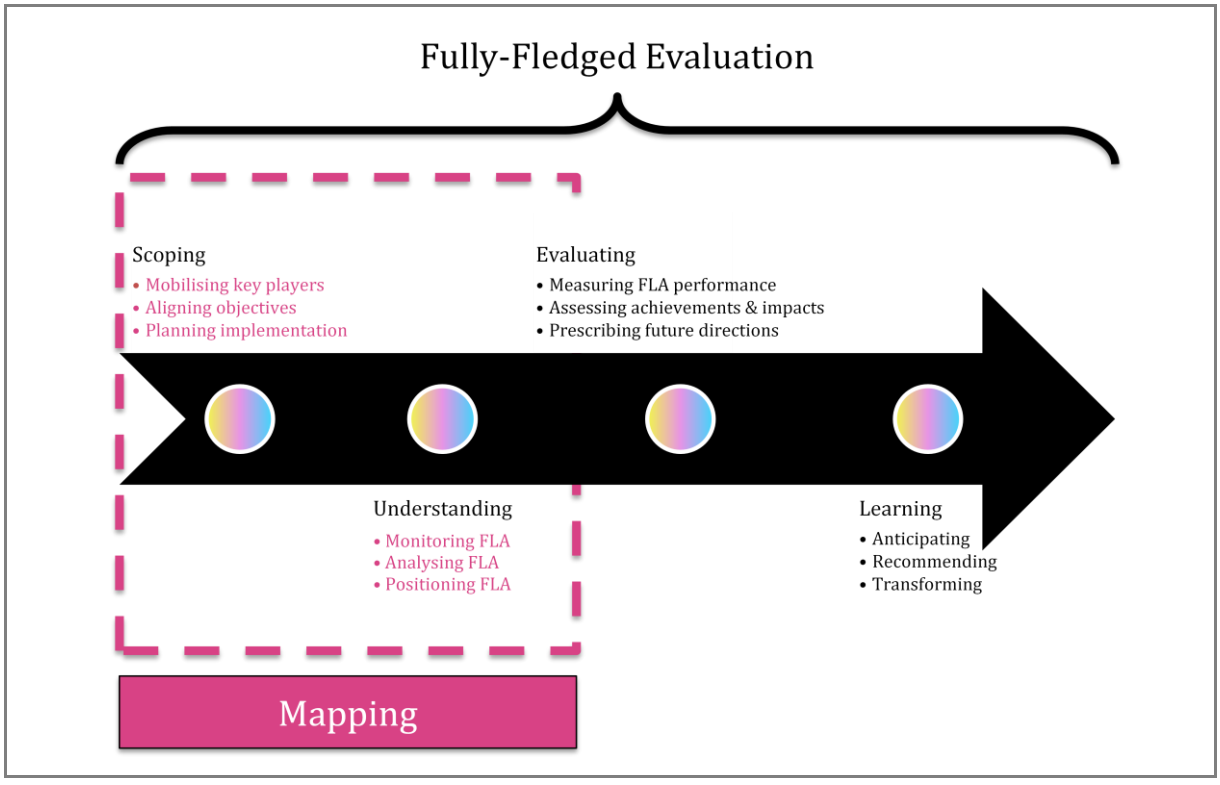
Forecasting is an activity aimed to predict how the future will look like. Such predictions are normally based on two types of knowledge sources: judgemental and statistical. While the former aims to predict one's own behaviour as well as others' behaviour; the latter is divided into two branches: univariate (extrapolation models) and multivariate (including theory-based and data-based models) (Adapted from Armstrong, 2001).

Impact Assessment identifies and examines the short- and long-term (technological, economic, environmental, political social and ethical) consequences of an intervention, be it a policy, project, legislation or the application of a technology (European Commission, 2009; International Association for Impact Assessment, 2011).

The concept of **mapping** and **evaluation** are intimately linked (see Figure 3 below). In fact, EFP Mapping is conceived as a process which involves (1) *scoping* – i.e. *mobilising* key players, *aligning* objectives to the needs of key players, and *planning* its implementation; (2) *understanding* – i.e. monitoring, analysing and positioning (MAP) forward-looking activities (FLA); and (3) *evaluating* – i.e. measuring FLA performance, assessing FLA effectiveness and impacts; and prescribing future directions.

Furthermore, EFP Mapping is in harmony with the Fully-Fledged Evaluation framework of FLA. By Fully-Fledged Evaluation we mean the "*systematic process aimed at assessing the appropriateness and level of achievement of [FLA] objectives, performance (using cost-benefit analysis), efficiency of organisational structure (i.e. approaches and methods) and effectiveness of implementation and aftercare. The process should assess the level of capacities and FLA culture achieved; its national, sub-national and international reach; level of commitment of participants; and novelty and impact of its internal activities (i.e. studies and projects). In addition, with the aim of aligning FLA with the implementation environment, the evaluation should try to measure the impact on public and private policies and strategies; agendas of science, technology and innovation (STI) programmes and institutions; consolidation of research groups; consolidation of S&T capacities; and internationalisation of R&D. Finally, a fully-fledged evaluation of FLA should also identify new products and services; new policy recommendations and research agendas; new processes and skills; new paradigms and visions; and new players*" (Popper *et al*, 2010).

Figure 3: Synergies between Mapping and Evaluation



This is the first report of the EFP Mapping activities led by the Manchester Institute of Innovation Research (MIOIR) at the University of Manchester. The main objective of this report is to share with interested parties (i.e. sponsors, practitioners and users of FLA) the frameworks, indicators and procedures that will be used in EFP Mapping.

In other words, this Practical Guide is the first EFP Mapping report aimed to:

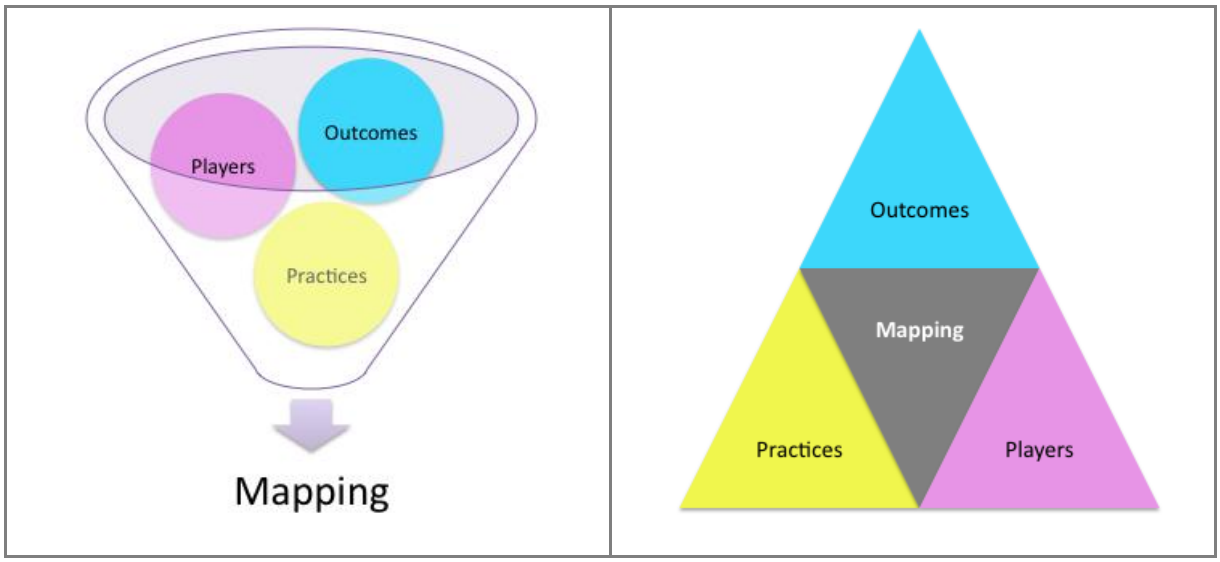
(1) discuss the opportunities and challenges of Mapping Foresight & FLA;
(2) describe the indicators and methodology used in the Mapping Foresight & FLA;
(3) demonstrate the usefulness of the methodology with the mapping of a pilot case study;
(4) draw lessons from the practical application of the mapping methodology; and
(5) introduce the logic and structure of the web-based EFP Mapping Environment.

As part of the EFP Mapping activities we will produce two additional reports. The second report will discuss key findings and lessons from the mapping of twenty-one cases. The third and final report will, on the basis of the mapping of 50+ case studies, (1) offer guidance on how to better exploit information about practices, players and outcomes of FLA; and (2) examine how EFP Mapping results can inform and shape the future of research and innovation policy – at national, European and global levels.

2 About Mapping Foresight and Forward-Looking Activities (FLA)

Mapping Foresight and Forward-Looking Activities (FLA) builds on key results and lessons learned from the first large international effort aimed at understanding the nature of FLA **practices** in Europe and other world regions, including Latin America, North America, Asia, Africa and Oceania. The significant number of FLA exercises mapped between 2004–08 (over 2,000 initiatives) is clear evidence of the rising interest in FLA. As shown in *Mapping Foresight* (2009), this is mainly because *foresight* and *forecasting* have become more than just tools to support policy or strategy development in science, technology, and innovation (STI). The results of previous *mapping* activities revealed that the scope of FLA, as practised in the early years of the twenty-first century, involves a wider range of objectives, including: analysis of the future potential of STI, promoting network building, priority setting for STI, supporting methodology and capacity building, and generating shared visions towards, for example, a strong European Research Area (ERA). In addition, these mapping efforts showed that "multi-scope" or "multi-purpose" FLA is not a European phenomenon but a global one, with interesting similarities as well as differences in FLA **practices** around world. The *mapping* publications also showed that the growth of FLA **practices** is not a matter of fashion but instead a systematic effort to promote effective processes to proactively think about the future. These processes have been applied to a variety of research and knowledge domains. The wide range of domains where FLA has been applied extends across the *natural sciences* (e.g. biological sciences, chemical sciences, physical sciences, etc.), *engineering and technology* (e.g. environmental engineering, communications technologies, etc.), *medical sciences* (e.g. public health and health services), *agricultural sciences* (e.g. crop and pasture production, etc.), *social sciences* (e.g. policy and political science), and the *humanities* (e.g. language and culture).

Figure 4: The Logic of EFP Mapping



In EFP we will further advance the mapping for **practices** and at the same time introduce additional indicators supporting the mapping of **player** and **outcomes** of FLA. The next section presents some opportunities and challenges of the new logic of EFP Mapping (see Figure 4).

2.1 Opportunities and challenges of Mapping Foresight and FLA

In spite of the more than 5-years know-how and steep learning curve associated with previous mapping activities, the use Forward-Looking Activities (FLA) as an umbrella term to refer to *foresight*, *forecasting*, *horizon scanning* and *strategic management* creates opportunities as well as challenges for EFP Mapping efforts.

There are significant advantages in mapping FLA. Firstly, Mapping FLA will help us identify individuals and organisations that belong to one or more building block(s) of the FLA umbrella, thus allowing us to recognise key FLA **players**. Secondly, "FLA players" share some competences and skills regarding the use of particular techniques (e.g. Delphi, roadmapping, scenarios and modelling) and the mapping of different applications and combinations of these methods can lead to a richer understanding of their *pros* and *cons*. Thirdly, there seems to be a growing recognition among public, private, academic and civil society actors about the importance of conducting *futures research* at local, national and international levels. This has increased the demand for quality and quantity of FLA, thus forcing "sub-domains" such as *foresight* and *horizon scanning* (FHS) to evolve in ways that practices are borrowed from each other and, as a result, previous boundaries and differences have become less obvious. Fourthly, the concentration of FLA into one platform offers an unprecedented opportunity for interconnecting knowledge on FLA **outcomes**, thus supporting better science, technology and innovation (STI) and RTD policy advice. Finally, the scope of Mapping FLA is so large that results from their systematic and continuous mapping could potentially be used to virtually shape any phase of the policy cycle (formulation, implementation and evaluation) in any region, country, sector or thematic area.

There are also challenges in Mapping FLA. Firstly, the boundaries between *foresight*, *forecasting*, *horizon scanning* and *strategic management* are rather fuzzy, and broadening the scope of the mapping to include all of them is extremely demanding, not only in terms of resources (e.g. time, capacities, funding, etc.) but also regarding the need for more inclusive and robust mapping platforms (including frameworks, indicators and infrastructures). Secondly, the universe of potential "FLA case studies" instantaneously jumps to tens or hundreds of thousands. This leads to two major questions for EFP: how do we select our FLA case studies? And, how many cases can be "fully-mapped" within the life of the EFP project? (See Section 7). Thirdly, FLA activities are distinct enough so that their *practices*, *players* and *outcomes* cannot be properly mapped with the same set of indicators used in previous *mapping foresight* efforts. This meant that further research was needed in order to develop a more comprehensive set of "FLA indicators", and EFP is not a *collaborative research and technology development project (CP)*[4] but a *coordination and support action (CSA)*.[5]

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[4] Collaborative RTD Projects (CP) are normally conducted by consortia with participants from different countries, aiming at developing new knowledge, new technologies, products, demonstration activities or common resources for research. The size, scope and internal organisation of projects vary according to fields and topics. Projects can range from small or medium-scale focused research actions to large-scale integrating projects for achieving a defined objective. Projects should also target special groups such as SMEs and other smaller actors.

[5] Coordination and Support Actions (CSA) are aimed at coordinating or supporting research activities and policies (networking, exchanges, trans-national access to research infrastructures, studies, conferences, etc.). These actions may also be implemented without calls for proposals. EFP is a CSA (supporting) project, which do not fund research, development or demonstration activities. CSA (supporting) are normally focused on one specific activity and often one specific event.

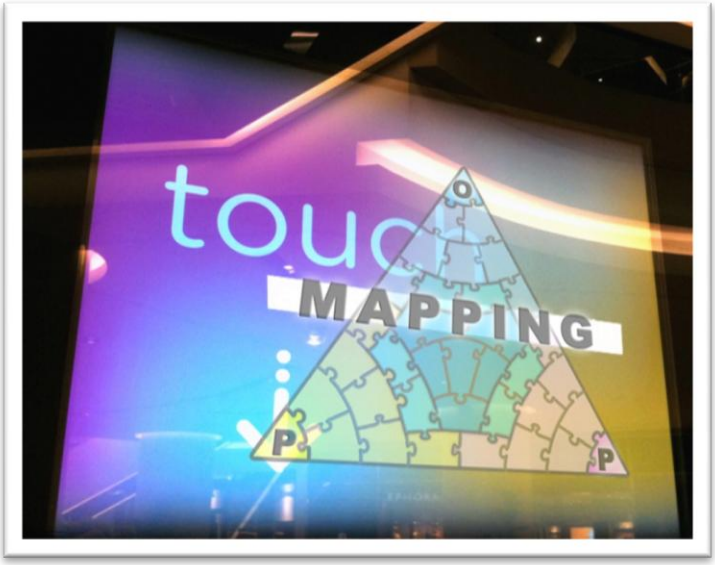
2.2 Key Lessons from Previous Mapping Experiences

Two previous initiatives, EUROFORE (2003–04) and EFMN (2005–09), have offered important lessons about mapping activities. This section focuses on five major issues:

- How to improve the ***interfaces and applications*** supporting mapping activities?
- How to improve the ***interactivity*** of the mapping activities?
- How to improve the ***indicators*** used in mapping activities?
- How to improve the ***intensity*** of mapping activities?
- How to improve the ***impact*** of mapping activities?

2.2.1 Interfaces and applications

The first lesson from previous mapping work is the need for more user-friendly, interoperable and dynamic interfaces and applications for the data *input*, *output* and *analysis* (IOA) associated to the mapping activities. In other words, mapping processes need better ways of gathering (data input), retrieving (data output) and processing (data analysis) large amounts of information. These infrastructures should be capable of handling the large number of case studies we have gathered (over 2,000) and more. We have learned that mapping systems should not only focus on data input, but also pay attention to the development of interfaces and applications helping users to retrieve/find relevant information and to perform basic statistical analyses (i.e. showing histograms representing common practices, players and outcomes). Such systems should also be interoperable with other data management software and be able to analyse the mapping data in real-time.



In spite of these needs, the nature of the EFP project (i.e. Coordination and Support Action), did not allow us to design a new system from scratch. However, the opportunity to build a partnership with the iKnow[6] research project, and to use the platform it has been developing, was available. iKnow's foresight, horizon scanning and innovation system proved to be versatile enough to provide the functionalities required by EFP Mapping.

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6 The iKnow Project is aimed at interconnecting knowledge on issues (e.g. wild cards and weak signals) potentially shaping the future of science, technology and innovation (STI) – see www.iknowfutures.eu

2.2.2 Interactivity

The second lesson is the need to add *interactivity* to the mapping process. By interactivity we mean a move from the simple publishing of mapping results to the participatory co-production of mapping-related knowledge. Given that forward-looking activities (FLA) are often conducted and used by several actors, it appears reasonable to seek the engagement of interested stakeholders in the description and assessment of FLA practices, players and outcomes. However, the active participation of interested parties will depend on, on the one hand, the user-friendliness of the mapping interfaces and applications (see above), and, on the other hand, the particular set of incentives that EFP can offer to promote a "bottom-up" approach to the mapping of FLA.

Some of the potential EFP strategies and incentives to promote a more "bottom-up" mapping of FLA, include:

(1) The establishment of "Mapping Ambassadors (MA)" in selected countries in Europe, North/South America, Asia, Africa and Oceania (see Section 8.4).
(2) The establishment of a "Mapping Credit System (MCS)" whereby users are rewarded with Mapping Credits based on their level and type of engagement and contributions. The more a user contributes to the Mapping – by assessing the relevance of mapped practices, players and outcomes for their own country or by contributing to the actual mapping of FLA indicators (see below) – the more access to customised information and functionalities the user will be able to access in the Mapping Environment.
(3) The featuring in the EFP Mapping Environment of the most visited and commented FLA practices, players and outcomes associated.
(4) The promotion of "mapping workshops" potentially organised by sponsors and RTD teams of selected FLA and supported by members of the EFP team.
(5) The preparation of EFP Briefs for FLA mapped at fully-fledged level (see Annexe 1).

2.2.3 Indicators

The third lesson from previous mapping work concerns the need to include more mapping indicators. While previous mapping activities have mainly focused on understating of FLA *practices* with a few indicators looking at *players*, EFP Mapping will further advance the mapping of these two dimensions and, at the same time, promote the mapping of FLA *outcomes*. We suggest three different levels of mapping: 'basic', 'advanced' and 'fully-fledged'.

Table 1: The Three Levels of EFP Mapping

PPO Mapping	SMART Futures Mapping	Mapping Indicators/Elements	Basic (EFMN)	Advanced (EFP)	Fully-Fledged
FLA Practices	**Scoping Futures**	Aims and objectives	✓	✓	✓
		Rationales and background		✓	✓
		Context and domain coverage	✓	✓	✓
		Methodology and work plan	✓*	✓	✓
		Territorial scope	✓	✓	✓
		Time horizon(s)	✓	✓	✓
		Funding and duration	✓	✓	✓
FLA Players	**Mobilising Futures**	Sponsors and champions	✓*	✓	✓
		Research and support teams	✓*	✓	✓
		Methodology and domain experts		✓	✓
		Cooperation and networking		✓	✓
		Participation scale	✓	✓	✓
		Target groups	✓	✓	✓
		Public relations (PR) and marketing		✓	✓
FLA Outcomes	**Anticipating Futures**	Visions, scenarios and forecasts		✓	✓
		Critical and key technologies		✓	✓
		TEEPSE drivers, trends and megatrends		✓	✓
		SWOT and Grand Challenges		✓	✓
		Wild Cards and Weak Signals (WIWE)		✓	✓
		Pathways and roadmaps		✓	✓
		Models and frameworks		✓	✓
	Recommending Futures	Policies and actions			✓
		Initiatives and actors			✓
		Appropriation and dissemination			✓
		Investments and training			✓
		Alliances and synergies			✓
		(FHS) Research			✓
	Transforming Futures	Capacities and skills			✓
		Strategies and priorities			✓
		Paradigms and current visions			✓
		Socio-economic and STI systems			✓
		Behaviour, attitudes and lifestyles			✓
		Knowledge-based products and services			✓

NOTES
FHS = Foresight and Horizon Scanning;
RTD = Research & Technology Development.
STI = Science, Technology and Innovation.
SWOT = Strengths, Weaknesses, Opportunities and Threats.
TEEPSE = Technological, Economic, Environmental, Political, Social, Ethical.
WIWE = Wild Cards and Weak Signals.

- '**Basic**' EFP Mapping corresponds to EFMN mapping except for those dimensions marked with '*'. In the latter case only one of the indicators of the EFP mapping dimension has been used in the EFMN, for example EFP will map RTD *and* support teams, while EFMN only mapped the leader of the RTD team. The inclusion of this mapping type ensures that EFP Mapping is compatible and coherent with the work done in EFMN.
- '**Advanced**' EFP Mapping includes 21 dimensions covering practices, players and outcomes.
- '**Fully-fledged'** EFP Mapping is the most comprehensive mapping type. The 50 cases mapped by the EFP team will be mapped at advanced or fully-fledged levels.

Table 2: Potential Role of Key Stakeholders in the EFP Mapping

PPO Mapping	SMART Futures Mapping	Mapping Indicators/Elements	Potential Role of Key Stakeholders					
			Sponsor	Coordinator	Advisors/ assistants	Participants	Beneficiaries	EFP Mappers
FLA Practices	**Scoping Futures**	Aims and objectives	✓	✓				✓
		Rationales and background	✓	✓	✓			✓
		Context and domain coverage	✓	✓	✓			✓
		Methodology and work plan		✓	✓			✓
		Territorial scope		✓	✓			✓
		Time horizon(s)		✓	✓			✓
		Funding and duration	✓	✓	✓			✓
FLA Players	**Mobilising Futures**	Sponsors and champions	✓	✓	✓			✓
		Research and support teams		✓	✓			✓
		Methodology and domain experts		✓	✓	✓		✓
		Cooperation and networking		✓	✓		✓	✓
		Participation scale		✓	✓	✓	✓	✓
		Target groups		✓	✓			✓
		Public relations (PR) and marketing	✓	✓				✓
FLA Outcomes	**Anticipating Futures**	Visions, scenarios and forecasts	✓					
		Critical and key technologies						
		TEEPSE drivers, trends and megatrends						
		SWOT and Grand Challenges						
		Wild Cards and Weak Signals (WIWE)						
		Pathways and roadmaps						
		Models and frameworks						
	Recommending Futures	Policies and actions						
		Initiatives and actors						
		Appropriation and dissemination						
		Investments and training						
		Alliances and synergies						
		(FHS) Research						
	Transforming Futures	Capacities and skills						
		Strategies and priorities						
		Paradigms and current visions						
		Socio-economic and STI systems						
		Behaviour, attitudes and lifestyles						
		Knowledge-based products and services						

"EFP Mappers" are members of the EFP team or Mapping Ambassadors (see Section 8.4) who are responsible for the mapping of selected FLA. As such, they should be become knowledgeable about the cases to be mapped.

2.2.4 Intensity

The fourth lesson relates to the intensity of the actual mapping work. In other words, the time and resources needed for *basic*, *advanced* and *fully-fledged* mapping of FLA. As mentioned in the introduction (Section 1), in the EFMN we managed to map over 2,000 FLA. Of those, around 1,000 were mapped against the ten indicators representing the 'basic' level of EFP Mapping. This information has been adapted to meet the structure of the EFP Mapping framework and will be publicly available in the EFP Mapping Environment (See Section 10). However, the EFP team has also been requested to map recent FLA and this required the careful estimation of capacity needs. We estimate that the four core partners of the EFP consortium will map at least 50 new FLA:

- 41 FLA mapped at advanced or fully-fledged level by MIoIR.
- 3 FLA mapped at advanced or fully-fledged level by AIT.
- 3 FLA mapped at advanced or fully-fledged level by IPTS.
- 3 FLA mapped at advanced or fully-fledged level by TNO.

EFP Mapping is a rewarding yet resource-intensive activity which should normally involve several of the following methods: web-scanning (i.e. identifying relevant documents), documentary analysis (e.g. reviewing final/interim reports and related publications), stakeholder interviews/surveys, and occasionally "mapping workshops" (interactive sessions to discuss particular indicators, especially those related to the last two phases of FLA, namely: *recommending futures* and *transforming futures*). However, as illustrated in Figure 3 above, the mapping activity is linked to evaluation practices but should not be considered a substitute or similar in its intensity (see also Annexe 2 on *Evaluating Foresight*). Following the mapping of the SANDERA project, we estimate that a well-informed researcher requires between 1 and 2 days for each fully-fledged mapping of selected FLA. However, the *fully-fledged evaluation* of the same FLA would possible involve a few months of research.

2.2.5 Impact

Finally, the fifth main lesson is that the mapping has had already an observable impact in both the policy and the FLA community. How can mapping – through its systematic characterisation of FLA – have an impact? We suggest that mapping can have three different types of impact stemming from the *application* of, the *research* about and the *inspiration* gained from the knowledge resulting from mapping FLA. The three impact types are mainly but not exclusively concerned with the policy, academic and FLA practitioners' communities respectively.

- One way that comes to mind would be the **APPLICATION** of knowledge gained on the basis of mapping by the policy community. Impacts could be *direct* i.e. when decision makers apply the knowledge with regard to a particular issue or *indirect* i.e. shaping the culture and acceptance of FLA by the media or think tanks (Johnston and Cagnin, 2011). For example, if an analysis of the mapped health sector forecasts arrive at similar recommendations on how to counter the effects of demographic developments these recommendations would gain a specific weight *vis-à-vis* other propositions.[7] Moreover, based on the mapping data, decision makers could assess their own FLA policy needs and priorities and e.g. shift their attention and resources to areas – domains or regions – where there have not been many FLA projects. So far the application impact of mapping has been rather small. The UK Parliamentary Office of Science and Technology (POST) used parts of the mapping results in a briefing note[8] on Futures and Foresight.

- In addition, mapping could have an impact on the academic community research by providing its members with data about past FLA for their **RESEARCH** work. We call this type of impact description and analysis. Researchers could analyse past activities, identify patterns, gaps and methodological weakness. Through their analysis they could improve the tools for forward looking activities and raise the awareness of FLA more generally. So far two peer-reviewed academic papers have been published.[9] While they have been written by people who were involved in the EFMN mapping activities, the reception in the academic community testifies to their impact. Thus, the papers received the "Outstanding" and "Highly Commended" Awards at the 2009 Emerald Literati Network Awards for Excellence and were among the top-fifteen papers downloaded from the *foresight* journal in 2008 and 2009.

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7 Similarly, in the environmental sector the Intergovernmental Panel on Climate Change (IPCC) Panel bases its recommendations on climate change policy on a kind of mapping, a meta-analysis of climate forecasts. See, for example, IPCC (2007), "Climate Change 2007: The Physical Science Basis. Summary for Policymakers. Contribution of Working Group I to the Fourth Assessment Report of the IPCC", available at: http://www.aaas.org/news/press_room/climate_change/media/4th_spm2feb07.pdf (accessed 25.06.2011)

8 Parliamentary Office of Science and Technology (2009), "Futures and foresight, May, Number 332", available at: http://www.parliament.uk/documents/post/postpn332.pdf (accessed 25.06.2011)

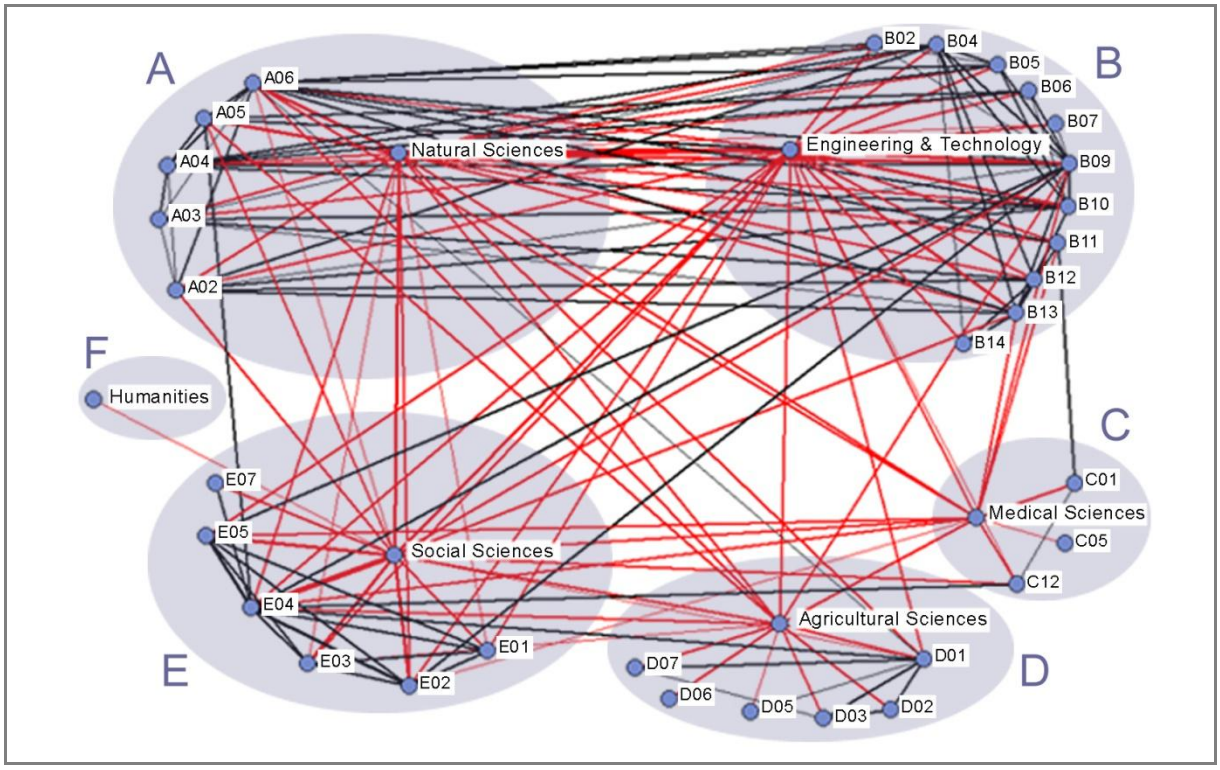
9 The two papers are Keenan, M. & Popper, R. (2008) Comparing foresight "style" in six world regions. *Foresight,* 10, 16 - 38. and Popper, R. (2008) How are foresight methods selected? *Foresight,* 10, 62-89.

- A third type of impact that mapping FLA can have is the concerned with the practice of forward looking activities within the FLA community: the mapping could impact by providing FLA practitioners with **INSPIRATION** of how to conduct their projects. While the examination made on the basis of EFMN has also provided analytical guidance, for example, regarding the use of methods for foresight projects, the EFP mapping goes beyond this analytical guidance. Practitioners will be able to draw through the Mapping Environment on the methodology and approach of similar projects; they will be enabled to consult with peer practitioners and to network with stakeholders who have been involved in similar FLA. The Mapping Environment will thus provide a tool to actually plan, conduct and control ongoing forward-looking activities. The EFP mapping, thereby, can be expected to impact on the very way in which FLA are carried out.

2.3 Rationales for Mapping Foresight and Forward-Looking Activities (FLA)

Over the past years, a growing need for FLA has been recognised in Europe and worldwide, as expressed in the increasing number of FLA interconnecting knowledge from a broad variety of domains (see Figure 5). At European policy level, a range of new policy initiatives that require a clearer vision of the future as well as enhanced cooperation between different policy areas and policy levels has reinforced the need for FLA. Apart from dedicated FLA (e.g. EFP, iKNOW, INFU, FARHORIZON, PASHMINA, CIVISTI, among others), forward-looking elements have been integrated in several European policy instruments, such as the ERA-Nets, Joint Programming Initiatives (JPIs) and Technology Platforms (e.g. in the form of technology roadmaps), and as diverse policy areas as agricultural and energy policy have embarked upon initiatives to better coordinate future sectoral policy needs and research agendas, at national and European level.

Figure 5: Mapping Research Areas Linkages in Foresight



Similarly, a growing number of European countries and regions have embarked on FLA to inform and support political decision-making in relation to research and innovation policies. But not only in the public sector has FLA started to play a more prominent role. Corporate FLA, building among others on the tradition in scenario planning, has grown in importance. In the face of the growing richness and diversity of FLA in Europe and the world, access to information on existing exercises and mutual learning about the experiences made are key to increasing the efficiency of FLA. Previous mapping reports showed the vitality of the FLA, with around 1,000 mapped in detail. The descriptive data have been used to support a range of quantitative analyses, which go beyond simple counts and bar charts of what topics are being addressed, where, and for whom. Figure 5 (above) is a striking visual representation of the application of such analytic methods. EFP will use tools that will let us examine the contours of FLA, and how they are changing, in evidence-based ways, from a variety of perspectives.

Following previous experiences, the EFP mapping approach has been modified and updated in order to take account of the five lessons discussed above in Section 2.2. Furthermore, the mapping indicators have been structured in a more refined way and used to design a dedicated EFP Mapping Environment aimed to make mapping results accessible to the wider FLA community through various web-interfaces.

Apart from serving as source material informing and supporting national and pan-European policy processes, EFP Mapping pays particular attention to the analysis of FLA practices, players and outcomes. However, in order to make sure that the mapping work is aligned to the needs of policy shapers, we have conducted three interviews to European Commission officials and asked them: (1) why is the EC interested in the mapping of FLA practices, players and outcomes? And (2) how can policy shapers use such information? The results of these interviews and our own views are summarised in the following three sections on rationales.

2.3.1 Rationales for Mapping Foresight and FLA Practices

In addition to the already valuable repository of knowledge on FLA, the mapping of practices helps policy shapers and other FLA users to put exercises in context (i.e. understanding the background conditions and *raison-d'être* of individual projects). The study of different types of practices also shows the flexibility of FLA and allows us to understand the various activities or building blocks of mapped initiatives. The mapping of FLA practices can also contribute to the identification of similarities and differences between sectoral (e.g. a particular industry), territorial (e.g. regional, national, etc.) and structural (e.g. institutional) studies. Moreover, the mapping of practices can help to answer questions such as: What are the main aims and objectives of FLA? What are the main background conditions (e.g. events, documents) of FLA? What are the most common methodological frameworks in FLA? Etc. Another important rationale for mapping practices is the identification of the role of science and technology issues in different socio-economic and policy areas. This information is normally gathered from the mapping of the domain coverage of an exercise, which maps FLA against thematic priority areas of the EC as well as the FRASCATI and NACE taxonomies.

2.3.2 Rationales for Mapping Foresight and FLA Players

One of the main reasons for mapping FLA players is to promote networking and cooperation between existing FLA communities. This should in principle empower the 300+ members of the EFP Community and 1,200+ members of the iKnow Community by allowing them to identify FLA players in their countries and around the world. Furthermore, a comprehensive "inventory" of FLA players can also be used to identify experienced and emerging practitioners; invite thematic and regional experts to workshops, events, conferences or expert groups/panels. Thus, the mapping of players can be used by various EC departments known as Directorates-General (DGs), including DG Research and Innovation (RTD); DG Agriculture and Rural Development (AGRI); DG Energy (ENER); DG Enterprise and Industry (ENTR); DG Environment (ENV); DG Health and Consumers (SANCO); DG Information Society and Media (INFSO); DG Maritime Affairs and Fisheries (MARE); DG Mobility and Transport (MOVE); DG Regional Policy (REGIO); and – because of the mapping of corporate FLA – DG Competition (COMP), among others. One of the obvious future uses of the results of the mapping for FLA players is to identify partners for research project and methodology experts to support the *scoping* and *mobilising* phases of FLA (See Sections 3, 4 and 5).

2.3.3 Rationales for Mapping Foresight and FLA Outcomes

Similarly to the mapping of practices, the mapping of FLA outcomes is important to build a more structured repository of knowledge about the future. In particular, EC officials have emphasised that this type of mapping if fundamental to access key information providing strategic intelligence for different policy areas and levels. Through the mapping of outcomes FLA can also demonstrate its value for money. However, as our interviews with EC officials have confirmed, the mapping of outcomes is not an easy task. *EFP Mappers* will need to go through selected exercises and dig out immediate outputs (e.g. policy options) as well as other possible outcomes (e.g. new capacities and skills).

There are different levels of sophistication in the mapping of FLA outcomes and results will depend on whether we are mapping ongoing or completed studies, and the timing of completion is another factor influencing the mapping work. For example, the mapping of recommendations will require careful documentary analysis supported with stakeholder interviews. The key challenge here is to achieve an interactive mapping process using "bottom-up" approaches. In fact, EC funded FLA may require: interviewing key members of RTD teams; interviewing EC Project Officers (POs) and EC Head of Units (HUs); and organising face-to-face or web-based activities for FLA users, including POs and HUs, to (possibly anonymously) assess the national and European relevance of FLA outcomes. On this issue, the interviewee from the Joint Research Centre (JRC) showed particular interest in the first level of FLA outcomes, that is, *anticipating* futures (see Section 4). In other words, the mapping of visions, scenarios and forecasts; key technologies; TEEPSE drivers, trends and megatrends; SWOT and grand challenges; wild cards and weak signals; pathways and roadmaps; and models and frameworks. The second and third levels of FLA outcomes – namely *recommending* and *transforming* futures (see Sections 5 and 6 below) – should be of interest for all EC departments or DGs with an explicit mandate to develop policy.

The mapping of FLA outcomes is complementary to any efforts aimed to evaluate the impacts of RTD projects. Thus, several EU bodies (such as the European Parliament and other EU agencies) should be interested in the mapping of recommendations (e.g. strategies and policy priorities) and impacts of FLA. This information can also support activities aimed to set medium-to-long term priorities (e.g. Lisbon 2020 strategy) and proactively respond to emerging trends, tensions (unsustainable trends such as ageing) and potential transitions.

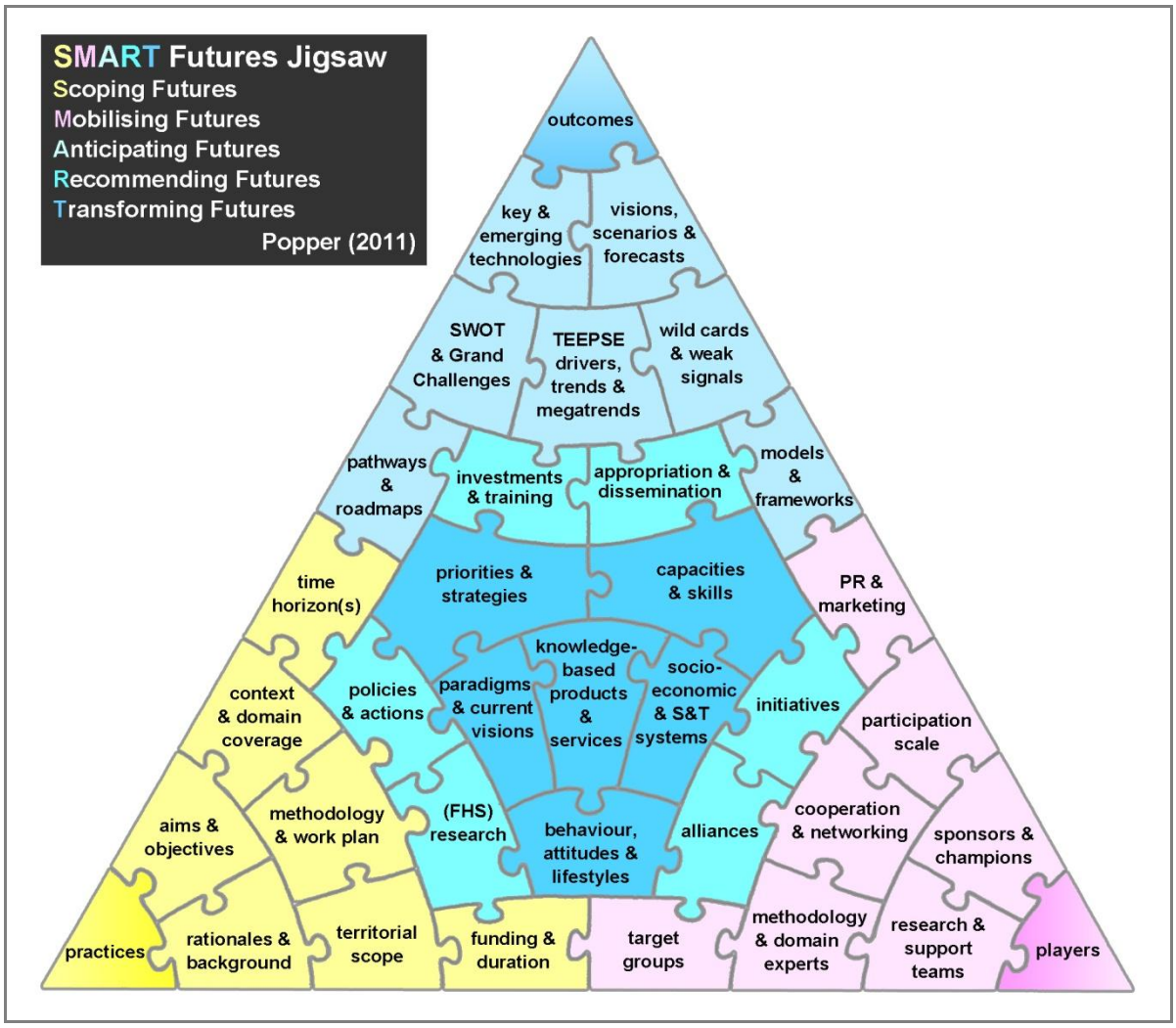
Based on the interviews to EC officials and our own views about the rationales for mapping FLA, we can conclude that the mapping of FLA practices, players and outcomes will:

1. Contribute towards the creation of a FLA mapping and evaluation culture;
2. Guide the exploitation of completed, ongoing and prospective FLA;
3. Empower and interconnect FLA practitioners and users;
4. Build a more robust repository of FLA knowledge;
5. Support policy- and decision-shaping processes.

3 Understanding the SMART Futures Process

The conceptual basis for mapping foresight and forward-looking activities is represented in the SMART Futures Jigsaw (Popper, 2011). It contains 36 elements, which are the dimensions along which we will map FLA. They related to the different phases of a FLA: *scoping*, *mobilising*, *anticipating*, *recommending* and *transforming*. Each of these phases and elements will be explained in greater detail below.

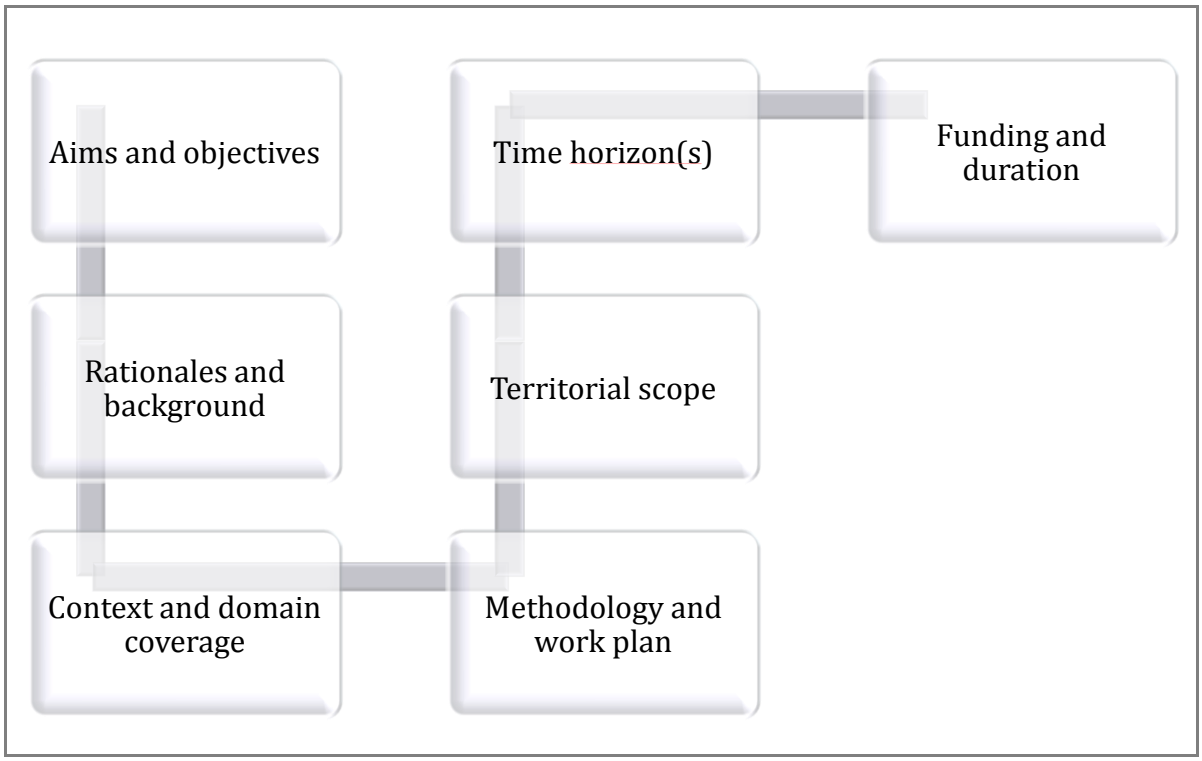
Figure 6: The SMART Futures Jigsaw



3.1 Phase 1: Scoping Futures

The first phase of any forward-looking activity (FLA) is about *scoping futures*. This involves the definition of the *aims and objectives* of the study, which are often related to a broader set of *rationales* (e.g. orienting policy and strategy development) and *background* conditions (e.g. events, documents, etc.). This is followed by the description of the *context* (e.g. EC funded FLA) and the *domain coverage* (e.g. energy, nanotechnology, security, etc.). Then the *methodology* is defined (by selecting and combining methods) and a clear *work plan* is prepared (by defining major activities, tasks and milestones). Next come the decisions about the *territorial scope* (considering the implications of choosing one or more of the following options: supra-national, national and sub-national) and the *time horizon(s)*, in order to decide how far should we look into the future. Sometimes the *funding* and the *duration* of FLA are independently determined by the context (such as open calls for tenders, for example). However, even if the total funding and duration in months are pre-defined, it is important to make sure that the overall scope of the project is realistic considering available resources. The key elements of the *scoping futures* phase are used in the mapping of FLA **practices** – see more in Section 4.

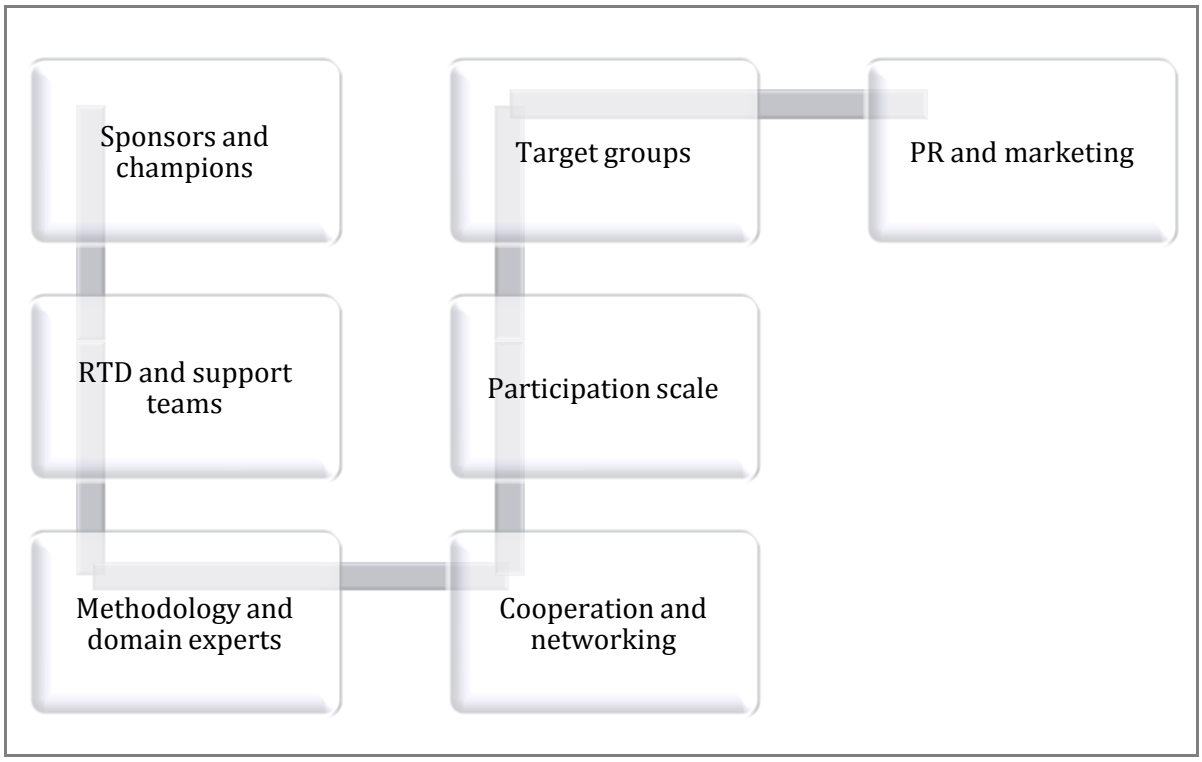
Figure 7: Key Elements of the Phase 1 of FLA – Scoping Futures



3.2 Phase 2: Mobilising Futures

For practical reasons *mobilising futures* is represented as the second phase of forward-looking activities (FLA). However, some activities are simultaneously initiated with the *scoping* phase, such as contract negotiations with the sponsor or definition of the research and technology development (RTD) teams; while others run throughout the life of the project (e.g. engagement of target groups). This phase requires regular (sometimes face-to-face) meetings and discussions with *sponsors* (responsible for both economic and political support) and *champions* (influential individuals capable of mobilising key stakeholders). The clear definition of capacities needed to conduct the study is one of the most critical success factors. By capacities we mean the *RTD team* (i.e. project leader, researchers and technology developers), *support team* (responsible for travel, logistical and administrative issues), *methodology experts* (providing guidance during the whole process) and *domain experts* (e.g. thematic specialists). Depending on the nature of the study (and of the sponsors!), the FLA team may need *cooperation and networking* to increase the *participation scale* and specific *target groups* (e.g. government organisations). Finally, one element that is often neglected or underestimated is the need for coherent *public relations (PR)* and *marketing* strategies. While the former helps to mobilise decision-makers, the latter is essential to communicate and disseminate key activities and findings. The main elements of the *mobilising futures* phase are used in the mapping of FLA **players** – see more in Section 5.

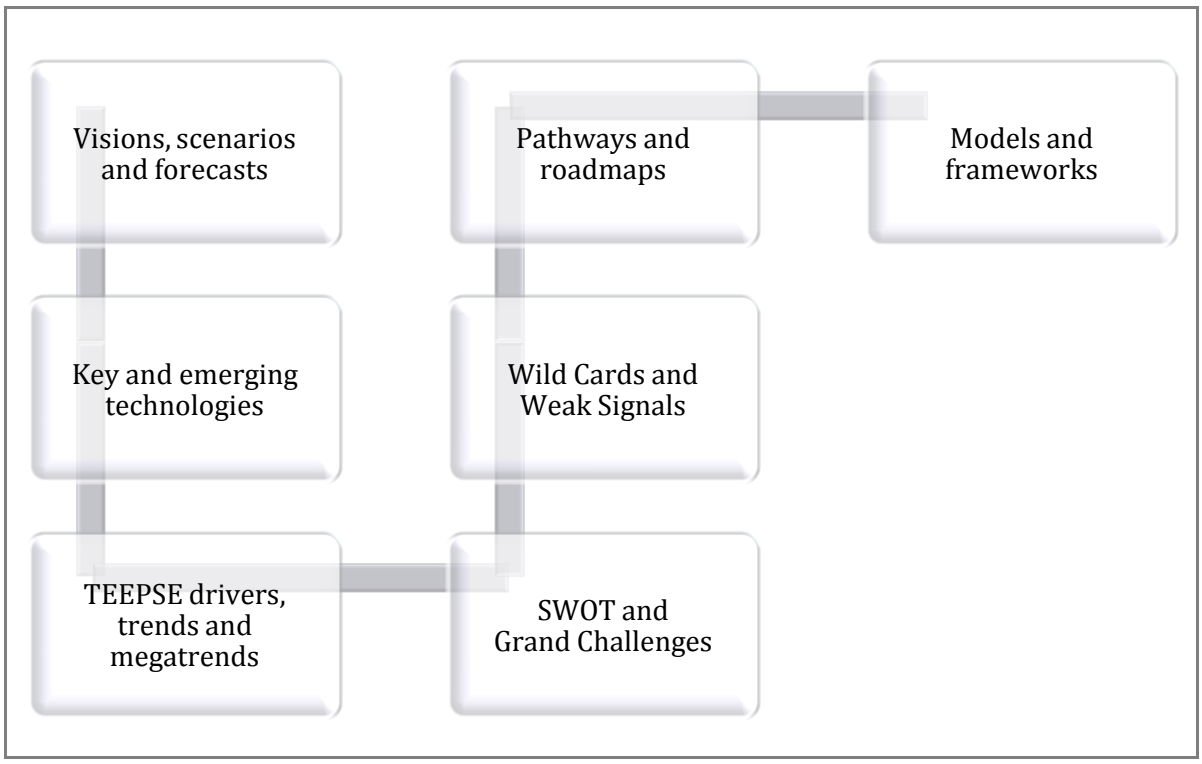
Figure 8: Key Elements of the Phase 2 of FLA – Mobilising Futures



3.3 Phase 3: Anticipating Futures

The third phase of forward-looking activities (FLA) is about *anticipating futures*, i.e. producing the "formal outputs" of FLA. First we have so-called *visions*, often described as desired or target futures. Then we find *scenarios* ranging from multiple possible futures to a single success scenario that could, but not necessarily, be used as a vision. In some FLA we can find *forecasts*, which are predictions or 'informed guesses' about the most probable futures. Some studies produce lists of *key and emerging technologies* where further research and investments may be needed. However, some of the most common immediate outputs of FLA include: lists of technological, economic, environmental, political and ethical *(TEEPSE) drivers, trends and megatrends*; as well as lists of strengths, weaknesses, opportunities and threats (*SWOT*) and *grand challenges* (problematic issues of sufficient scale and scope to capture the public and political imagination). More recently, we see a growing interest in the production and analysis of lists of *wild cards* (uncertain future events with low 'perceived probability' and high impact) and *weak signals* (current issues/developments which are highly uncertain and ambiguous). More systematic and action-oriented studies tend to generate *pathways* (future directions) and *roadmaps* (details plans with one or more ways to achieve desired/target futures). Finally, we find *models* (using judgemental or statistical knowledge) and *frameworks* (including conceptual, methodological and analytical ones) as typical outputs of evidence-based FLA. The main elements of the *anticipating futures* phase are used in the mapping of FLA **outcomes** – see more in Section 6.

Figure 9: Key Elements of the Phase 3 of FLA – Anticipating Futures



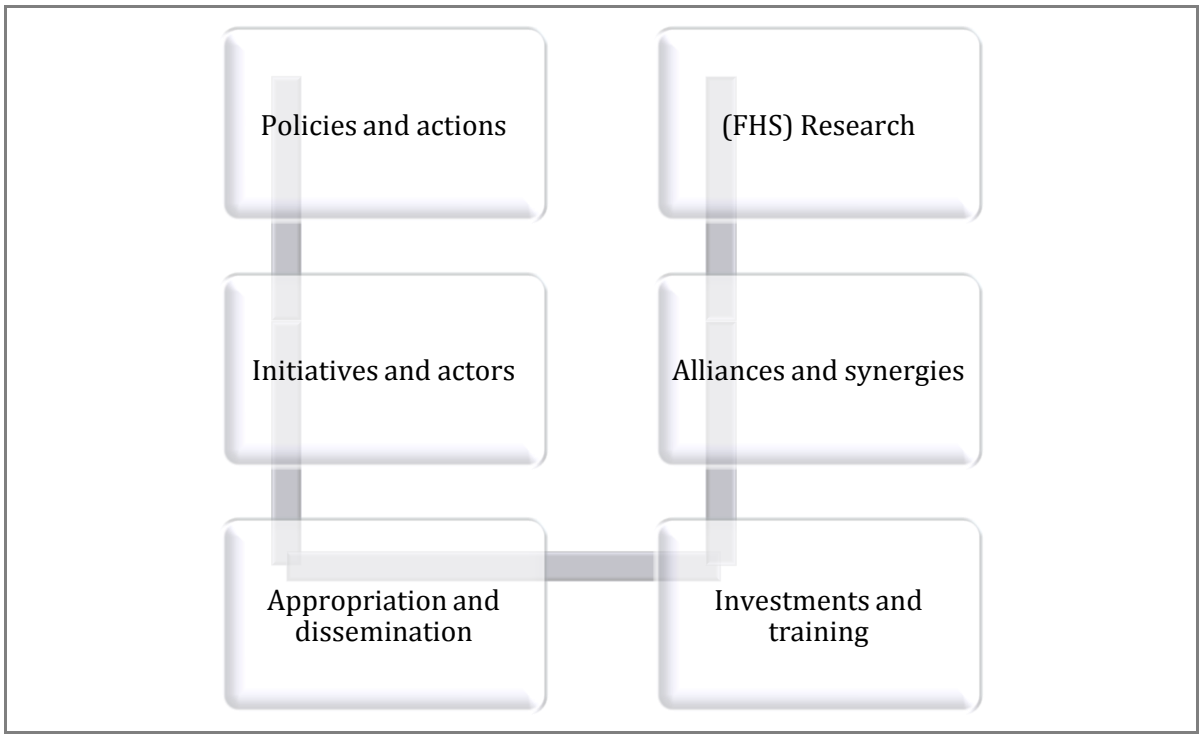
3.4 Phase 4: Recommending Futures

The fourth phase of forward-looking activities (FLA) is about *recommending futures*. Many types of recommendations can be mapped against practices, players and "formal outputs" (see Section 3.3) of a particular FLA. This will allow EFP to codify and measure the extent to which FLA conducted at different levels (sub-national, national, European and international) suggest some types of recommendations. However, the STI orientation of FLA players quite often (but not always) makes the recommendations more relevant for actors in the research and innovation system. Even where recommendations are not explicitly stated in "formal outputs" of FLA (e.g. reports), often they can be detected implicitly. However, for the purposes of the EFP Mapping, it is important to be clear as to what is meant by 'recommendations' otherwise confusion could result. A couple of points should be highlighted:

- *Recommendations are not the same as 'Priorities'*. The latter refers to topics and areas that have been identified as important in FLA. By contrast, recommendations refer to actions that should be taken to address priorities. Care should therefore be taken not to confuse the two of them;
- *Recommendations are wide-ranging in terms of what they cover and who they target*. Policy recommendations are normally directed at the likes of ministries and other funding agencies, but recommendations from foresight panels and task forces often tend to be broader in scope and refer to a wider group of targets, including companies and researchers, for example. So mapping efforts have had to be focused upon a broader set of recommendations than those that simply refer to public policies.

With these points in mind, we integrated the twelve types of recommendations used in the *Global Foresight Outlook* report (2007) into six broader categories (see Figure 10 bellow and Section 6).

Figure 10: Key Elements of the Phase 4 of FLA – Recommending Futures

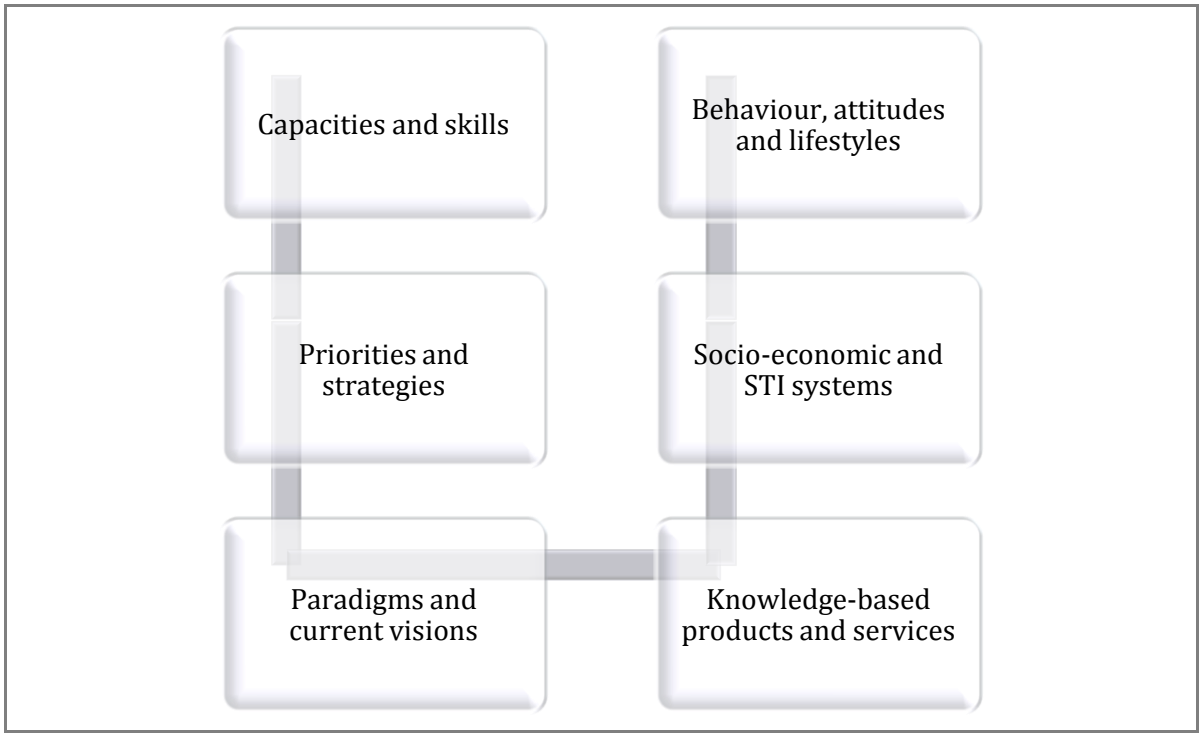


3.5 Phase 5: Transforming Futures

Finally, the fifth phase of forward-looking activities (FLA) is about *transforming futures*. Here we mean the ability of FLA to shape a range of possible futures (also known as *futuribles*) through six major types of transformations representing the ultimate outcomes or impacts of FLA:

- Transforming *capacities and skills*
- Transforming *priorities and strategies*
- Transforming *paradigms and current visions*
- Transforming *socio-economic and STI systems*
- Transforming *behaviour, attitudes and lifestyles*
- Transforming *knowledge-based products and services*

Figure 11: Key Elements of the Phase 5 of FLA – Transforming Futures



4 Mapping Foresight & FLA Practices

Just like *foresight*, most FLA practices are the result of a systematic work to promote effective processes to proactively think about the future. FLA can be applied to a variety of research areas or knowledge domains, such as natural sciences, medical sciences, engineering and technology, agricultural sciences, social sciences, and the humanities.

The original purpose of previous **mapping** activities was to analyse key features and characteristics of collected *foresight* exercises and describe relevant issues about *foresight* practices in Europe and other regions of the world. However, the extension of the mapping to cover a wider range of forward-looking activities (FLA) – i.e. foresight, horizon scanning, forecasting and impact assessment – will allow us to expand our knowledge, learning and absorptive capacities. In addition to the analysis of key features and characteristics of each of these activities will help us identify commonalities and differences of various approaches to futures research.

Section 2.3.1 (above) discussed the rationales for mapping FLA *practices*, i.e. the *why* question. Here we focus on one practical question: *How* to map FLA *practices*?

The answer to this question is presented in seven sections 4.1 to 4.7 representing the core elements of FLA practices (Figure 12). We should also highlight that in the foresight literature and previous mapping activities we have considered the *sponsors* and *target audiences* in the mapping of FLA *practices*. While this was convenient in the past, we have recognised that these and other elements associated to the participatory nature of FLA deserve more attention (see Section 2.3.2) and, for this reason, we will consider them in the mapping of FLA *players* (Section 5). Similarly, "formal outputs", recommendations and impacts are considered in the mapping of FLA *outcomes* (Section 6).

Figure 12: Mapping Foresight & FLA Practices

The mapping of Foresight & FLA practices is associated to the *scoping futures* phase. This involves the mapping of seven elements:

- Aims and objectives;
- Rationales and background;
- Context and domain coverage;
- Methodology and work plan;
- Territorial scope;
- Time horizon(s);
- Funding and duration.

4.1 Aims and objectives

The *aims and objectives* are amongst the most important elements of FLA *practices*, simply because they determine the overall scope of the activity and the type of *players* and *outcomes* that are required. They also provide a basis for the evaluation of FLA since they determine the courses of action and quite often represent the yardsticks against success will be measured.

The *EFP Mappers* of aims and objectives can be anyone registered to the EFP Mapping Environment and with access to genuine information about a project's *raison-d'être* and objectives. These include members of the project team or people with access to relevant documents, such as final/interim reports, terms of reference, etc. Furthermore, once a project is completed, well-informed FLA players should be able to assess how well has a project met its objectives.

The aims and objectives of FLA are normally defined before the project starts and some minor adjustments can be made during, for example, contract negotiations with the sponsors. Certainly, unexpected conditions can change the objectives of a project (e.g. new project leader, loss of key capacity or expertise) but they happen once in a blue moon. Therefore, the aims and objectives can be mapped once the project is ongoing or after its completion.

With regards to the **aims** (often aligned to the expected ultimate impacts of FLA) *EFP Mappers* will whether a project aims at one or more of the following outcomes: (1) shaping capacities and skills; (2) shaping strategies and priorities; (3) shaping paradigms and current visions; (4) shaping socio-economic and STI systems; (5) shaping behaviour, attitudes and lifestyles; and (6) shaping knowledge-based products and services. These so-called "ultimate impacts" of FLA are further mapped when we look at the *outcomes* of FLA. The **objectives** are desired goals and targets contributing toward the achievement of the aims. Objectives are normally specific (i.e. clear), measurable (i.e. quantifiable in terms of outputs), achievable (i.e. attainable as a result of the study), relevant (i.e. related to the aim) and time-bounded (i.e. related to a deadline). The mapping of objectives is more open-ended, in the sense that there are no predefined templates. FLA objectives should be mapped in their original format, as they appear in project documents, websites, etc. In addition, we will allow any registered user of the EFP Mapping Environment to assess FLA objectives of a project in terms of their relevance for Europe and their own country.

4.2 Rationales and background

The mapping of *rationales and background* help to explain why a given FLA was funded and conducted. The *rationales* offer a set of justifications and logical reasons for the project. In both gray and academic literatures we can find lists of foresight and FLA rationales, some of which are based on findings of previous mapping activities (Popper et al, 2007; Georghiou and Cassingena, 2008; and Popper, 2009). We have merged these lists and complemented them with a couple of rationales that are also relevant to forecasting, horizon scanning and impact assessment. Table 3 below shows the set of twelve FLA rationales and their typical relevance to the four types of FLA considered in EFP Mapping.

Table 3: Mapping Foresight & FLA Rationales

FLA Rationales	Foresight	Forecasting	Horizon Scanning	Impact Assessment
Forecasting TEEPSE events/developments	★★★	★★★★★	★★★★	★★★
Orienting policy and strategy development	★★★★★	★★★	★★★	★★★★
Recognising drivers/impacts of TEEPSE changes	★★★★★	★★	★★★★★	★★★★★
Engaging key stakeholders and decision-shapers	★★★★★	★	★★★	★★★
Supporting STI priority-setting and governance	★★★★★	★★	★★★	★★★★★
Identifying key/emerging TEEPSE issues	★★★★★	★★★★★	★★★★★	★★★★★
Generating (shared) visions and scenarios	★★★★★	★★★★★	★★★	★★
Harmonising (STI) supply and demand needs	★★★★	★	★★	★★★★★
Transforming/absorbing capacities and methodology	★★★★★	★	★★★★	★★
Identifying risks, grand challenges and opportunities	★★★★★	★★★★	★★★★★	★★★★★
Networking and international cooperation	★★★★★	★★	★★★	★★★
Generating bridges between science and policy	★★★★★	★★★	★★★	★★★★★
Notes TEEPSE = technological, economic, environmental, political, social, ethical. STI = science, technology and innovation.	★ = None/very low ★★ = Low ★★★ = Moderate ★★★★ = High ★★★★★ = Very high			

With regards to the *background* conditions, we have considered two categories (a) *event-based*, including technological, economic, environmental, political, social, ethical events; and (b) *knowledge-based*, including knowledge-based products (e.g. reports, academic/grey literatures, white/green papers, databases, policy/research briefs, etc.) and knowledge-based initiatives (e.g. research programmes, agendas, networks, expert groups, etc).

Ideally, the mapping of the rationales and background of a project should be done by the lead person or team who designed the project or its terms of reference. This information can sometimes be found in the text of calls for tenders associated to some projects, the original project proposal or description of work (DoW) and final project reports. Ultimately, interviews to the sponsors or members of the project team can also be useful, thus anyone with access to these sources could map the *rationales and background* of a project.

The rationales and background of a project can be mapped anytime. The mapping of rationales requires an assessment similar to the table above, where *EFP Mappers* rate the relevance of the twelve rationales for the project. The mapping of the project background requires the identification the up to five event-based and knowledge-based "conditions" that have helped to justify, design or inform the project.

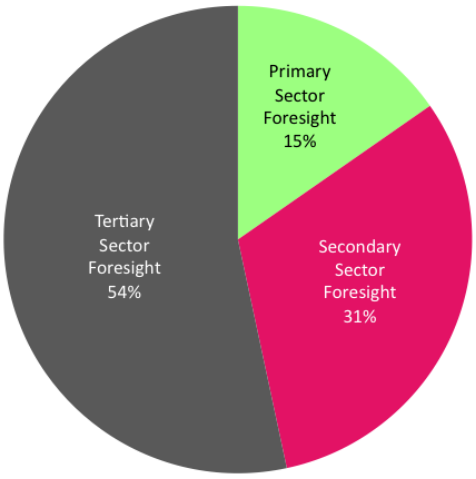
4.3 Context and domain coverage

The context and domain coverage set the boundaries of FLA. They also offer a clear picture of the potential areas and sectors where outcomes are expected to be influential and applicable. The mapping of the context considers the following eight settings: European Commission funded FLA; European FLA *detached* from the EC Framework Programme; National FLA *attached* to a national Foresight or Horizon Scanning (FHS) programme; National FLA *detached* from a national FHS programme; International FLA; Sub-national FLA; Corporate FLA; and Structural FLA. The classification of projects against these categories will help us analyse FLA practices, players and outcomes under different contexts. This information will also be used to refine the identification of case studies and examples of "good practices" for each context. The context and domain coverage can be mapped while the project is still ongoing and project members should ideally validate the information once the project has been completed.

As documented in the 2009 *Mapping Foresight* report, the analysis of the *domain coverage* helps to find interconnections and potential interdependencies between the research areas covered by FLA. These interconnections are indicated using the six aggregated research areas of the Frascati taxonomy and the 21 aggregated socio-economic sectors of the recently updated NACE taxonomy. An example from previous mapping analyses of 841 cases (see left side of Figure 13) shows that while 58% of the Engineering and Technology studies are interconnected with areas of Natural Sciences, the proportion of Natural Sciences studies that are interconnected with areas of Engineering and Technology is considerably higher (79%). The pattern is different when we look at the interconnections between Engineering and Technology areas and Social Sciences. They both show interdependencies of similar proportions (32% versus 35%). By contrast, projects on Medical Sciences and Agricultural Sciences show high linkages with Engineering and Technology areas (56% each), but only 20% of Engineering and Technology projects are linked to areas in Medical Sciences and Agricultural Sciences. In addition, the mapping of the domain coverage uses the NACE taxonomy to identify the proportion of FLA carried out in each 'grand' economic sector. These findings have shown, for example, that FLA on *services* is really dominant (see right side of Figure 13). Finally, we will include a third category to map the relevance of FLA for the ten thematic areas of the EC Framework Programme for RTD.

Figure 13: Mapping Foresight & FLA Domain Coverage

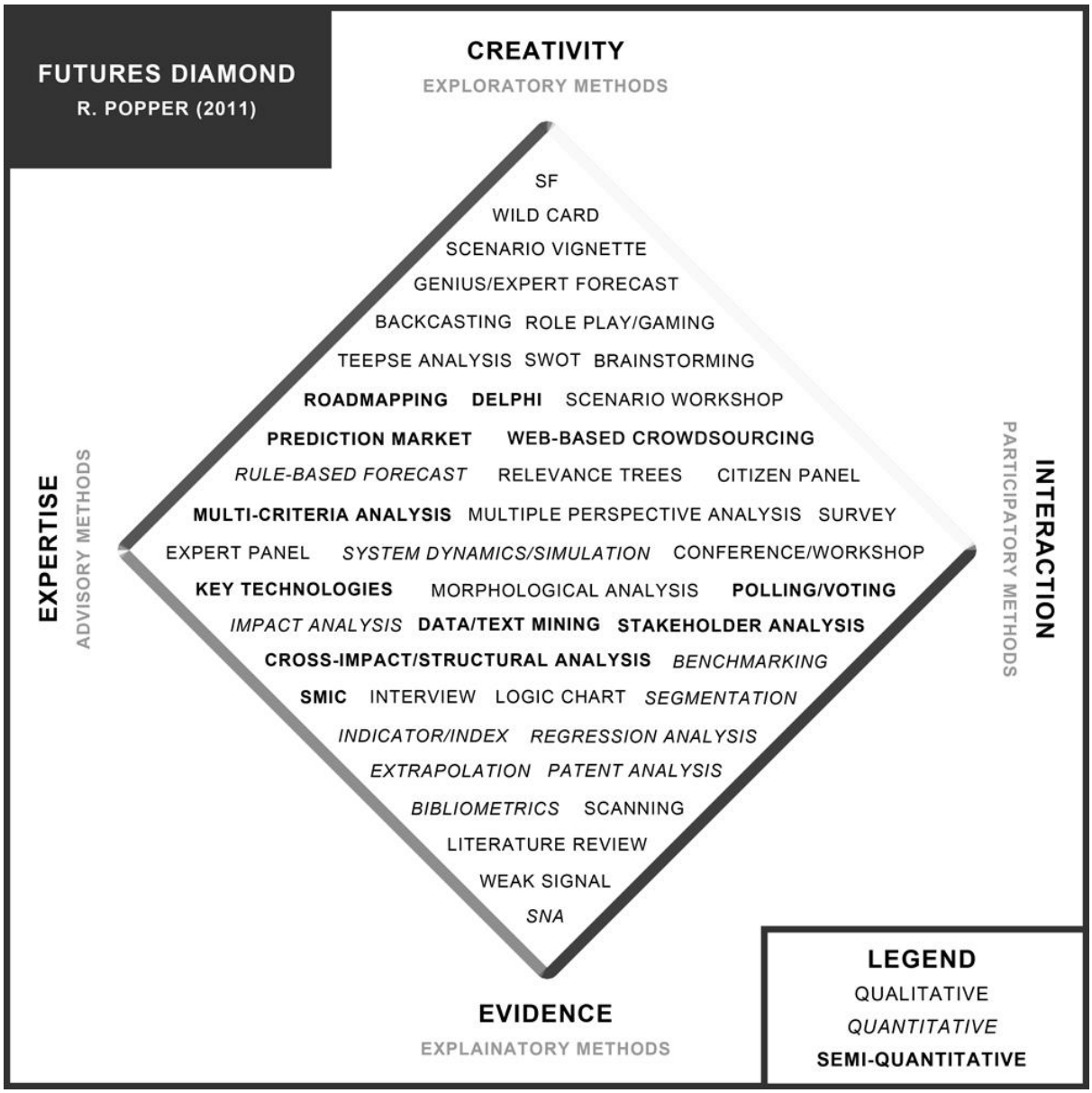
Research Areas		A	B	C	D	E	F
A	Natural Sciences		79%	26%	27%	34%	6%
B	Engineering & Technology	58%		21%	20%	32%	5%
C	Medical Sciences	50%	56%		27%	54%	8%
D	Agricultural Sciences	55%	56%	29%		47%	10%
E	Social Sciences	27%	35%	22%	19%		7%
F	Humanities	65%	65%	42%	50%	96%	



4.4 Methodology and work plan

The mapping of FLA *methodology* can be done while the study is ongoing but should be revised upon completion. Just like in EFMN, EFP uses the Futures Diamond as a practical framework to assess the use and contributions of 44 methods. The mapping environment will also allow the inclusion of additional methods, if necessary. The methodology mapping will be done in terms of the core type of knowledge source each method is mainly based upon (see Figure 14). There are three font styles in the Foresight Diamond (below), which indicate the type of technique: qualitative (using normal style), semi-quantitative (using strong style), and quantitative (using italic style). Previous mapping reports have shown that, even if unintentionally, most FLA process use at least one method from each pole. Exactly how methods are located will be to some extent contingent on particular forms of use. The mapping of the work plan is based on common FLA practices in Europe. This involves the mapping of activities or work packages (WP), WP leaders, resources, deliverables and milestones.

Figure 14: The Futures Diamond



In relation to the type of knowledge source (creativity, expertise, interaction or evidence) we should emphasise that these domains are not fully independent from one another. As discussed in the Foresight Methodology chapter of *The Handbook of Technology Foresight* (2008), it is helpful to consider characteristics that can be assigned to each method, as indicated below:

> **Creativity-based methods** normally require a mixture of original and imaginative thinking, often provided by technology "gurus", via genius forecasting, backcasting or essays. These methods rely heavily on (a) the inventiveness and ingenuity of very skilled individuals, such as science fiction writers or (b) the inspiration which emerges from groups of people involved in brainstorming or wild cards sessions. As Albert Einstein once stated: "The only real valuable thing is intuition … Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world" (Einstein as noted by Viereck, 1929).
>
> **Expertise-based methods** rely on the skill and knowledge of individuals in a particular area or subject. These methods are frequently used to support top-down decisions, provide advice and make recommendations. Common examples are expert panels and Delphi, but methods like roadmapping, relevance trees, logic charts, morphological analysis, key technologies and SMIC are essentially based on expertise. A warning note about expertise is sounded by Arthur C. Clarke (1962, p. 14): "If an elderly but distinguished scientist says that something is possible, he is almost certainly right, but if he says that it is impossible, he is very probably wrong".
>
> **Interaction-based methods** feature in foresight for at least two reasons – one is that expertise often gains considerably from being brought together and challenged to articulate with other expertise (and indeed with the views of non-expert stakeholders); the other is that foresight activities are taking place in societies where democratic ideals are widespread, and legitimacy involves "bottom-up", participatory and inclusive activities, not just reliance on evidence and experts (which are liable to be used selectively!). Scenario workshops, voting and polling are among the most widely used methods here; of course these often require some sort of expertise to apply the method and inform the interactions. Other methods like citizen panels and stakeholder analysis are becoming popular because of their potential contribution to further networking activities. But it is not always easy to encourage participation and the anonymous saying accurately states that "the world is ruled by those who show up".
>
> **Evidence-based methods** attempt to explain and/or forecast a particular phenomenon with the support of reliable documentation and means of analysis. These activities are particularly helpful for understanding the actual state of development of the research issue. For this reason, quantitative methods (e.g. benchmarking, bibliometrics, data mining and indicators work) have become popular given that they are supported by statistical data or other types of indicator. They are fundamental tools for technology and impact assessment and scanning activities (see Porter et al., 1980). These methods can also be employed to stimulate creativity (sometimes by challenging received wisdom). And while supporting workshops, evidence-based information is quite useful to encourage interaction and getting feedback from participants. A word of warning here, for both practitioners and users, may be the well-known quote attributed to Benjamin Disraeli by Mark Twain (1924): "There are three kinds of lies: lies, damned lies, and statistics" – which basically points out that sometimes statistics are used to mislead the public.

In the same chapter, Popper highlights that information technology (IT) tools are being applied to most of these approaches, especially interaction- and evidence-based activities. Many applications are available now to support several types of modelling, data mining, scanning, participatory processes, and visualisation – there are even tools designed to facilitate creativity. However, the use of IT does not always mean more effective application of foresight and FLA techniques. Salo and Gustafson (2004) identified five factors which need to be met in order to make good use of IT here: a clear mandate from the sponsoring organisation; high-quality process and technical facilitation; presence of senior representatives; presentation of unequivocal information inputs; and sufficient time for informal debate.

Mapping FLA methodology helps us identify methods that are widely used across the world; such is the case for expert panels, literature review, scenarios and trend extrapolation. Table 4 illustrates regional similarities and differences in the use of 25 selected methods. Finally, EFP will expand this kind of analysis by mapping the order and usefulness of methods combination.

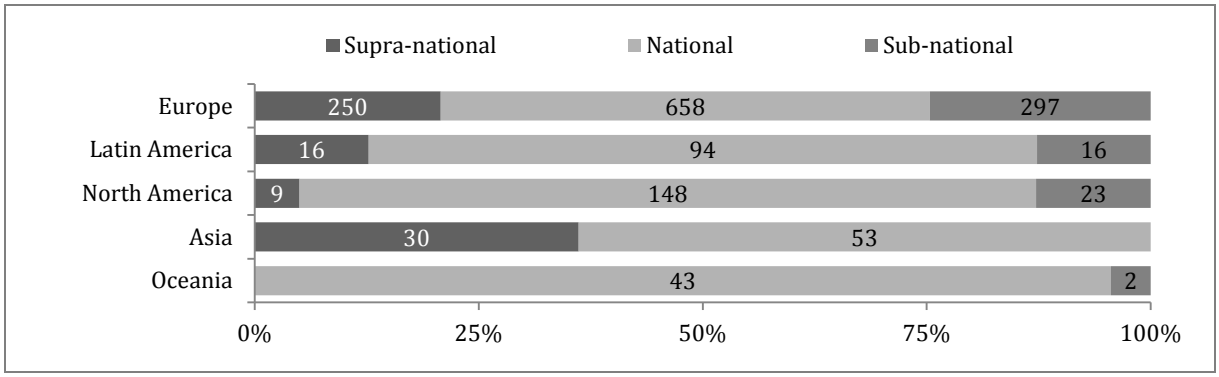
Table 4: Mapping Foresight & FLA Methods by World Regions

FLA Methods	Internat.	Europe	Latin A.	North A.	Asia	Oceania
1079 cases	65 cases	691 cases	116 cases	106 cases	86 cases	15 cases
Backcasting						
Bibliometrics						
Brainstorming						
Citizens Panels						
Cross-impact / SA						
Delphi						
Environmental Scanning						
Essays						
Expert Panels						
Futures Workshops						
Gaming						
Interviews						
Key Technologies						
Literature Review						
Modelling and simulation						
Morphological Analysis						
Multi-criteria Analysis						
Questionnaire/Survey						
Relevance Trees						
Scenarios						
Stakeholder Mapping						
SWOT Analysis						
Technology Roadmapping						
Extrapolation/Megatrends						
Other methods						
Source: Mapping Foresight (2009)	0% 50% 100%	0% 50% 100%	0% 50% 100%	0% 50% 100%	0% 50% 100%	0% 50% 100%

4.5 Territorial scope

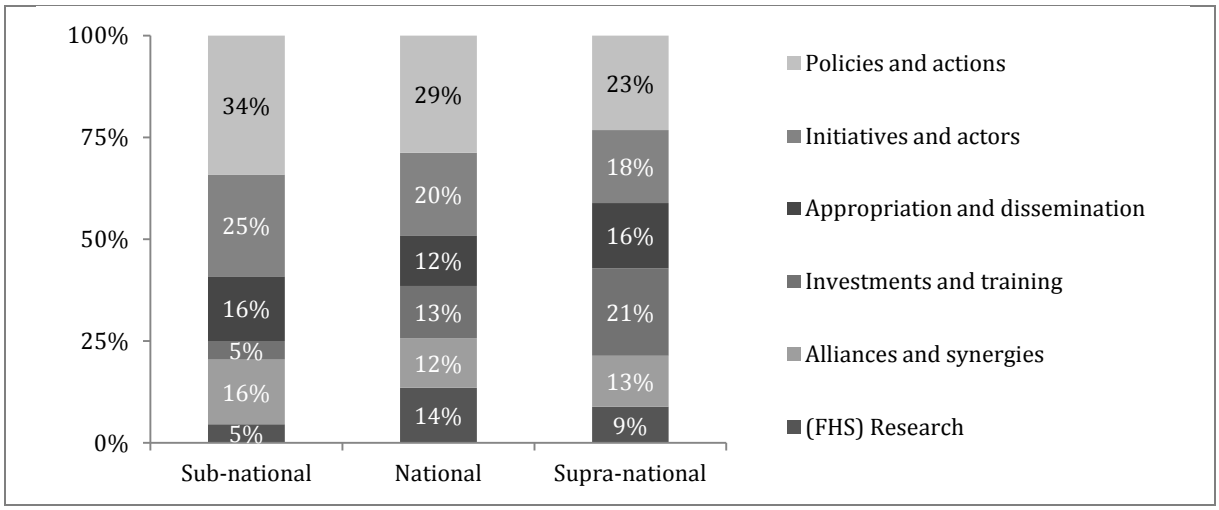
The mapping of the territorial scope of forward-looking activities can be used in several ways. The scope of FLA ranges from *sub-national* projects (covering issues that are relevant for a territory that lies below the level of a nation state, e.g. federal region, city region, etc.) to *national* exercises (covering territories, sectors or themes bounded by the national borders of a nation state) to *supra-national* studies (also focused on cross-national issues, sectors or themes but on a much larger geographical scale, such as Europe, Asia and Latin America, or covering at least two nation states). Figure 15 shows the FLA is widely conducted at the national level in Europe, Latin America, North America, Asia and Oceania, thus it would be possible for EFP to use the mapping data to identify "good practices" in *national* level FLA around the world. However, with the current data, the identification of good practices in sub-national level FLA will only be possible for Europe. For this reason, we hope that readers of this report will be encouraged to register to the EFP Mapping Environment and contribute to the EFP Mapping knowledge base with new sub-national cases from other world regions.

Figure 15: Mapping Foresight & FLA Territorial Scope by World Regions



In addition, we can use the mapping of the territorial scope in combination with other EFP Mapping elements. This means that users of the EFP Mapping Environment will be identify different types of recommendations by country or territorial scope, for example (see Figure 16).

Figure 16: Mapping Foresight & FLA Recommendations by Territorial Scope

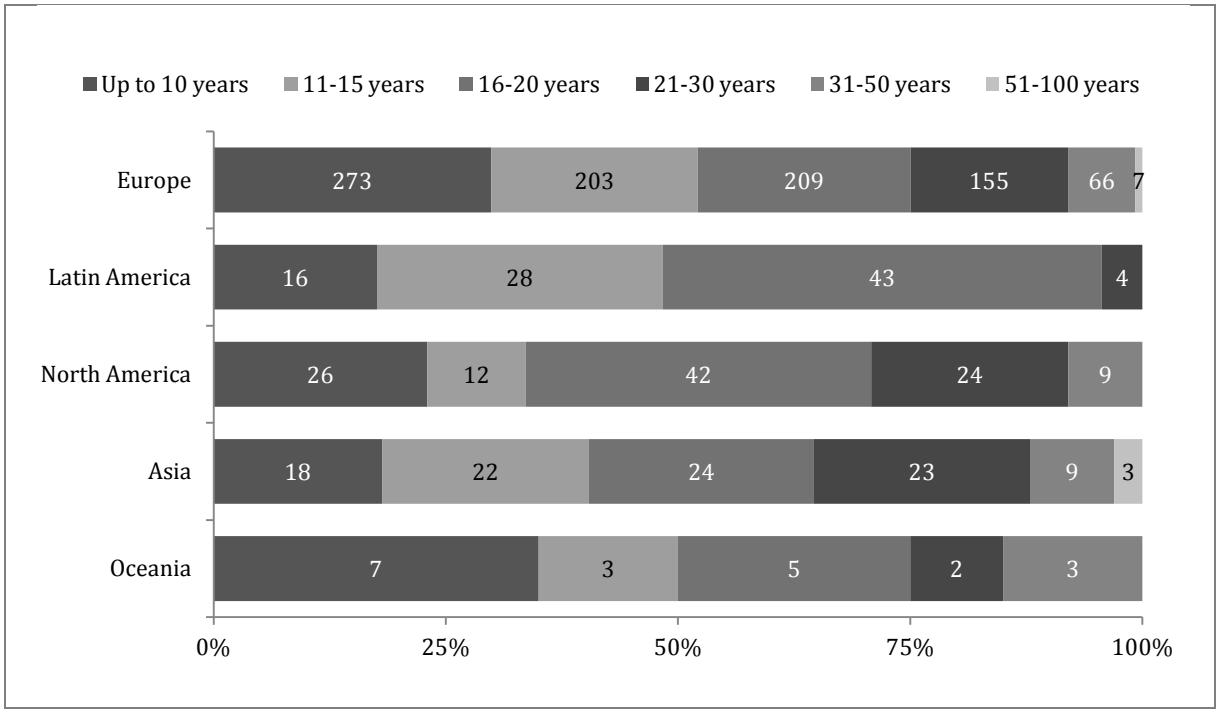


4.6 Time horizon(s)

The time horizon(s) used in forward-looking activities are frequently dependent on the thematic domain being addressed, the needs of the sponsors, target groups and, possibly, cultural aspects. For example, a ten-year time horizon may be seen as a short-term outlook in the energy sector but in the rapidly changing sectors (e.g. mobile communications) it may be considered medium-to-long-term. Six timeframes will be used in the analyses associated to the time horizon: Up to 10 years, 11-15 years, 16-20 years, 21-30 years, 31-50 years, 51-100 years. Figure 17 shows the type of results that can be achieved when crossing the time horizon dimension with, for example, the territorial scope by world regions. We can for example see that nearly all regions use time horizons between 11 and 20 years. In Latin America, looking into the far future (i.e. over 20 years) does not seem to be very common. On the contrary, Asia and North America show higher proportions of FLA looking beyond 2030. One possible explanation is that time horizons are more likely to be shorter in emerging economies, which are sometimes marked by radical changes, than in countries where there is more stability and greater certainty around short-term prospects. However, the current economic turbulence in the USA and Europe will "help" us test this proposal if we see a sudden shift from longer to shorter time horizons in the near future.

EFP Mapping will also allow the inclusion of multiple time horizon(s) followed by a discussion on whether – under the context and domain coverage (theme/sector) of the study – the chosen timeframe is considered a short-, medium- or long-term perspective.

Figure 17: Mapping Foresight & FLA Time Horizons by World Regions

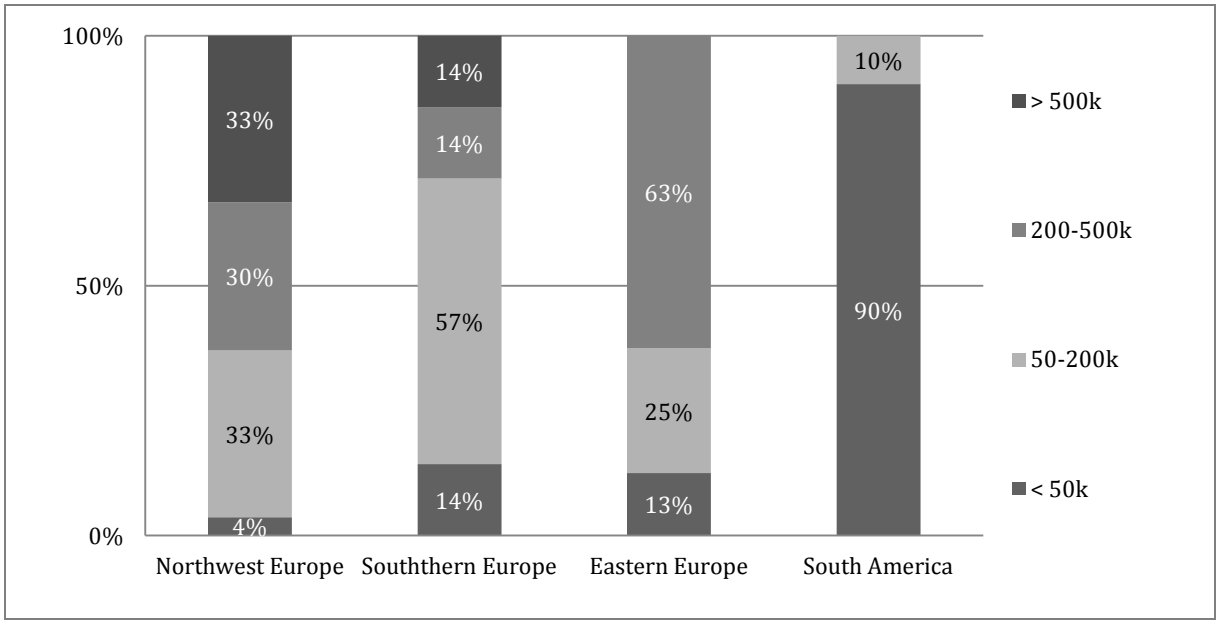


4.7 Funding and duration

As highlighted in *Evaluating Foresight* (2010), the amount of funding made available to conduct a FLA depends upon a number of factors concerning the territorial scope, methodological choices, extent of the domain coverage, background conditions and context (i.e. if the study is conducted under economic crisis or boom environment), etc. However, all other things being equal, regional economic development should in principle determine the funding levels of FLA. As a result, we can expect exercises costing more in Europe than in South America, for example. Testing this proposition has been challenging due to the difficulties in collecting data on the cost of FLA. The results presented in Figure 18 (below) show that the most FLA in South America cost €50,000 or less. Indeed, no activities in the region appear to cost more than €200,000. Although the numbers for Northwest Europe are based on a sample with less than 50 cases, they are still interesting. The results for this region show a rather distinct situation from that seen in South America, with over 60% of the exercises costing more than €200,000. When compared to Northwest Europe, Eastern Europe shows a similar proportion of FLA under and over €200,000 but with no cases with budgets above the €500,000. Even though this data is weak in terms of volume, it does seem to confirm what one would expect with regards to funding levels in different regions. Thus, differences in FLA cost between regions seem to be explained by the local cost of labour, goods and services, as well as the financial muscle of local sponsors (mostly public administrations).

The information about funding and costs of FLA is often difficult to map. Previous mapping efforts, such as EUROFORE and EFMN, tried to collect this type of data but not even managers of programmes are able (or willing) to estimate the costs of national and sub-national exercises. For this reason the cost for more than two-thirds of all cases mapped by the EFMN remains unknown. However, growing transparency and accountability in the use of public resources, especially in European Commission-funded initiatives, are increasing the possibility to map FLA funding and costs.

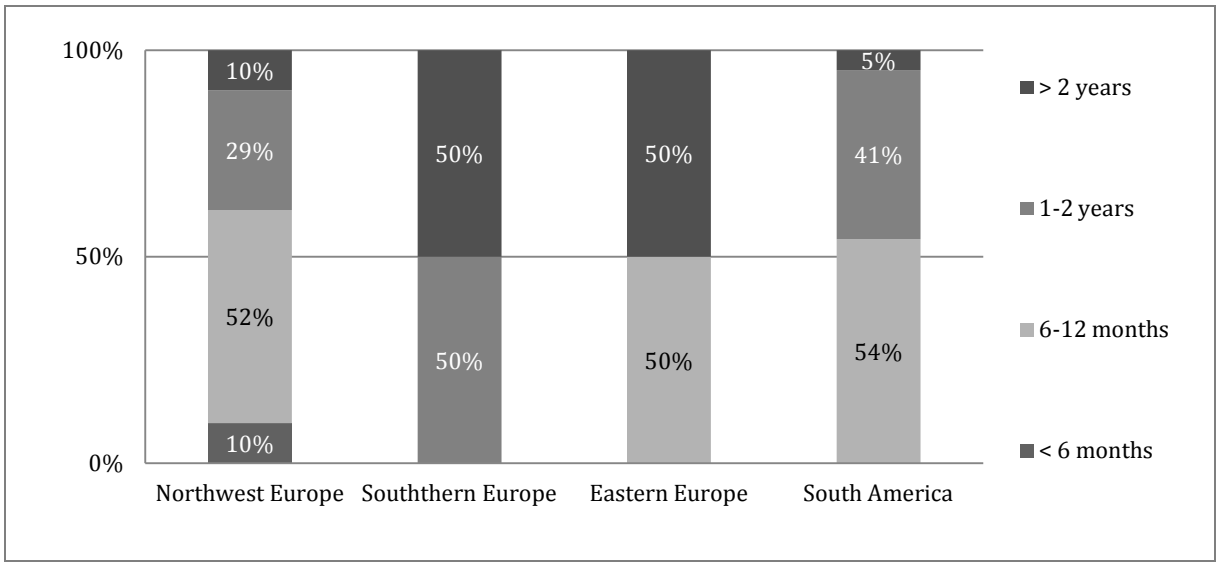
Figure 18: Mapping Foresight & FLA Funding in Europe and South America



There seems to be a minimum amount of time to implement FLA, but also a view that overly prolonging exercises runs the risk that sponsors, target audiences and participants could lose interest. There would seem to be few reasons, if any, for the FLA duration to vary between world regions. The results of previous *Mapping Foresight* reports (see Figure 19) also suggest that this variable is independent, and that similar patterns of FLA duration should be observable across the world. However, the main problem in exploring this proposition is the lack of data. In many countries and regions it is not easy to find the end-dates of FLA, particularly as the "official" end-dates of activities often unclear or extended.

In spite of the difficulties in finding this information, we will devote some efforts to this endeavour mainly because the mapping of the funding and duration will help classify projects into small, medium, large and continuous (i.e. open-ended) activities. In EFP Mapping we will expand to eight the categories to map the duration.

Figure 19: Mapping Foresight & FLA Duration by Territorial Scope



5 Mapping Foresight & FLA Players

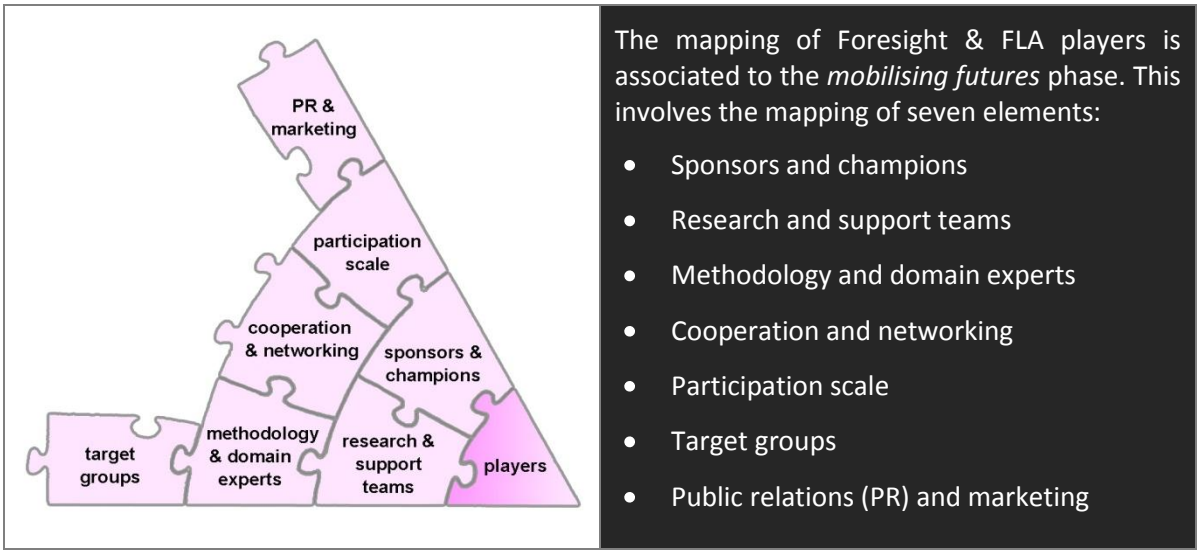
The growing demand for forward-looking activities (FLA) has increased the number of players *prescribing*, *applying*, *researching, improving* and *supporting* FLA. This has both *pros* and *cons*. On the one hand, we find new actors *prescribing* practices or "systemic approaches" that have not been properly oriented or aligned to the three fundamental features of fully-fledged FLA: forward-looking (prospective orientation), strategic-intelligence (practical orientation) and stakeholder-engagement (participatory orientation). On the other hand, we see more players *improving* and *supporting* FLA practices based on lessons learned from systematically *researching* (i.e. mapping and evaluating) and *applying* (i.e. practising and exploiting) FLA. In EFP we will map the latter group of **players** in an effort to identify key FLA competences, capacities and skills in Europe and other world regions.

By **players** we mean actors who have been involved in forward-looking studies mapped in the EFP Mapping Environment. This possibly means that, in the short-term, our lists of actors would not be representative of the universe of FLA players. However, the mapping of FLA players is *not* meant to be a *census* or process aimed to collect information about all members of the FLA community. Instead, our aim is to systematically record the type, role and number of FLA players contributing to the projects mapped in EFP. In other words, we will not map institutions, initiatives or individuals teaching or publishing on FLA, unless they have been involved, in one way or another, in one or more than the following phases of mapped FLA: *scoping*, *mobilising*, *anticipating*, *recommending* and *transforming* futures.

Section 2.3.2 (above) discussed the rationales for mapping FLA *players*, i.e. the *why* question. Here we focus on another question: *How* to map FLA *players*?

The answer to this question is presented in seven sections 5.1 to 5.7 representing the core elements of FLA players (Figure 20). We should highlight that the mapping of players also includes those actors supporting the *scoping* phase of FLA, in particular: sponsors, research teams and domain/methodology experts.

Figure 20: Mapping Foresight & FLA Players



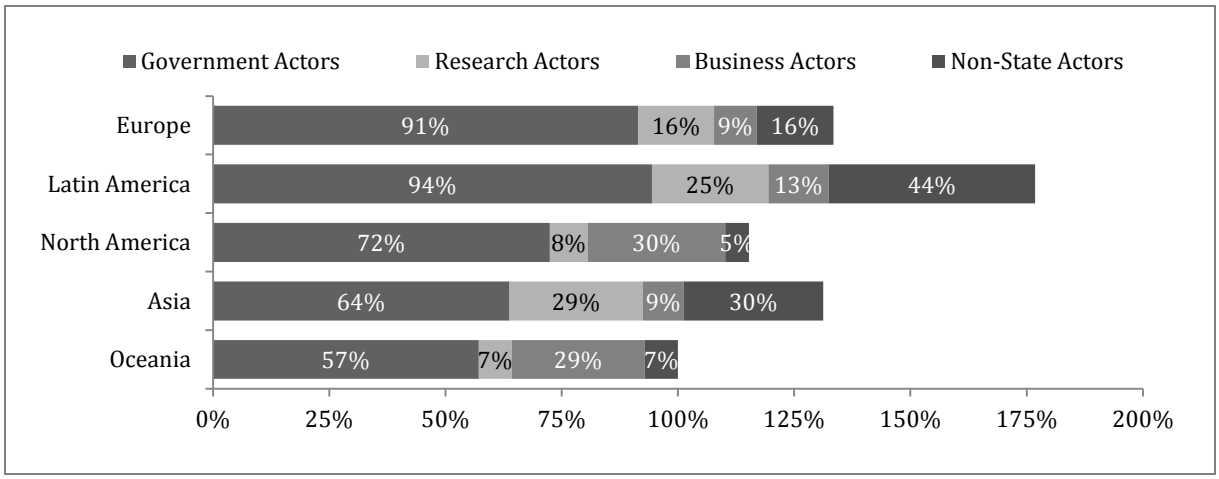
The mapping of Foresight & FLA players is associated to the *mobilising futures* phase. This involves the mapping of seven elements:

- Sponsors and champions
- Research and support teams
- Methodology and domain experts
- Cooperation and networking
- Participation scale
- Target groups
- Public relations (PR) and marketing

5.1 Sponsors and champions

Sponsors are individuals or organisations providing financial support to FLA. They are broadly classified into four categories, namely *government*, *research*, *business* and *non-state* (e.g. EU, IGOs) actors. There are many reasons for sponsoring FLA but the underlying rationales are kind of universal (e.g. orienting policy and strategy development; engaging key stakeholders; supporting governance; etc. – see Section 4.2). Some discussions about sponsors refer to the old saying: "he who pays the piper, calls the tune". However, a tune can only be called if it is known or written. Therefore, in the business of forward-looking sponsors can at best provide guidance of the type of *tune* (research) that is required but the *piper* (FLA practitioner) will often write and play the tune (i.e. anticipate and recommend futures). Of course, when it comes to transforming futures – through, for example, the setting of priorities and strategies – sponsors tend to play a more leading role.

Figure 21: Mapping Foresight & FLA Sponsors by World Region



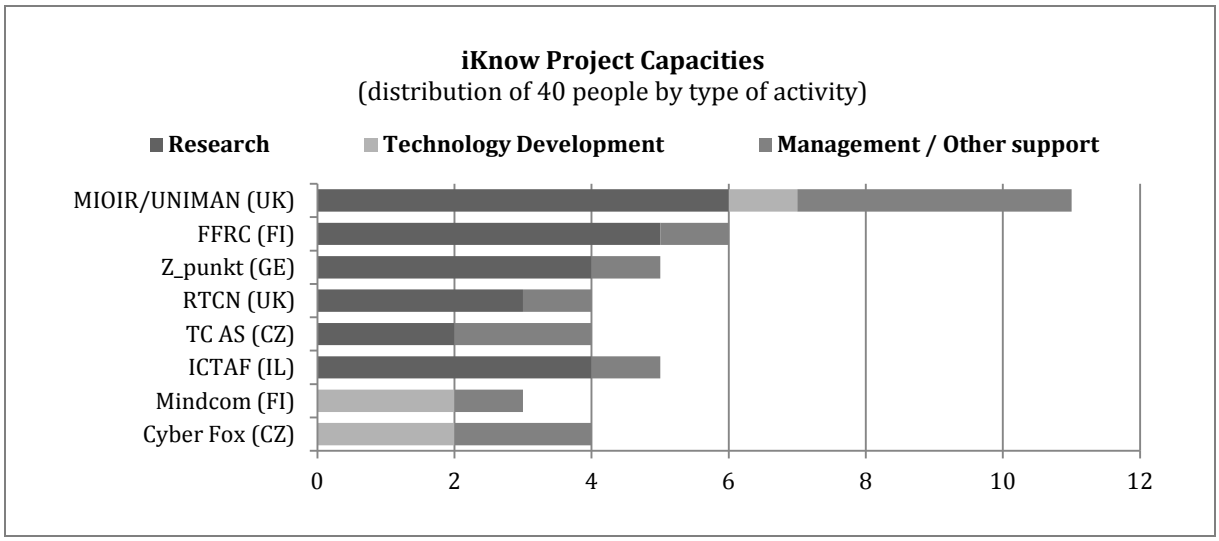
The 2009 *Mapping Foresight* analysis of over 1,000 FLA showed (Figure 21 above) that government agencies and departments (or 'government actors') are by far the most common sponsors of FLA in Europe and other world regions. This type of analysis also showed that more than one actor can sponsor FLA. This is particularly obvious in Latin America, where the sponsorship bars add up to over 175 per cent. By contrast, the bars for Asia add up to 100 per cent, indicating an inclination towards single sponsorship. This lead to an interesting question: What are the pros and cons of multiple vs. single sponsorship? In Latin America, for example, the limited funding from government actors has practically forced FLA practitioners to pull together several sponsors before an exercise becomes feasible. On the positive side, we see an emergence of the forward-looking culture in more sponsoring organisations, the emergence of networking among different organisations, and the like. However, on the negative side, we can see a potential loss of focus, the increasing complexity of having to produce difference outputs for several actors, and more challenges when defining results ownership, for example.

In addition to the mapping of sponsors, EFP will try to identify the so-called FLA *champions*. These are influential individuals who are capable of mobilising key stakeholders, maintaining momentum and building political support and commitment for the project. This information can help us explain the geographical and institutional reach of some projects.

5.2 Research and support teams

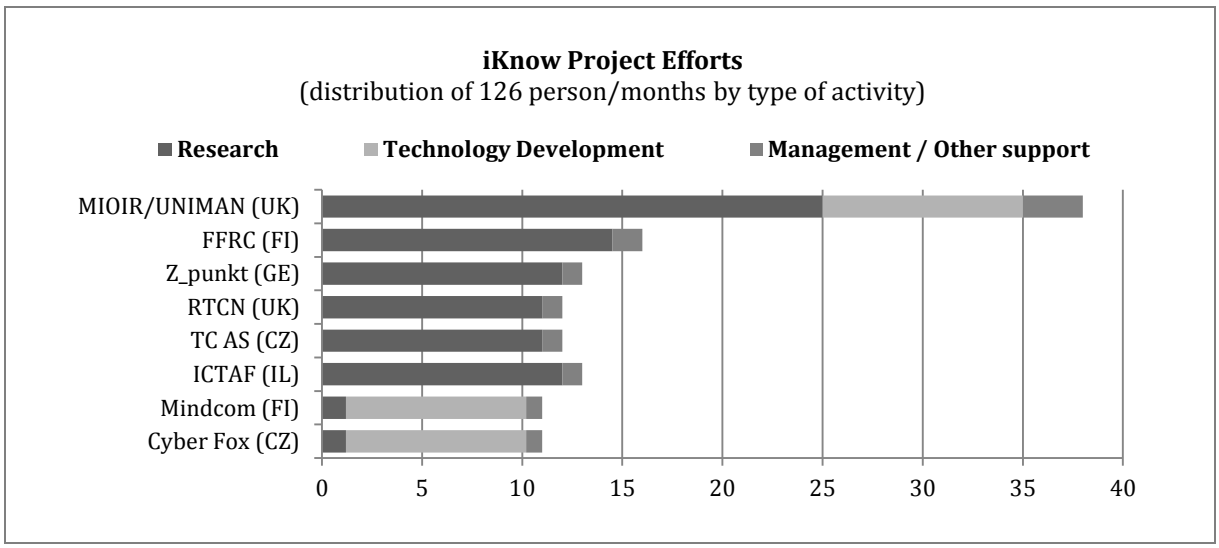
Forward-looking activities are often carried out as a project by a team or consortium that exists only temporarily and is made up of different members, i.e. organisations and individuals. The *research* and *support* (including technology development) teams are responsible for the design and execution of activities that lead to the "formal outputs" – also called deliverables – of FLA. Mapping FLA research and support team can be used to identify potential partners in future projects, but also to recognise common and emerging collaboration patterns and networking strategies. Furthermore, we are introducing the mapping of FLA *capacities* and *efforts*. Mapping *capacities* will allow us to understand the size of the teams involved in specific FLA (Figure 22).

Figure 22: Mapping the iKnow Project Capacities by Type of Activity



By mapping FLA *efforts* (measured in person/months) we will understand the contribution of each member of the project, in terms of the following three types of activities: research, technology development and management (Figure 23).

Figure 23: Mapping the iKnow Project Efforts by Type of Activity



5.3 Methodology and domain experts

In order to effectively and efficiently undertake the five phases of any forward-looking activity (*scoping*, *mobilising*, *anticipating*, *recommending* and *transforming* futures), we need to involve *methodology* and *domain* experts. *Methodology experts* can be project members or external consultants providing four types of methodological support to FLA:

- *training* project members on specific methods and FLA process management;
- *designing* activities associated to individual methods or the combination between methods, e.g. preparing questions for a survey or an interview,
- *implementing* methods, e.g. conducting a scenario workshop or moderating an expert panel;
- *supervising* the execution of a method, e.g. identifying potential weaknesses and strengths of methodological choices.

Domain experts are those with expertise in specific research areas. In EFP we will use the FRASCATI taxonomy of research areas and subareas (see Table 5 below) to classify the domain expertise of up to ten experts who contributed most substantially to the study. In addition, we will map the type of expertise against the TEEPSE framework: *technology* expertise, *economic* expertise, *environmental* expertise, *policy* expertise, *social* expertise and *ethical* expertise. Thus, the mapping of key domain experts will help to increase the legitimacy of FLA outcomes, and at the same time allow us to build a list of individuals engaged with forward-looking activities in each of the FRASCATI areas.

Table 5: List of Frascati Areas and Sub-Areas

Research Areas		Sub-Areas
A	**Natural sciences**	(A01) Mathematical science; (A02) Information, computing and communication science; (A03) Physical science; (A04) Chemical science; (A05) Earth sciences; (A06) Biological sciences.
B	**Engineering and technology**	(B01) Architecture, urban and building; (B02) Industrial Biotechnology and Food Sciences; (B03) Aerospace Engineering; (B04) Manufacturing Engineering; (B05) Chemical Engineering; (B06) Resources Engineering; (B07) Civil Engineering; (B08) Geomatic Engineering; (B09) Environmental Engineering; (B10) Materials Engineering; (B11) Biomedical Engineering; (B12) Electrical and Electronic Engineering; (B13) Communications Technologies; (B14) Interdisciplinary Engineering; (B15) Other Engineering and Technology.
C	**Medical sciences**	(C01) Medicine general, (C02) Immunology; (C03) Medical Biochemistry and Clinical Chemistry; (C04) Medical Microbiology; (C05) Pharmacology and Pharmaceutical Sciences; (C06) Medical Physiology; (C07) Neurosciences; (C08) Dentistry; (C09) Optometry; (C10) Clinical Sciences; (C11) Nursing; (C12) Public Health and Health Services; (C13) Complementary/alternative Medicine; (C14) Human Movement and Sports Science; (C15) Other Medical and Health Sciences.
D	**Agricultural sciences**	(D01) Crop and Pasture Production; (D02) Horticulture; (D03) Animal Production; (D04) Veterinary Sciences; (D05) Forestry Sciences; (D06) Fisheries Sciences; (D07) Land, Parks and Agriculture Management; (D08) Other Agricultural, Veterinary and Environmental Sciences.
E	**Social sciences**	(E01) Education; (E02) Economics; (E03) Commerce, management, tourism and services; (E04) Policy and Political Science; (E05) Studies in human society; (E06) Behavioural and cognitive sciences; (E07) Law, justice and law enforcement.
F	**Humanities**	(F01) Journalism and curatorial studies; (F02) The arts; (F03) Language and culture; (F04) History and archaeology; (F05) Philosophy and religion.

5.4 Cooperation and networking

There are several types of cooperation and networking activities involved in foresight and FLA. In EFP Mapping we use the information about *research and support teams* (Section 5.2 above) to identify FLA cooperation patterns by territorial scope, country and organisation.

Table 6: Mapping Foresight & FLA Cooperation by Territorial Scope

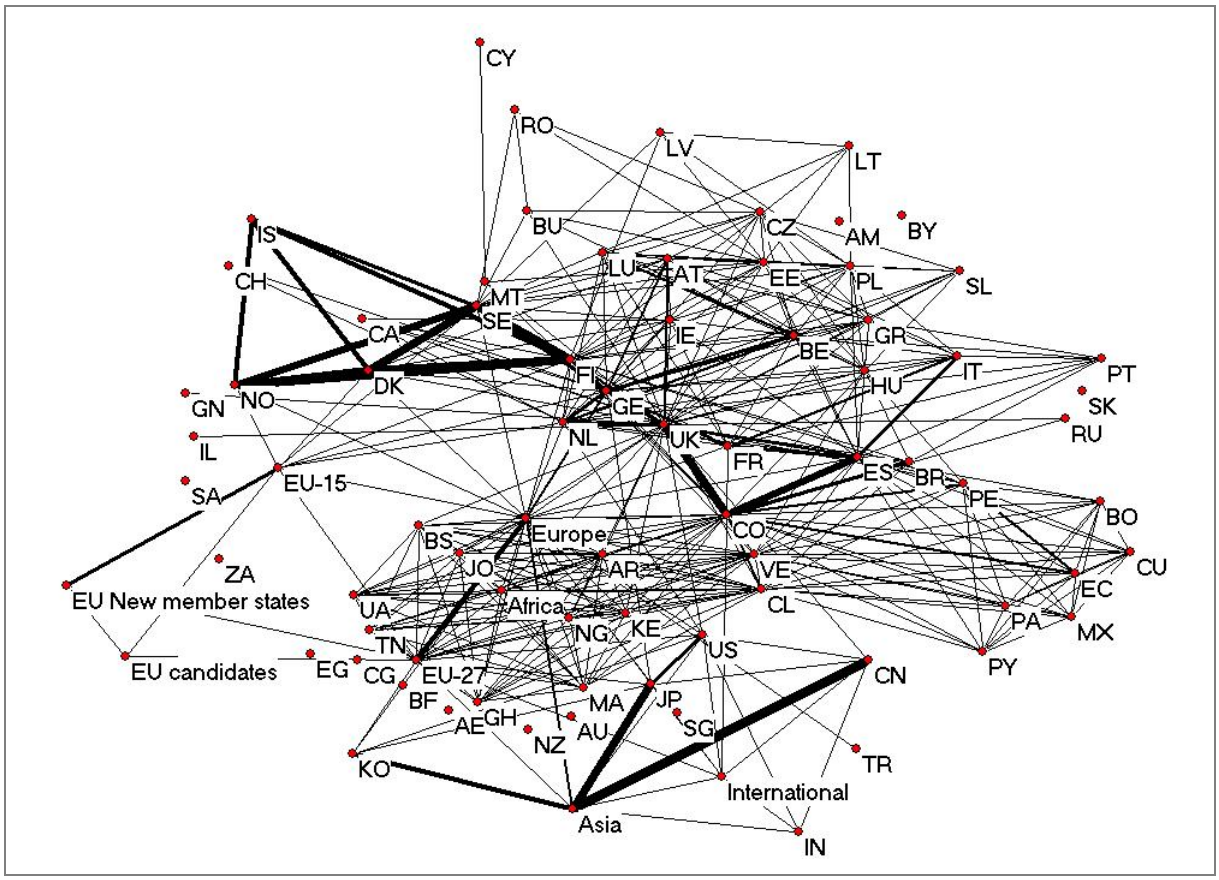
Mapping FLA Cooperation	With NWE	With SE	With EE	With SA
North-West Europe (NWE)	**63%**	14%	18%	6%
Southern Europe (SE)	52%	**30%**	9%	9%
Eastern Europe (EE)	41%	10%	**45%**	4%
South America (SA)	30%	13%	10%	**47%**

Source: Adapted from *Evaluating Foresight* (2010) – 643 Cases: 467 NWE, 62 SE, 35 EE, 79 SA.

For example, the analysis of FLA cooperation by territorial scope (Table 6) shows a strong tendency for Southern and Eastern European FLA to cooperate with players in North-West Europe (NWE). We also observe that for Southern Europe FLA cooperation within the region is much lower (30%) than cooperation with NWE (52%). By contrast, NWE cooperation with Southern and Eastern Europe is significantly lower (14% and 18%, respectively), and intraregional cooperation considerably higher (63%). If we compare these results with a non-European region (e.g. South America) we find a similar NWE preference. So, how can FLA players and policymakers use this type of mapping results? On the one hand, we could use these results to argue that foresight seems to be an effective instrument for NWE to shape science, technology and innovation policies in other regions. On the other hand, if we look at the cooperation ratios (52/14 for SE/NWE, 41/18 for EE/NWE and 30/6 for SA/NWE), we can see that North-West Europe has a considerable foresight "cooperation deficit", which could be explained with the history of foresight in these regions. In the mid-1990s, NWE players set the foresight scene in Europe by defining the "rules of the game" with concepts, methods and practices used in national foresight programmes in the UK (1994), France (1995), Austria (1996), among others. As a result, subsequent "waves" of FLA "imported" and adapted NWE practices through a wide range of national and EU-funded cooperation mechanisms (e.g. collaborative projects, capacity building courses and seminars, advisory/expert groups, etc). However, in the long run, the cooperation imbalance could potentially become problematic for NWE if no efforts are made to learn the lessons from successful practices elsewhere. For example, in recent years we have seen outstanding nanotechnology foresight studies supported by "fully-fledged roadmapping" activities at the Higher School of Economics in Moscow; the effective integration of horizon scanning, foresight and productive chain approaches (a kind of "methodological salsa") at the Colombian Foresight Institute in Cali; the sudden emergence and institutionalisation of foresight in Malaysia; and other interesting developments which could, to some extent, be replicated in North-West Europe and other parts of the world. Some policymakers may argue that the "foresight market" will eventually self-regulate itself but the size of the cooperation "deficit" and "surplus" in some regions may require "corrective actions", such as: promoting foresight knowledge transfer from other regions to NWE; inviting SE, EE and SA players to participate in NWE foresight initiatives; etc.

Figure 24 (below) shows the results of mapping FLA cooperation by country that, because of space limitation, could not be included in 2009 *Mapping Foresight* report. With the use of social network analysis (SNA) techniques we can visualise the cooperation of over 1,000 FLA by country. Thinker lines indicate higher number of joint foresight activities between countries and regions. The results show five European countries playing a "central role" in international and intraregional FLA cooperation: Finland, France, Germany, Netherlands and United Kingdom. Nordic countries show the strongest intraregional cooperation but we can also see that Asian and Latin American countries are well-networked. Finally, the mapping of FLA players will allow us to generate similar analysis by organisation.

Figure 24: Mapping Foresight & FLA Cooperation by Country



There are many other cooperation and networking activities that go beyond the mapping of FLA research and support teams. These include research and technology development (RTD) partnerships with other initiatives (not necessarily FLA); coordination and support actions, such as networking and personnel exchange; access to research infrastructure; organisation of joint events, workshops and conferences; knowledge co-production, etc. In particular, there is one type of cooperation instrument, which is common in industry and many disciplines (especially in engineering and technology) but rarely used in FLA, that is, standardisation agreements. We often see similar processes and methods being called with different names and this complicates the monitoring, analysis and positioning of FLA worldwide. Therefore, we hope that the systematic mapping of FLA practices, players and outcomes will contribute to the creation of "standard" protocols to study and conduct foresight and forward-looking activities.

Our mapping will consider three types of cooperation and networking that look beyond the core activities of the research and support teams:

- *Joint Knowledge Production (JKP)* – refers to knowledge production activities that are jointly carried out with other initiatives (not necessarily FLA). The EFP *briefs*, *mapping* and *joint policy workshops* are good examples of this type of cooperation, where other initiatives use the protocols and procedures developed by EFP to produce new knowledge. Other examples include co-authored book chapters, joint workshop reports, case studies and journal articles where at least one author is not a member of the mapped FLA research and support teams.
- *Information and Infrastructure Sharing (IIS)* – refers to collaboration by providing access to information (e.g. sharing reports, granting interviews, providing advice) and infrastructures (including physical or virtual facilities).
- *Networking (Net)* – refers to acknowledgements of the existence or relevance of similar initiatives carried out by other actors. This can be done with the inclusion of linkages and references in the project website, newsletters, reports, publications, etc. Providing space for other initiatives to be presented/discussed in conferences and seminars are among the most common networking activities.

The mapping of collaboration and networking highlights the importance of taking other FLA work into account and relating it to an existing body of knowledge when conducting a study. Monitoring the synergies between foresight and forward-looking activities offer valuable information for a variety of actors. For example, FLA *sponsors* will recognise the impact and usefulness of the activities, *practitioners* will be able to identify players for future collaborations and *users* of FLA will find useful links to other potentially relevant initiatives.

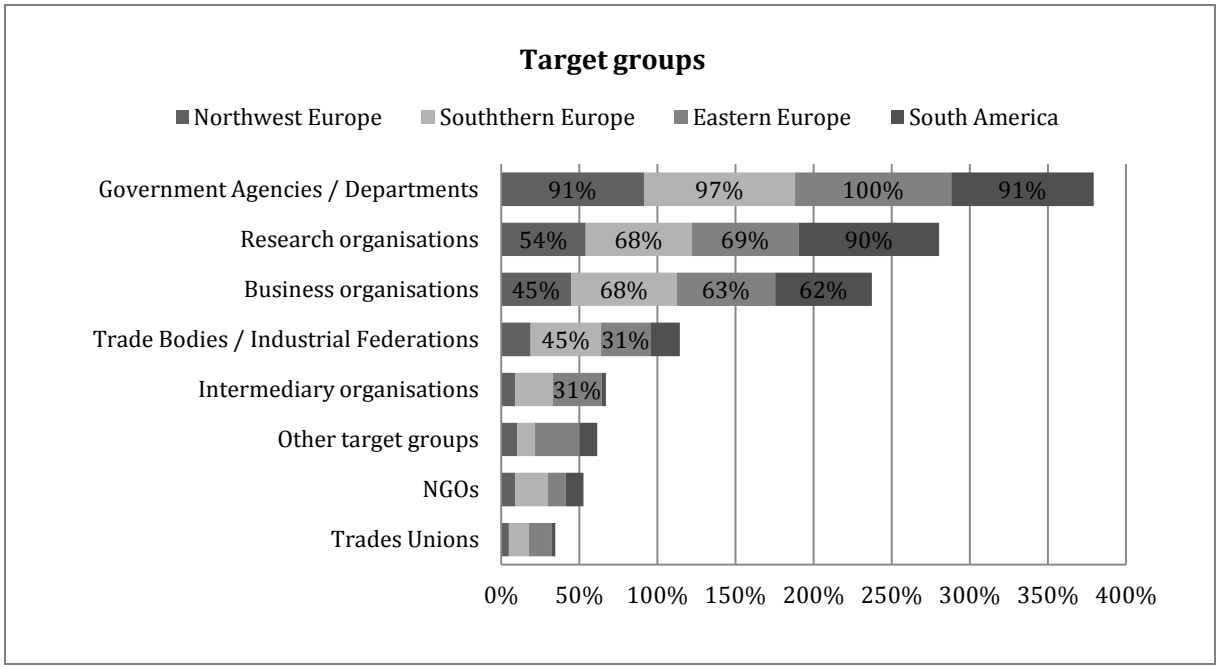
5.5 Target groups

Target groups are types of stakeholders or organisations that forward-looking activities aim to inform or shape. Target groups can be reached by either engaging them in the early stages of the FLA process (*scoping*, *mobilising* and *anticipating* futures) or by addressing them in the later phases (i.e. *recommending* and *transforming* futures). In some cases the sponsor is the primary target; in others the sponsor might wish to shape the expectations of a particular audience. Hence, the process and the dissemination strategy of the FLA will directly be aimed at involving or reaching that audience. In EFP mapping we will consider the following target groups:

- *Public organisations* – including public corporations and national industries; government departments or ministries; government agencies; and parliaments.
- *Research and education organisations* – including: research funding organisations; public research organisations (non-HEI); private research and innovation support organisations; higher education institutions (HEI); and primary and secondary schools.
- *Private organisations* – including SMEs (e.g. consultancies and IT services); large and transnational companies; and associations representing commercial interests.
- *European Union* – including the European Commission; the European Parliament; and other EU bodies/agencies.
- *International agencies* (OECD, UNESCO, UNIDO, etc).
- *Non-governmental, not for profit, organisations* (NGO).
- *Media* – including the corporate and community/alternative press.
- *Civil society.*

Figure 25 uses the 2010 *Evaluating Foresight* findings to show the most common target groups in a selection of 700+ FLA. The results indicate that foresight and forward-looking activities are commonly aimed to inform and shape public organisations. Similar type of analyses will be conducted in EFP Mapping.

Figure 25: Mapping Foresight & FLA Target Groups by Territorial Scope



5.6 Participation scale

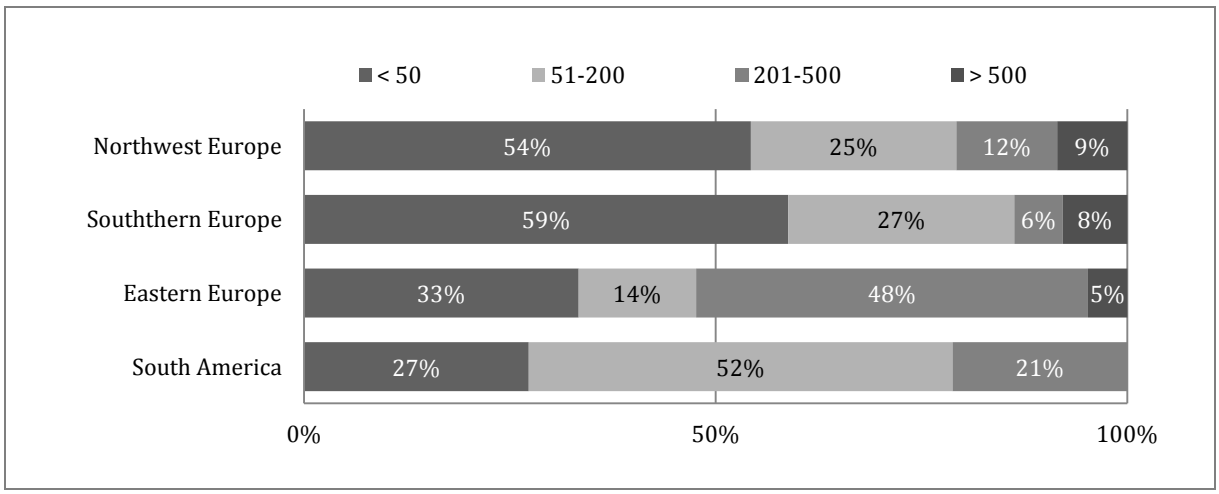
The mapping of the *participation scale* refers broadly to all the people taking part in FLA other than the members of the research and support teams. As Miles and Keenan (2003) highlighted:

> Whether the aim is to set up a process-based or a product-based Foresight activity … one of the main features of Foresight activities must be the active involvement of the various stakeholders from initiation and throughout all the stages of the activity. This is a core factor differentiating fully-fledged Foresight from more narrow futures and planning approaches ... Widespread participation by various types of local players should not be tokenistic (though it does play a role in establishing the legitimacy of the activity): it should be highly-valued as a source of vital knowledge and perspectives. It should not be occasional and episodic (though there will certainly be occasions where specific knowledge inputs are required and thus particular sorts of consultation arranged). Foresight requires the participation of local players in guiding the participants right from the identification of the general and specific objectives, through the planning of the activities to be completed and the methodologies to be adopted, to the management of operations and the dissemination of results. Participation must be considered a determining factor of the final result.

However, in spite of being one of the three fundamental pillars of foresight (participatory-orientation, prospective-orientation and practical-orientation), to find comprehensive information about the participation scale has been among the most challenging tasks in previous mapping activities. Figure 26 adapts Keenan and Popper (2008) analysis of the participation scale in over 300 FLA. In the paper the authors emphasise that:

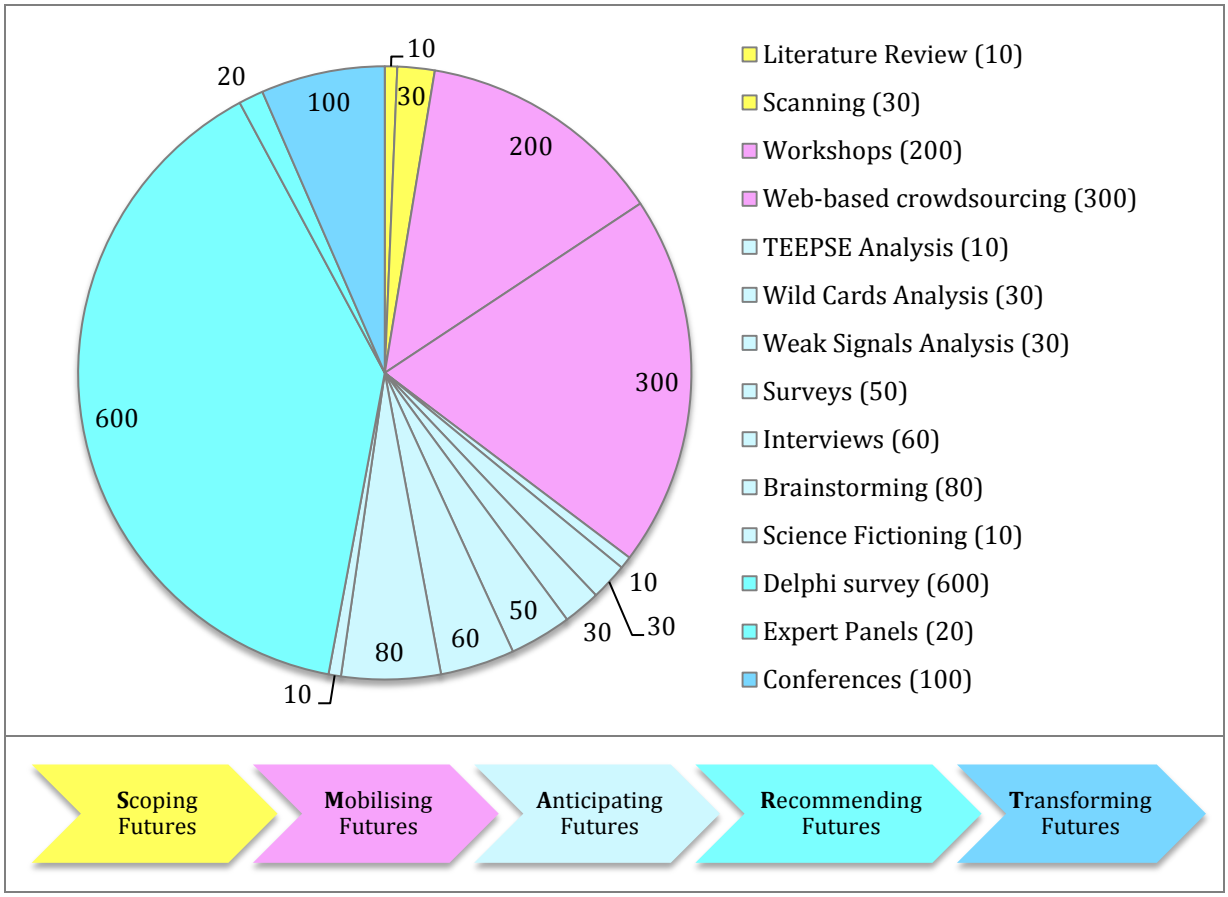
> The most startling feature of this [mapping] data is the apparent low levels of participation across all regions, with around half the mapped exercises indicating participation of fewer than 50 people. This result seems rather surprising, given the high participation claims often made on behalf of foresight. But it might be explained, at least in part, by inclusion in the EFMN database of future-oriented activities that do not necessarily conform to those definitions of foresight used, for example, by the European Commission, where high levels of participation tend to be emphasised. Another factor might be that some of the largest national exercises have been broken down into their constituent parts for the purposes of mapping, creating a measurement effect. Finally, a further explanation may simply be that large-scale, multi-participant exercises are too challenging, expensive and time-consuming to organise, so that in many situations the ideal of deep and wide participation remains just that – an ideal.

Figure 26: Mapping Foresight & FLA Participation Scale by Territorial Scope



Now, given that EFP will not only map foresight studies but also horizon scanning, forecasting and impact assessment activities which do not necessarily demand high levels of participation, we will inevitably continue mapping exercises indicating participation of fewer than 50 people. However, in order to improve our mapping procedures and reduce "measurement effects", we will estimate the participation scale from the combined number of people involved in the core activities of study. In other words, the mapping of the participation scale will be linked to mapping of all methods used in the five phases of the FLA process: scoping, mobilising, anticipating, recommending and transforming (see Figure 27). This information is not only of interest to those who wish to evaluate a particular FLA but also to practitioners and sponsors of FLA who might, for example, wish to know how effectively can methods be used to engage specific stakeholders.

Figure 27: Mapping iKnow Project's Participation Scale (1,500+ people) by Methods[10]



[10] These figures are just an early estimation of the number of participants involved in the various activities of the iKnow Project, at the time of writing this practical guide.

5.7 Public relations (PR) and marketing

Public relations (PR) – often called Word of Month – can be one of the most effective ways to create awareness about foresight and forward-looking activities. It is also considered an effective and inexpensive tool to mobilise key stakeholders and communicate the benefits of a study. Common *PR* activities include: presenting the project at events/conferences organised by others; attending events/conferences organised by others; organising events/conferences; personal briefings; lobbying; etc.

Marketing refers to stakeholder engagement activities undertaken before, during and after the lifetime of a project to generate awareness about it and to solicit participation in and (further) support for it, without necessarily communicating interim outcomes. There are many ways in which project marketing or dissemination activities can be classified, but we will focus on two types: *online* and *offline*. By *online* we mean the use of websites, emails, blogs, web-discussion fora, web-videos/podcasts; while *offline* refers to the use of newsletters, flyers/leaflets, policy/research briefs, media articles/interviews, television/radio/press promotion, etc.

Finally, our experience suggests that a number of "catching hooks" are used to attract interest in dissemination events organised during the project. In this regard we will assess how the following factors helped to mobilise keynote speakers and stakeholders: reputation of individual project members; agenda-setters in the project team; brand of organisations; sponsors' influence; location of events; access to knowledge (i.e. content); access to know-how (methodology).

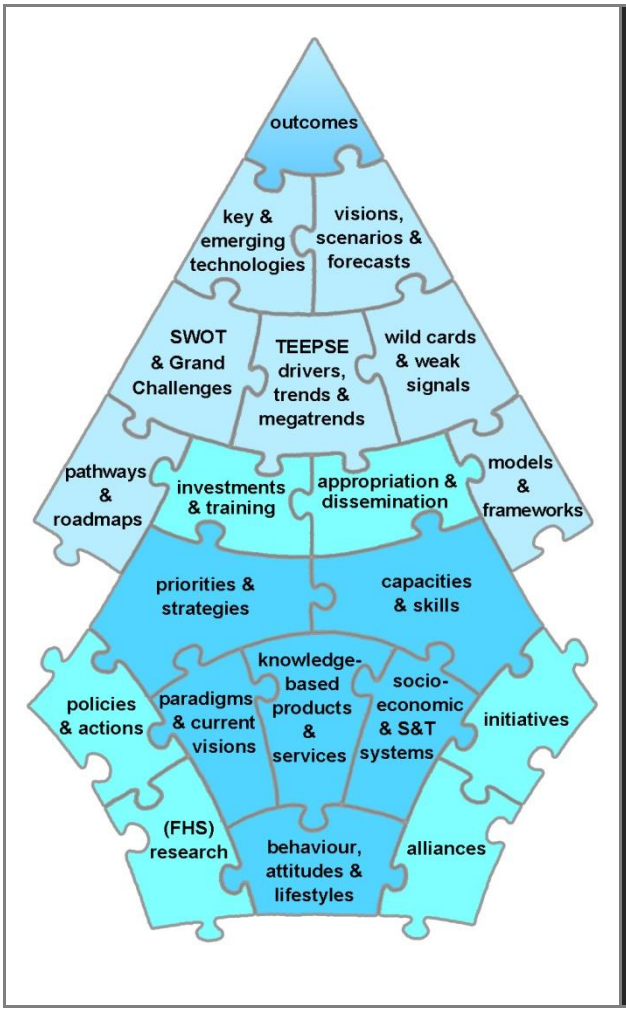
6 Mapping Foresight & FLA Outcomes

The monitoring, analysis and positioning of outcomes from foresight and forward-looking activities plays a central role in the new wave of mapping activities. To this end, nineteen of thirty-three elements (58%) of the SMART Futures Jigsaw have been devoted to the mapping of outcomes (see Figure 6 above and Figure 28 below).

Section 2.3.3 (above) discussed the rationales for mapping FLA *outcomes*, i.e. the *why* question. Sections 3.3 to 3.5 introduced the elements of *anticipating*, *recommending* and *transforming* futures. Thus, this section will focus on another question: *How* to map FLA *outcomes*?

At this point we should emphasise that the mapping of outcomes is the most demanding but possibly the most rewarding task of our mapping activities. It is demanding because the mapping of outcomes cannot be completed with desk research and documentary analysis alone. It often requires one or more stakeholder interviews and open participatory processes that could lead to divergent views and controversial attribution debates. Furthermore, this type of mapping is not based on predefined templates. Instead, we aim to capture the most important results of foresight and forward-looking activities, as far as possible, in their original format.

Figure 28: Mapping Foresight and FLA Outcomes



The mapping of Foresight & FLA outcomes is associated to the ART of futures research, which involves:

Anticipating Futures (7 elements)

- Visions, scenarios and forecasts
- Critical and key technologies
- TEEPSE drivers, trends and megatrends
- SWOT and Grand Challenges
- Wild Cards and Weak Signals (WIWE)
- Pathways and roadmaps
- Models and frameworks

Recommending Futures (6 elements)

- Policies and actions
- Initiatives and actors
- Appropriation and dissemination
- Investments and training
- Alliances and synergies
- (FHS) Research

Transforming Futures (6 elements)

- Capacities and skills
- Strategies and priorities
- Paradigms and current visions
- Socio-economic and STI systems
- Behaviour, attitudes and lifestyles
- Knowledge-based products and services

6.1 Anticipating Futures

Anticipating Futures relates to what we often call the "**formal outputs**" of foresight and FLA, which include:

- Visions, scenarios and forecasts
- Critical and key technologies
- TEEPSE drivers, trends and megatrends
- SWOT and Grand Challenges
- Wild Cards and Weak Signals (WIWE)
- Pathways and roadmaps
- Models and frameworks

Desk research and documentary analysis are very useful for the mapping of "formal outputs" but they are not sufficient. One of the challenges of mapping outputs is the need to capture them, a far as possible, in their original format. However, the simple *monitoring* of, for example, a few pages long report on scenarios or key technologies will add little or no value unless we *analyse* and *position* formal outputs against a common set of criteria. For this reason, we have developed a common template which, based on desk research and documentary analysis and interviews and web-based crowdsourcing (e.g. collaborative web rating and tagging), will allow us to build a systematic library of foresight and FLA results (see Table 7).

- Issue Type – refers to the type of issue to be mapped, e.g. a vision.
- Short Name – offers a brief headline of maximum 140 characters, e.g. *By 2020, all players should benefit from attractive conditions for carrying out research and investing in R&D intensive sectors in Europe*.
- Short summary – offers a brief description of the FLA output.
- Importance for Europe – allows us to engage the EFP community in the assessment of the relevance of formal outputs at the European level.
- Importance for your country – refers to the assessment of importance for the country of the user of the Mapping Environment.

Table 7: How to Map Key Elements of the Anticipating Futures Phase?

Issue Type (1)	Short Name (2)	Short Summary (3)	Importance for Europe (4)	Importance for [your country] (5)	Research Needs (6)	FRASCATI Sub-Areas (7)	TEEPSE Relevance (8)					
							Tec	Eco	Env	Pol	Soc	Eth
Desk Research and Documentary Analysis (Captured as far as possible, in their original format)			**Interviews & Web-based Crowdsourcing**			**Desk Research & Documentary Analysis**						
Notes												
(1) **Type of Formal FLA Output** (2) Text area with maximum 140 characters (~1 Tweet). (3) Text area with maximum 1400 characters (~10 Tweets). (4), (5) & (6) require rating with 1 to 5 stars: ★ = None/very low; ★★ = Low; ★★★ = Moderate; ★★★★ = High; ★★★★★ = Very high (7) Select up to 3 Frascati Sub-Areas. (8) Select up to 3 TEEPSE categories.												

6.1.1 Visions, scenarios and forecasts

Under this dimension one type of concrete ideas about the future will be mapped. In particular we think about 'forward-looking images' that describe a particular state at a certain point in time in the future.

6.1.2 Critical/key technologies

Technologies can be subject of forward-looking activities in different ways. They can be the subject of a FLA e.g. in the case of a forecast about the future development and market potential of a particular technology or if the impact of its increasing use should be assessed. Alternatively, technologies can be identified as drivers of a particular trend or megatrend; or as a wild card in a particular scenario. We wish to map those technologies that are considered to be critical for the topic addressed in a FLA.

6.1.3 TEEPSE drivers, trends and megatrends

TEEPSE stands for 'Technology, Economy, Ecology, Politics, Society and Ethics.' It provides a template to systematically consider the different dimensions of a scenario, an issue, a (mega) trend or a driver.

Drivers are forces of change. The term driver applies to one-off, recurrent and continuous developments (e.g. goods, services, policies, strategies, investments, technologies, attitudes, etc) that are not necessarily measurable. They include changes in values (e.g. growing public concerns about environmental issues), behaviours (e.g. emergence of peer-to-peer file sharing models); services (emergence of no-win no-fee lawsuits); players (e.g. emergence of Wikileaks), etc. In relation to trends, drivers are thought of as 'causes' of or reasons for developments and trends are characteristics of developments. *Trends* are measureable developments indicating clear and relatively steady changes over time. For example, the 21st Century has witnessed a growing trend towards left-wing governments in South America: Venezuela (2001, 2007); Brazil (2003, 2011), Argentina (2003, 2007), Uruguay (2005, 2010); Bolivia (2006), Ecuador (2007); and Peru (2011). *Megatrends* are developments resulting from the interconnection of several trends and therefore provide "less uncertain" hints about the future. Some examples include: growing globalisation; growing customisation of services; growing demographic pressures (e.g. ageing in developed countries, immigration from developing countries); etc.

6.1.4 SWOT and Grand Challenges

A **SWOT analysis** assesses a project, scenario, organisation or any other subject of a FLA in relation to its environment. Strengths are qualities that give the subject an advantage over similar subjects in the environment; Weaknesses are attributes that place the subject at a disadvantage relative to others; Opportunities are elements aspects that offer chances for improvement; and Threats are aspects that could cause problems for the future of the subject.

Grand Challenges "are of sufficient scale and scope to capture the public and political imagination, create widespread interest among scientific and business communities and NGOs

and inspire younger people. They must be capable of acting as an important tool for percolating attention at all levels of society all the way down to civil society and the public at large."[11]

Core criteria for the selection of Grand Challenges are:[12]

- Relevance demonstrated by contribution to European-added value like transnationality, subsidiarity and the need for a minimum critical effort
- A research dimension to ensure the buy-in of the research community and the potential to induce improvements in efficiency and effectiveness;
- Feasibility as an economic or social investment in terms of research and industrial capability and a viable implementation path.

6.1.5 Wild Cards and Weak Signals

For each FLA we wish to draw the attention to the identification and analysis of Wild Cards and Weak Signals (WIWE).[13] **Wild Cards** are surprising and unexpected events with low 'perceived probability' of occurrence but with very high impact (e.g. 2001 attack to the World Trade Centre on 9/11, major disasters in environmental or technological systems, etc.). Serendipity or the faculty of making scientific discoveries by accident is another important source of wild cards, which can be included into the unexpected surprises of human actions category. Some typical examples are the discovery of the penicillin (by Fleming), LSD (by Hofmann), dynamite (by Nobel), America (by Columbus) and Viagra (by Osterloh), to name a few.

Wild cards can be grouped in different ways. We follow here the typology suggested by the iKNOW project and distinguish between:

- nature-related "surprises"
- unintentional "surprises" resulting from human actions
- intentional "surprises" resulting from human actions

Weak Signals are past or current developments/issues with ambiguous interpretations of their origin, meaning and/or implications. They are unclear observables warning us about the probability of future events. For example, changes in public attitudes to one thing or another, an emerging pattern of concern about emerging health problems. Finding "relevant" weak signals is one of the most challenging tasks in futures research and their analysis often leads to the identification of potential Wild Cards. When talking about WIWE it is important to bear in mind that they are 'relevant' and 'wild' only with regard to a particular frame of reference e.g. in a particular scenario. The same events or trends that are considered to have a high impact and low probability in one setting/situation/scenario or by one community might be absolutely self-evident in another setting/situation/scenario or if considered by another community. In other words WI-WE are particular to a specific FLA. The FLA needs to be taken into account when identifying and discussing WIWEs.

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11 ERA EXPERT GROUP (2008) Challenging Europe's Research: ERA Rationales for the European Research Area. Brussels. For further information please consults EFP (2010).

12 AUSTRIAN GOVERNMENT (2011), "ERA Portal Austria, Joint Activities, Grand Challenges", available at: http://www.era.gv.at/space/11442/directory/11794.html (accessed 25 June 2011)

13 In the following we draw on the work of the FP7 funded iKNOW project. For more information please consult the project website at http://wiwe.iknowfutures.eu.

Several FLA have focused on the issue of wild cards and weak signals such as iKNOW[14] and SESTI[15]. The EFP will make use of the results of these projects, in particular on iKNOW.

6.1.6 Pathways and roadmaps

Another possible output of FLA are pathways and roadmaps.

A **roadmap** is a plan with a clear timeline matching goals with specific solutions of how to reach these goals. The solutions, called 'milestones', can be distinguished into different layers e.g. technology, legal environment, political decisions etc, which are potentially interconnected. A roadmap helps to reach a consensus, to make future developments and interconnections more concrete and provides a framework for planning and coordination. There are for example technology roadmaps or roadmaps for the development of an industry or sector.

A **pathway** charts possible issue areas, its components – single issues – how they are connected and what are their borders. It is more open than a roadmap in that it does not have a specific time schedule (or only a rather vague one), few or no milestones and does not extend to different layers. It allows for more flexibility and creativity than a road map. For example, a pathway of a FLA could sketch themes for FP8 and channels for RTD funding taking FP as a conceptual framework which requires the identification of major thematic areas and sub-thematic areas.

6.1.7 Models and frameworks

Another type of output from FLA concern novel conceptual developments, in particular models and frameworks. We consider a **model** to be anything used in one way or another to represent anything else, e.g. models of physical objects such as houses, cars or bees or models of mental objects such as concepts, developments or processes. Models have parts and establish certain relationships between these parts.

- They can be used for purposes of representation and explanation. For the latter, a model embodies a theory.
- Other distinctions of models concern the character of the data used in them: if it is numbers and relations between numbers we speak of 'quantitative' models; if the relations are e.g. conceptual we speak rather of 'qualitative' models. However, also many models working with numbers often have only qualitative character, if, for example they work with ordinal (as opposed to cardinal) scales. While the traditional distinction between qualitative and quantitative models may be useful at times it should not be overemphasised.

Frameworks are not fully-fledged theories but rather something intermediate. They provide analytical guidance by connecting all aspects of inquiry such as issues definition, purpose, methodology, data collection and analysis. A framework serves like maps that give coherence and consistence to an empirical investigation. They are used to help us know and understand the subject matter they represent. We distinguish between new frameworks developed in a FLA and the use of existing frameworks in a FLA.

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[14] See iKNOW (2011)
[15] See SESTI (2011)

6.2 Recommending Futures

Recommending Futures is a fundamental part of any foresight and FLA process. In previous mapping activities we have analysed over 500 recommendations from FLA and here we re – clustered the results around six major categories, which are explained below.

Similar to the mapping of "formal outputs", we have developed a common template to analyse recommendations.

Figure 29: Mapping Foresight & FLA Recommendations

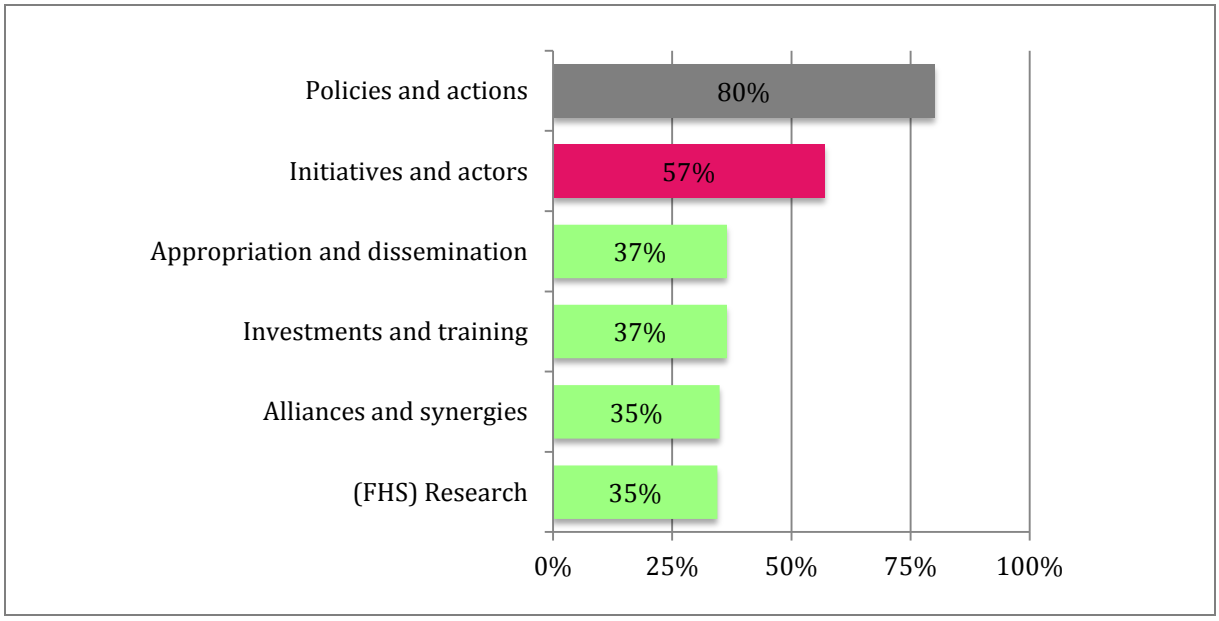

Table 8: How to Map Key Elements of the Recommending Futures Phase?

Issue Type (1)	Recommendation Short Name (2)	Recommendation Objective (3)	Expected Impact (4)	Importance for Europe (5)	Importance for [Your Country] (6)	FRASCATI Sub-Areas Relevance (7)	Key Responsible for Implementation (8)					
							EU	N-St	GO	BU	RE	O
Desk Research and Documentary Analysis (Captured as far as possible, in their original format)			**Interviews & Web-based Crowdsourcing**									
Notes												
(1) FLA Recommendations.												
(2) Text area with maximum 140 characters (~1 Tweet). (3), (4), (5) & (6) Text area with maximum 700 characters (~10 Tweets). (7) Select up to 3 Frascati Sub-Areas. (8) Select up to 3 Actors: EU= European Union, N-St = Non-State, GO = Government, BU = Business, RE = Research/education, O= Other.												

6.2.1 Recommending Policies and Actions

While FLA may be oriented towards the long-term future they propose recommendations for action for the present or near term in light of what might or should happen later. 'Policy options' refers to any proposed actions to be undertaken by an organisation or person with 'policy' being broadly understood. The term is not only used to refer to measures taken by public authorities ('policies proper') but also measure taken by a private organisation e.g. a company or a NGO. Each proposed action can be further specified in terms of level (e.g. regional, national, European, international) and subject (e.g. research, policy, business strategy). As a key outcome of any FLA it is important to map this dimension.

- Policy Shift: Refers to shifts in public policy recommended by a foresight exercise. This could include a very wide range of topics, essentially covering all areas of public policy. Note that we mean 'policy' rather than 'programmatic' shifts, i.e. the recommendation should refer to a shift at a higher strategic level than simply programme planning, e.g. to include regulation and legislation.
- Private sector and NGO action: Refers to actions that should be taken by the private and NGO sectors in light of the priorities identified in a foresight exercise. A wide variety of actions are possible, including new investments in technologies, development of new services to meet emerging needs, and so on.

6.2.2 Recommending Initiatives and Actors

Recommendations can also refer to the creation of new initiatives or actors. For example, a FLA might propose the establishment of a forum for the exchange of information among existing organisations.

- Creation of new initiative (e.g. project / programme / strategy / forum): Refers to the establishment of new initiatives in response to the findings of a foresight exercise. This will certainly include things like new (research) projects and programmes, but might also cover things like the establishment of new working groups and committees, new associations and networks, and other similar hybrid fora.
- Establishment of new centre: Refers to the setting-up of a new group or institute dedicated to addressing priorities identified in a foresight exercise. This can be either a bricks- and-mortar or a virtual centre.

6.2.3 Recommending Appropriation and Dissemination

Dissemination would be part of the FLA itself.

- Incorporation of findings into ongoing debates and strategies: Refers to recommendations that specify the use of foresight results in defined policy and decision-making processes that already exist. For example, it might include recommendations for the inclusion of foresight results in ongoing policy reviews or for results to be integrated into strategy documents.
- Dissemination of Findings: Refers to concrete proposals for disseminating the findings of a foresight exercise to various groups and communities.

6.2.4 Recommending Investments and Training

Recommendations may refer to future investments. We distinguish between investment propositions into tangible and intangible assets.

- Increased public spending: Refers to the need for increases in public spending on areas identified in a foresight exercise. Applies in situations where spending increases are proposed without specifying the need for new projects or centres.
- Human resource development: Refers to initiatives to enhance development of human resources, particularly through education and training.

6.2.5 Recommending Alliances and Synergies

FLA may identify a need to produce new knowledge a recommendation that was mapped above under the dimension of 'Further research and FHS' or to share existing knowledge more effectively. This can be achieved by partnerships for co-producing, sharing or transferring knowledge. While the co-production of knowledge might be understood as a recommendation for further research, the emphasis here is on the fact that a recommendation stresses the need for a *collaborative* effort.

- Improved academic-industry links: Refers to the improvement of academic-industry links, for example, through greater R&D collaboration, joint training schemes, and so on.
- Greater cooperation, including international cooperation: Refers to calls for greater cooperation between actors in the innovation system around the priorities and issues highlighted by a foresight exercise. Also refers to calls for greater international cooperation.

6.2.6 Recommending (FHS) research

Except for proposals on action on the subject matter of a FLA, an outcome can also refer to additional research activities. These can be related to examine new topics related to the subject of the FLA or to further probe into the future development of the subject matter i.e. to conduct foresight or horizon scanning activities (FHS). To map this dimension would provide an indication on the impact of foresight in generating new topics of research. It will also allow to trace the origin of certain ideas over time.

- Further research: Refers to a situation where a foresight exercise makes a general call for further research in a particular area without specifying the need for new projects or centres.
- Further foresight: Refers to the need for further foresight exercises, possibly at different locations or levels, but also in the future.

6.3 Transforming Futures

Finally, the *transforming futures* phase involves six elements:

6.3.1 Transforming capacities and skills

FLA can have a significant impact on the resources (e.g. personnel, infrastructure, technology) and management (e.g. strategic leadership, know-how) *capacities* of FLA sponsors, practitioners and users. For this reason, in EFP we will map FLA-related transformations in terms of new/better:

- ***capacities*** *for the design, implementation and evaluation of the 5 phases of FLA: scoping, mobilising, anticipating, recommending, and transforming (including evaluating and renewing);*
- ***skills*** *for management, knowledge generation, systemic thinking, data handling, communication and social skills, technological, and methods usage?*

6.3.2 Transforming priorities and strategies

As discussed in Section 3.4 (above), FLA can identify *new priorities* and confirm the relevance of *existing priorities*. As a result, *new strategies* are often defined to exploit or develop conditions and instruments (e.g. collaboration schemes at EU level or between academia, industry and government) supporting the implementation of recommendations associated to these priorities. In EFP we will map the following:

- ***new/existing priorities*** *by positioning areas, challenges, policies, sectors, technologies, topics, etc.;*
- ***new strategies*** *for business, innovation, research, policy, etc. and* ***existing innovation strategies****, including:*
    - *Horizon 2020 Innovation Strategies*: strengthening Europe's science base; boosting Europe's industrial leadership and competitiveness; increasing the contribution of R&I to the resolution of key societal challenges; providing customer-driven scientific and technical support to Union policies; and helping to better integrate the knowledge triangle – by combining (a) research, (b) researcher training and (c) innovation.
    - *EU Innovation Strategies*: delivering growth and jobs through Innovation; strengthening the knowledge base and reducing fragmentation; getting good ideas to market; and leveraging EU policies externally.
    - *OECD Innovation Strategies*: empowering people to innovate; unleashing innovation in firms; creating and applying knowledge; addressing global and social challenges; improving the governance and measurement of policies for innovation.
    - *iKnow Innovation Strategies*: addressing grand challenges; addressing great responses; addressing emerging issues; addressing knowledge governance; and applying a 'worldviews' approach.

6.3.3 Transforming paradigms and current visions

The anticipation and recommendation of alternative futures (see Sections 3.3 and 3.4), together with the interdisciplinary nature of FLA (see Figure 5), can lead to the revision of underlying assumptions, concepts and practices defining a scientific field, thus resulting in paradigm shits. For example, the move from industrial to information to knowledge (and possibly to wisdom) societies required some changes in our *current visions* and the establishment of new *paradigms*.

6.3.4 Transforming socio-economic and STI systems

The ultimate purpose of FTA is to transform socio-economic as well as science, technology and innovation (STI) systems. These transformations are often linked to the rationales of FLA, such as the need to orient policy and strategy development; the need to engage key stakeholders and decision-shapers; and the need to identify risks, grand challenges and opportunities, among others (see Section 3.7). It is possible to find socio-economic and STI transformations that were not considered as "original" rationales of FLA (e.g. unexpected improved dialogue between science and policy actors), similarly we find studies aiming at transformations that do not – and possibly never will – happen.

- ***Transforming socio-economic/industrial systems**, by: replacing products and services being phased out; improving products and services quality; extending products and services range; maintaining traditional market share; creating new markets; ensuring compliance with modern standards; increasing flexibility of production; increasing industrial capacities; reducing labour costs; reducing materials costs; reducing energy costs; reducing environmental damage; and improving working conditions.*

- ***Transforming science, technology and innovation (STI) systems**, by: forecasting TEEPSE events/developments; orienting policy and strategy development; recognising drivers/impacts of TEEPSE changes; engaging key stakeholders and decision-shapers; supporting STI priority-setting and governance; identifying key/emerging TEEPSE issues; generating (shared) visions and scenarios; harmonising (STI) supply and demand needs; transforming/absorbing capacities and methodology; identifying risks, grand challenges and opportunities; networking and international cooperation; and generating bridges between science and policy.*

6.3.5 Transforming behaviour, attitudes and lifestyles

By generating new scenarios, visions and strategies to achieve them, FLA both directly and indirectly shape our behaviours, attitudes and lifestyles. This has been evident in the FLA field where we studied the state of evolution of foresight practices, by analysing at the level of imitation, learning and adaptation/innovation of several countries in Asia and Latin America, for example.[16] These analyses show that conducting FLA transforms our behaviour and attitude towards FLA. However, a more challenging task is the identification of FLA influence on other fields and our lifestyles. In other words, the assessment of FLA role in informing and shaping short-term strategic-intelligence activities (e.g. strategic planning) and stakeholder-engagement activities (e.g. networking), for example (see Figure 2 above).

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16 See Johnston and Sripaipan (2008) and Popper and Medina (2008).

6.3.6 Transforming knowledge-based products and services

The research nature and "formal outputs" of FLA (see Section 3.3) are key elements contributing to the transformation of current and future knowledge. Furthermore, some results of FLA have an impact on knowledge-based *products* (e.g. books, research papers, white papers, case studies, databases, reports, etc.) as well as knowledge-based *services* (e.g. research consultancy, risk management, software and technology development, procurement advice, etc.). Some examples of these kind of transformations include:

- *General advancement of knowledge*
- *Commercial exploitation of R&D results*
- *Exploitation of research & innovation results via standards*
- *Exploitation of results through public policies*
- *Exploitation of results through (social) innovation*

7 Possible use of the EFP Mapping Environment

In the following chapter we will provide examples of how the data collected in the mapping process can be used. The Mapping Environment of EFP will be the first comprehensive structural library of forward-looking activities in the world. While the main purpose of the mapping is to build a systematic and more comprehensive repository of FLA knowledge, this is not an end in itself. At this stage we can see five different uses for the mapped data:

1. Benchmark along all dimensions of SMART Futures Jigsaw
2. Provide input for an evaluation of FLA
3. Optimise research agendas
4. Empower FLA project management
5. Exploit outcomes of completed FLA for policy-making

We will briefly look at each of these different purposes.

7.1 Benchmark along all dimensions of SMART Futures Jigsaw

The Mapping Environment allows to systematically collect data about FLA. Building the data collection on the Jigsaw ensures a standardisation, which in turn allows for comparison and meaningful cross-case analysis along the different dimensions and criteria. For example, it will be possible to identify the territorial distribution and scope, the time horizon or duration of FLA, as illustrated in Chapter 4. Similar analyses could be carried out with regard to actor of FLA, as shown in Chapter 5. In the future EFP will provide the basis for also analysing FLA outcomes. On the basis of benchmarking researchers, as well as policy makers will be able to draw lessons for their individual purposes.

7.2 Provide input for the evaluation of FLA

Benchmarking and the analysis of past FLA activities prepare the way for evaluating those activities. While the mapping does neither provide a concept of evaluation nor standards for judging the quality of a FLA it is envisioned to provide data necessary to run such analysis (see Annexe 2). For example, it will be possible to put the outcomes of different FLA side by side and to analyse them in a comparative manner. In 2010 the fully-fledged evaluation of foresight activities in Colombia drew on mapped projects and showed how powerful a tool this way of data collection and presentation is (*Evaluating Foresight*, 2010).

7.3 Optimise research agendas

Based on an analysis of the mapped projects it will be possible to draw conclusions for optimising research agendas. For example, it will be possible to identify the topics that have been addressed in the past and those that have received less attention. Moreover, questions such as what organisations and which experts have done research on particular issues and with what specific focus; what methodologies were used, which ones have not been employed yet or where have competence centres for specific issues evolved could be addressed. Such an analysis will, in turn allow to recognize gaps not been addressed, what understudied or overlooked by informing and shaping research agendas. This is of interest to FLA practitioners and policy makers alike. While the former might want to identify a niche for their research strategy, the latter might be more interested in gaps they could address with their policy tools.

Within the EFP project we will use the mapping to inform our activities in Work Package 3, 4 and 5.

- For example, for WP 3 the mapping could be used to provide input for the production of EFP Briefs. So far Briefs have been a successful product of EFMN and EFP and the mapping could help to shape what types of Briefs are produced and how they are produced. For example, in addition to the existing project brief specific briefs informing about particular policies or dedicated to the discussion of a methodology could be written. The mapping could also be used to target – and thereby to speed up – the production of EFP Briefs.
- Regarding WP 4, the mapping can provide a basis to identify projects in which particular methodologies have been developed and used. We can then approach members of those project teams and ask to share their experience either in a dedicated online community or at a workshop organised by EFP.
- Similarly, for WP 5 the mapping can be used to identify 'hot issues' i.e. those challenges that have been addressed in FLA in the past and those that have not been examined yet. We will be able to point to experts and stakeholders who have been involved in discussing these issues in the past and can approach them in a focused manner.

7.4 Empower FLA project management

The Mapping Environment provides a systematic outlook on forward-looking activities, which FLA practitioners can use in several ways: on the one hand, they can use the Mapping Environment and in particular the Jigsaw as a project management tool. First, if a project can be characterised *ex post* along the thirty odd dimensions entailed in the Jigsaw, then the same dimensions can also provide guidance for planning a FLA project. Moreover, not only can the criteria be considered as a check list but the wealth of the collected data will be at the disposal of the user, so that she can easily identify methodological experts, contact project leaders who have been engaged in similar projects or look for partners who might be interested in contributing to the intended FLA. Thus, the Mapping Environment will serve targeted searches for standardised information and the EFP Briefs will provide ideas and more comprehensive descriptions of what can be done and how it can be done.

On the other hand, practitioners can use the mapping as a way to 'push' information about their projects into the community around EFP. The mapping allows them a way to be present in the community and to talk about their work and experience to other experts who are interested in using similar methodologies, related topics and issues or in a particular region.

7.5 Exploit outcomes of completed FLA for policy-making

Finally, the mapping of FLA in a systematic and comprehensive manner will provide for the possibility to exploit the stored information about completed, ongoing and prospective FLA. It will be possible to conduct smart searches as each individual dimension of the Jigsaw will be searchable. On the basis of the mapping questions such as 'What policy recommendations have been made by horizon scanning projects in the energy area?' 'What further research topics have been recommended by forecasting projects on demographic developments?'. By providing input to answer this type of questions the mapping will support policy- and decision-shaping processes.

8 Methodology for the nomination of case studies for FLA mapping

In this chapter we will describe how to select the case studies of forward-looking exercises that are going to be mapped for EFP. We will briefly characterise the challenge, outline how the 50 cases mapped by the EFP team were selected and, finally, discuss the process how we intend to nominated further cases in the future. The reader will gain a more comprehensive understanding of the selection processes and criteria.

8.1 The challenge

The mapping of case studies for the European Foresight Platform faces two main challenges: what cases are going to be mapped and how is the information getting into the Mapping Environment? These questions concern the issue of how project are identified as interesting for EFP and subsequently nominated for a mapping. In other words, they concern the question of how to feed the EF platform and how to ensure the quality of the feed in different phases of the project. In addressing these questions we distinguish three phases:

- In a first phase, a process needs to be installed by which it will be possible to identify a critical number of cases (50) for a first round of mapping, carried out by the EFP project team. These cases will serve as a basis to demonstrate the validity of the EFP concept, to illustrate the possible analyses that can be made on the basis of the mapped data and to create a critical mass that will attract further participants.
- In a second step we will import about a 1000 cases from the EFMN database into the EFP Mapping Environment.
- In a third phase, a mechanism will be set up that will motivate others to actively contribute to EFP in the future and to submit information about their and other FLA to the platform.

In other words, while for the first phase we have chosen to follow a top-down approach, we will work in the future in a bottom-up manner.

8.2 Mapping of 50 FLA cases by the EFP team

During the first mapping phase the EFP team will map all in all 50 case studies. How did we arrive at these particular cases? We nominated already 41 out of 50 cases following a two-step process of Identification and Selection. The remaining nine cases will be nominated by the other EFP partners.

8.2.1 Identification of cases

In a first step we identified in a top-down manner about 150 FLA cases. They were identified by searching the websites of significant sponsor of FLA such as the European Commission, the governments of the EU Member States, of the United States, Canada, India, Russia and several Latin American countries. The expertise and acquaintance of some of the team members with different types of FLA activities in these regions was key for the identification of the cases. In addition, we carried out a simple survey among selected professional contacts in France and the United States to suggest projects they consider to be relevant for EFP. The filter was very broad and included all types of FLA activities, all sizes of funding, all topics of work, all domains etc.

As a result we arrived at an internal list of about 150 FLA exercises.

8.2.2 Selection of cases

In a second step we filtered the list of cases. Out of the 150 cases we selected about one third by using three different criteria:

- The project addresses on of the themes of the Commission's Framework Programme;
- The selection gives a fair representation of different countries and regions of the world;
- Presence of different types of FLA projects i.e. of forecast, foresight, impact assessment and other types of FLA.

A list of 41 projects that are going to be mapped in the next phase of the EFP project by MIoIR has been prepared and shared with the EFP consortium and the EC in internal communications.

8.2.3 Mapping of cases

Every partner of the EFP team will map three FLA projects with UNIMAN mapping forty-one cases. These cases will be fully mapped. In case the person who maps the case has not been involved in the project, (s)he will rely on publicly available information in the first instance and on information provided in interviews in the second.

Beyond the three cases per partner (and 41 by UNIMAN), we encourage every partner to map additional FLA. These mapping may not be fully-fledged, though that would be desirable, but rather in an advanced mapping mode. The difference between the two modes is in the number of mapping categories on which we will ask partner to provide information:

8.3 Future input of cases through 'EFP ambassadors' from around the world

For the future of EFP we suggest two ways to ensure the self-sustained growth of the EFP database. First, we ask those who have already shown an interest in EFP, either by submitting briefs or registering their interest in any other way through the EFP website, and ask them to map their projects.

To this end we will pilot the idea of having 'EFP Ambassadors' in various countries and/or regions around the world. They will be distinguished FLA practitioners with at least 5-years of experience in FLA, preferably with a research background and affiliated with a research institution. We suggest that Ambassadors will have the following tasks and functions and will be motivated by several incentives EFP is able to offer them.

Table 9: Tasks and incentives for 'FLA Ambassadors'

Tasks of 'EFP Ambassadors'	Incentives for 'FLA Ambassadors'
• To identify projects in their country or region that should be mapped • To map projects • Advocate the use of EFP • Suggest further Ambassadors	• Privileged access to specific mapping data on the basis of which they can conduct their analysis, write article, engage with the community etc. • Privileged access to EFP for presenting their projects, the results of their research work • Access to EFP to source their FLA work

Ambassadors will be asked to identify projects that can be mapped, which will then be confirmed by a responsible from EFP. To make the decision we will require the following information about each identified project:

1. Name,
2. Topic
3. Theme
4. Type of FLA
5. Region
6. Project website
7. Contact details of project manager

The identified cases will then be reviewed by EFP and nominated. Once nominated the project manager or/Ambassador will be asked to map the project.

On the basis of their experience with EFP and with mapping projects Ambassadors will be able to guide their colleagues in the use and application of EFP and advocate its application in their countries or regions. Moreover, they will be invited to suggest other experts as Ambassadors.

While the role of an Ambassador implies certain obligations and contributions EFP will try to motivate them by offering privileged access to the Platform. This can take several forms. For example, it could mean privileged access to specific mapping resources such as data on the country, region, domain, FLA type that an Ambassador has contributed to. Such access can be personalised in relation to the volume and quality of input Ambassadors provide. Access to such data will provide these experts with a unique basis on which they can conduct their analysis, write article, engage with the community etc. In addition, EFP can offer privileged access to the various opportunities of the platform for presenting the projects and for the dissemination of project results. Ambassadors can also draw on EFP to source their FLA work, be it through contacts to other experts for interviews or through contact to an interested policy community.

As for the identification of Ambassadors we will proceed in a step-by-step manner. At first each partner will propose an Ambassador and UNIMAN will appoint them. Later on, further Ambassadors will be identified on the basis of recommendations from existing Ambassadors and from the EFP network.

As in the case of mapping done by EFP partners, those who map the projects can either rely on the information they know from their work on the project or on publicly available information complemented by information provided in interviews.

We will encourage experts to map their cases in the fully-fledged mode but leave them the option to map their cases in advanced mapping mode.

9 Pilot case study: SANDERA project

The methodology described in this report was tested in a pilot case study: SANDERA project. We mapped a project using the tables and questions presented above. In the following we will briefly reflect upon the mapping of the pilot case. We will outline why we chose project SANDERA, then describe how we mapped it and finally report on some lessons we learned during the mapping exercise.

9.1 Why was SANDERA nominated?

The question raises two issues: on the one hand, one might ask, why is it at all interesting to have a pilot case; on the other, why was this particular project mapped? As to the former issue, the main purpose of mapping a pilot case was to critically assess how clear and self-evident the

instructions were, how they could be improved and to what extent did they need adjustment in the programming for the web-based environment, which was not in place for the mapping of SANDERA. The latter point was examined in close cooperation with our IT partners.

Why did we choose project SANDERA as a pilot case? SANDERA is one of the six blue-sky projects financed by the European Commission on emerging issues of science and technology, more particularly on the future interaction between Security AND Defence policy and the European Research Area. Three considerations were key for our decision to pilot SANDERA:

- SANDERA fulfilled all the criteria established for the identification and selection of to-be-mapped FLA mentioned above.
- SANDERA was a 'most likely' case in the sense that we were most likely to find all the information required for the mapping. The principal investigator, project manager and several key researchers of SANDERA were in close proximity, working at MIoIR and could be easily accessed to clarify the different questions. We are aware of the fact that this might be different in other FLA we will map in the future. However, if we were not able to obtain the mapping information for SANDERA, then we would be very unlikely to ascertain the information for other cases.
- Finally, SANDERA will be also presented in an EFP Policy Brief. Mapping the project would reveal how the two instruments are both required and how they complement each other.

9.2 How was SANDERA mapped?

Since project SANDERA was mapped without the Mapping Environment in place, we used an Excel spreadsheet that emulated the web-based interface to the Mapping Environment. The spreadsheet was prepared in such a way that it can be used for mapping further cases as long as the web-based interface is not available. The information will at a later stage be transferred to the Mapping Environment. For this purpose the questions were transferred to the spreadsheet and the responses were filled in using codes of numbers for the stars shown in the tables above.

The mapping was done in several sessions. First, by providing information on basic elements that are publicly available, be it on the CORDIS or the project websites or in official publications. Second, the questions that could either not be fully answered or not be answered at all in step one, were then addressed in interviews with project team members. Finally, we raised several questions in an interview with the EC Project Officer (PO) of SANDERA. During the entire process we noted when the mapping methodology was unclear or when other challenges arose.

9.3 What did we learn from mapping the pilot case?

The mapping of project SANDERA proved to be extremely useful for the development of the mapping methodology. Several lessons can be drawn from this experience:

- First, the jigsaw used for the mapping is a very effective tool for the FLA project manager, as it makes her think about the different aspects of the project, when presenting it. She can then choose what points to highlight and to stress in a presentation depending on the audience or topic under discussion.
- In addition, the mapping showed that the jigsaw can be used as a tool to structure and guide the preparation, planning, implementation and review of a forward looking activity. Some of

the activities of SANDERA would have been planned differently and some additional activities might have been pursued had we known the mapping tool before.

- Finally, we adjusted several dimensions and questions of the methodology in feedback loops on the basis of the mapping experience of SANDERA. We expect that further adjustments may be required as we circulate this mapping report and an increasing number of team members will start working with it to map their own projects. EFP team members will record their experience and feed it back in writing to allow for the tool to be further improved.

9.4 What does the pilot imply for the quality management of mapping?

The mapping of a pilot case also entailed useful lessons with regard to quality management of the mapping. With 'quality management' we primarily refer to the quality of the data input. The latter is important as to allow for the comparison and cross analysis of mapped FLA cases. The following elements have been taken into account for ensuring the quality of the mapping data.

- **Simplicity and clarity of mapping requirements:** In EFP we will map FLA in more than thirty dimensions. Mapping the pilot case pointed to the ambiguities and vagaries in the formulation of several questions. We have been able to improve on their formulation.
- **Perspicuous representation of each mapped case – 'Fiche':** Each FLA case will be mapped using a web-based Mapping Environment. In order to assess the completeness and quality of the data it will be possible in a quasi-automated manner to generate a full and structured print out of the data put into the Mapping Environment, which we call 'Fiche'.
- **Check of all mapped cases by one team member:** One member of the EFP team will critically go over each fiche and identify gaps. She will then contact the authors or, if possible, other potential other contributors who could provide input on the project and ask for their support.

The printed Fiche will automatically fill in the information provided in the mapping in a template. Where there is no information available, it will say so, for example 'There is no entry on objectives.' This will then allow EFP team members to follow up the mapping of that particular project with targeted questions. The Fiche can, of course, also be used during the mapping by the person who is putting in the data into the Mapping Environment as means to orientation.

In sum, mapping the pilot case study has proven to be a very useful exercise that allowed us to further improve the mapping methodology and to develop a means for quality control. Further input by EFP team members shall extend this learning experience.

10 Final remarks and next steps for EFP mapping

This Guide presents the first out of three EFP Mapping Reports. The main objective of the first mapping report is to provide interested parties with a structured guiding framework to map forward-looking activities, i.e. it represents a report on the mapping methodology rather than on mapping outcomes. The EFP project will produce two more reports: 2nd EFP Mapping Report and 3rd EFP Mapping Report.

The second mapping report will discuss key findings and lessons from sixteen **Security** FLA mapped. The cases will selected so that they (1) represent the FP7 security thematic priorities; (2) take into account different geographical areas; (3) consider the different types of FLA. The report will also discuss key findings of the 16 cases. We have provided examples of such analysis throughout chapters 4 and 5 when discussing the different dimensions of the SMART Futures Jigsaw. These examples illustrate the type of analysis we will attempt to provide in the next mapping report. Finally, the report will discuss how the mapping of selected 16 Security FLA reaches new levels of depth and richness compared to the previous EFMN analyses.

On the basis of additional 20 case studies, the third mapping report will systematically examine key findings of selected **Health** FLA. To this end, the report will mainly (1) discuss key findings of 20 **Health** FLA and the extent to which they complement each other; and (2) examine how the analysis of Health FLA can inform and shape the future of research and innovation policy (at national, EU and global levels).

As a next step each partner of the EFP consortium will set up a mapping team. Each team will collect the data and conduct the research necessary to map the chosen number of cases (three per partner and forty-one for the University of Manchester).

Finally, this Practical Guide and the Mapping Environment should support the work of many European actors dealing with major societal challenges and emerging STI needs. The Mapping activities will be able to support the mobilisation of FLA players, including researchers, sponsors and the civil society. As recently highlighted in the conclusions of the Seminar on "Building the Future of 'Innovation Union' and the European Research Area" (EC, 2011), the European Technology Platforms provide a mechanism for incorporating selected, largely commercial interests, but efficient dialogue with citizens still needs to be strengthened. The EFP Mapping Environment will hopefully contribute the challenging but necessary goal of engaging European citizens in proactive forward-looking activities aimed to inform and shape our future.

Annexe 1: Draft SANDERA Bulletin

Mapping contributors	2 EFP Mappers
Leader	Manchester Institute of Innovation Research at the University of Manchester, UK
Duration	06/09-05/11 **Budget:** 599,758
Summary	SANDERA focuses on the future relationship between two critical European policy domains: namely, the EU strategy since Lisbon to move towards the European Research Area (ERA) and those EU policies focused on the security of the European citizen in the world. SANDERA will use exploratory scenarios to 2020 to examine how future developments in European security and defence policies combined with technological change and the evolution of European science and technology policy could interact in intended and unintended ways to affect the pace and character of the move towards the ERA as well as priorities for future research funding.

PRACTICES

Aims

The main aims of this project are presented in the following table.

Aim category	Content of aim
• To change/transform Strategies and policy priorities	• To identify drivers of change in the relationship between security and defence policies and the ERA
• To change/transform Paradigms and current visions	• To develop exploratory scenarios of alternative futures of the relationship between security policy and ERA and • To analyse the policy implications of the scenarios
• To change/transform Behaviour, attitudes and lifestyles	• To stimulate dialogue and promote stronger networking between the security policy and science and technology policy communities

Rationales

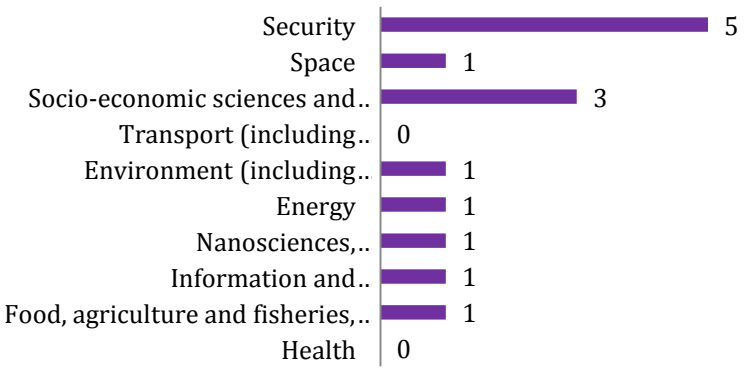
The most important reasons for undertaking SANDERA are to

- engage key stakeholders and decision-shapers;
- generate (shared) visions and scenarios and to
- generate bridges between science and policy.

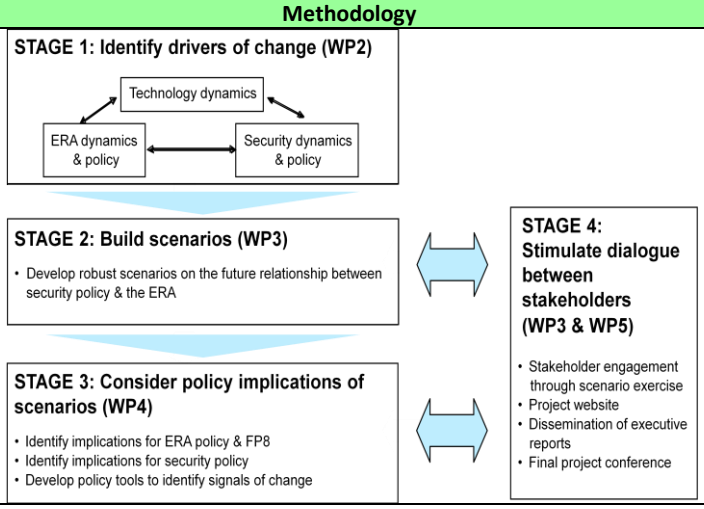
Context and domain coverage

SANDERA is a project in the context of European Commission Framework Programme for RTD (FP7) and Cross/Inter-national foresight and forward-looking activity.

It is supported by the instrument of Collaborative Projects (CP). The chart shows the SANDERA's relevance for the Themes of FP7 on a scale from 1 to 5.



Methodology and methods

Methodology	Methods
	SANDERA uses the following methods • qualitative: Backcasting, Brainstorming, Conferences/Workshops, Essays/Scenario Writing, Interviews, Literature Review (LR), Scanning, Scenario/Scenario workshops, SWOT analysis, Wild cards & Weak Signals analysis • quantitative: none • semi-quantitative: Roadmapping

PLAYERS

RTD and support teams

All in all nine partners are involved in the project:

Organisation Acronym, Name	Country	Contact	Email	URL	Activity
MIOIR, Manchester Institute of Innovation Research	UK	Andrew JAMES	EMAIL	URL	Project Leader
CNRS, Armines	FR	Philippe LAREDO	EMAIL	URL	Task Group ERA
CBS, Copenhagen Business School	DK	Susana BORRAS	EMAIL	URL	Task Group ERA
EGMONT, Royal Institute of International Relations	BE	Sven BISCOP	EMAIL	URL	Task Group Security
IE-HAS, Hungarian Academy of Sciences Institute of Economics	HU	Attila HAVAS	EMAIL	URL	Task Group ERA
IAI, Istituto Affari Internazionali	IT	Alessandro MARRONE	EMAIL	URL	Task Group Security
INGENIO, Institute for Innovation and Knowledge Management	SP	Jordi MOLAS-GALLART	EMAIL	URL	Task Group Knowledge
SWP, Stiftung Wissenschaft und Politik	GE	Christian MOELLING	EMAIL	URL	Task Group Security
LU, University of Lund	SE	Rikard STANKIEWICZ	EMAIL	URL	Task Group Knowledge

Networks and international cooperation

In the lifetime of the project SANDERA partners collaborated with other FLA projects:

Project Website	Organisation	Country	Contact person	Email	Active	Passive
URL	ICTAF	IL	Yair SHARAN	EMAIL	1	1
URL	MIoIR	UK	Rafael POPPER	EMAIL	1	1
URL	Adelphi	GE	Irina COMARDICEA	EMAIL	1	
URL	AIT	AT	Karl-Heinz LEITNER	EMAIL	1	
URL	CNRS	FR	Gilles TRAIMOND	EMAIL	1	

Participation scale and target groups

Participation		Target Groups
SANDERA involved between 51 and 200 participants. Most experts came from • Public sector (incl. research) • Private sector (incl. research) • Intergovernmental organisations (IGO)		The primary target groups are: • European Commission, • Government organisations (Departments, Agencies) • Private organisations (Corporations, Firms, SME), • Associations representing commercial interests and • Civil society.

OUTCOMES – Anticipating futures

Scenarios

"INDIFFERENCE" in 2030	"COOPERATION" in 2030
Under SANDERA's Indifference scenario, by 2030, the relationship between the European Research Area and European defence research and innovation is predominantly characterised by indifference. Despite the legal possibilities provided by the Lisbon Treaty defence research and innovation has not become a cornerstone of the ERA concept and has not entered the mainstream ERA debate. Defence is largely seen as a technology follower rather than a technology leader; innovations in defence technologies draw on civilian technologies, borrowing and modifying those solutions. While the policies for the ERA are pursued at EU and national levels, defence research and innovation activities are conducted primarily through relationships between Member States and outside the EU framework. ERA and defence R&I policies are set and implemented independently, without any noteworthy communication between the two policy communities. There is no institutionalised structure to discuss defence technology needs with ERA, i.e. the EDA remains unconnected to ERA. Hence, there is no flow of resources between ERA and defence R&I policy domains. Intellectual property rights (IPR) and research funding rules are kept separate. Actors from both policy domains keep this separation intentionally. The Indifference scenario is characterised by defence R&I not being featured among the ERA Grand Challenges.	SANDERA's Cooperation scenario envisages a future where, by 2030, the relationship between the ERA and defence R&I is characterised by closer linkages between ERA and defence research. The distinction between security and defence R&I has remained in place and the Framework Programme or its future successor continues to be restricted to civil security with non-lethal applications. However, policy actors on all sides agree that working together generates mutual benefits. Co-ordination between the European Commission and the EDA develops along the lines of the Framework Co-operation on Security and Defence Research to promote synergies. ERA and defence R&I policy-makers identify many common interests – while retaining their distinctive goals, regulations and rules, and largely working with separate funding mechanisms. ERA and defence R&I policies are set independently, but well-designed structures and mechanisms are put in place to co-ordinate policy implementation. Regular, systematic dialogue on distribution of resources leads to efficient use of financial and human resources. IPR rules are kept separate, stemming from the different research cultures and rationales in these two domains. Associate countries to the EU Framework Programme may be excluded from participation in joint R&I projects where it is deemed necessary on security grounds. Defence is not featured among the ERA Grand Challenges but receives increasing attention in ERA policy goals and rationales. However, civil security is perceived as a societal Grand Challenge and security research and innovation is addressed with the full range of ERA policy instruments.
SANDERA's Integration scenario describes a future where, by 2030, defence research and innovation is fully integrated into the ERA and has become another element of the EU's research and innovation policy very much like security, space or aeronautics. The Lisbon Treaty has opened up the legal possibility for EU defence research and a political decision has been taken by the European Council that defence research should be included in the Framework Programme and FP funds should be used for technology development in support of CSDP tasks. There is recognition by policy actors from the ERA and defence R&I policy fields that working together generates mutual benefits and that these can be best achieved through common policy instruments and funding mechanisms. Defence R&I for CSDP missions is integrated across Member States and EU institutions. ERA is a tool at the disposal of CSDP. Appropriate, carefully designed structures and mechanisms are in place to establish common rules and regulations (e.g. on funding and IPR) and to recognise mutual restrictions.	By 2030, the relationship between the ERA and European defence research and innovation policies is characterised by competition between their rationales and visions for European science and innovation. Civil society actors, distinguished European scientists and some EU institutions have raised concerns about the "militarisation" of European science in the early 2010s. They propose an alternative normative model for European research and innovation emphasizing scientific openness to the world and the free circulation of knowledge. As a result both policy domains are vertically integrated, each pursuing goals according to a separate logic of integration and without considering the other area. When both domains are integrated with an equal voice at EU level, one can anticipate conflicts associated with different political visions of the world: on one side a free circulation of knowledge championed by people associated to research and innovation capabilities and firms; on the other, the sharing at European level of geostrategic considerations.
"INTEGRATION" in 2030	"COMPETITION" in 2030

Drivers

The following drivers were considered to be most important for the envisioned development.

1. Divergent demographic developments may put EU at a geopolitical disadvantage (Soc, Pol)
2. Climate change likely to exacerbate existing conflict situations (Env)
3. Generic technologies will become increasingly important in all areas of life, including defence and security applications, and have the potential for misuse, and may therefore be increasingly 'securitised' (Techn)
4. There will be a growing shift towards a more open innovation model in the different sectors, making technologies more available and potentially fuelling proliferation risks (Techn)
5. Rising reliance of society on technologies may increase vulnerabilities (Techn, Soc)
6. The international system is likely to become increasingly multi-polar (Pol)
7. New scientific strongholds in Asia and BRICS (Pol)
8. New forms and dimensions of warfare are expected to emerge (Pol, Techn)
9. Growing attention is paid to the societal dimensions of security as well as the implications of technological change (and security policies) for personal privacy (Techn, Soc)
10. Declining role of defence as a sponsor and lead-user of advanced technologies is likely (Techn)

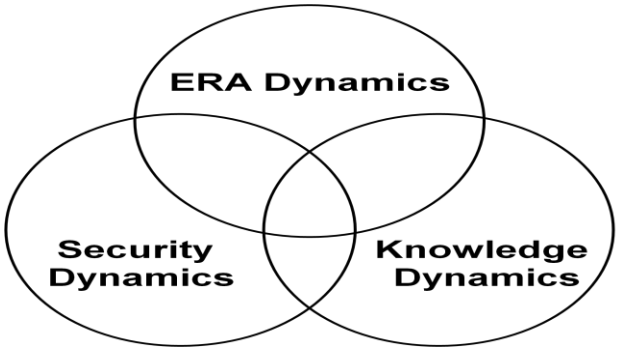
Frameworks

SANDERA developed the following key frameworks.

Dynamics influencing the relationship between policy domains

The SANDERA team identified three key elements that may influence the future relationship between the ERA and defence research and innovation policy:

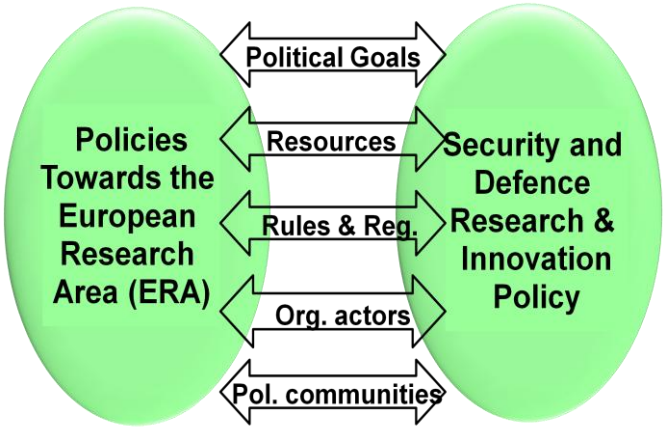
- **Knowledge dynamics** refers to the changing processes of knowledge creation, accumulation and use. Recently there has been the rapid expansion of the generic capabilities that create technological commonalities across seemingly unrelated innovation domains. Closely associated with this is the internationalisation, indeed globalisation, of innovation processes. This puts considerable pressure on the defence innovation systems of individual countries.
- **ERA dynamics** refers to the changing landscape due to the policy initiatives that deliberately try to shape and influence research and innovation in the Union. The European Research Area was launched in 2000 and has changed the governance of research (and innovation) across Europe considerably, having led to new forms of functional coordination and integration in the governance of research. ERA is a broad, deliberately ill-defined concept to tackle key institutional challenges of research and research funding in Europe such as fragmentation of research funding and research efforts, the openness of data, mobility of researchers, horizontal and vertical coordination of funding and policy making and subsequently of research activities.
- **Security dynamics** refers to the changing security and defence environment as we start the 21st Century. After the end of the Cold War, the last twenty years have seen tremendous changes in the security environment of European countries. European states face new security threats and risks connected to the rising interdependence between states, as well as the spread of new technologies upon which our societies increasingly rely for everyday life, the security of infrastructures, of energy, or of international transportation, in addition to the traditional defence challenge.



SANDERA examined three different environments of the future relationship between ERA and security and defence policy domains and identified a number of drivers of change that are likely to shape that relationship.

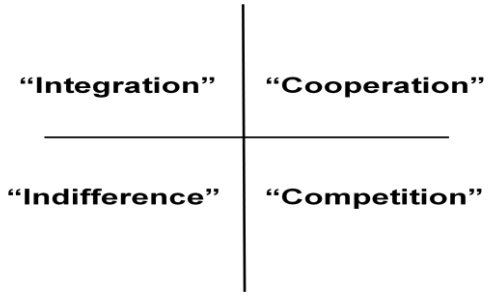
Relationship between policy domains

A policy domain is a policy issue area. It can be more or less "vertically integrated". "Vertical integration" refers to the degree to which a domain is Europeanised in terms of the conduct of the activities, how they are planned, organised, implemented, budgeted and controlled. Between two or more policy domains exist relationships, which we term "horizontal integration". The latter can be characterised – along five dimensions: goals, resources, rules and regulation, organisational actors, political communities.



Tones of relationships between policy domains

The relationship between policy domains can be characterised by ideal typical "tones": indifference, cooperation, integration, competition. On the basis of the tones the team developed four scenarios that reflect the character of the tones.



OUTCOMES – Recommending futures

Policy options

In order to move towards "INDIFFERENCE" in 2030	In order to move towards "COOPERATION" in 2030
• Enhance strategic policy intelligence capacity	• Deepen the existing dialogue
• Develop a shared vision and set common goals • Remove current limitations to collaboration	• Develop policy goals based on the principles of human security • Strengthen institutional separation
In order to move towards "INTEGRATION" in 2030	**In order to move towards "COMPETITION" in 2030**

Further research

- Compare policy instruments and structures of the ERA
- Examine the relationship between "vertical" and "horizontal" integration
- Analyse new modes of research, innovation and production in the defence sector
- Examine the mobilisation of knowledge in private industry for security and defence purposes
- Research issues of transnational cyber security
- Use of foresight for defence policy purposes
- Research the strategic independence of the EU
- European technology procurement systems for defence and security
- Refine the concept of security

Annexe 2: Evaluating Foresight

This annexe reproduces two sections of the 'Introduction to Foresight and Evaluation Approaches' chapter in *Evaluating Foresight* (2010). The first covers "*what is evaluation*?" (ibid, p. 24) while the second discusses "*key features of selected evaluation approaches*" (ibid, 25-27).

What is Evaluation?

> By the term 'evaluation', we mean systematic examination of events occurring in and consequent on a contemporary programme - an examination conducted to assist in improving this programme and other programmes having the same general purpose. By the term 'programme', we mean a standing arrangement that provides for a social service (Cronbach *et al*., 1980).
>
> … there is no 'right' way to define evaluation, a way that, if it could be found, would forever put an end to argumentation about how evaluation is to proceed and what its purposes are. We take definitions of evaluation to be mental human constructions, whose correspondence to some 'reality' is not and cannot be an issue. There is no answer to the question, 'But what is evaluation really?' and there is no point in asking it (Guba and Lincoln, 1989)
>
> Evaluation research is more than the application of methods. It is also a political and managerial activity, an input into the complex mosaic from which emerge policy decisions and allocation for the planning, design, implementation, and continuance of programs (Rossi and Freeman, 1993).
>
> [Evaluation is] concerned with judging merit against some yardstick. It involves the collection, analysis and interpretation of data bearing on the achievement of an organisation's goals and programme objectives. Evaluation usually attempts to measure the extent to which certain outcomes can be validly correlated with inputs and/or outputs. The aim is to establish whether there is a cause-effect relationship (Phillips *et al*., 1994)
>
> Evaluation is simply the process of determining the merit or worth of entities, and evaluations are the product of that process. Evaluation is an essential ingredient in every practical activity…and in every discipline (Scriven, 1994).

Key features of selected Evaluation Approaches

As result of the wide-ranging differences in definitions, we can find several approaches to evaluation. This section presents a selection of key features considered by influential scholars (see Table 10 below):

- *Tyler* (1942) is often credited with the idea of objectives-oriented evaluation, i.e. evaluation focused on the specification of objectives and the measurement of outcomes. This approach requires: formulation of clear objectives; creation of a taxonomy of objectives into major types; definition of actors' behaviour associated to each type of objective; identification of situations in which different actors show these types of behaviour; piloting various methods for obtaining evidence about each type of objective; and exploiting the most promising methods to measure the outcomes of the programme.

- *Campbell* (1957) is normally recognised for pioneering the use of experimental designs in evaluating programme outcomes. His evaluation approach favours 'internal validity' (i.e. causal relationship between intervention outputs and processes of change leading to outcomes and impacts) over 'external validity' (generalisation about findings to other settings (interventions, regions, target groups, etc.). This approach aims to produce information to improve decision-making and avoid mistakes, especially during periods of serious reforms.

- *Scriven* (1967, 1972) makes emphasis on the identification of merit or worth, thus favouring summative over formative evaluation. He warns about "goals bias" evaluators and

distinguishes between the "wrong question" – *These are the programme objectives: have they been achieved?* – and the "right question" – *Here is the programme: what are its effects?* In this approach judgements are made on consumer-driven criteria (e.g. needs assessment) rather than being management-driven. The evaluator is normally an 'outsider' who maintains a distance (and thus objectivity).

- *Cronbach* (1980, 1982) – taking a different approach to that of Campbell and Scriven – favours *external validity* (i.e. need for general knowledge to inform social action) and *formative evaluation* from within, rather than between programmes. This type of approach assumes that the primary role of the evaluator is knowledge diffusion and education. For this reason, it is often referred to as a more flexible and pragmatic approach to evaluation, ensuring that no particular conception of the scientific method should trivialise the process of asking important questions. In other words, this process of evaluation will trade-off precision against relevance, with the evaluator being considered a multi-partisan advocator – both conservative and committed to change. In terms of methods, both quantitative and qualitative tools are often combined.

- *House* (1980) suggests that the 'logic' of evaluation is not so much rational evidence but persuasion and argumentation. So evaluation should persuade (instead of convince), argue (not demonstrate), be credible (rather than certain) and be variably accepted (rather than compelling). He also condemns naïve pluralism and argues for a reformist, just and socially oriented evaluation, based on fair evaluation agreements and basic evaluation ethics.

- *Stake* (1980) looks at the evaluator as a service provider, who should enable and facilitate processes rather than provide insights. Stake also refuses the idea that research leads to knowledge, which leads to improved practice. Instead, he thinks research leads to better personal experience and, consequently, to improved practice. This approach focuses on programme activities rather than goals. In so doing, the evaluator should respond to local stakeholder requirements for information. Qualitative methods and case studies are often favoured, mainly because they tend to promote participation and increase local control.

- *Wholey* (1981) makes emphasis on performance management and cost-effectiveness of programmes. The evaluator is presented as a change agent primarily reporting to programme managers, legislators and executives. He is also concerned with the cost of obtaining evaluation information and proposes a four-step process called 'sequential purchase of information': *evaluability assessment* (i.e. How feasible is it to conduct the evaluation?; *rapid-feedback evaluation* (i.e. What can available information tell us?); *performance* (i.e. What are the main outcomes?); *monitoring* (i.e. How to assess a programme's performance over time?); and *intensive evaluation* (i.e. What is the effectiveness of a programme's activities in relation to observed results?).

- *Rossi and Freeman* (1985) positioned the terms 'theory-driven evaluation' and 'comprehensive evaluation', presented as the systematic use of social research methods to assess, conceptualise, design, implement and employ social intervention programmes. Another term attributed to them is that of 'tailored evaluation' which is simply the recognition that the "one size fits all" approach is not appropriate for programme evaluations. In other words, the evaluation should fit the programme's size and status, thus taking into account whether a programme is under construction (*ex ante*), ongoing or completed (*ex post*).

- *Weiss* (1987) argues that political intrusion in evaluation is unavoidable, mainly because programmes and policies are the result of political interactions involving support, opposition and bargaining. As a result, evaluations tend to overlook the social and institutional structures within which the problems of target groups emerge and evolve. She

favours a more strategic research where evaluation provides information on service needs, including evidence of key achievements. She looks at the evaluator as an educator, building an 'enlightening model' that leads to policy adaptation, rather than a policy turnabout. Thus, she regards evaluation as a tool, amongst many, and not usually powerful enough to steer decision-making processes.

- *Guba and Lincoln* (1989) coined the term *Fourth Generation Evaluation* which asks for responsive focusing and constructivist methodology. The former takes into account the claims, concerns and issues of stakeholders as key organising elements of the evaluation, while the latter puts emphasis on the need to develop judgmental consensus among stakeholders who earlier held different, perhaps conflicting, views. This approach supports the idea of multiple, socially constructed realities, which cannot be studied in pieces but holistically and in context. Stakeholder interviews and surveys are often preferred since they are powerful tools supporting this approach.

- *Owen and Lambert* (1998) suggest that the field of evaluation is changing in that evaluators are using more participatory approaches to conduct evaluations that take into account stakeholders' interests. In so doing, evaluators seek to involve key stakeholders in the construction of the evaluation process and product. This collaborative approach is believed to provide the conditions for the evaluator and interested organisations to jointly generate prescriptions and recommendations.

Table 10: Scholars and Approaches to Evaluation

Scholars	Approaches to Evaluation
Ralph Tyler	Objectives-oriented evaluation
Donald Campbell	Probing causes
Michael Scriven	Goal-free evaluation
Lee Cronbach	Evaluation within programmes
Ernest House	Evaluating for justice
Robert Stake	Responsive evaluation
Joseph Wholey	Performance management
Peter Rossi and Howard Freeman	Tailored evaluation, Theory-driven model
Carol Weiss	Evaluation as enlightenment
Egon Guba and Yvonna Lincoln	Constructivist evaluation
John Owen and Faye Lambert	Participatory evaluation

Despite the obvious value that the above-mentioned evaluation definitions and approaches suggest, several academics (see Weiss, 1987; Majone, 1988; Lynn, 1989; Lindblom, 1990; Ballart, 1998) have noticed that even in countries where evaluation of programmes is more frequently applied, it is not easy to identify its power and usefulness.

One possible explanation here may be related to the systems rationale, which suggests that a programme cannot be evaluated independently of its context. As pointed out by Georghiou and Keenan (2008), the importance of the context falls out at two levels: "*the need to understand the relative signal strength of* [a] *Foresight* [programme] *compared with other influences in determining the attribution of impacts, and the interactions of* [the] *Foresight* [programme] *with the strategies of the organisations it seeks to affect. Evaluation has to steer a difficult course between under- and over-attribution.*"

Annexe 3: Glossary of key terms

Champion	Champions are persons or organisations granting political support to a FLA.
Cooperation	Cooperation between different FLA projects refers to joint activities of those projects or to activities that relate to other FLA. *Active* cooperation refers to contributions and joint activities/tasks aimed to support/enrich specific deliverables of other projects, for example the granting of interviews or participation in workshops or conferences of Project A by members of Project B. *Passive* support/collaboration include references of the project/study in another network/project website/newsletters/reports/etc.
Domain	By 'domain' we wish to refer to an area of expertise or policy, for example; or to a sector or industry.
Driver	A driver is a force of change, applying to one-off, recurrent and continuous developments that are not necessarily measurable.
FHS	Foresight and Horizon Scanning
FLA	Forward-Looking Activities
Forecast	A forecast is the result of a forecasting exercise. Forecasting is an activity aimed to predict how the future will look like. Such predictions are normally based on two types of knowledge sources: judgemental and statistical. While the former aims to predict one's own behaviour as well as others' behaviour; the latter is divided into two branches: univariate (extrapolation models) and multivariate (including theory-based and data-based models).[17]
Foresight	'Foresight is a systematic, participatory, prospective and policy-oriented process which, with the support of environmental/horizon scanning approaches, is aimed to actively engage key stakeholders into a wide range of activities anticipating, recommending and transforming (ART) technological, economic, environmental, political, social and ethical (TEEPSE) futures.'[18]
Grand Challenge	Grand Challenges "are of sufficient scale and scope to capture the public and political imagination, create widespread interest among scientific and business communities and NGOs and inspire younger people. They must be capable of acting as an important tool for percolating attention at all levels of society all the way down to civil society and the public at large."[19]
Horizon scanning	'Horizon Scanning (HS) is a structured and continuous activity aimed to monitor, analyse and position (MAP) "issues" that are relevant for policy, research and strategic agendas. The types of issues mapped by HS activities include: new/emerging trends, policies, practices, stakeholders, services/products, technologies, behaviours/attitudes, potential "surprises" (i.e. wild cards) and "seeds of change" (i.e. weak signals)'.[20]

17 See Armstrong (2001)
18 Popper, 2011.
19 Georghiou, L., Cassingena Harper, J., Cooke, P., Cozzens, S., Dearing, A., Henriques, L., Langer, J., Laredo, P., Sanz Menendez, L., Weber, M. and Popper, R. (2008), Challenging Europe's Research: Rationales for the European Research Area (ERA). Report of the ERA Expert Group, European Commission, DG Research, EUR 23326. Available at http://ec.europa.eu/research/era/pdf/eg7-era-rationales-final-report_en.pdf (accessed 13 August 2011)
20 Popper, 2011.

Mapping	Mapping is a process to systematically characterise a project according to certain dimensions and criteria.
Marketing	'Marketing' (as opposed to 'dissemination') refers to activities undertaken *before* and *during* the lifetime of a project to generate awareness about the project and to solicit participation in and support for it, without communicating the outcomes yet.
Megatrend	Megatrends are developments resulting from the interconnection of several trends and therefore provide "less uncertain" hints about the future.
Pathway	A pathway charts possible issue areas, its components – single issues – how they are connected and what are their borders. It is more open than a roadmap in that it does not have a specific time schedule (or only a rather vague one), few or no milestones and does not extend to different layers e.g. technology, legal environment, political decisions.
Policy options	Policy options are any proposed actions to be undertaken by an organisation or person with 'policy' being broadly understood. The term can not only refer to measures taken by public authorities ('policies proper') but also measure taken by a private organisation e.g. a company or a NGO.
Roadmap	A roadmap is a plan with a clear timeline matching goals with specific solutions of how to reach these goals.
RTD	Research technology and development
Sponsor	Sponsors are persons or organisations providing formal financial support to FLA. They can be from either the public or private sector and are sometimes from both.
SWOT	A SWOT analysis assesses a project, scenario, organisation or any other subject of a FLA in relation to its environment.
Target Group	Target groups are kinds of persons or organisations at which a particular FLA are directed. Target groups can be reached by either involving them in the FLA process or by addressing them in the dissemination strategy.
TEEPSE	TEEPSE stands for 'Technology, Economy, Ecology, Politics, Society and Ethics.' It provides a template to systematically consider the different dimensions of a scenario, an issue, a trend or a driver.
Trend	A trend is a measureable development indicating clear and relatively steady changes over time.
Weak signals	Weak Signals are past or current developments/issues with ambiguous interpretations of their origin, meaning and/or implications.
Wild cards	Wild Cards are surprising and unexpected events with low 'perceived probability' of occurrence but with very high impact

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