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Final report

Monitoring foresight activities in Europe and the rest of the world

November 2009

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EUROPEAN COMMISSION

Final report

Monitoring foresight activities in Europe and the rest of the world

2009

Directorate-General for Research
Socio-economic Sciences and Humanities

EUR 24043 EN

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This publication is part of the series of EFMN publications. They are the result of a fruitful collaborative work done by the EFMN team.

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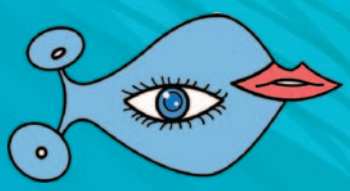
1 Introduction to the European Foresight Monitoring Network



1

Introduction to the European Foresight Monitoring Network

This chapter provides a background to the European Foresight Monitoring Network and gives some historical starting points as well as information on the approach adopted.

1.1 History

With the increasing popularity of Science & Technology foresight exercises in Europe from the mid-1990s, foresight analysts, sponsors and practitioners argued for a process of stock-taking, comparative analysis and mutual learning between the various activities. Early comparative work had already been conducted during the 1980s. However, by the mid-1990s, this information was already somewhat out-dated in its coverage, though not in its messages.

As the amount of foresight activity exploded, particularly in Europe, a number of attempts to capture these developments were made. However, these were largely limited to descriptions of a selected number of large-scale national technology foresight exercises. A notable exception was work carried out by 'Futuribles', Paris, in the mid-1990s, listing scores of future-oriented studies conducted across Western Europe.

With the spreading use of foresight around the turn of the Millennium, studies were increasingly used in a much wider set of contexts and at different territorial levels, especially with a growing focus on the regional level. This on the one hand created the need for stock-taking and monitoring of foresight activity through the sheer number of studies conducted: potentially, there was the problem of repeating previous studies as well as missing the opportunity to learn from past experiences. On the other hand, the widespread use required a much broader view, moving beyond the national level and a sole focus on technology foresight.

Aim of the report

This report is the concluding report of four years of activity of the European Foresight Monitoring Network. The report shows the backgrounds and history of the EFMN, as well as its evolution and achievements. The report provides the academic reader, as well as the policy-maker and the otherwise interested, an overview of some of the most inspiring results, as well as offering some insights into the lessons learned during the four years the programme has been running.

This first chapter provides a concise overview of the backgrounds and organization of the EFMN. The second chapter gives a more detailed insight into how the organization of work and Network development evolved. The following chapters show the evolution and results of the mapping, issue analysis, briefs production and dissemination, being the main activities of the project. The report closes with a look at the lessons learned from the project, as well as a glimpse of the possible future of the EFMN.

These developments were the underlying reasons for developing the idea of monitoring foresight activities.

With Europe the place where much of the growth in foresight activity initially occurred, the European Commission (EC) played an important catalytic role in its diffusion. This particularly applied in the case of Candidate Countries through, for example, the funding of foresight scoping and pilot actions. But also at the regional level (subnational) the Commission played a facilitating role through, for example, Networks such as FOREN[(1)], the publication of regional foresight guides and the funding of pilot regional foresight work. But many more initiatives were started, like FOMOFO[(2)], FUTURREG[(3)] and BEFORE[(4)].

In addition to the initiation of European foresight activities, the European Commission has also been an active user of foresight itself for a long time, conducting its

(1) *FOREN was an EC-FP5 project for facilitating Networking on regional development and foresight techniques (http://cordis.europa.eu/foresight/research.htm).*

(2) *FOMOFO was an EC-funded foresight initiative to develop cooperation between four European regions on foresight.*

(3) *FUTURREG was an EC-funded (INTERREG IIIC) foresight project to exchange experiences gained from the use of foresight in Innovative Actions and other regional development policies.*

(4) *BEFORE was an EC FP6-funded project performing a comparative analysis of efficient support instruments for RTD in geographical areas with demographically significant imbalances.*

Europe +30 study in the mid-1970s, followed by the establishment of the Forecasting and Assessment in Science and Technology (FAST) programme in the late 1970s. FAST was eventually superseded in the mid-1990s by the setting up of the Joint Research Centre – Institute for Prospective Technological Studies (IPTS) in Seville. Other European institutions, such as the European Foundation for the Improvement of Living and Working Conditions and the European Environment Agency have also been active in both using and promoting the use of futures-oriented work.

BLED Forum Award

In 2008, the EFMN project received the so-called BLED Forum Award for outstanding performance in foresight activities. Previous winners of this annual award were Jerome C. Glenn, Director of the Millennium Project, Maria J. Rodrigues as the author of the Lisbon Strategy, and Slovenian President Janez Drnovšek.

The Bled Forum on Europe is a scientific event organized by the Forum Bled Research Association for NGOs and companies. Emphasis is placed on foresight studies as a means of anticipating and influencing the future development of the EU and its role in both a global and regional context.

The EFMN was judged to be making a unique contribution to the European foresight community, by offering a rich and valuable source of information about foresight activities around the world.

It was the IPTS, through its European Science and Technology Observatory (ESTO) Network, that played an important role in consolidating foresight experience and learning in Europe. The goal was to provide decision-makers with future-oriented strategic intelligence, as well as to promote knowledge-sharing and mutual learning between existing and 'would-be' foresight practitioners and sponsors. Funding was provided to pilot projects for foresight mapping such as the EUROFORE[5] project. Also ways of building infrastructures to promote foresight learning were explored.

These EU pilot projects became the main pillars of the EC's Science and Technology Foresight Knowledge Sharing Platform in the Sixth Framework Programme, eventually comprising three building blocks:

1. **monitoring** of foresight developments in Europe and in major world regions, as well as disseminating the related information to practitioners, users and stakeholders;
2. the active promotion of **mutual learning** between foresight practitioners, users and stakeholders in Europe;
3. **specific studies** on prospective key issues for EU research and innovation policy.

The first building block constituted the starting point for an initiative to enhance the efficient use of information and expertise throughout the foresight community. This led to a call for tenders to create a European Foresight Monitoring Network, to be set up under the 6th Framework Programme.

1.2 The Objectives

With the creation of a monitoring Network in mind, the overriding goal of the EFMN was to identify recent and ongoing foresight developments and, most importantly, provide this information to practitioners, users and stakeholders. The main clients for this activity were research and innovation policy-makers, and managers of research and innovation schemes in Europe, as well as the foresight 'community' itself. To achieve its overriding goal, three more specific objectives were defined:

1. to **monitor** foresight activities at national, regional, international and sectoral level with implications for European decision-making. This information was to be collected by a distributed Network of correspondents collecting information about foresight projects;
2. to produce an **annual overview** of foresight activities at country level. This, known as the EFMN annual mapping review, was designed to disseminate analyses of the mapped data, highlighting different focal themes each year;
3. to identify **key emerging issues** relevant for science and technology policy highlighted in foresight activities. The identification of emerging issues was to be done on the basis of the collected future studies mapped as part of the ongoing activities.

(5) EUROFORE was an EC-funded project to establish a database mapping a selection of foresight exercises and competencies in the enlarged European Union.

In addition to providing strategic policy intelligence and a platform for knowledge-sharing and mutual learning, the goal of the EFMN was to encourage foresight programmes, initiatives and institutions to be better coordinated and supported, in close cooperation with all relevant actors in Europe, and when necessary to be geared towards common problems and issues at transnational, interregional, or European level through the EU's Open Method of Coordination (OMC).

At the start of the project, the main focus of the EFMN was on foresight initiatives. However it soon became clear that characteristics like 'participatory', 'open to alternative futures', 'action-oriented' and 'multi-disciplinary' were too limited. Accordingly a more open approach to 'foresight' was adopted, extending to the collection of information about other future-oriented and forward-looking studies and initiatives.

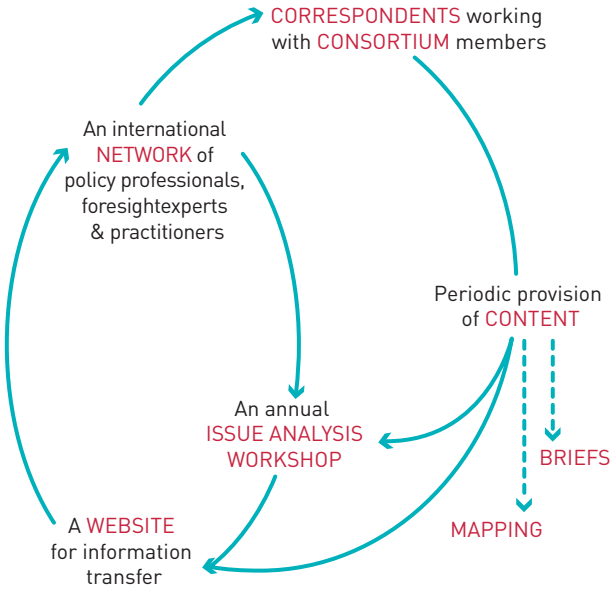
1.3 Approach

The identification of European and even global foresight projects (and other future-oriented initiatives) was at the heart of the EFMN. However the actual use of the information collected also needed to be ensured, and it was clear that the collection and exploitation of this information could not be done by the consortium alone, so building up a network was crucial to the success of the EFMN.

The concept of the project was to have an interactive set of activities, where collection, dissemination and information analysis were closely connected. In the organisation of the work, an evolutionary approach was applied, shifting from a high consortium focus to motivating the foresight community to become involved in the identification and dissemination of foresight information.

The main activities of the EFMN revolved around five core elements. First, the task of establishing and developing a foresight Network was addressed, with the participation of foresight experts around the world including active correspondents. The second activity focused on the identification and mapping of foresight and future-oriented activities, using a foresight database, while the third focused on the analysis of the information collected in order to find key emerging issues that could be of importance to the European Commission. The fourth activity dealt with the production of concise Briefs which highlighted specific initiatives, in order to intelligently inform the foresight community about recent and ongoing events, and the last aimed at the development of an interactive website as a platform for two-way information dissemination.

Figure 1: Diagram of the structure of EFMN activities



Source: Maurits Butter

The collected information was managed by the TNO Dynamo information management platform. It enabled both consortium mapping and data analysis activities, as well as powering the EFMN website with information.

1.4 The EFMN Consortium

It is clear that the work of the EFMN was complex and called for a rapid response. To ensure quality and broad coverage of the data collected, a consortium was created of 11 European partners, comprising a significant portion of foresight expertise, for an initial duration of four years (2004-2008). The consortium's partner organisations were all highly experienced in foresight methods and analysis, and are familiar with the conduct and administration of European projects. Collectively, the consortium was designed to be able to contact leading foresight practitioners all over the world, with detailed knowledge of the work they do.

Project coordination was in the hands of the Dutch research organisation TNO, which was responsible for the overall management of the project and Network

development. Four Core Partner organisations were responsible for specific strands of the work:

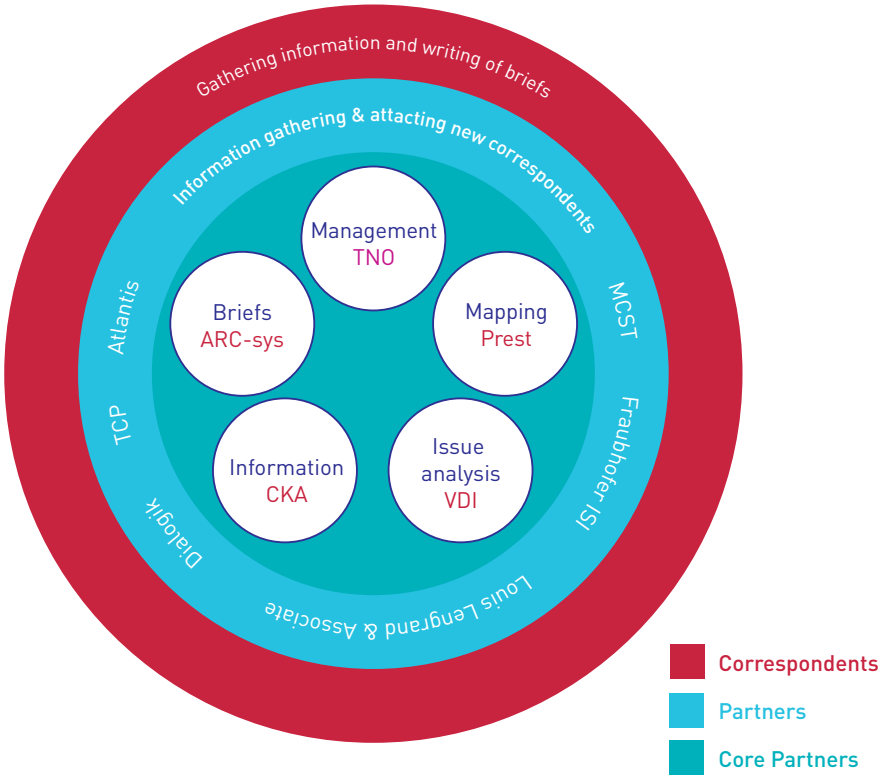
1. mapping of foresight initiatives: Manchester Institute of Innovation Research;
2. issue analysis: VDI;
3. briefs production: The Austrian Institute for Technology[6];
4. website and information dissemination: CKA.

Other Partners contributed to the collection of foresight initiatives and Briefs production, also some were involved in the annual issue analysis. These partners included: Atlantis, Fraunhofer-ISI, Technology Centre Prague, Louis Lengrand Associates, Dialogik and the Malta Council for Science and Technology.

Using this two-layered approach, the consortium gained broader geographical coverage and a richer set of technical skills.

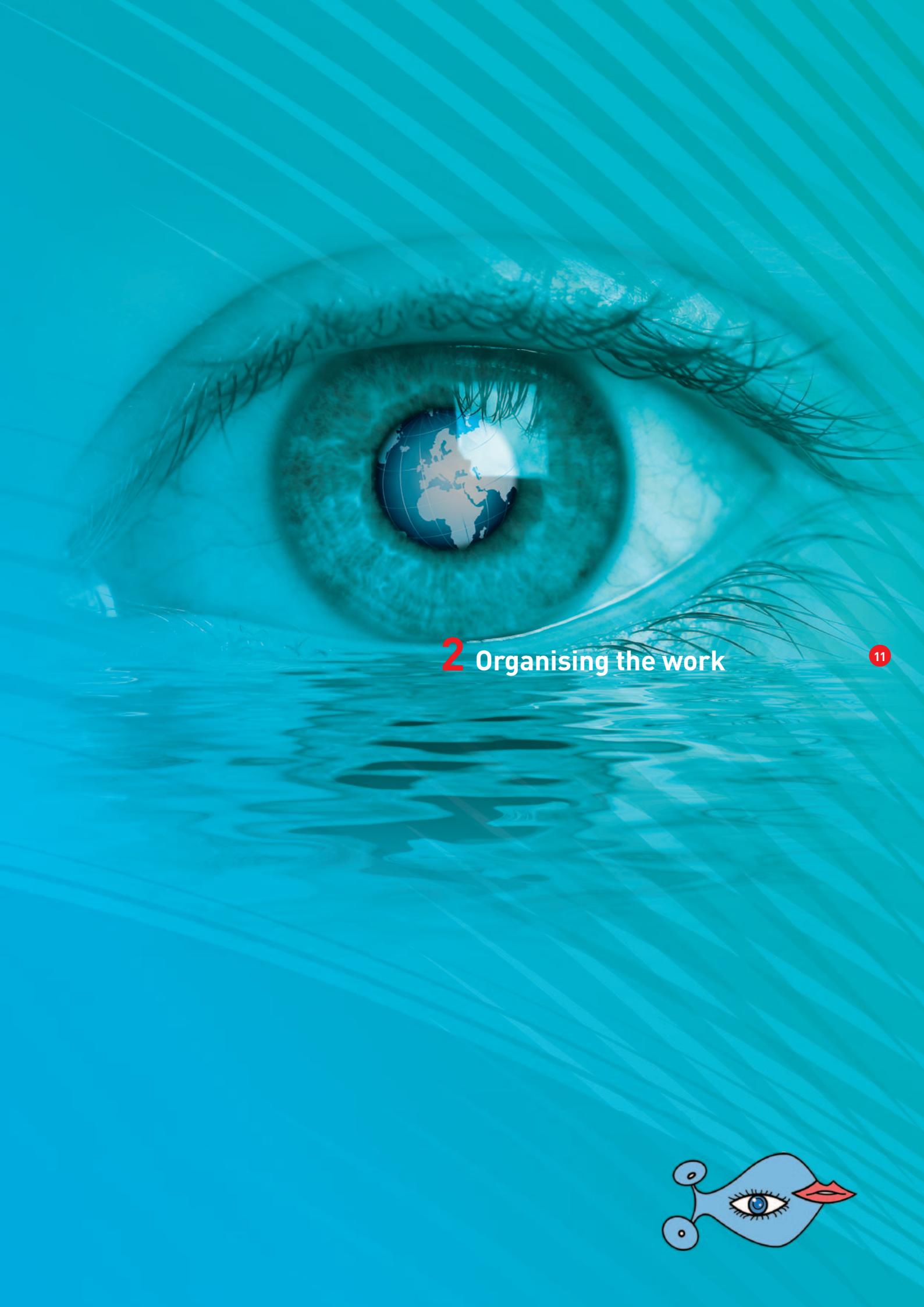
Next to these formal EFMN partners, an outer circle of so-called Correspondents complemented the activities of the consortium. They ensured a more open approach to data collection and analysis and they contributed considerably to the identification of new foresight initiatives, as well as the production of Briefs.

Figure 2: Organisational structure of the EFMN



Source: Maurits Butter

(6) *Presently known as the Austrian Institute for Technology.*



2 Organising the work

2
Organising the work

This chapter focuses on the Network and community-building activities of the EFMN. With the project depending on a strong Network, community building necessarily touches on all activities. Such being the case, these will be only briefly mentioned in this chapter, with subsequent chapters on each activity laying out things in more detail. Here the focus is on the organisation of the activities with, first, a concise overview of the different activities and work packages. This is followed by the original strategy for Network building as well as an overview of the different actors in the Network. Because of their special role, particular attention is paid to EFMN Correspondents, who are associated external experts helping achieve the Network's objectives, and the activities organised for them.

2.1 The evolution of the Network

The success of EFMN depended largely on the organisation of the work; the links with the foresight community were considered particularly crucial. The completed project would only be successful with substantial participation by the external experts; both in terms of information collection and usage. To keep mapping information up-to-date and achieve the desired geographical scope, the EFMN required a high-level participation of external foresight experts from Europe and the rest of the world.

The organisation of the Network comprised three different layers:

1. the Core consortium Partners;
2. the other consortium Partners;
3. the Correspondents.

The five Core Partners of the EFMN consortium were the heart and inner circle of the Network. They organised activities and developed the templates and first versions of project results. They were also responsible for the creation of the 'critical mass' needed to get other external foresight experts (Correspondents) involved.

The other Partners of the EFMN consortium enhanced the production of the results to help achieve this 'critical mass'. They also provided access to the regional foresight communities, introducing them to the EFMN Network. They contributed their expertise, as well as new initiatives and Briefs.

In cooperation with the publisher *Emerald*, the EFMN has published part of its work in the journal *Foresight*. In a special issue of the journal (Vol 10, No 6, 2008), several partners published papers introducing the EFMN, showing some of the work on mapping, issue analysis and more general insights gained during the project. This special issue was well received, and two of the papers were rated among the best papers in *Foresight* in 2008.

The third layer of the EFMN comprised the Correspondents actively involved in the EFMN. These external foresight experts provided suggestions for new initiatives and contributed to the production of Briefs. Some also participated in the annual issue analysis on specific themes, besides 'spreading the word' to the rest of the foresight community. Over the four years of the programme, the number of EFMN correspondents grew to about 150 experts. While, at the beginning, Correspondents were nominated by Partners, in the final years interested outsiders tended to approach the EFMN direct. All work of Correspondents was voluntary, hence the activity levels of individual Correspondents differed greatly and varied over time. In return, Correspondents enjoyed exclusive access to the database containing the mapping information. However, voluntary participation is difficult to rely on and, although necessary for a sustainable Network, requires constant community building by Partners to keep members actively involved.

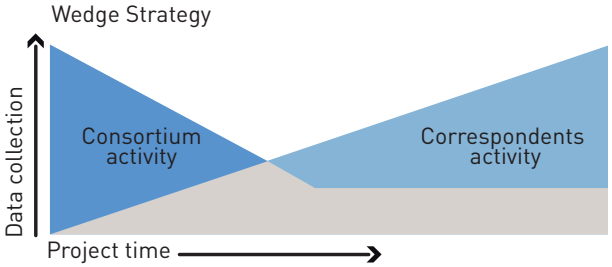
In addition to the three layers that contribute actively to the activities of the EFMN, currently over 1 700 experts from all around the world are on the EFMN mailing lists. These include the passive user base that accesses the collected information and project reports. EFMN Briefs are particularly widely read by this group which comprises researchers, policy-makers, consultants, companies and other interested individuals. This large user base has over the years been used for identification of experts for workshops organised by the European Commission.

2.2 Setting up the Network

The first task in the project was the establishment of an active Network. The approach was based on a two-stage strategy. In order to ensure high quality outputs from the very start, the consortium Partners adopted a hands-on approach for the first two years, taking direct roles in country monitoring and analysis. This work was

supplemented with inputs from additional Correspondents from outside the core consortium. Maintaining the quality and relevance of inputs involved an interactive quality control process to help correspondents learn from each other on how to ensure that their inputs were of consistently improving quality. Core Partners assumed a continuous role in the analytical components of the project and retained responsibility for the production of project outputs. Accordingly, a 'wedge' strategy was used to build up the Network and put it on stream. This idea is illustrated in the diagram below.

Figure 3: Wedge strategy



Source: Maurits Butter

The early stages of the EFMN focused on the start-up of the Network. This included both establishing the infrastructure and activating the Correspondents. The Partners assumed primary responsibility for monitoring foresight activities, each Partner being assigned a number of countries. At the same time, each Partner established links with Correspondents in their assigned country group, in order to build up a self-sustaining Network over time. Where additional local knowledge of individual countries was required, for example due to language barriers, partners outsourced work to local experts.

The second stage of the project saw full use of the infrastructure. Coverage of all country activities was established by the consortium Partners after the first period – the objective being, as outlined above, to hand over monitoring activity to the country Correspondents over time. Such being the case, some of the core Partners had to carry on monitoring in the second stage of the project. However, this was expected to be transferred to a vetted and tested group of Correspondents on handover.

On handover to Stage Two, the objective was to have as much of the data gathering as possible standardised, in order to allow cost-effective, high-quality data collection by experts outside the consortium. The expected advantages of organising the Network in this way were:

- maximising the quality of the Network and data collection from the start, building upon extensive core member contacts and existing knowledge of European and international foresight monitoring and mapping;
- bringing the methodological and analytical expertise of foresight experts into the Network formation process, so that information-gathering protocols could be targeted to the most relevant information;
- providing direct contacts between the monitoring network (Correspondents) and the data analysis activities under the responsibility of core Partners, continuing these through Stages One and Two.

2.3 Mapping of foresight initiatives

The second activity aimed at the identification and mapping of foresight projects and other future initiatives. Using first the EFMN Partners and, later, the external Correspondents, individual initiatives were identified and mapped according to specific indicators (e.g. country coverage, sponsor types, methods used). This information was essential to making an assessment of developments in the foresight community, as well as providing the foresight community easy access to interesting initiatives.

In principal, the procedure for collecting initiatives involved a number of steps. In the first instance, foresight exercises were simply nominated by Partners and Correspondents and sent to the Partner responsible for mapping. This Partner also browsed the Internet and other sources to find individual initiatives. Additionally, network members could suggest new foresights by sending information about them to an EFMN partner.

The initiatives were then entered into the TNO *Dynamo* system and mapped according to a number of characteristics. Nomination involved entering some basic information relating to a handful of indicators. More extensive mapping of foresight initiatives tended to be carried out by Core Partners – or by those who were directly involved in the exercise (sometimes specific Correspondents) – and involved mapping foresight exercises against a wider range of indicators and normally uploading some of the main reports and publications emanating from the exercise.

The *Dynamo* system holds a library of foresight reports, unrivalled anywhere else on the Internet. While geographical coverage is widespread – with hundreds of initiatives mapped from North and South America, for example – the vast majority of exercises are European, reflecting the openly Eurocentric bias of the EFMN consortium and its sponsor's interests. Nevertheless, there

is sufficient data for comparative analysis between countries and between world regions. This analysis, together with other cross-tabulations, is published annually as the EFMN Annual Mapping Report[1].

2.4 Issue Analysis

The third activity within the project analyzed the information collected and identified emerging issues for science and technology. This data has been used to underpin an annual Issues Analysis Report, focused on the analysis of a specific annual topic.

The aim of this activity was to identify and analyze key emerging science and technology issues that emerge from foresight exercises relevant to European Union policies. In particular, interest focused on S&T policies in foresight activities in Europe at national or regional level. The outputs were designed to contribute directly to EU research and innovation policy development.

The issue analysis comprised the following tasks:

- scanning, screening, selecting and listing S&T issues: screening of important foresight exercises to identify interesting science & technology developments, innovations and issues;
- analysis of broader issues and implications, such as determining socio-economic factors or conditions that might help explain the identified key emerging scientific and technological policy developments;
- assessment and comparison: detailed analysis of the results of foresight activities, programmes or projects in Europe that show some degree of commonality, assessing relevance to EU-level policies.

Although the approach has varied from year-to-year, the Issue Analysis Reports offered a list of issues to the EC for consideration, with the latter making the final decision on the topic(s) to be chosen for further analysis and workshops. At the annual workshops organised by the European Commission, issue analyses were presented to Commission officials and outside experts, in order to consolidate the results and explore the European dimension.

2.5 Foresight Briefs production

Perhaps the most widely used outputs of the EFMN up until now have been the Foresight Briefs, which have proven particularly popular with policy-makers in the EC. They are short documents, restricted to four pages, that are quick and easy to read and focus on specific foresight-related topics that are noteworthy for their novelty or importance. Most summarise the results of a recently completed or on-going foresight activity that deals with currently debated policy topics, such as the hydrogen economy, the knowledge-based development of rural economies, and the sustainable exploitation of marine resources (see Annex II for a full overview of Briefs produced).

The purpose of these Briefs was to provide readers with concise, up-to-date overviews of the motivation, process and results of recent or ongoing foresight exercises. They were designed to strike a balance between succinctness and sufficient detail, allowing the reader to assess whether it would be worthwhile consulting the original sources or contacting the people involved in the implementation of the exercise. The content was presented in such a way as to be relevant to decision-makers in European, national and regional policy, as well as in industry. With this in mind, foresight Briefs were written to be concise and easily accessible in terms of language and style, while featuring up-to-date and useful information.

The led to the formulation of four criteria for high-quality Foresight Briefs:

1. **actuality:** results reported were to be of recent nature and certainly not more than 2-3 years old. Intermediate results from ongoing activities are also featured;
2. **relevance:** Briefs were to focus on issues of interest to policy professionals, and elaborate on issues of particular relevance to RTD policy;
3. **anticipation:** the exercise reported should have a medium- to long-term horison of 5-20 years, depending on the S&T dynamics of the topic considered;
4. **participation:** activities reported should be highly participatory in nature, a key characteristic being to distinguish foresight from other futures-oriented work.

Next to the goal of making foresight information accessible to decision-makers, the Briefs also played an important role in EFMN community building. From the standpoint of the authors of foresight Briefs, who were often actively involved in the implementation of specific exercises, they represented a unique opportunity both to present their work to an international community of peers and to enter into a process of information exchange with other experts and practitioners.

(1) Keenan et al. (2005); Keenan et al. (2006); Popper et al., 2007; Popper et al (2009).

The success of the foresight Briefs depended, and still depends, on the willingness of individuals to make interesting contributions on a voluntary basis. This adds to the growing list of Briefs and contributes to a rich content-driven information base of recent foresight activities not only in Europe but also in other world regions. This interest from international correspondents shows the potential for this activity, not only at the European level but also globally. Following the 'wedge' strategy outlined at the beginning of this chapter, most Briefs initially written by project Partners. Over time as the Network become better known, with results published on the Internet, more and more Briefs were produced on a voluntary basis by EFMN Correspondents from around the world. In the final stages of the project the majority of Briefs were written by volunteers.

2.6 Information dissemination

All the efforts in monitoring, mapping, issue analysis and Briefs production had to be disseminated on the widest possible basis to have real impact: the success of the project depended on its actual use. The goal was to reach policy professionals, foresight experts, foresight practitioners and, indeed, anyone who is interested and hopes to benefit from such work.

To put this into practice, a website – www.efmn.eu – was developed which (still) provides access to all content created by the Network, including the Foresight Briefs, the annual Issue Analysis Reports, and the Annual Mapping Reports. An important aspect of the web portal is support for the visualisation of information gathered under the mapping and Brief-writing activities. In this regard, an interactive Europe map has been provided that executes a search with a simple click on a country. An interactive world map conducts a similar search with a click on a world region. A search interface has also been established, allowing users to search for foresight exercises against most of the mapping indicators used in the *Dynamo* system.

The key to keeping people interest in the Network's activities is to regularly communicate with the audience via the website. The most important tool has been a periodic newsletter, summarising 4-5 Foresight Briefs, linking directly to the content on the site. Every time newsletters were issued, the activity on the website would increase considerably for 1-2 months. The newsletter was sent to a mailing list of interested people that had subscribed to the EFMN newsletter via the website over the years. By the final stage of this project, the newsletter was being emailed to about 2 000 people, providing a rich passive Network interested in foresight and futures work.

To further serve the needs of the foresight community and reinforce their use of the website, an Events Calendar and links to a variety of useful resources were added. There is a specific section that allows Correspondents to provide information about themselves, making it attractive for volunteers to contribute to the Network with the status of Correspondent. However by no means all EFMN Correspondents have published their details this way.

In addition to the online dissemination activities, the EFMN Core Partners have also organised annual Correspondents Days, small workshops aimed at disseminating information about the services and products of the EFMN.

3 Mapping foresight initiatives

3
Mapping foresight initiatives

This chapter describes the evolution and background of EFMN mapping activities. Some of the information contained in this document is based on two recent papers published in the special issue of the journal *Foresight*[1], as well as on the EFMN Mapping Reports published in 2005-2008.

3.1 The evolution of mapping

One of the major activities of the EFMN has been the identification of foresight initiatives, their mapping and the collection of the data that emerges from them. The overall aim was to allow policy makers, programme managers, foresight practitioners, and anyone else with an interest in foresight and its results to gain a rapid overview of foresight activities in Europe, whilst providing the option of focusing upon a particular region, domain area, method, etc. for further investigation. The mapping served to unlock the most relevant data about current foresight activities and trends, and to offer insights into different methodological approaches.

At the start of this project, the mapping activities were divided into four steps, from identifying exercises to delivered results:

1. the **identification** of foresight initiatives: different stakeholders were involved in this process;
2. the **mapping** of the initiatives: this mapping exercise involves providing input to the *Dynamo* system to qualify a foresight exercise as adequately mapped;
3. the **quality control:** this requires feedback from the person responsible for the foresight exercise, so that the information provided by the Core Partner can be enhanced where appropriate;
4. the **reportage:** an annual Mapping Report is produced, representing the synthesis of the mapping activities and analysis of the results.

Award winning papers based on the work of the EFMN

Every year *Emerald* invites each journal's Editorial Team to nominate what they believe has been that title's Outstanding Paper and up to three Highly Commended Papers from the previous 12 months.

In 2009, two of the EFMN papers published in the *Emerald* Special issue on the EFMN received the award:

- The paper **Comparing foresight style in six world regions** published in *Foresight* was chosen as a **Highly Commended Award Winner** at the Literati Network Awards for Excellence 2009.
- The paper **How are foresight methods selected** published in *Foresight* was chosen as an **Outstanding Paper Award Winner** at the Literati Network Awards for Excellence 2009.

But before work could start, a mapping approach had to be developed which would map the initiatives on usable indicators. A mapping framework was developed based on earlier work done under the ESTO EUROFORE project but, because this showed suboptimal usability for most potential users of the database, a new structure was developed. Focus was on impact, as the ESTO indicators paid insufficient attention to the results of the exercises mapped and their policy impacts. This framework was then tested before collection and mapping commenced.

Once the data collection protocols have been piloted and finalised, the Correspondents' Network started its data collection work **(identification)**. An important change in the original focus was that the initiatives to be identified changed from pure foresight exercises (participatory, action-oriented, etc.) to more forward or future-looking initiatives. This shift was due to the fact that differentiation would be difficult and actual users (i.e. policy-makers) would not make the distinction, as they would be looking for any initiatives that could help them anticipate the future. As for the approach, the identification process was initially based on the 'wedge strategy': 1) have the consortium select a certain number of initiatives 2) once a critical mass

(1) *Evaluating foresight: An introduction to the European Foresight Monitoring Network (2008), Vol 10, No 6, Emerald Group Publishing Limited, Northampton.*

was established, shift the work to the Network. The experts in the Network would be better acquainted with the initiatives and could offer their broad expertise. However, this process proved unrealistic, as these external experts were not prepared to offer their involvement unpaid. So the approach was changed to ensure a more dedicated team effort. The Network was only asked for suggestions, and the work was done by the mapping team.

Raw data was entered and **mapped** on an online database which allowed it to be collated and displayed in real time. Here also, it was planned to use the 'wedge strategy', but the mapping proved to be an activity involving a steep learning curve, and individual experts could not be persuaded to get involved. Even the original broad 'consortium' approach had to be more centralised on the mapping team to be efficient. Although some individual initiatives were mapped by individual consortium Partners, the bulk of the mapping was done by the mapping team.

Quality control evolved in the same way. The original approach was to have the consortium Partners and external experts look at the mapped initiatives and provide comments for improvement. But more initiatives were identified than originally planned. And getting the Network involved proved to be a problem because of the learning curve and the lack of incentive for the participants. In the end, quality control became an internal team activity. And the objective of ensuring a high quality of a small number of initiatives changed to having a large number of initiatives of lower quality. The consortium concluded that the community would be more interested in access to a large number of initiatives. To address this issue of varying mapping quality, an indicator was developed to show the different quality levels.

The last step of the mapping process was the further analysis and **reportage** of the results on an annual basis, in order to generate a full map. Initially, the Annual Reports were to include a country overview of foresight initiatives and a visualised results analysis of some of the indicators. The approach developed proved to be too complex to include all possible cross-tabulations and other mapping results. Also, the increase in data over the four years demonstrated the feasibility of improving interpretation of the results in the reports, as the actual results would not significantly change over time. So, the annual mapping reports not only included an annual assessment, but also new perspectives using different mapping indicators.

The final results and background information will be found in the following sections.

3.2 The methodological approach

The development of the mapping approach (mapping dimensions, indicators, etc.) used the structure of a previous EC-funded initiative (the EUROFORE Project) as the starting point. This project included already about a hundred foresight initiatives mapped on specific indicators. However, the feedback from the community showed that the mapping structure was not optimally designed for maximum usability and the mapping itself was very complex.

Development of the mapping structure was finalised with four hierarchical levels of mapping and lower level mapping included in the higher levels:

1. **level 0 – Nominated:** this level only covered the entry of an initiative on the database, featuring just the title and possibly some other information, in order to be available for further elaboration;
2. **level 1 – Basic mapping** to have the initiative included in the database so that the community is informed of a specific initiative; open fields of entry are title, description, website; codified indicators used are year of conduction and country coverage; when available, reports are uploaded to the database;
3. **level 2 – Detailed mapping** for statistical analysis; additional open fields of entry are contact information, executor, sponsor, funding, territory name; additional codified indicators are time horison, duration, territorial scale, period, methods, sponsor type, audience, output and number of participants;
4. **level 3 – Full mapping:** this highest level of mapping includes more qualitative information; three open fields were added for expert analysis: objectives, impact, benefits and limitations. codified dimensions were also added: impact, consumer needs coverage (CPI), research disciplines (Frascati) and industrial sectors addressed (NACE).

Most indicators could be mapped using a codified structure by simply using tick boxes, enhancing efficiency and enabling cross-tabulation analysis. Using this codified information, different indicator dimensions could be related, e.g. featuring the different methods used for different audiences (e.g. which initiatives comprise audience A and method 1?).

About 50 % of all collected initiatives were mapped at Level 2 (14 codified indicator dimensions) and about 10 % at Level 3, giving an enormous dataset for analysis. As two, even three, dimensions could be combined in an analysis, in theory hundreds of cross-tabulations could be processed. Also the qualitative information could be connected with the codified indicators,

permitting analysis of the differences between the objectives of different sponsors, for example.

Although this document is not the place to go through the 14 indicator dimensions, some dimensions have particular merit as they are crucial foresight characteristics. For these dimensions, some output conclusions are given in the results section, although for a more detailed description of the mapping results we need to refer to the Annual Mapping Report.

The first indicator dimension worth mentioning is foresight 'methods'. This indicator dimension is divided into three subcategories: qualitative, quantitative and semi-quantitative, including 24 classes:

- the first sub-category covers qualitative methods. These are often used to provide meaning to developments and observations. Such interpretations tend to be based on particular views, beliefs and knowledge which may be difficult to corroborate, since such methods provide a lot of room for creative and subjective thinking. Altogether 15 qualitative methods have been included in this category: back casting, brainstorming, citizens panels, environmental scanning, essays, expert panels, futures workshops, gaming, interviews, literature reviews (LR), morphological analysis, questionnaires/surveys, relevance trees, scenarios and SWOT analysis;
- the second category of methods covers quantitative techniques. These are often used to monitor measurable variables and to apply statistical techniques to process and analyse the 'hard data' or indicators. EFMN mapping considered three quantitative methods: bibliometrics, modelling/simulation and trend extrapolation/megatrends;
- the third category includes semi-quantitative methods. These tend to apply mathematical principles to quantify opinions or judgements of experts, for example. The database included six methods from this category: cross-impact/structural analysis, Delphi surveys, key/critical technologies, multi-criteria analysis, stakeholder mapping and (technology) roadmapping. Finally, a category labelled 'other methods' was included in mapping. This was used when an exercise applied methods like benchmarking, patent analysis, etc.

In addition to these 24 methods, an open field of [other] was used in the project. Analysis showed that this tick box was used frequently, and further analysis is needed of the additional methods used. From experience with this indicator dimension in the project, the conclusion can be drawn that further elaboration would be appropriate.

A second dimension is foresight 'output', which is important because it gives an insight into what the audience might expect in terms of results. It includes policy recommendations, analysis of trends and drivers, scenarios, research and other priorities, forecasts, key technologies and technology roadmaps. This dimension was set up at the start of the project and it can be concluded that additional thought should be given to developing it from a user viewpoint.

As the project was initiated by the European Commission and regional scope was part of the Commission policy on foresight, the indicator dimension 'territorial scope' was added to the mapping structure. This dimension should provide more insight into how national, EU regional and European foresights differ. This dimension included the following classes:

- the subnational level, including initiatives addressing issues within country regions;
- the national level, including initiatives to address country-specific issues;
- supranational, including initiatives that address country-specific issues, but from a multinational perspective (within international cooperation);
- transborder, including initiatives that have an international character and so not address country-specific issues.

Of course, sponsors are an important aspect to address, as analysing these sponsors will give input to the foresight community for initiating and developing foresight activities. The sponsor dimension has been divided into the following classes: research, government, business, non-governmental organisations, inter-governmental organisations, and the general public. Analyses of their funding, preferred methods, preferred outputs, etc., are of great interest to the foresight community.

The viewpoint of the audience is important in defining foresight initiatives. This perspective has also been addressed, using an indicator scheme with the following categories: research community, governmental agencies and departments, firms, trade bodies/industrial federations, trades unions, non-governmental organisations, intermediary organisations. As in the case of the sponsor dimension, analysis of this dimension can help foresight experts adjust their activities and results to the user group.

3.3 Identifying new initiatives

The process of identifying new initiatives was divided into various steps. First, the mapping team would browse the Internet, look through reports and use the consortium as well as their individual networks to identify major recent and ongoing initiatives. This process identified almost 80 % of all interesting initiatives. These initiatives were then entered into the database. Besides the 11 Partners of the EFMN there were also about 150 Correspondents (mainly foresight practitioners, sponsors and policy-makers) involved in the mapping process.

A more focused effort was also developed to complement this process. Drawing on the Correspondents network and the private networks of the consortium Partners, a periodic 'call for initiatives' was sent to individual country experts. This call was tailor-made and included a list of already identified foresight initiatives with the request to make suggestions on omissions. This procedure was effective, because the mailing was both personal and motivating for these experts.

Beside these two procedures, the website also included a function enabling visitors to send suggestions to the website team on new or missing initiatives. This procedure only prompted limited input to the database.

All in all, these procedures were effective, but called for considerable efforts from the consortium. A new way of identifying initiatives with the help of the Network needs to be developed in order to reduce resource use of the mapping team and to enhance efficiency.

3.4 Mapping the initiatives

The second core activity of the mapping process is the characterisation of initiatives using the indicator dimensions developed by the consortium. This was done using the *Dynamo* system database, accessed over the Internet by agreement with the Dutch TNO organisation. TNO allocated a user name and password to all authorised participants. Once a participant was accorded access, he/she could see and edit existing information on foresight projects, as well as add new data. Only some of the information contained on the *Dynamo* system was publicly available through the EFMN website (www.efmn.info and www.efmn.eu).

The *Dynamo* system was developed by TNO in cooperation with the Dutch Ministry of Economic Affairs, with the purpose of systematically gathering information about future developments. It was subsequently adopted and adapted for use by the EFMN, where its basic function has been to offer an interface to collect information efficiently about identified foresight exercises (www.dynamo.tno.nl).

Mapping of the collected initiatives is undertaken by the consortium's mapping team, as the work involves a steep learning curve: the 14 dimensions are complex and it takes a significant amount of time to get acquainted with them. Also getting to know the *Dynamo* system and its limitations takes some time. In addition to these more operational issues, consistency of mapping is enhanced by restricting the work to a specialised team. Even though all EFMN deliverables are written in English, one of the issues that emerged from the first mapping efforts was the problem of language. Not all the foresight reports in EFMN were written in English, which required a division of labour between the different country Partners in the project. This had some impact on the makeup of the project team supporting English, Spanish, German and Dutch. Other experts were included temporarily to support Korean, Turkish, Japanese and French.

An important element in the mapping process is **quality control** to validate the data entered into the database. To do this, it was essential to have access to the contact person in each of the foresight exercises. This person, who would have been involved in the preparation of the activity, would then be able to provide feedback on the accuracy of the exercise.

The procedure for quality control was the following. A person involved in the management and execution of the foresight exercise was contacted by email, provided the email address was available in the database file of that foresight activity (automatically activated by the system). This email stated the purpose of the quality control and why it was essential that the person addressed assist in the mapping process: the accuracy and reliability of the information could only be assured if someone directly involved in the exercise verified it. Emails often failed to reach addressees due to delivery glitches, or the person in question did not reply. In such cases, the email is sent again. If at this stage the person had not responded, then the telephone was another means of reaching him/her. When the person replied, either by email or phone, any amendments were done manually.

3.5 The results

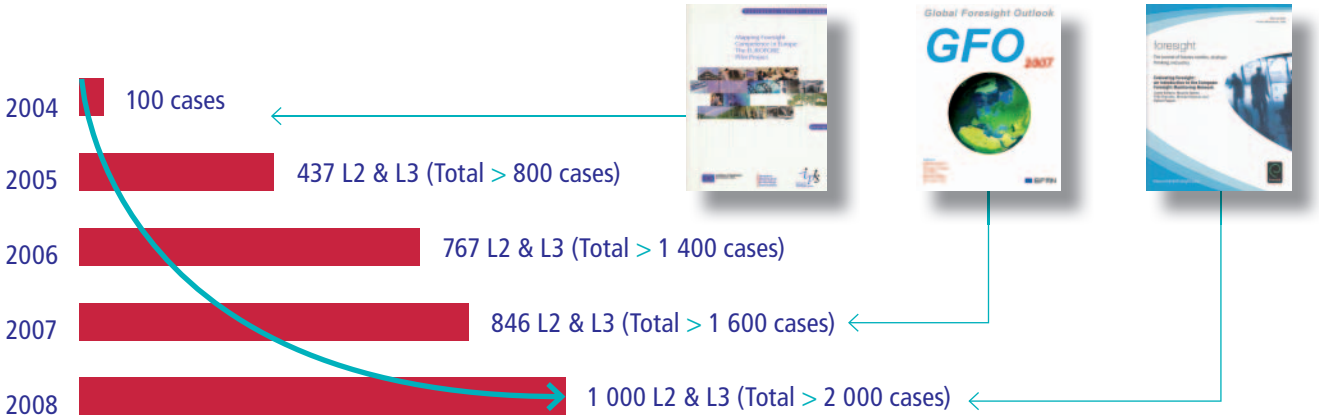
The mapping of foresight activities was launched in 2004, aiming to provide a single location where foresight exercises from Europe and other countries of the world could be stored. It started with the compilation of a small number of foresight exercises which were later on expanded. The work started in 2005, when more than 400 exercises were mapped and, from then onwards, the number of foresight exercises mapped increased dramatically. At present, the overall number of foresight initiatives collected in the EFMN database is 2 057, which greatly exceeds the original expectation of about 500. Over 50 % of them have now been mapped (characterised at minimal level 1) and over 2 000 experts from all over the world make use of the information. The evolution of foresight mapping activities is illustrated in the figure below.

The foresight exercises are presented in six regional contexts:

- an International context, where funding comes from international organisations such as OECD, FAO, UNESCO, UNIDO and the World Bank. These organisations have provided considerable methodological support to the foresight activities (67 cases);
- a European context, dominated by European studies but also transnational exercises. The countries involved in these exercises also include states outside the EU, such as Iceland, Norway, Switzerland, Turkey, Ukraine and Russia. Foresight activities have increased considerably in these areas over the last ten years (713 cases);
- a Latin American context that includes Argentina, Bolivia, Brazil, Chile, Colombia, Cuba, Ecuador, Mexico, Panama, Paraguay, Peru and Venezuela. Latin American countries have started implementing foresight activities gradually, mostly under the influence of initiatives carried out in Europe (120 cases);
- a North American context including the USA and Canada. North America has a long tradition of technological foresight. One of the first approaches (the Delphi method) was developed there during the 1950s and the 1960s (109 cases);
- an Asian context, with China, India, Japan, Singapore and South Korea as leaders in foresight activities. The Japanese experience is widely known and has inspired many other countries. Also, within the Asia-Pacific Economic Cooperation (APEC), a technology foresight centre was set up in the late-1990s: this centre undertook several of the initiatives mapped by EFMN (89 cases);
- Oceania, especially Australia and New Zealand. The number of foresight activities in these two countries is extensive, though the number of foresight exercises mapped by EFMN does not represent the real number of foresight exercises available (15 cases).

EFMN has given particular emphasis on mapping foresight activities in European countries, delivering case studies on the following countries: Belgium (17 cases); Denmark (25 cases); Finland (50 cases); France (119 cases); Germany (57 cases); Italy (17 cases); Netherlands (181 cases); Norway (21 cases); Spain (44 cases) and United Kingdom (144 cases).

Figure 4: EFMN mapping progress during 2004-2008



Source: Rafael Popper

Over 500 foresight initiatives were mapped at the highest level, including qualitative information on **objectives**. By analysing this information, conclusions were drawn on the most common objectives of foresight exercises. These objectives were:

- fostering STI cooperation and networking;
- orienting policy formulation and decisions;
- recognising key barriers and drivers of STI;
- encouraging strategic and futures thinking;
- supporting STI strategy- and priority-setting;
- identifying research/investment opportunities;
- generating visions and images of the future;
- helping to cope with Grand Challenges;
- triggering actions and promoting public debate.

One of the most common general objectives in European foresight work is to **foster cooperation and networking** in the science, technology and innovation (STI) field. This is often a very challenging objective given that it requires (1) the creation of a common space for open thinking, and (2) the engagement of key STI stakeholders at various levels (international, European, national, subnational). On the one hand, these activities require the development of, for example, knowledge platforms and research infrastructures. However, this work often calls for formal agreements on the use and sharing of particular technologies and the creation of clear cooperation protocols, normally linked to existing regulatory frameworks or policy instruments. On the other hand, the promotion of STI cooperation must take into account the challenges of bringing together multi-sectoral, multi-disciplinary and (sometimes) multinational expertise to discuss and share views about STI futures in general, and the need for better understanding and continuous monitoring of the key drivers of STI cooperation. Some initiatives are problem-driven by issues such as global warming, terrorism, poverty, natural disasters, energy needs, etc. Others are more aspirational, e.g. sustainable development, social cohesion, regional integration and the like.

The results of our analysis also confirmed that the most common objective of foresight activities in Europe is to provide **orientation to policy formulation and decisions**. The term 'orienting' was chosen because it combines the notions of providing methodological support and recommending 'directions'. This kind of orientation often requires the development of specific activities, such as the introduction of new perspectives into existing mechanisms for agenda-setting and prioritisation; the development of new consensus-based frameworks to explore policy options; and the development of guidelines to assist both government and enterprises in policy design and decision-making processes.

This frequently involves the collection, analysis and synthesis of information about the main subject of study, for instance a territory, an industry, an institution, a particular technology or a problem. Such information would generally cover a wide range of dimensions – social, technological, economic, environmental, political and values-related (STEEPV) – with the overall intention of increasing the robustness of proposed policies and decisions, thus making recommendations relatively 'future-proof'.

In doing so, two common challenges are the development of contextualised recommendations and the provision of a sound basis for assessing whether the proposed recommendations are sufficiently coherent and compatible with the long-term objectives of the sponsoring institutions. Sometimes the orientation process goes one step further to include the design of strategic plans and roadmaps based on the proposed policies and decisions.

The word 'recognising' is used to stress the importance that European exercises give to acknowledging and **identifying both current and potential barriers and drivers** of science, technology and innovation (STI). 'Barriers' are limitations and constraints that hinder the development of a sector, territory, research area, etc. These are normally classified as economic barriers (e.g. lack of funding), political barriers (e.g. inappropriate regulatory framework, lack of political will), technological barriers (e.g. limited research infrastructures, including access to databases, databanks, facilities, etc.), social barriers (e.g. undeveloped collaborative culture, lack of human capabilities), ethical barriers (e.g. inappropriate means of production, unjust business models), and so on.

Drivers are events, trends, technologies, and other types of issues shaping the development of a society, organisation, industry, research area, technology, etc. These are also classified in categories; especially using frameworks (see STEEPV above). Normally European exercises devote considerable resources – time, money and brain – to recognising new barriers and drivers in STI. This information is then used to (1) identify major STI problems that must be addressed in the next 10 to 20 years; (2) set technical requirements and research pathways; (3) detect weak signals forecasting technological breakdowns and provide a sound basis for creating a continuous 'technology watch' and monitoring system on key subjects; (4) discuss threats and opportunities that the barriers

and drivers present for the international, national and subnational communities; and (5) understand the dynamics that govern the adoption (or lack of adoption) of new technologies.

A classic objective of foresight is the **encouragement of strategic and futures thinking**. This can be achieved with (1) the evaluation of existing medium-to-long-term national and regional visions, (2) the assessment of desired, possible and alternative scenarios; (3) the exploration of new approaches for solving and sharing problems; (4) the identification of future applications and the implications of new technologies; (5) the exploration of future development trends in sectors (e.g. energy) and sub-sectors (e.g. biofuels); (6) the identification of opportunities, threats and challenges for the future; (7) the connection of research to business and government goals; (8) the identification of new paradigms; (9) the assessment of possible impacts of policy recommendations and decisions derived from foresight exercises; (10) the exploration of promising preconditions for sustainable development and economic growth (e.g. resources, legal frameworks, capabilities); and (11) the creation of a foresight culture. The most important contribution of strategic and futures thinking to a foresight exercise is the timely identification of issues that should alert and support decision-making, especially when it comes to strategy- and priority-setting activities.

The mapping results show that European foresight exercises support **STI strategy- and priority-setting** by mobilising key stakeholders to set and/or strengthen strategic STI areas linked to public and private industries. Such activities normally assess STI developments in specific sectors (e.g. agriculture, environment, health, etc.) as well as the development of framework conditions in industrial production and possibilities for commercialisation of goods and services capable of enhancing competitiveness in key sectors. In doing so, research and technology milestones are defined with the objective of achieving medium-to-long-term industry goals.

But the setting of STI strategies and priorities is not an easy objective. It requires the combination of many challenging activities, for example (1) the definition of public and private research and technology development (RTD) agendas, (2) the evaluation of RTD policies and priorities of innovation and research portfolios of public funding agencies, (3) the identification of future technological needs, risks and opportunities, (4) the identification of desirable and undesirable impacts of modern technologies (e.g. biotechnology), (5) the analysis of both qualitative and quantitative data about past and present STI and socio-economic developments, (6) the promotion of thorough discussions about STI paradigm changes, and occasionally, (7) the creation of policy frameworks guiding the development of new/critical technologies.

One common way of dealing with STI needs is to use available technologies and capabilities. This normally requires an assessment of the national or regional position in the sector studied, the creation of new networks between industry, academia and government capable of developing a shared strategic vision of the sector, and the political insight to propose adequate changes to existing STI strategies and the priorities of government agencies, academic institutions and firms. Here we would highlight the fact that one of the most significant challenges of priority-setting in foresight exercises is to ask stakeholders to set their priorities on the basis of experts' assumptions about the future, instead of their existing views on current conditions and realities.

A considerable number of European foresight exercises are aimed at **identifying research and investment opportunities**. This often involves (1) the mapping of promising technologies, successful research and business models, and infrastructural requirements, (2) the identification of promising markets and business directions, (3) the translation of key STI barriers and driving forces into opportunities for both public and private industries, (4) the adaptation of innovative industrial policies and strategies to national and regional contexts, (5) the exploration of potential impacts of the growth or reduction of production capacity, consumer demand or market share, (6) the exploration and evaluation of entrepreneurship trends (7) the benchmarking of future-oriented action plans; and so on.

Some exercises focused on SMEs and NGOs are: the identification of potential future demands for new products and services, the identification of medium-to-long-term prospects (5-10 years) for economic growth and competitiveness, the determining of effective ways to attract bright and highly skilled people to make careers in particular industries, the identification of (new) industry products and services capable of creating new ways of reducing societal problems (e.g. crime prevention and crime-solving), and the improvement of the ability to anticipate and prepare for new science risks and opportunities.

The objective of gathering and **generating shared visions and images** is implicit in nearly all European foresight exercises. It is heavily linked to the objective of encouraging strategic and future-oriented thinking, given that both require the evaluation of existing visions and the assessment of desired, possible and alternative scenarios. However, the most important

aspect of this objective is the actual creation of shared visions and images which will eventually lead to the development of new scenarios with their related strategies and recommendations.

Having this in mind, we would point out that, while many studies tend to succeed in the development of visions; they often fail in the development of 'shared visions'. This is mainly due, on the one hand, to poorly designed participatory processes and, on the other, to unsuccessful communication and dissemination strategies. The creation of 'shared visions' requires (1) an open space for discussion, (2) a thorough and careful analysis of opinions and contributions, (3) a dynamic and interactive feedback mechanism, (4) a clear list of convergent and divergent issues and (5) an open consultation process aimed at building consensus on shared visions.

A shared feature across many foresight exercises is the presence of ambitious objectives or '**Grand Challenges**'. These Grand Challenges are often politically or socially driven, but have a strong economic and technological orientation. Foresight was seen as instrumental in achieving the engagement of major stakeholders in such aspirational objectives. However, one of the biggest obstacles in including Grand Challenges in a foresight exercise is the problem of investing so much time and resources in (1) lobbying the key stakeholders intensively and (2) securing their political commitment.

Examples of EU Grand Challenges include the EU Lisbon Objectives, the European Research Area (ERA) and, more abstractly, the European Knowledge Society. Exercises focused on these types of objectives have also contributed to the creation and consolidation of the European identity in new EU Member States and Candidate Countries. At the transnational level there are various references to the United Nations Millennium Goals, with a few exercises focused on global problems such as climate change, natural disasters, terrorism and poverty. As for the national and subnational levels, it is possible to find some exercises targeting 'traditional' Grand Challenges, for example: social equity, sustainable development, regional integration, social cohesion and sustained economic growth.

Making sure that foresight **triggers action** is one of the most challenging objectives of many exercises in Europe and elsewhere. A considerable number of cases recognise that foresight outputs have informed decisions, but they are cautious about the extent to which the process has led to action. The general perception is that, on the whole, foresight only triggers the actions that need to be taken and that further steps, such as formalising and implementing the action (e.g. policy recommendations), are almost entirely dependent on the willingness and manoeuvring potential of the sponsoring organisations. Sometimes the promotion of public debate on particular foresight results has influenced decisions about RTD investments (e.g. in Malta, the Marine exercise claims to have lead to an increase in public RTD investment in the sector while, in the Czech Republic, the outcomes of the foresight dialogues are believed to have led to a more strategic distribution of public resources for research).

A second element analyzed was **sponsors**. This revealed that:

- government is almost always the main sponsor, irrespective of the region. The main exception here is Latin America, where the proportion of exercises supported by government is relatively low;
- business sponsorship is high for North America and Oceania, so business-funded foresight exercises seem to be an Anglo-Saxon phenomenon;
- NGOs sponsor, to a great extent, foresight activities in Africa: other trans-European exercises are not far behind;
- most of the trans-European activities are funded by IGOs, a fact that is not surprising given that the EU is an important sponsor of foresight exercises, with several pilot studies in new Member States and Candidate Countries. A high proportion of IGO sponsorship is also evident in Latin America, as a result of UNIDO's funding activities on national initiatives and transborder exercises.

The results of **audience** analysis do not vary tremendously from those for sponsors. Government agencies and departments are the main target audiences of the exercises analyzed. In comparison with sponsor results, research and businesses are high community targets and NGOs are a significant target group in Africa. Trades unions are missing from the Anglo-Saxon countries and the trans-European exercises.

The analysis of **territorial scope** aims to provide insights into the foresight activities that have a national, regional or supranational context. National scope is predominant, representing approximately 70 % of exercises mapped. This reflects the fact that government is the principal sponsor; when a government awards funding for a foresight initiative, it is aiming to get information about issues that may impact across the whole country. Subnational, supranational and transborder exercises represent approximately 10 % each. Regional foresight exercises seem to be very limited, while transnational ones are well represented by a number sponsored by UNIDO. Supranational initiatives are often related to supranational country networks, like the Nordic countries and the EU.

The results of the **output** analysis reveal that policy recommendations are the most common outputs in all regions, particularly in EU-27+, Asia, Africa and Oceania. By contrast, policy recommendations account for just over 50% of outputs in North America and Latin America. Analysis of trends and drivers is the most frequent output (relatively speaking) in Latin America, followed closely by the EU-27+ and Africa. Scenarios are most common in Oceania and Asia, but less so across the other regions (though with a similar frequency), with the exception of North America, where they are relatively rare.

Research and other priorities are relatively more frequent outputs in Latin America and Oceania, followed by North America with 40 % of cases featuring research priorities. Forecasts are most popular in Africa, closely followed by Asia: this might reflect the popularity of megatrend analysis in these two regions and the use of modelling and simulation in Africa. On the whole, across all regions, forecasts appear to be one of the least reported outputs. Key technologies are the third most important output in Asia, but not very common in other groups. Technology roadmaps are generated most frequently in North America – hardly surprising given the popularity of the TRM approach there. However, Latin America and Africa show no technology roadmaps in their outputs while, in other regions, these represent approx. 10 % of outputs.

The range of **methods** used in foresight exercises is very extensive, and methods are rarely used alone. The following lines summarise the most widely used method combinations:

- **Cross-Impact Analysis** is often combined with brainstorming (62 %) and questionnaires/surveys (62 %).
- **Backcasting** is often combined with brainstorming (37 %), trend extrapolation (28 %) and environmental scanning (26 %).
- **Brainstorming** is often combined with futures workshops (43 %), SWOT analysis (31 %), key technologies (31 %), Delphi (30 %), environmental scanning (26 %) and interviews (26 %).
- **Citizen panels** are very often combined with futures workshops (71 %), brainstorming (59 %), interviews (47 %), environmental scanning (41 %), SWOT analysis (41 %) and questionnaires/surveys (35 %).
- **Environmental scanning** is often combined with brainstorming (60 %), futures workshops (40 %), trend extrapolation (35%), SWOT analysis (33 %), questionnaires/ surveys (28 %), stakeholder mapping (27 %), interviews (25 %) and key technologies (25 %).
- **Stakeholder mapping** is often combined with brainstorming (62 %), environmental scanning (55 %), futures workshops (45 %), SWOT analysis (41 %) and trend extrapolation (41 %).
- **Essays** are often combined with megatrend analysis (33 %) and futures workshops (29 %).
- **Futures workshops** are often combined with brainstorming (32 %).
- **Gaming** was only applied in four instances in the sample and was mainly combined with futures workshops, modelling and simulation.
- **Interviews** are often combined with questionnaires/surveys (42 %) and brainstorming (32 %).
- **Megatrend analysis** is commonly combined with futures workshops (33 %).
- **Morphological analysis** was only used in five cases, combined with backcasting, brainstorming, stakeholder mapping and structural analysis.
- **Questionnaires/surveys** are often combined with interviews (42 %) and megatrend analysis (25 %).
- **Bibliometrics** was used in five cases and was mainly combined with environmental scanning, stakeholder mapping, and trend extrapolation.
- **Scenarios** are commonly combined with futures workshops (25 %).
- **Modelling and simulation** is often combined with trend extrapolation (45 %) and megatrend analysis (34 %).
- **Key technologies** is commonly combined with brainstorming (39 %), futures workshops (39 %), technology roadmapping (35 %) and Delphi (25 %).
- As expected, most methods are frequently combined with **expert panels, literature reviews** and **scenarios**. N.B. to avoid repetition, these categories are not referred to again below: **please keep this in mind**.
- **Structural analysis** is often combined with brainstorming (85 %), questionnaires/surveys (69 %), SWOT analysis (69 %), environmental scanning (62 %) and stakeholder mapping (46 %).
- **Multi-criteria analysis** has been used in eight cases only, with half of these combining the technique with interviews and megatrend analysis.
- **Delphi** is commonly combined with brainstorming (42 %), key technologies (28 %) and futures workshops (25 %).
- **Expert panels** are often combined with futures workshops (34 %) and brainstorming (27).
- **SWOT analysis** is commonly combined with brainstorming (52 %), futures workshops (33 %) and questionnaires/surveys (28 %).
- **Technology roadmapping** is often combined with key technologies (55 %) and futures workshops (48 %).

- **Literature reviews** are commonly combined with futures workshops (28 %).
- **Trend extrapolation** is mainly combined with the three most common methods (expert panels, literature reviews and scenarios).
- **Relevance trees** were only used in two instances, in both cases combined with cross-impact analysis.

This overview only shows some of the results of EFMN mapping activities. We suggest the reader look at the Annual Mapping Reports for in-depth results: regional mapping differences, a different focus on the topics addressed, other differences, and the connections between the methods used.

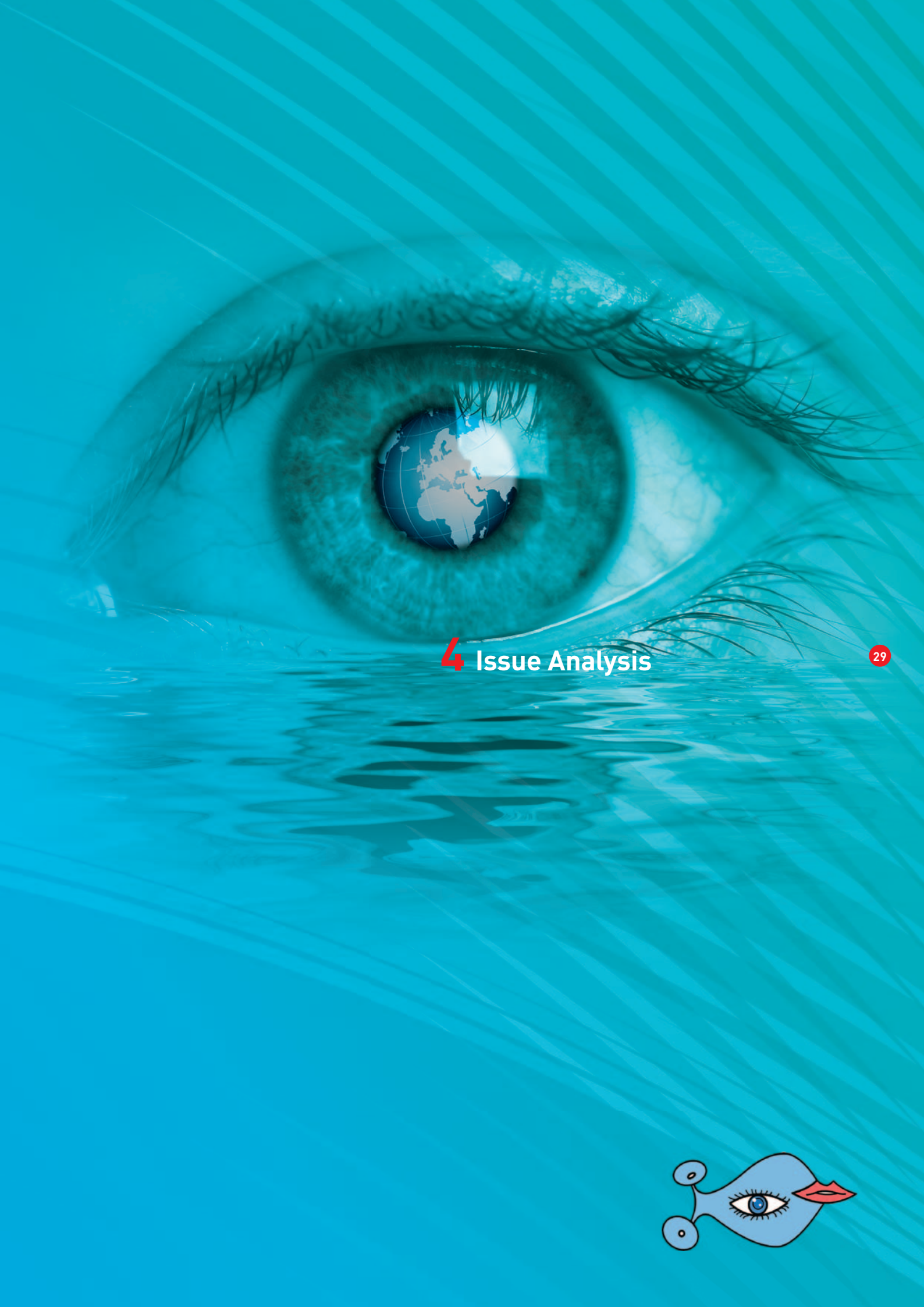
3.6 Conclusions for mapping

Reviewing EFMN mapping activities, it is safe to conclude that these have been very successful. Over 2 000 initiatives were identified and over 1 000 mapped – far more than anticipated. However, quality control proved to be more difficult than anticipated and needs enhancement. Still, the results are unmatched by any other initiative in the world, and the EFMN consortium is proud of the achievement.

There are mixed feelings about the figure of 2 000. It seems a substantial number, but the conclusion can also be drawn that it is just the tip of the iceberg. The total number of foresight initiatives in the world can be estimated to be approximately 10-100-fold this number. Additional initiatives will, however, be regional and developed by industry.

The mapping structure was adequate for analysis purposes, but the EFMN experience shows that important improvements can still be made. New approaches and methods are within our reach, as the high number of 'other foresight methods' shows.

Another important conclusion is that the mapping approach should be enhanced to provide greater user-oriented results, but from a non-foresight-expert perspective! Foresight is becoming more mainstream, and mapping activities should be giving more attention to the needs of non-experts.



4 Issue Analysis

4
Issue Analysis

This chapter describes the evolution and some of the results of the EFMN annual Issue Analysis work, based on the EFMN Issue Analysis Reports published in the period 2005-2008. EFMN Issue Analysis, its aim and results, as well as the lessons learned from these past years, were also presented in the recent special issue of the journal *Foresight* on the EFMN[1].

4.1 Evolution of Issue Analysis

Issue Analysis aims to support policy-making related to the development of science and technology (S&T) policies. Key emerging science and technology issues relevant to EU S&T policies were identified and analyzed, in order to contribute directly to the development of research and innovation policies. This process of identification and analysis was an annual activity, with its finalisation in an annual workshop with the Commission on a specific emerging issue. The rationale behind this Issue Analysis was to exploit the wealth of information on international foresight activities collected by the EFMN.

The mapping of foresights can also be used as a source of information to identify key emerging science and technology issues and, consequently, contribute to the development of future European science and technology policy priorities. Hence, on an annual basis, a selection was made of international foresight themes, issues and activities that offer the highest potential for supporting European science and technology policies. Of particular interest were key emerging issues relevant to the political reality of the European Commission's DG RTD.

Overall, the Issue Analysis team was responsible for the following annual activities:

1. the **screening and analysis** of outputs from EFMN foresight mapping, as well as EFMN Briefs, in order to identify key 'emerging S&T issues';
2. the **identification and selection of emerging S&T issues** that were relevant to European S&T policy-making, based on specific selection criteria;
3. the **consolidation and synthesis** of the findings on one issue, selected as most relevant to discrete policy areas of the EC;
4. the organisation of an **annual workshop** on the focal issue involving the EU Commission, the foresight community and sector/issue-specific experts, in order to encourage mutual enrichment between the different fields of knowledge, as well as between different expert groups;
5. the analysis of **policy implications** and relevant priorities for S&T policy that emerge from the discussions at the workshop, in the form of a final report.

The outputs of EFMN Issue Analysis are designed to contribute directly to the development of EU research and innovation policies.

Over the last four years, EFMN Issue Analysis used the above approach for the identification of important emerging issues relevant to policy-making. The identification process was based on the screening and analysis of information collected by the Network, as well as on the EFMN briefs published on outstanding foresight activities. While the basic principles of the approach remained the same over the years, the methodology used evolved over time as the Network increased and matured, and the amount of information in the EFMN database accumulated.

The first year of the EFMN, 2005, was devoted to setting up the Network and the database facilities, including an Internet-accessible Issue Analysis Sandbox, and to collecting the first basic information on foresight techniques. Due to the limited amount of information available, the process of identifying relevant issues was based on a bottom-up approach, relying on the expertise and knowledge of EFMN Partners who were asked to deliver selected information on foresight and future-oriented activities in the countries they had agreed to map[2]. Information was collected on a wide range of foresights in the EU and Candidate Countries, as well as in Turkey, Canada and the USA, and led to the identification of 21 so-called 'Emerging Issues 2005'. These issues were categorised as: socio-economic developments, innovations and S&T developments, on the basis of the *Dynamo* taxonomy (see section on Methodology). Based on a ranking of these 21 emerging issues in terms of their importance for future European R&D policies, the topic of cognitive science was chosen for the 2005 Issue Analysis[3].

(1) *Evaluating foresight: An introduction to the European Foresight Monitoring Network (2008), Vol 10, No 6, Emerald Group Publishing Limited, Northampton.*

(2) *For details on the EFMN structure, see the introduction chapter or the mapping chapter.*

(3) *Braun, A., Rijkers-Defrasne, S., et al., 'Cognitive Science', EFMN Issue Analysis 2005 – Final Report. Available on: www.efmn.eu*

Between 2005 and 2006, the amount of foresight initiatives mapped in the EFMN database doubled, allowing the identification of emerging issues in 2006 solely by an analysis of the database information. Interesting issues were then ranked in terms of their frequency in foresight activities, as well as their presumed future importance (value judgments), by an expert team working in collaboration with the European Commission. By virtue of differences in scientific knowledge, the EFMN team and the EC's staff experts had rather different perspectives on whether major scientific advances were likely to occur in a given area over the next five to ten years, on their probable impact on other S&T issues, and on the extent to which these fields would be a priority for EU S&T/R&D policies. Nevertheless, the broad topic of 'ageing population', in combination with the impacts on health and the healthcare systems, was among the most frequently voted issues. The EFMN findings resulted in the selection of the issue of 'Healthy Ageing' for the Issue Analysis workshop in 2006 (4).

At the outset of the third EFMN year, an internal discussion was launched among EFMN Partners on the relevance of the selection of 'emerging issues', based on the frequency of their appearance in foresight studies. On the one hand, it was argued that looking at 'frequent issues' could lead to the identification of the usual suspects, like 'information society', 'global warming' or 'climate change' – namely issues that had already been addressed over a long time and which surely would continue to play an important role in the future as megatrends – rather than actual *emerging* issues that had not been addressed before but would nevertheless impact on future R&D needs and policies, the so-called 'wild cards'. The issue of whether additional weight should be given to issues which were not, or not yet, the focus of policy debates was debated.

However, whether an issue is *emerging* or not may depend on the perspective; indeed several issues were identified that were addressed frequently in foresight activities at national or regional level, but not explored in their European dimension. In this sense, such issues would be potentially 'emerging' in policy and policy debate at EU level, and their identification would therefore correspond exactly to the type of information the EFMN Issue Analysis was supposed to deliver.

Based on a pre-analysis of foresight studies included in the EFMN pool and described in EFMN Briefs, the EFMN Issue Analysis of 2007 led to the identification of the 'Emerging Knowledge-based Economy and Society' as one topic on which the European dimension had previously been neglected – although the challenges and perspectives of the knowledge economy and society had been addressed frequently in regional and national foresight activities. In order to stimulate a discussion on the European aspects of this issue, this topic was chosen for the 2007 EFMN Issue Analysis Workshop (5).

The 2008 EFMN Issue Analysis involved a rather similar approach and, with the focus on public health systems, addressed a topic that has without doubt been of great importance in foresight activities at national or regional level for a long time. However, future trends and challenges – such as ageing, increasing mobility, increasing globalisation of R&D and innovation activities in the health sector, the labour market becoming increasingly global, EU enlargement, etc. – go beyond national borders and make it necessary, first, to address the European dimension of the issue of public health systems and, second, to explore the options for European action in overcoming future challenges. Choosing the issue of 'Public Health Systems Changes' was very much in line with the European policy agenda, especially in the light of the new Programme of Community Action in the Field of Health 2008-2013 that came into force on 1 January 2008. While health is a competence of EU Member States, actions taken under the Health Programme complement national health policies on, for example, cross-border health threats such as influenza (6).

4.2 Methodological approach

Though much methodological work has been undertaken in **developing S&T indicators**, undeniably these indicators have often failed to create effective policies for scientific and technological development. Indeed, due to the very complex relationship between science and technology performance on the one hand and the socio-economic system on the other, there is no theoretical agreement on what emerging S&T issues might be. Furthermore, different patterns

((4) Braun, A., Rijkers-Defrasne, S., et al., 'Healthy Ageing: Challenges and Options for Research', EFMN Issue Analysis 2006 – Final Report. Available on: www.efmn.eu

(5) Rijkers-Defrasne, S., Korte, S. et al., 'Emerging Knowledge-Based Economy and Society', EFMN Issue Analysis 2007 – Final Report. Available on: www.efmn.eu

(6) Braun, A., Rijkers-Defrasne, S. et al., 'Future of public health systems in Europe', EFMN Issue Analysis 2008 – Final Report. Available on: www.efmn.eu

depicting S&T performance as well as certain social-economic factors can be observed in different geographic areas and at different times. Theories based on such situational patterns, which can be quite diverse, have guided the various formulations of S&T indicators[7]. The many conceptual models and the methodologies used to construct S&T indicators are in general discretional rather than science-related. Hence, these indicators fail to offer the performance required for the identification, selection and analysis of emerging S&T issues from foresight exercises, since there is often little relationship between an indicator, the policy issue it relates to and the system the policy is expected to change[8].

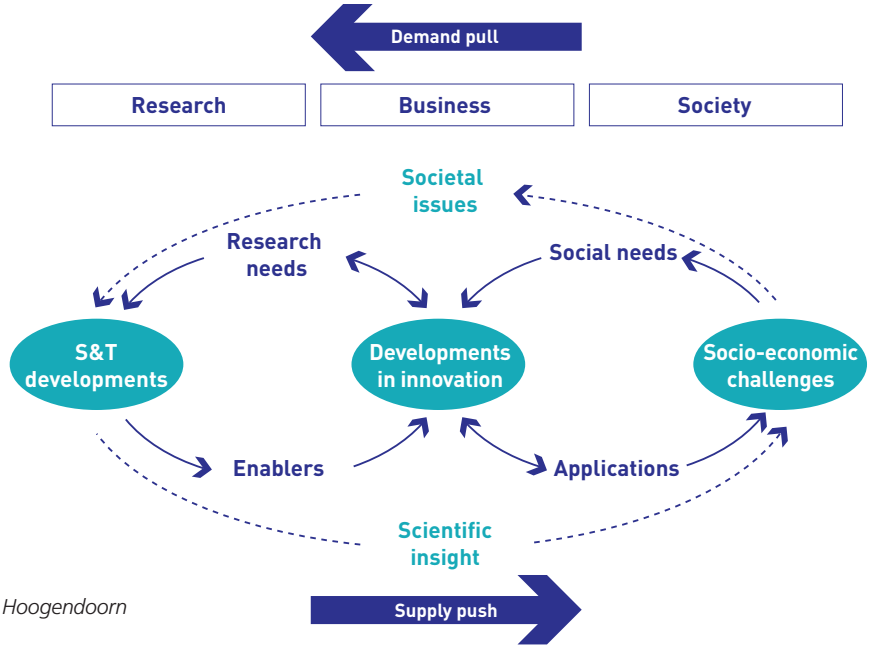
In the EFMN Issue Analysis and the context of identification and filtering of issues from foresight exercises, the term 'issues' was interpreted as 'trends and trend breaks'. Based on work done by TNO on this identification of future developments, a distinction was made in the Issue Analysis work between three different types of future development:

- **science and technology developments** – inventions that provide the technological basis for innovation; such developments are focused on the fulfillment of technological functions rather than social ones;
- **innovations** – commercial applied science and/or technology used in an innovative way; they exploit new insights in S&T, focus on market/societal needs and provide applications that address specific social functions;
- **socio-economic issues** – the demand side of society, i.e. problems of an economic, social or environmental nature where innovation can offer an answer or solution.

These three types of developments, S&T developments, innovations and socio-economic issues, are linked respectively to the three major institutional actors in the innovation process (Figure 5):

1. the **research arena**, comprising academia as well as more applied research and technology organisations focused on research;

Figure 5: The different stakeholder communities of innovation and the related three types of developments



Source: © 2005 Butter, Hoogendoorn

(7) *For instance, the Third European Report on Science & Technology Indicators 2003.*

(8) *For the basic discussion of conceptual and methodological questions on the selection of S&T indicators, please cf.:*
Fabian, Y. (1984). The OECD International S&T Indicators System. Science and Public Policy, 11(1):4-6.
Khalid Saeed: Emerging issues in the development and utilization of S&T. indicators in developing countries of the ESCAP region.
Strategic Policy Intelligence: Current Trends, the State of Play and Perspectives.
IPTS, http://www.jrc.es/home/pages/detail.cfm?prs=1012
International Council for Science, International Council for Science. 2002. Identification of Key emerging Issues in Science and Society: an International Perspective on National Foresight Studies. 28 pp. © ICSU 2002, ISBN 0-930357-54-X.

2. the **business arena** which applies research knowledge to create and commercialise innovations to address societal needs;
3. the **societal arena** which deals with the socio-economic issues that can be addressed by the innovations developed in the business arena.

These three concepts form the basis for classifying the topics identified in foresight activities.

A second element in the issue analysis methodology is the **selection of issues** relevant for EFMN work. This selection framework was based on the three major EC criteria for the identification of the thematic domains of the 7th Framework Programme, i.e.:

1. relevant emerging issues which should contribute to EU policy objectives in the medium to long term, particularly those of DG RTD, i.e. they should have the potential to:
   a. anticipate scientific and technological needs and generate new knowledge (fundamental re-search and technology issues) to meet these needs. In particular, relevant emerging issues should contribute to achieving the Lisbon objective to transform Europe into a dynamic and competitive knowledge-based economy, capable of sustainable economic growth;
   b. strengthen cooperation in research and the European scientific base; and
   c. develop scientific and technological capacities (research infrastructure issues) and contribute to the building and strengthening of the European Research Area (ERA);
2. emerging issues which should have high potential for European research, either because future support can build on past and current investments and successes in relevant research areas or because research results are expected to lead to social and economic benefits;
3. there should be a strong case for European policy intervention in the research areas defined by the emerging issues, providing added value to existing research activities in Member States.

The mechanisms employed by the International Council for Science, the RAND Corporation and the FISTERA [9] study were also relevant as guidelines.

Working from the above, a set of selection criteria was developed for the intelligent evaluation and exploitation of foresight exercises featured in the EFMN database and in EFMN Briefs. Assuming these criteria, emerging issues are those which:

- are likely to take place over the next five to ten years, and where the necessary resources are likely to be available to enable these scientific advances to take place (e.g. genomics, nanotechnology);
- tend to generate and promote possibilities for other scientific developments or fields (e.g. new research instrumentation, modelling and simulation techniques);
- tend to benefit from international or global collaboration (e.g. environmental sciences, space research);
- develop new approaches to multi- or interdisciplinary cooperation (e.g. global warming, ageing);
- are likely to result in major benefits to society, whether in the form of wealth creation, improved quality of life or risk reduction (e.g. new materials, earthquake prediction), and are linked with ethical aspects – for example, developments that are likely to reduce the digital/medical/nano divides.

4.3 Results of four years Issue Analysis

Issue Analysis 2005: Cognitive Science

The first EFMN Issue Analysis in 2005 identified the issue of 'Cognitive Science' – covering the converging technologies of Nano, Bio, Info, Neuro, Cogno and related economic, social and environmental topics – as most relevant to EU policies. Indeed, Europe holds a large part of the responsibility and merit for launching cognitive science and fuelling it with some of its key insights. However, in the face of the increased level of competition from China and the USA, which is now giving cognitive neuroscience top priority, Europe has to act in a concerted way and make a very resolute effort if European cognitive science is to remain in the lead.

Europe is motivated to do so, in part for reasons shared by its competitors, in part for reasons of its own such as the specific problems of a diverse, multicultural, complex and ageing population. European research initiatives in the field of cognitive science are also very promising since they draw on cutting-edge teams in various areas, strong traditions in the core disciplines, as well as a population of excellently trained top students. Furthermore Europe has preserved a respect for diversity, ensuring a pool of seminal ideas and active traditions which will be needed in the search for the more sophisticated and

(9) *FISTERA was funded by the IPTS and aimed to bring together actors and insights from national foresight exercises on ISTs in a systematic way that ensures continuity over time.*

differentiated ideas required when the simple intuitions of the early stages no longer suffice.

Building a strong European cognitive science is therefore a goal which all the Members States of the EU can contribute to, as all of them can. Research in the field does not require the heavy artillery of 'big science'.

However, the development of cognitive science is being hindered by many obstacles that could be – at least partly – overcome through European action. Indeed, the potential of cognitive science seems to be insufficiently perceived by academic institutions, as well as by policy-making bodies. Even more, there seems to be no consensus on what cognitive science actually is, nor on the different aspects covered by research in this area. Furthermore, on the one hand, reigning branches in the core disciplines tend to compete rather than cooperate while, on the other, cognitive science would benefit from a less reluctant attitude towards interdisciplinary work in order to capture all the aspects of this very broad and complex field. Lastly, reluctance to change basic organisational patterns, as well as a generally slow pace in the implementation of innovative policies, are also challenges which European action can help to overcome.

European action could in particular contribute to furthering synergies between research groups across the EU, so as to consolidate the performance of EU science in understanding neuronal processes, as well as to improve Europe's ability to compete in an increasingly globalised research environment.

From the analysis of recent foresight studies, the development of cognitive science at the interface between life science and physical science is expected to accelerate progress in both disciplines as well as have profound social implications – while at the same time raising fundamental challenges on both fronts. Current approaches to ICT may be revolutionised by the increasing understanding of neuronal systems, neuronal information processing and thought processes, as well as brain performance. This may, as a result, influence the computer architectures and algorithms of the future and lead to the development of artificial cognitive systems and autonomous robots. Against this background, it will become inevitable to reflect intensely on what it means to be human.

Being able to merge knowledge from different disciplines – for instance from robotics and cognition research, as well as from psychology or linguistics – is the most important challenge of research in the cognitive science field. Such an interdisciplinary approach is a *sine qua non*, for instance, for the successful development of robots answering users' needs, such as robots able to adapt and survive in low-structured contexts or to move around in a social environment.

The 2005 EFMN Issue Analysis underlined the immediate need to establish a state-of-the-art of cognitive science in Europe so as to set up a roadmap for future research, taking into account both epistemological and institutional problems, as well as public perceptions of the problem: public acceptance of novel applications and technologies, emerging from breakthroughs in cognitive systems research, requires timely public debate on the potential risks and benefits.

A major finding of this Issue Analysis was that, even though the USA and China are becoming serious competitors in this field, European research in cognitive science is not lagging behind. However, a common platform where all scientific disciplines concerned with the different aspects of cognitive science can interplay and mutually enrich their research portfolios is still lacking.

All EU Member States can contribute to achieving the goal of building a strong European cognitive science. Particular attention should be paid to breaking the boundaries between scientific disciplines, and to furthering interdisciplinary approaches involving scientists from life sciences, physical sciences and social sciences. Importance should be attached to the development of a broadly consensual definition of the field, as well as of PhD and research programmes involving scientists from various disciplines. In the opinion of participants in the 2005 EFMN Issue Analysis Workshop, the EU could take the lead in creating a platform linking national and cross-border activities in cognitive science.

Issue Analysis 2006: Healthy Ageing

While ageing will become more of a universal trend in coming decades, there is a wide diversity in terms of the timing and speed of demographic change, the social and economic contexts, and the perception of the challenges posed. Among the developed countries, Europe and Japan will experience the most pronounced ageing trends up to 2050 – the share of the 'above 60' group as well as the number of 'very old' people aged 80 years and over being expected

to rise[10]. Ageing raises several socio-economic challenges such as adjusting to an ageing and shrinking workforce, ensuring adequate and sustainable pensions, securing access to high-quality healthcare for all and ensuring the financial viability of healthcare systems.

At the beginning of 2005, the European Commission published the Green Paper 'Confronting demographic change: a new solidarity between the generations'[11] aimed at launching a debate amongst all relevant stakeholders and society, seeking to find answers to the challenges caused by ageing as well as the means for coping best with the impacts of an ageing population. Against this background – and given the fact that a 'Communication on the demographic future of Europe' by the Commission (DG EMPL) had been announced for summer 2006, presenting a synthesis of replies to the 2005 Green Paper on ageing, the first results of the analytic studies prepared under the pilot action of the European Parliament (Walter initiative[11]) and the Commission's proposals for further action in this domain[12] – the EFMN Issue Analysis identified the issue of 'Healthy Ageing' as most relevant to EC policies.

Foresight studies at the time underlined the fact that, as a result of the ageing of European societies – especially the ageing of the workforce, the growth in the number of people over the age of 60-65, and also 'elder ageing', i.e. the rapid increase in the number of people aged 80 and over ('triple ageing') – the importance of health and social services was set to increase. This growing demand for services, provided today by the public sector in many Member States of the EU, is creating unprecedented pressures on health and social care systems. In particular the implications of triple ageing for health and social services are profound[13] and are expected to lead to almost treble the long-term care expenditure as a proportion of GDP over the coming 50 years. The countries and companies that manage to handle the challenges of an ageing society to best effect can therefore gain advantage socially, economically and in terms of competences. Furthermore, the issue of Ageing Population has a broad popular and political interest because it contains a series of crucial societal dilemmas that call for solutions and opportunities. In this regard, technology has a special role to play: Technological innovation must be based extensively on the fact that society is undergoing an ageing process and that technology, which through dynamic interaction both influences and is influenced by society, can contribute to an ageing society being not a problem but an opportunity to be embraced[14][15].

In this context, the 2006 EFMN Issue Analysis stressed that creating the conditions for healthy ageing – i.e. improvement in 'healthy life years' without any activity limitation and disability or disease – is a European policy priority. This requires efficient and sustainable healthcare systems, allowing coverage of the needs of the whole population and especially of the elderly. Healthy ageing also presumes that sickness and chronic illnesses, including dementia, depression and loss of functional ability, can be better treated or can even be prevented or deferred until later in life. Going beyond that, healthy ageing also means improving quality of life for the elderly as well as promoting the social participation, care, self-fulfilment and dignity of older people. This requires, for instance, adapting the labour-market so as to offer better opportunities for late careers, life-long learning and flexible continuance in employment. Moreover, strengthening the cooperation in research on healthy ageing can contribute to extending European scientific and technological capacities (research infrastructure issues).

A wide range of foresight studies addressed the different social, economic and political aspects of the issue of healthy ageing. Even though a direct comparison of the studies analyzed in the 2006 Issue Analysis is not possible because of differing objectives, aims, motivations and methods, the consolidated view on options and perspectives for healthy ageing in Europe expressed in the studies can be summarised as follows:

(10) http://ec.europa.eu/health/ph_information/dissemination/diseases/age_en.htm

(11) Under the so-called 'Walter initiative', a series of demographic studies was launched in 2004 to tackle the policy implications of ageing.

(12) Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Unlocking Europe's full potential, Commission Legislative and Work Programme 2006.

(13) For example, it is estimated that healthcare costs for 65-75 year olds are 2.5 times greater than those for people under 65, whilst the costs for those over 75 are estimated to be 4.5 times greater. [Source: Sector Futures, 'The future of health and social services in Europe', EMCC, 2003, http://www.emcc.eurofound.eu.int/publications/2003/sf_hss_1.pdf

(14) 'Ageing Society 2030', Teknologisk Fremsyn, Danish Foresight.

(15) Sector Futures, 'The Health and Social Services Sector', EMCC, 2003, http://www.emcc.eurofound.eu.int/content/source/tn03008a.html?p1=sectorfutures&p2=null

- the precondition for being able to develop adequate measures preventing illness and disability is to further research and to consolidate knowledge on the fundamental biological and psychological ageing mechanisms as well as on health determinants;
- in the future, the focus should lie on the prevention of diseases – by, for instance, adopting measures to promote health in everyday life and at the workplace – rather than waiting to be forced to cure them. In this regard, advancements in genetics appear very promising since they may allow an increasing and broader use of genetic screening in the prevention of diseases. However the latter is subject, on the one hand, to costs being affordable and, on the other, to ethical aspects of the technology being addressed in a timely public debate. Furthermore, it requires that, during their vocational education or through appropriate professional training, primary care doctor are taught the skills of interpreting the results of genetic screening and provide guidance on the basis of genetic indicators, matching treatment to patients' genetic profiles;
- together with the focus on prevention, foresights underlined the future new role of patients as no longer being 'passive recipients' of care but more involved and willing to take ownership of their own health. This might be furthered by (financial) incentives for health-promoting behaviours (wages, health insurance contribution rates, etc.). This evolution would be associated with and driven by broad and efficient information campaigns to enhance health-promoting behaviour and by widespread access to information through media such as the Internet and digital television. As people actively take ownership of their health, public health is expected to improve – in particular, key risk factors such as smoking and obesity are expected to decline. Moreover, reductions in risk factors could be largest where they are currently highest – namely among people in the most deprived areas – and this could contribute to reduced socio-economic inequalities in health;
- the fusion of IT with biotechnology will lead to telemedicine and telemonitoring applications that will profoundly affect the patient-doctor relationship and further the emergence of new patterns of information-sharing and communication within all actors in the healthcare system. This trend will contribute to making substantial sections of the health service – at least partially – independent of time and place. It may also contribute to meeting the special needs of an elderly population, such as telehomecare. In order to ensure public acceptance and to motivate public use of telemedicine applications, the security of health information should be guaranteed and citizens' competencies should be developed so that they can master the use of these new technologies;
- progress in genomics, biotechnologies, nanotechnologies and robotics is expected to lead to new forms of medical treatment and technologies, as well as improved clinical outcomes. Breakthroughs in stem cell research could accelerate developments in gene therapy and regenerative medicine. However, these technologies are, at least in some aspects, highly controversial: this is particularly true of stem cell research where ethical aspects related for instance to the use of gene therapy, gene profiling and regenerative medicine, as well as to the potential health risks associated with nanotechnology, should be duly addressed to ensure public understanding;
- elderly people will benefit from the design and development of technical solutions for everyday life, helping them to remain self-reliant and not dependent on assistance. Thanks to applications such as fall-safe floors for example, older people are expected to be able to stay in their own homes for as long as possible – even if they experience a minor or even a major loss of functional ability;
- the pace of discovery of new drugs and drug target applications is expected to accelerate as a result of progress in combinatorial chemistry as well as the Human Genome Project. It will furthermore be increasingly possible to satisfy the high demand for so-called 'lifestyle drugs' (growth hormones with anti-ageing properties and mood-enhancing drugs are examples in this category).

The development of measures and conditions for promoting healthy ageing is expected to reduce the number of persons reliant on healthcare provision services and may therefore help stem the increasing costs of health and social services. Furthermore, realising the vision of an age-integrated market will contribute to flexible use of all labour resources and mitigate the negative economic effects of a shrinking working population. To make the vision a reality, research should identify the factors that enable older persons to remain – and, even more important, want to remain – active in the labour market, either as wage-earners or self-employed. Of course, changes in pension schemes are a necessity, but might not be a sufficient condition for persuading older persons to remain active in the labour market. The results of such research should lead to new strategies for companies, motivating older persons to stay at work.

Lastly, before designing any health-promoting measures, the following controversial issues should be addressed: how does our society define the concepts of 'good years of life' or 'quality of life'? How can the

consequences of 'medical ageism' and biomedicalisation – involving pathologisation and treatment of signs of ageing which are not symptoms of disease – be faced? How to ensure – and under what conditions – that everyone remains free, on a well informed basis, to either undergo or reject life-prolonging treatment? How to face the potential risks for intergenerational tensions in an ageing society?

Issue Analysis 2007: Emerging Knowledge-based Economy and Society

In a preliminary analysis of the foresight studies of the EFMN pool, in 2007 the EFMN Issue Analysis team highlighted the fact that the issue of 'Emerging Knowledge-based Economy and Society' is addressed frequently in recent foresight activities worldwide at national, regional and supranational level. This reflects the high importance of this topic and its impact on working and living conditions. In this context it is, however, surely surprising that the European dimension of this issue is not – or not sufficiently – taken into account in foresights. Initiating a discussion on the European dimension of the issue of 'Emerging Knowledge-based Economy and Society' was therefore the rationale for focusing the 2007 EFMN Issue Analysis on this topic. This decision was also in line with the political agenda at European level, especially with the European RTD policy agenda, as well as with the planned revision of the re-launched Lisbon Agenda[16].

In analysing the European dimension of the issue of 'Emerging Knowledge-based Economy and Society', more than 30 recent national, regional and supranational foresights were taken into account in the EFMN Issue Analysis. The following points were highlighted:

- One of the main drivers shaping the future of the knowledge society is without doubt globalisation – encompassing aspects as diverse as the development of global digital media markets, the globalisation of R&D and innovation activities, and the available knowledge.
- However, regional approaches towards economic growth will constitute a counterbalance to globalisation: Such approaches may be based on the revival of traditional branches, as well as on the development and support of new industrial sectors. Through the shift from production to more technological sectors, such approaches may provide an answer to the increasing delocalisation of manufacturing services.
- No country will be able to address future challenges on its own. In order to address future developments and challenges such as ageing population, infrastructure, spatial and rural development/environment and agriculture, competitiveness, R&D, energy, security and social cohesion, common European answers will (should) be complementary with actions at national level.
- ICT has become increasingly pervasive in society, with computing power becoming ever more distributed (distributed networks vs. earlier generations of standalone and one-to-one computing). Furthermore, 'smart' technologies and innovations will emerge from the combination of ICT with 'traditional' technologies and with bio- and nanotechnologies.
- Along with the rise of the 'service economy', the notion of services extends increasingly to all sectors of the economy: More and more firms are oriented to providing services – whether this is their core business or not, whether they deliver raw materials, goods or intangibles. In this context, knowledge-intensive business services play an increasing role and firms increasingly shift from investment in plant, machinery and other forms of fixed capital toward intangible assets involving the availability of services and/or the capacity to produce them.
- Innovation – be it technological or organisational – is playing an increasing role as a source of competitiveness, on the one hand, and as a means to increase organisations' efficiency and effectiveness on the other. Furthermore, in the knowledge economy, innovation capacity will increasingly rely on having access to knowledge and being able to manage it. In parallel, increasing global competition in innovation activities call for greater cooperation in the innovation process, for instance between research and industry.
- The emergence of the knowledge-based economy and society has profoundly impacted on the labour market: demand for 'knowledge-intensive' employment has increased and is still on the rise; new business and organisational structures have emerged where people and employees can work all around the world, organised, managed and administered via ICT Networks. As a result, work will become increasingly independent of time and location and new work models, such as tele-working, remote working, possibly using electronic networks for remote supervision, virtual meetings, etc. will become common practice. These will raise new challenges regarding how to manage knowledge in such distributed networks.

(16) In particular, the Spring Council, under the Slovenian Presidency, was planned to review progress on the re-launched Lisbon Agenda in March 2008 and examine Commission proposals for revised Integrated Guidelines to cover the period 2008-2011. Furthermore, Member States were expected to present a second round of National Reform Plans, based on the revised integrated guidelines in autumn 2008. Source: http://www.euractiv.com/en/innovation/growth-jobs-relaunch-lisbon-strategy/article-131891

- The role of education and training in general is expected to increase in the (future) knowledge society. To invest in the education system as well as in lifelong training, tools will be needed to support the development of the knowledge-intensive sectors. In parallel, firms have started to promote and institutionalise the use of knowledge management methods and concepts within their organisations, so as to become 'learning organisations'.
- Since knowledge as well as innovation activities are increasingly global, no country will be able to rely on its national innovation capacity alone. On the one hand, monitoring international developments as well as specific efforts will be essential to ensure that all actors of the innovation system – be they research institutions, business or industry organisations, including SMEs – can timely access information on internationalisation and global business operations as well as R&D results. Cooperation between research institutions will be indispensable.

Apart from the above, the emergence of the Knowledge-based Economy and Society is accompanied by the growing importance of sustainability concerns, as well as the development of new forms of governance – partly emerging from the increased and pervasive use of ICT applications, as is the case for e-governance applications. The ability to access and produce knowledge from everywhere will also favour a greater interest by the civic sector in participating in societal and political matters. At the same time, several risks and challenges will emerge, ranging from the high and increasing dependence and reliance of the knowledge-based society and economy on ICT Networks to the acceptance of new scientific developments by the public.

During the discussion at the EFMN Issue Analysis Workshop in September 2007, participants emphasised the importance of education and lifelong learning for the knowledge society. 'Traditional learning modes' have become obsolete, and additional and so-called 'tacit' skills – communication, collaboration, cultural, networking skills, etc. – are a *sine qua non* for everyone in the knowledge society, whether in working or in everyday life, to be able to adapt to very rapidly changing environments. Enhancing knowledge, basic as well as specialised, and improving the existing education system were therefore seen as the most important challenges.

Education should be reinvented and should mix formal, informal and non-formal learning. In addition to teaching facts, teachers should increasingly assist children and students to learn on their own and develop tacit skills. New learning models should be developed taking into account the increasing understanding of learning processes and of brain functions. The aim should be to integrate formal and extra-institutional learning and to promote lifelong learning opportunities. Special attention should be paid to the risks of social divides and social exclusion as a result of unequal access to education and lifelong learning.

Education was also underlined as being a precondition for innovation/innovative capacity. To be innovative, people need to be creative, to think critically, to work in teams, to be able to solve problems, to take risks as well as to learn from errors – all competencies that future education should be able to develop. In order to make society more innovation-friendly, it is therefore necessary to strengthen from elementary education onwards the willingness of students to experience and take risks. It is also essential to look beyond EU societies and standards so as to create better conditions for education, research and innovation and thus contribute to tackling the 'brain drain' problems faced by several EU countries.

Although there is a consensus on the shift towards an innovation-driven and service-based economy, the mechanisms of innovation themselves have been insufficiently explored up to now. Indeed, innovation mechanisms in the knowledge society and economy may differ from traditional innovation models. In the future, mechanisms such as 'open innovation', 'consumer-driven innovation' or 'common-based peer production' may become common practice. The means by which innovation can be promoted should be explored, for instance through specific learning environments. Apart from that, potential innovation barriers – linked for instance to intellectual property rights – have still to be identified and overcome, and factors promoting innovation and the development of new services (for instance specific learning environments supporting creativity) need to be enhanced.

In the (future) knowledge economy and society, the design of new or future services will increasingly respond directly to specific social and individual needs and will lead to more social participation (e.g. through new services like blogs, Web 2.0, etc.) and more opportunities for self-realisation. Future developments in services will therefore be closely linked to the future needs of society and will reflect public concerns, like sustainability and ethical issues, and relate to self-realisation opportunities. Furthermore, future innovations and services may contribute to (partly) overcoming challenges such as poverty, energy scarcity, etc.

Given the fact that many services to society, e.g. infrastructure management, are provided by public authorities and institutions, attention should be paid to the fact that different rules may apply to innovation in the public service and private sectors. In particular, R&D should explore how to promote innovation in public services and ensure their sustainability, while at the same time addressing the critical issue of privatisation of public goods as well as ethical concerns related to social divides, social exclusion, etc.

The 2997 EFMN Issue Analysis highlighted the fact that no definition actually captures all aspects of the 'Emerging Knowledge-based Economy and Society' – ranging from knowledge as the predominant factor in wealth creation to knowledge as the door to new social patterns and networks. Similarly, there can not be one single vision of the knowledge society in Europe: reflecting different cultures and traditions, different visions may emerge in different contexts. Indeed, the knowledge society has arrived in Europe, but not for everyone and not in the same way. There is, for instance, still a strong North/South divide existing regarding indicators like ICT use, adaptability of work arrangements, and digital literacy. For this reason, indicators for the advancement of the knowledge society, which are based on discrete aspects, may only draw a partial picture. This makes it difficult to compare the situation in different EU Member States. Even more, there may be substantial diversity at subnational levels from region to region as well as, beyond borders, between European regions and social groups. Against this background, one of the key factors shaping the development of a European knowledge society, comprising a broad range of different facets and social models across the EU's Member States, may be the retention of subsidiarity at many different levels.

Issue Analysis 2008: the Future of public health systems in Europe

The issue of 'Public Health Systems Changes' is high on the European policy agenda, particularly in the light of the new Programme of Community Action in the Field of Health 2008-2013 that came into force on 1st January 2008. This programme aims to improve the level of physical and mental health and wellbeing of EU citizens and reduce health inequalities in the European Union. In particular, the programme supports health-promoting and preventive actions that address major health determinants. While health is an area of competence of Member States, EU initiatives taken under the Health Programme complement Member States' national health policies relating, for example, to cross-border health threats such as influenza.

Based on the analysis of about 35 foresight studies carried out at national, supranational and regional level in Europe or in the private sector, the Issue Analysis identified the following factors and trends likely to burden health systems in future and calling for health service reforms:

- The drop in birth rates and the ageing of the population are seen, in foresight exercises, as important drivers – if not the main drivers – of public health systems change. On the one hand demands on healthcare systems will increase since, in general, an ageing population uses more health care services than a younger one: this leads to increased costs and raises important challenges in terms of the availability of sufficient general practice care, pharmaceutical services and emergency help. On the other hand, population ageing will also lead to an ever-accelerating epidemiological shift from communicable diseases to more non-communicable diseases and chronic conditions (including asthma and *diabetes mellitus*), neurodegenerative diseases and mental health disorders, which are expected to absorb a growing share of total healthcare costs. There is a need to improve the quality of care provided to the chronically ill while, at the same time, limiting costs (resulting for example from unplanned hospitalisation) by improving the architecture of healthcare systems and the way that the chronically ill population is cared for.
- Other demographic factors impacting future healthcare needs and the design of future public health systems are related to changing life styles – including urban life style, individualism and living alone – and the emigrational movement of people within and to Europe that affects the synthesis of

nations, as well as changing eating habits that lead to an increased demand for care for obese and diabetic patients.

- Globalisation and the related increased mobility and migration are expected to exacerbate the spread of infectious diseases and epidemics, as well as lead to the emergence of new disease spectra or the re-emergence of old diseases in a more virulent form – calling for appropriate and responsive health services. Coordination and cooperation between health systems in the enlarged EU will be essential to ensure coordinated answers to global health threats. Furthermore, when designing future national health systems, attention should be paid to the fact that the components of the health systems are increasingly becoming global.
- EU enlargement raises the challenge of ensuring equal access to modern health services as well as the same quality of health services and healthcare in all EU Member States. In particular, new MS which are still struggling with the consequences of economic and democratic transition may have difficulties in facing rising expectations from their own populations regarding access to modern and high-quality healthcare. Due to increased mobility within Europe, there is a growing need for the provision of cross-border health services, calling for harmonisation of technical standards and health regulations. As a result of the increased mobility of people globally, as well as at the European level within the Single Market, national health services need to be adapted to different and multicultural population groups.
- As a consequence of population ageing and the increasing prevalence of chronic disorders, the demand for general practice, pharmaceutical services, homecare services, as well as emergency help services, is expected to increase. Evidence suggests that the supply of general practice care will not be able to keep up with the growth of this demand. Measures to improve the match between supply and demand in general practice could include redefining and reshuffling tasks within the healthcare systems, creating incentives for healthcare workers to postpone retirement and remain longer in the labour market, as well as broadening the use of ICT applications to increase efficiency and cut costs.
- Public health systems and public health policy have to adapt to new threats posed by climate change and environmental issues. The consequences on health of environmental factors such as climate change and chemicals are a result of complex interactions between the environment and humans that are still not fully understood.

As a result of these trends, health spending has accelerated over the last 10 years and is expected to increase much faster in future than in the past. More and more services will be demanded – as a result of population ageing and the increase of important risk groups – from a sector supported by a decreasing working population. Massive financial burdens can be expected to lead to the collapse of health systems, as well as health problems for current and future generations, unless reforms are implemented over the next 15 years to make national (public) health systems sustainable.

While there is a broad consensus in (foresight) studies on the *need* for reforms to restructure (public) health systems and make them sustainable and financially viable, particularly against the background of population ageing and the expected increase of age-related diseases and chronic conditions, the *nature* of the reforms needed is rarely explored. Indeed, most studies relate to the future of public health, and not so much to the future of public health *systems*. In particular, issues such as the role in national health systems of the private sector (e.g. the pharmaceutical industry) and the privatisation of public hospitals and voluntary organisations providing welfare services, as well as tasks distribution between public and private stakeholders in the health systems, are rarely dealt with. However, a private/public mix model –, where the public sector has a dominating responsibility for financing and control, and where both private and public stakeholders supply health services – may be a promising way of structuring future health systems.

Concerning the financing of health services and health systems there seems to be, among health leaders and experts, a *'wide support for a health system with shared financial risks and responsibility among private and public payers versus the historic cost-shifting approach'*[17]. Accompanying the growing active role of patients as empowered consumers of health services is a *'growing interest in pay-for-performance and increased cost sharing'*[18]. The emergence of public-private partnerships as a new way of financing projects is also expected to affect the financing of health related projects and provide valuable results.

Performance assessment may contribute in the future to improving the quality and efficiency of public health systems, while ensuring accessibility to, and the equity

(17) 'HealthCast 2020: Creating a Sustainable Future', PwC Health Research Institute, 2005.
(18) ibid.

of, healthcare. However it is difficult to agree on the appropriate efficiency and productivity measurements. 'Customer/patient satisfaction' could be one of the measures, but the difference between the measurement of efficiency and productivity across EU Member States poses a nupber of issues, due to the fact that these measurements are driven by different sources: social insurance systems, hospitals, etc. In particular, increased transparency of quality and pricing is deemed an important factor in ensuring the sustainability of health systems. Expenditures on pharmaceuticals could, for instance, be reduced through the dissemination of information on the treatment costs for different ailments, the greater use of generic drugs, and the prohibition of expensive branded pharmaceuticals.

To reduce the burden on future social systems caused by increasing health needs – and for example to minimise avoidable costs due to fragmented and duplicated health services – it is important to improve communication and coordination between all stakeholders in the health systems. Contracting entire primary care at the local level, as a cohesive package, could be a way to avoid duplication of the services provided. The restructuring of the healthcare sector should also be supported and influenced by social dialogue among all the stakeholders. Lastly, strengthening transnational research may be a way to make sure that new treatments are introduced quickly to clinical practices, improving healthcare efficiency.

From analysis of foresight studies, the 2008 EFMN Issue Analysis identified various characteristics of future healthcare systems, as well as measures that might increase the efficiency and quality of the healthcare provided:

- greater use of IT in healthcare;
- development of new medical treatments and technologies based, for instance, on breakthroughs in genomics, nanotechnology, biotechnology and regenerative medicine;
- increasing rate of drug development, thanks to developments in combinatorial chemistry;
- focus on prevention instead of cure;
- emergence of the empowered consumer of health services or 'expert patient';
- adaptation of learning and training opportunities to match the needs of future health and social care professionals.

4.4 Conclusions for Issue Analysis

The rationale of the EFMN Issue Analysis was to support the development of future European public (R&D) policies by identifying and analysing the key relevant emerging issues from foresight activities carried out worldwide at national, regional and supranational level. In particular, the EFMN Issue Analysis aimed to identify possible research gaps and future European R&D needs, and to promote greater coordination at the European level.

The EFMN Issue Analysis was based on the information collected by the EFMN in a database, as well as on the knowledge and expertise of the EFMN Partners and Correspondents. As with any analysis based on the processing of database information, the EFMN Issue Analysis relied highly on the quality of the information available. This may probably be its main strength, since the information on foresight activities included in the EFMN pool has been collected and mapped by the EFMN Correspondents, i.e. foresight experts and practitioners. Thus, the EFMN *Dynamo* database goes beyond providing only raw data on foresight studies, as it also involves the expertise and knowledge of the EFMN Correspondents. Furthermore, these experts could be consulted and involved at any stage in the EFMN activities, including the Issue Analysis, in order to complete information or deliver greater in-depth insights on specific foresights or the outputs of foresight activities. Working from the database, the expertise of EFMN Correspondents extended to 'tacit knowledge' of foresight activities.

However, some limitations to the work of analysis still applied. Indeed, as specified in all EFMN Issue Analysis Reports[19], as well as in a recent paper on Issue Analysis in the *Foresight* journal, *'given the complexity of the relationship between different S&T performances, socio-economic systems, cultural patterns, geographic areas, times, etc., it was impossible to derive one unique theoretical definition for emerging S&T issues. Even though the requirement for a systematic screening method is acknowledged, it became clear that even the best mechanism for an intelligent issue identification approach cannot deliver the kind of incontestable information policy-makers and other stakeholders would prefer to have. Given the Dynamo architecture, the*

(19) See for instance Rijkers-Defrasne, S., Korte, S. et al., 'Emerging Knowledge-Based Economy and Society', EFMN Issue Analysis 2007 – Final Report. Available on: www.efmn.eu

EFMN issue identification, selection and analysis may be best regarded as an intelligent reading and validation process of foresight and forecasting exercises inventoried in the Dynamo database and described in EFMN Briefs. It helps to deliver clarification of values and to provide insights and an enhanced understanding of the areas involved. Besides the immediate instrumental use, the issue analysis approach contributes to an informed policy debate and to the quality and legitimacy of decision making processes'[20].

From a practical point of view, differences in country coverage as well as the availability of English translations of foresight results may also bias the Issue Analysis.

The EFMN Issue Analysis was able to launch and stimulate the discussion on key emerging issues relevant to European policies, with particular regard to S&T and R&D developments and, consequently, support the development of future European R&D policies. Beyond that, the EFMN Issue Analysis contributed to bringing 'new combinations of leadership together into working groups thus contributing to a wider participation in policy-making'. Bearing in mind that there is always a strong element of uncertainty when projecting trends for the future and given the limitations of the analysis, the EFMN Issue Analysis managed to combine trends and drivers from a variety of foresights worldwide, merging different perspectives and taking different cultures and environments into account when drawing a picture of future emerging issues.

Overall, the EFMN Issue Analysis aimed at providing strategic intelligence to EU policy-makers. However, the expertise and knowledge developed over the last four years can, without doubt, be of interest to other stakeholders who can benefit from similar analyses in their specific context – be it at national, regional or EU level – especially regarding the development of future policies.

(20) *Rijkers-Defrasne, S., Amanatidou, E., Braun, A. and Pechmann, A. (2008), 'Detecting and analysing emerging science and technology issues: the EFMN Issue Analysis',* Foresight, *Vol. 10 No. 6, pp. 90-102.*

5 Production of Briefs

5
Production of Briefs

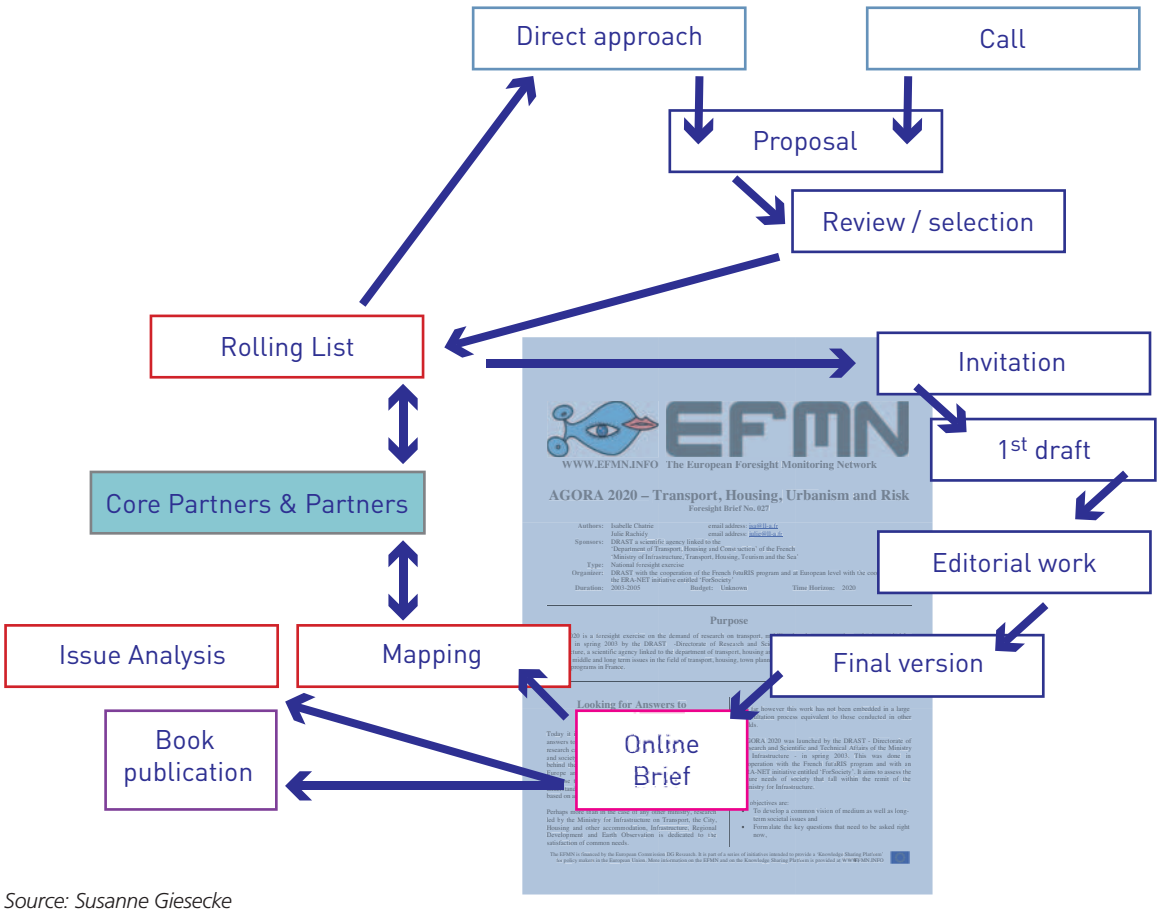
This chapter describes the evolution of Briefs production and gives an overview of the results of this EFMN activity. Briefs production has proved to be one of the most appreciated activities of the EFMN and, as there is no formal report on this work, the chapter will also include more insights into the results.

5.1 The evolution of Briefs production

One of the most important EFMN activities was the production and dissemination of Briefs to the foresight community. The purpose of this activity was to inform policy-makers about foresight results and to contribute to the improvement of policy-making at all levels in the EU. The information gathered through the Correspondents was processed and disseminated as a regular series of short Foresight Briefs that provide overview descriptions of foresight activities relating to countries and/or regions and to thematic areas. Accordingly, the consortium had to regularly interpret and assess foresight monitoring data and compile these data into a regular series of Foresight Briefs covering significant activities and results in this domain.

The Foresight Briefs served also as a tool for community building within the EFMN project. Foresight Briefs are concise descriptions and analyses of foresight processes, aiming to highlight interesting findings on future developments and challenges of relevance to research and technology or societal issues. Among the objectives of the Foresight Briefs was to highlight interesting results from recent foresight activities, pointing to future challenges and opportunities for policy and society. This was achieved in the selection of 160 Briefs. They represent a fine selection of findings with relevance to decision-makers in European, national and regional policy, as well as in industry and non-governmental organisations. In fact, they provide a 'showroom' function for foresight exercises as an opportunity to make activities more widely known.

Figure 6: The brief production process



Source: Susanne Giesecke

Addressees of Foresight Briefs are policy-makers and public administration at European (Parliament, Commission) and national levels (ministries, funding bodies, research councils). We also address, and have as authors, researchers and strategists in industry and in academic organisations as well as stakeholders from industrial associations, NGOs such as UNIDO, etc.

Looking at this activity, the following functions can be distinguished:

- **creation and maintenance of a 'rolling list'** of possible Briefs to be produced. This list included suggestions from both the network and the consortium partners on various themes;
- **production of Briefs**, including selection and drafting;
- **quality control of Briefs** in order to maintain a standard of quality that will earn the EFMN status for active output and interest value.

The process of Brief production went through a learning curve over the four yours of the EFMN. While the starting point of ways to identify interesting foresight initiatives for consideration for a Brief broadened, the process of Communication with Correspondents, quality control and editing were progressively rationalised and streamlined.

The approach to **creating and maintaining a 'rolling list'** of potential Briefs was originally based on the mapping itself: the EFMN database was scanned for new or recent initiatives that would be interesting topics, considering the Briefs already produced and any structural shortcomings (e.g. topics and countries/regions not covered). However, over the project's lifetime, the identification process shifted to an approach where periodic calls were sent to Correspondents, asking them to make suggestions. These were assessed by the Briefs production team and, after evaluation, given the 'green light'.

The **production of Briefs** followed the 'wedge strategy'. On the basis of pilot Briefs drafted by the Core Partners, the consortium Partners developed a critical mass of Briefs. The first 40 or so Briefs sparked the interest of the foresight community, which was then invited to contribute to them. External production was at first limited but, as the added value to Correspondents became clear, the foresight community took over. Now, coming to the end of the EFMN project, most Briefs are produced by the Correspondents. The 'wedge strategy' has been successful.

The most significant evolution can be seen in **quality control.** The original concept for quality control was a consortium effort, where many partners would be involved in evaluating the Briefs produced, a 'peer-to-peer' approach. This approach was quickly considered impractical, because both of the steep learning curve and the inhibiting effect of having a 'peer-to-peer' procedure. Here again, the activity was centralised on a Brief production team which assessed quality, suggested improvements, and handled the final layout. Quality control accordingly became the responsibility of a permanent and experienced team of experts.

The next sections provide a fuller introduction to the Briefs process, including a description of the concept and the criteria for contents.

5.2 The concept of Briefs

The first step in producing a Brief was to pinpoint the rich information resources of various foresight initiatives focusing on potential future developments. Policy-makers and other experts were able to use this information in their work, but access to the information was limited. Details of many initiatives were available, but it was too much for experts to be fully informed on what was going on. A short description of an initiative, where the expert could scan in five minutes and decide whether the initiative was interesting, would be helpful and of high added value.

The criteria for selecting a candidate topic for a Brief were:

- novelty;
- policy relevance;
- forward-looking;
- contribution to community building;
- balanced thematic and geographic coverage;
- compatibility with the focus of Issue Analysis and mapping.

There were different types of Briefs. The first and most important was a description of a foresight initiative, including the objectives, approach, organisation, results and impact. The purpose of this type of Brief was to inform the community about recent and ongoing foresight activities. A second type of Brief was thematic, focusing on a special topic from a foresight perspective. The objective of this type of Brief, linked to Issue Analysis, was to inform the community on emerging issues.

As became clear in the process, the impact issue was a difficult one to address. An important factor in Briefs

production was that they became a recognised means of communication for the foresight community on recent and ongoing initiatives. However, as Briefs were often written by the persons involved in these foresight exercises, their descriptions were not always objective. This conflict between personal motivation and the need for externally produced Briefs led to greater involvement by the production team in increasing objectiveness.

5.3 Creation of Briefs

With Briefs production shifting to external proposals, the task of creating a dynamic 'rolling list' of potential Briefs evolved over the four years into a well organised process of passive and active stimulation of suggestions from the foresight community. As the EFMN became better known, along with the opportunity to write Briefs that were disseminated to over 2 000 experts in the network, individual experts involved in foresight activities were encouraged to write Briefs *ad hoc*. Also, periodically, correspondents were sent an email requesting them to come up with suggestions for Briefs, with a small budget to defray their costs. In the final resort, Partners were invited to suggest new Briefs. In total, EFMN approached the community of some 200 Correspondents and, by the end, over 50% of Briefs production was originating outside the consortium.

Topics for Briefs were selected in close discussion with the European Commission. The team also looked for activities in missing fields or regions with the help of the Internet, conference proceedings, etc. The results of the mapping and the desk research contributed to the task of identifying contact persons and approaching them directly with an invitation to write a Brief. In total, some 250 topics were suggested as Briefs and 160 were actually produced. Some topics were rejected as unoriginal, others had already been covered, and yet others were produced by the consortium itself.

Although, originally, quality control was organised in a way that most consortium Partners were involved, this approach proved very cumbersome. Quality control called for a full understanding of the concept of a Brief and took quite some time. The learning curve was too steep to ensure an efficient process: evaluating a Brief is a unique process which cannot be compared with editorial experience on journals. In the end, quality control comprised:

- discussion within the team and consultation with the European Commission for selection of topics;
- evaluation of Brief content by a team member, in consultation with other team members, to enhance readability;
- evaluation on English by an external native speaker to ensure high-level readability;
- finalisation of layout using an external expert (native speaker) to increase the quality and utility of the Brief.

By centralising the various activities on a small team of experts, the efficiency and quality of Briefs production was ensured.

5.4 Results

In total 160 Briefs were produced, with only the first year not meeting the annual mark of 40 Briefs (due to start-up issues). This number corresponds to the original objective of the EFMN.

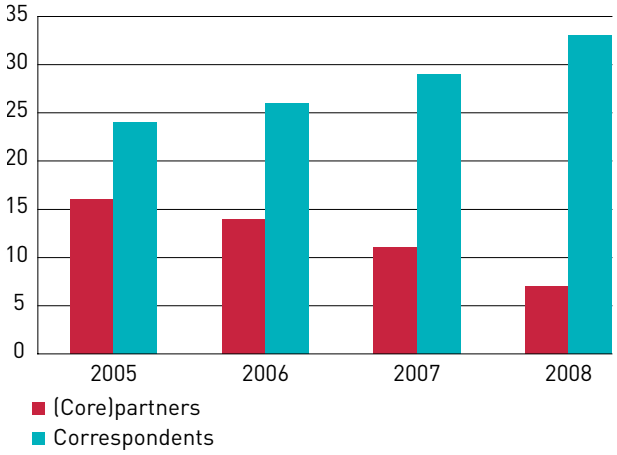
The most popular Briefs downloaded from the website over the last 12 months were as follows:

Brief No.	Title	No. of Downloads
142	Foresighting Food, Rural and Agrifutures in Europe	1 919
137	The Future of Manufacturing in Europe – A Survey of the Literature and a Modeling Approach	1 644
119	Evaluating Foresight – The Colombian Case	1 536
90	Global Technology Revolution 2020	1 384
118	Austria's Futures: Past Perspectives and Present Expectations	1 361
140	Security of Energy Supply for the EU-25 in 2030	1 265
139	Future Prospects of Care Facilities and Services for the Dependent Elderly in France	1 226
141	Research, Technology and Innovation Policy in Vienna	1 212
117	England's Rural Futures Project: Scenario Creation & Back-casting	1 114
120	Opportunities in Innovation for the Dutch Defence Industry	1 061

The network of Correspondents representing almost all EU and European countries grew steadily, finally extending to North and South America, the Mediterranean countries, and even to Asia, Australia and some regions

of the African continent. From call to call, EFMN was able to increase the number of voluntary Correspondents covering foresight activities they were familiar with, or even actively engaged in, in their country. Figure 7 shows the number of Briefs published by Partners or Core Partners (red) and by Correspondents (blue). Over the years, the red column decreases whereas the blue one increases.

Figure 7: Ratio production of briefs by consortium partners and correspondents

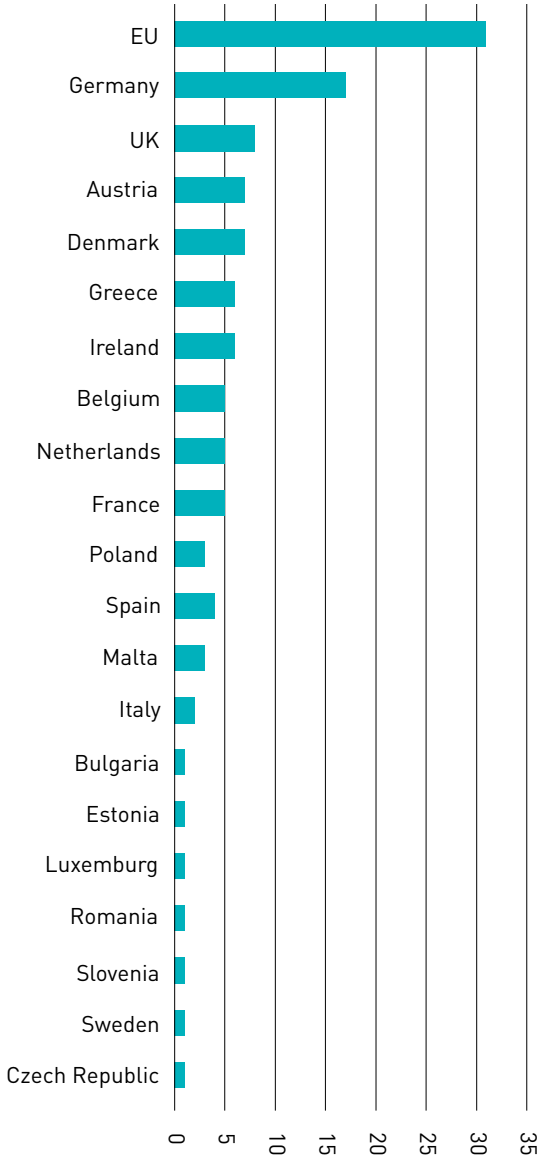


Source: Susanne Giesecke

The willingness of external experts to write Briefs was evident from the outset. Already in the first year, the number of external experts contributing to the consortium increased. And this number grew substantially during the four years of the EFMN. In total 111 Briefs were produced by external experts and only 49 by the consortium itself. But even more significant was the shift towards unpaid Briefs production. From the beginning, modest financial support was offered to experts who wrote a Brief on a foresight initiative they were not directly involved in, and a significant number of Briefs received this support. However, by the end of the programme, this type of support was no longer necessary and experts used the EFMN as their way of communicating with the community.

During its four years of operations, the EFMN core team monitored systematically for interesting content-oriented digests from foresight processes that had been implemented in regions, countries or at the international level, on sectors and themes of relevance to research, technology, society, agriculture, services, etc.

Figure 8: Regional distribution – EU

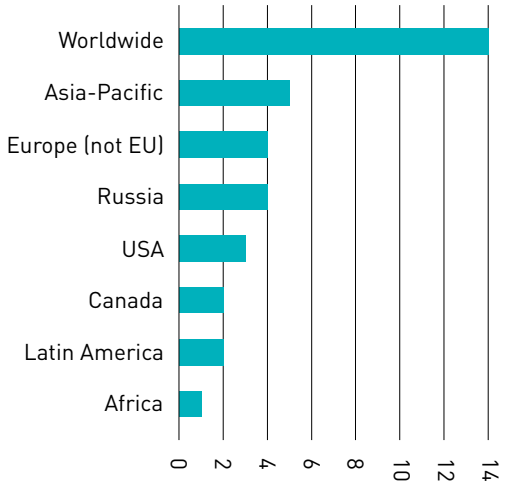


Source: Susanne Giesecke

Figure 8 shows the distribution at regional level of the EU countries featured in EFMN Briefs. Some cover more than one country; others concentrate on regions within a country, on cross-border regions or on urban areas.

The majority of Briefs focus on the EU in general or on issues that deal essentially with the EU. At national level, Germany is the country most represented with 17 Briefs, followed by a fair coverage of the UK, Austria, Denmark, Greece, Ireland, Belgium, the Netherlands, France and Spain with 4-8 Briefs each. Other EU countries were only featured in one or two Briefs. This is not representative of foresight activity overall, but reflects the national representation within the consortium. More details are available in the chapter on foresight mapping.

Figure 9: Regional distribution on the rest of the world

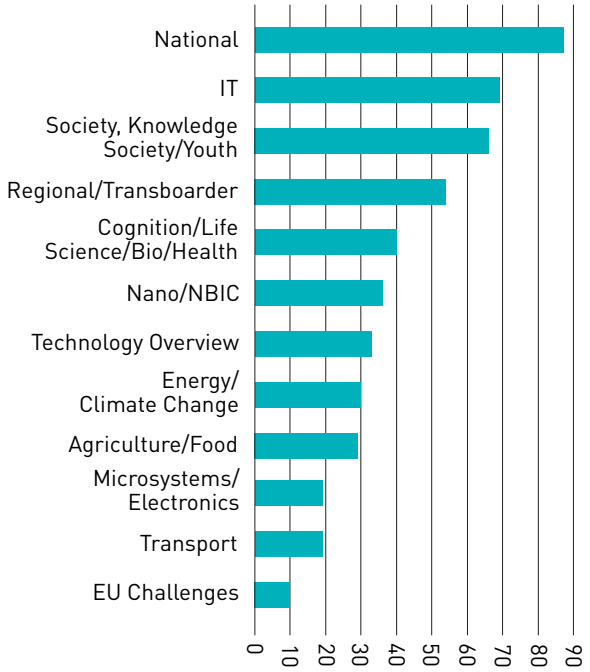


Source: Susanne Giesecke

As regards global coverage, most Briefs deal with issues that are valid worldwide (see Figure 9). Worldwide issues are followed by Briefs on the Asian-Pacific region (including Australia and New Zealand), European countries that are not members of the EU, Russia, North America, Latin America and Africa.

The presentation by topic (Figure 10) shows that the majority of Briefs are on national foresight activities. The list of technological topics is headed by ICT, followed by cognitive science/health, nano and converging technologies, energy and climate change, microsystems, and finally transport. Other prominent issues can be summarised under the heading 'society, knowledge society, youth', the topic of almost 70 Briefs. Agriculture and food are covered in 30 Briefs, and EU challenges – a very general subject – in 10 Briefs.

Figure 10: Overview of Briefs by Topics

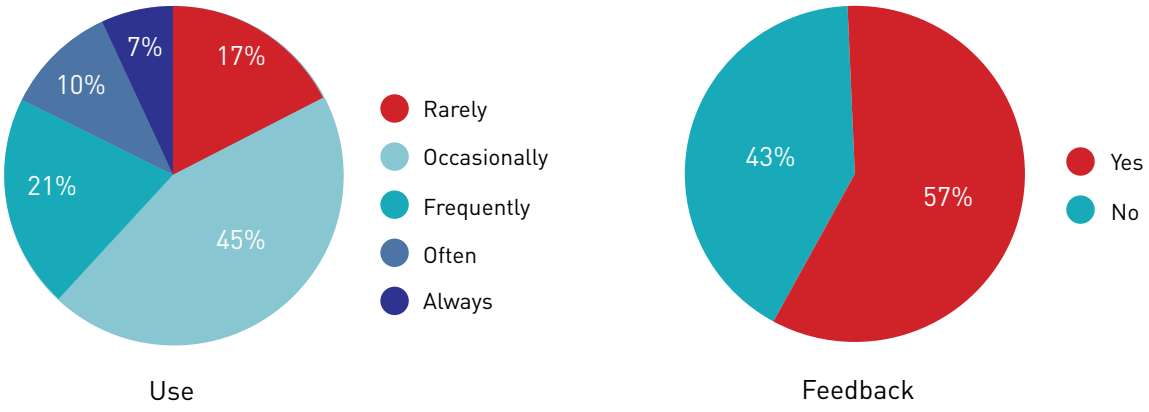


Source: Susanne Giesecke

The EFMN and the Brief-based information exchange have become a well-known vehicle for foresight practitioners to inform the community of their activities and keep up-to-date with recent exercises, find inspiration for new subjects and learn from one another.

A short survey conducted by EFMN among authors in September showed that 45% used their Briefs as a reference occasionally, 57% received feedback on their published Briefs and displayed them as a reference on their own or their organisation's website homepage (see charts below).

Figure 11: Use of Brief as Reference and feedback to author



Source: Susanne Giesecke

5.5 Conclusions on Briefs production

Briefs production was without doubt one of the key outputs of the EFMN: they are greatly appreciated in the foresight community and beyond! The fact that most Briefs are produced by its Correspondents and not by the consortium clearly demonstrates the positive attitude of the community.

We believe that one of the success factors is the concise format the Briefs use, enabling the reader to decide very quickly whether the initiative is interesting; the well-designed template largely contributes to this. But the experience gained in editing and commenting on the Briefs is essential to efficient Briefs production.

6 Dissemination of information

6
Dissemination of information

This chapter describes evolution of the process of information dissemination to the network of users of EFMN data. As there has been no formal report on this work, the chapter will also include a summary of the results.

6.1 Evolution of the dissemination process

The management and dissemination of the information generated by the EFMN centred on a Web-based facility consisting of a number of tools and interfaces available via an open interactive portal, accessible to all stakeholders in the project. Its main objective was to provide the consortium and community with a portal containing information on foresight activities within Europe and beyond. Unlike the ForLearn[(1)] portal, its purpose was not to focus on methodological issues, although the mapping activities provided some information on how foresights were used around the world. The portal also provided the community with the background to the EFMN and the Correspondents.

The work was divided into two main tasks:

- **set-up of the information system and website** to provide all the online facilities essential for the internal and external applications of the project. The website consisted of both a public and a password-protected section, the latter to be used for interaction within the project team and the collection and management of data (consortium). The public part made all outputs – data, Maps, Briefs, Reports – available to all users;
- **publication, dissemination and communication** of all project-related data and output. This covered the presentation in the most effective way possible of Foresight Maps, Briefs and Reports, also the editorial work necessary to ensure that the results were expressed in a consistent, clear and accessible form for a wide variety of potential users. Also a strategy was developed to actively disseminate information to the foresight community.

These parameters provided great scope for experimentation. Standard **information systems** for classifying or categorising foresight initiatives did not exist when the EFMN project was launched in early-2005. Indeed one of the first dissemination tasks was to develop a system for mapping the data. This was complicated by the fact that, until you have collected a reasonable sample of data, you do not know the level of interest or relevance of the parameters measured, or the use to which a foresight expert might put them. One of the tasks was therefore to develop a system to present, in a handy and accessible way, a mass of complex data in the public section of the website, for use by foresight practitioners and researchers. It was impossible to do this in a single go, and the initial plan under which the team was expected to design a system quickly, based on the mapping, was naive. In the end an iterative approach was required that adapted to the quantity and complexity of data as it became available, and that also made reasonable trade-offs in presentation on the basis of the possibilities provided by the state-of-the-art of the Web technologies.

For **the publication, dissemination and communication** activities, the original approach was to provide a service to the other activities and, at the same time, fine-tune the final output. Over the four years, the dissemination process was cut back to the activities based on the website and the emails. The email system proved crucial in communication with the foresight community. An annual EFMN Correspondents Day was also organised. As the project was still in its start-up phase in the first year, this event was only held three times. The first time, invitation was limited in order to ensure in-depth discussion on the output to be provided to the community. The second and third EFMN Correspondents Days were announced more widely, and focused on dissemination of EFMN information.

6.2 The information system

The information system comprises two elements. The first supports collaboration between members of the consortium on the mapping of foresight data as well as other complex tasks, namely the development of the issues analysis and the dissemination of the results to a public of foresight practitioners and policy experts.

The information system combines two separate but linked systems. First, an existing Internet-based infrastructure, the *Dynamo* system, provided support for mapping activities. This contains a large amount of data from policy-related TNO projects and has a project-oriented flexible structure for a range of applications.

(1) ForLearn is carried out by the IPTS and aims at the dissemination of methodological knowledge on foresight (see http://forlearn.jrc.ec.europa.eu/index.htm).

The system provides basic support for project teams involved in gathering and classifying content and other data on foresight initiatives. Some aspects of this system were of direct relevance to the EFMN and immediately usable, whereas others categorising content were developed and deployed as the need arose. This work was carried out by TNO in collaboration with the teams working on the mapping exercise.

While useful for supporting teamwork, data gathering and classification, the *Dynamo* system was not suitable for use by a general public comprising foresight and policy practitioners or visiting researchers. So the team also used a CKA-based system that supports access to and visualisation of all project data, as well as project-related mailing lists and discussion fora. This system has been used on www.efmn.info and www.efmn.eu. These two sites are still active, one being a simple mirror of the other. The overall approach has been to develop a site that is both informative and generous in the information it offers.

The approach was to consolidate all key mapping data on the *Dynamo* system, where it could be easily uploaded, edited and otherwise managed by the mapping team. This worked out well, and data was occasionally transferred to the EFMN site for referencing via the search engine and other data-browsing tools. Mapping-related searches were conducted on either of the EFMN sites, eventually directing users to data and files on the *Dynamo* site. The interface on the EFMN site permitted browsing, searching, selection and visualisation of data either directly on the dissemination site or in the *Dynamo* system.

Both the TNO and CKA websites required continuous servicing throughout the duration of the project. In the case of the EFMN site, this was due to the need to maintain a high service level. Despite the work done on the development of standards for browser architecture, graphical interfaces and data formats, the software environment in which a website operates is evolves continuously, not only at the server level, but at the level of every browser accessing the server. This situation demanded continuous attention to the following issues:

- **search engine optimisation:** a site needs to be found on the basis of simple queries using all the major search engines such as Google and Yahoo! Each search engine has its own strategy for ranking sites in search engines. Constant effort is required to ensure a good ranking on all the major search engines;
- **on-site search engines:** one of the main tasks for this project was to make the great quantity of data available to users, and the team applied a number of different approaches. One of these factors is the search engine itself which has limited functions, and it is easy to think of new features one would like to add, but this is a never-ending project…;
- **security developments:** new virus and hacking threats emerge every day. The website needs to be maintained and adapted constantly to face up to these threats. A number of attacks occurred over the period of the project and were a major problem in ensuring continuity;
- **maintenance and incremental improvements:** as always with software, some small errors that needed to be solved emerged during the use of the system. Some small enhancements are also planned, based on day-to-day use.

Development of the EFMN site was undertaken by CKA, with support from external contractors. The contractor in the first two years was 'Across Limits', a Maltese IT service provider. The overall look and feel of the website evolved from mid-2005 to the final version of May 2006. The *Dynamo* system, provided by TNO, was updated with general improvements during the period of the EFMN project.

6.3 Publication, dissemination and communication

The publication, dissemination and communication of EFMN information and the project activities can be grouped under the following main headings:

- the publication of annual reports;
- the Briefs;
- the EFMN website;
- periodic newsletters to the foresight community;
- the annual EFMN Correspondents Day.

The outcomes of the EFMN programme are formalised through the Annual Reports. These include the overall EFMN Annual Report, an Annual Mapping Report and the reports on the annual issue analysis. Experience showed that an annual report devoted exclusively to progress was excessive. Too little changed in one year to justify an annual report. So, rather than apply a common structure and message, these reports present different perspectives. An essentially methodological approach was applied in the first year. Different perspectives were adopted in the second and third years, while the final year's report looked at the programme in retrospect. In fact, there were relatively few readers for these reports, and extending the distribution did not change things significantly. Reports need to be structured as manageable documents with a single message.

By contrast, the Briefs have been very successful, as described elsewhere in this report.

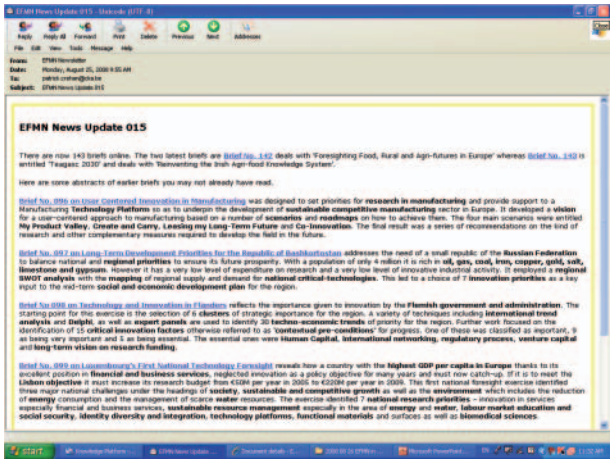
The major dissemination activity is the public section of the EFMN website, which provides access to:

- general information about the EFMN project, with background data on the project objectives, approach, organisation and other aspects;
- electronic access to results such as the EFMN Annual Reports, the Mapping Reports, and the Issue Analysis Reports;
- access to all Briefs, using an elaborate search interface which also shows the number of times Briefs are downloaded;
- an interface to mapped data, permitting easy browsing and search, subsequently developed as an interactive GUI enabling users to select indicators and produce tailor-made figures: relevant mapped initiatives were available for downloading, with source information linked to the *Dynamo* system uploaded periodically;
- information about the EFMN Correspondent Days: programmes, presentations, participant lists and other relevant information;
- information about related initiatives such as the For-Learn project, the FOREN Guides and the Regional Foresight Blueprints;
- an Events Calendar: this proved of limited value due to the limited interaction (provision of data) by the community;
- a Correspondents section with keyword search function featuring all those active in the EFMN network with selected details (subject to approval by the persons concerned): a continuously updated section of the website shows photos of all Correspondents;
- a discussion forum section which allows file sharing and indicates when new documents are uploaded or new members added to the discussion group: designed for the EFMN team, Correspondents and members of the foresight community anxious to host and facilitate discussions, it was not used much – these techniques are labour-intensive, requiring regular proactive intervention by the thread champion in building the list, motivating participants, leading discussions and structuring conclusions.

The second key method for actively disseminating information to the community was the EFMN newsletter, using the same mailing list. This newsletter, which comprised short descriptions of new Briefs, evolved over time and featured the following headline items in its final format:

- a summary of all Briefs available;
- names and links to the most recent Briefs;
- a 'smart' summary of five earlier Briefs;
- references to upcoming events;
- references to recent EFMN-related events such as Correspondents Days on Issues Analysis; workshops, etc.

Figure 12: Example of EFMN newsletter



Source: Susanne Giesecke

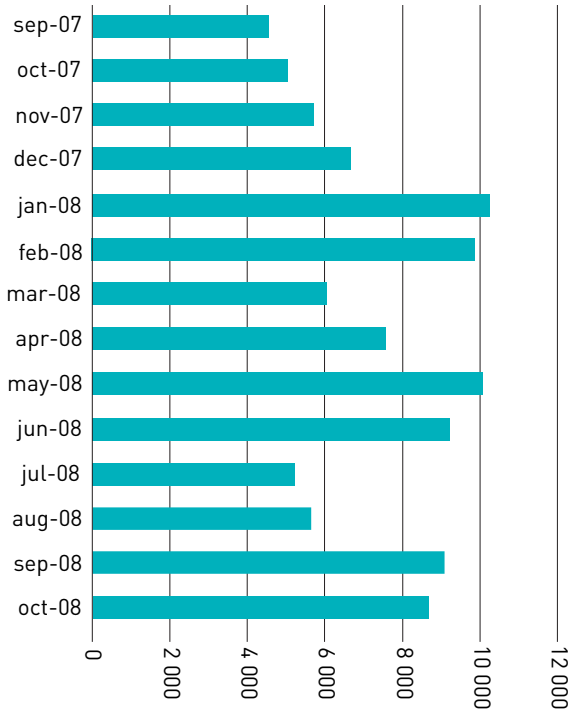
This format, which was no-nonsense and content-oriented, proved very successful in its own right and acted as a driver of traffic to the EFMN website. Above is an example of a typical newsletter as it arrives in the inbox of an EFMN network member. The recipient can quickly check the subject-matter and click to download any document of interest.

6.4 Website dissemination results

The EFMN website, which has been the most successful element of the dissemination process, is widely known throughout the foresight community and visited frequently.

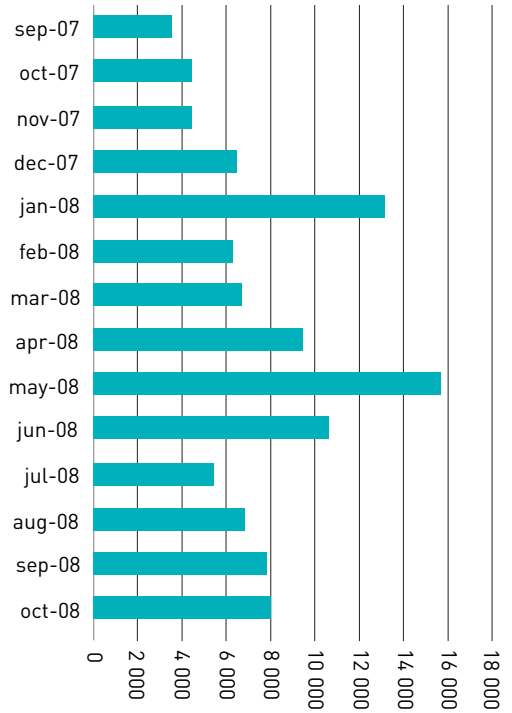
Much of the traffic to the site was generated by visitors using the search engine and other facilities, but a considerable proportion came from users clicking linking directly to an item on the site from the newsletter. In the last 12 months of the project, a total of 2 672 636 files were downloaded from the site, corresponding to 98 207 megabytes of data.

Figure 13: Average daily downloads (number)



Source: Patrick Crehan

Figure 14: Donwloaded data of the EFMN website (Megabytes)



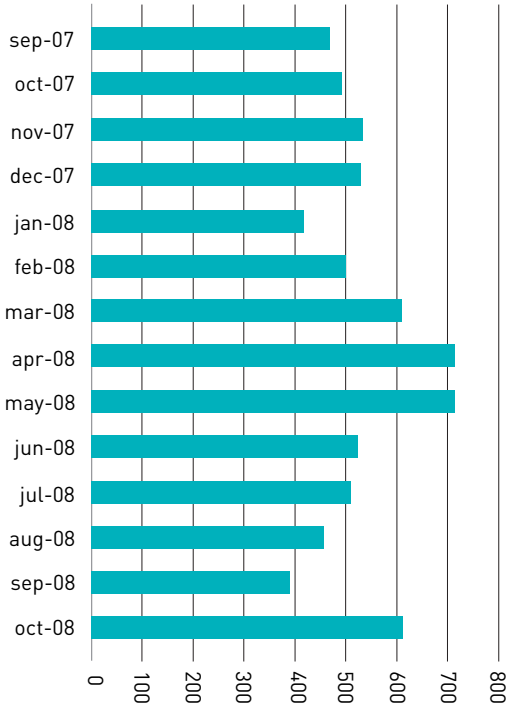
Source: Patrick Crehan

The transition from one hosting and service provider to another in the period 2006-2007 was unplanned and the site had to be completely rebuilt as a result. The site was always accessible during the changeover – a final version of the original site was kept online until the new one was ready – but it was effectively in limbo for several months. There was a gap in user-related data during this static phase, but performance-related statistics are available for almost the whole four-year period of the project.

From July 2007 the average number of daily downloads was consistently more than 4000 files per day and, on two occasions, exceeded 10000 files per day. The average number of daily downloads for each month of the four-year period of the project was as follows:

In April and May 2008 the site was visited on average more than 700 times per day. A 'visitor' is someone who browses through several pages and download several files. The data for the whole period of the project was as follows:

Figure 15: Average website daily visits



Source: Patrick Crehan

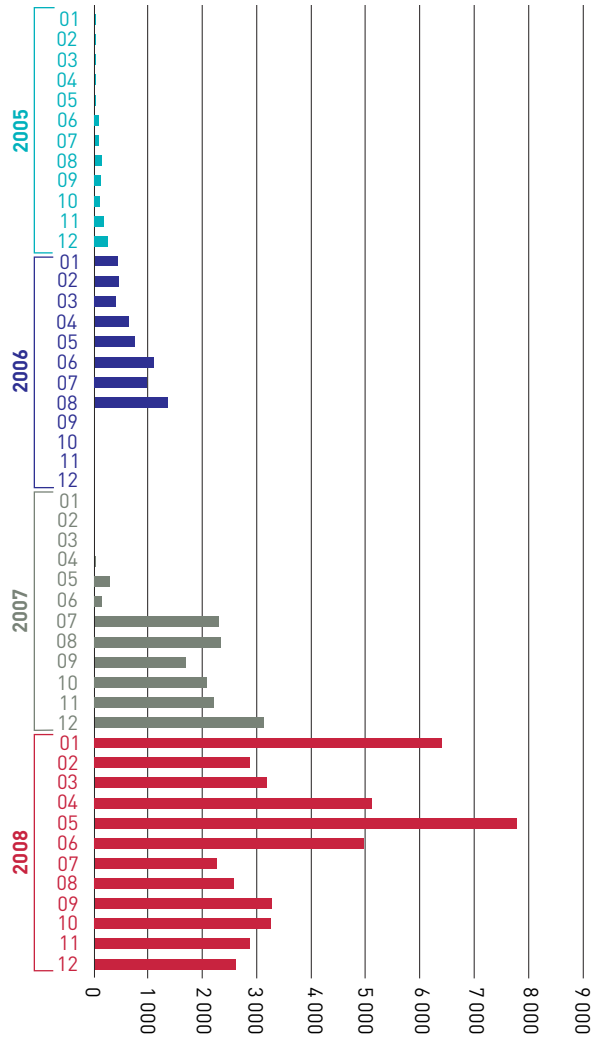
The low figures for the first few years are due to a combination of factors:

- there was comparatively little content on the site;
- EFMN had not yet started to systematically carry out 'search-engine optimisation', in anticipation of visits from the Google and Yahoo robots;
- the newsletter was bot yet being used to drive traffic to the site.

The difference this combination of factors made to the performance of the site was remarkable, but came at a price in terms of the attention and effort required of the site manager.

Other interesting statistics are provided by the page views which are a measure of how long visitors stay on the site and where they go. It would be possible to provide many levels of detailed analysis, such as 'how many visits to what page' or 'the most visited page', but the overall statistics are as follows:

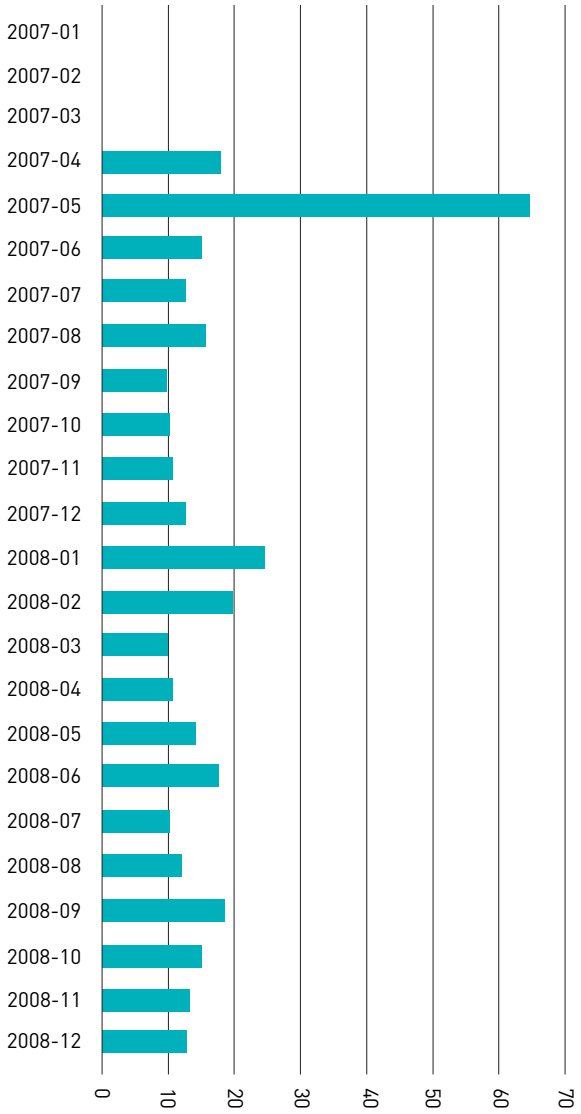
Figure 16: Website daily average page views



Source: Patrick Crehan

The number of files downloaded per visit is another interesting behavioural statistic. For the last two years of the project, this consistently averaged more than 10 downloads per visit, while some visitors downloaded many more, notably first-time or occasional visitors to the site and professional researchers. Please note that these figures may sometimes be skewed by the activities of the consortium, especially in the lead-up to a deadline for a review or visits by Correspondents and the authors of Briefs, as well as programmers testing out live versions of the site. We do not know how significant these extremes are in terms of the degree to which they diverge from the behaviour, for example, of a regional policy-related professional with only a passing interest in the subject. In particular we think that the July 2007 figure was largely due to the high level of activity by the consortium and those involved in the re-launch of the new version of the site.

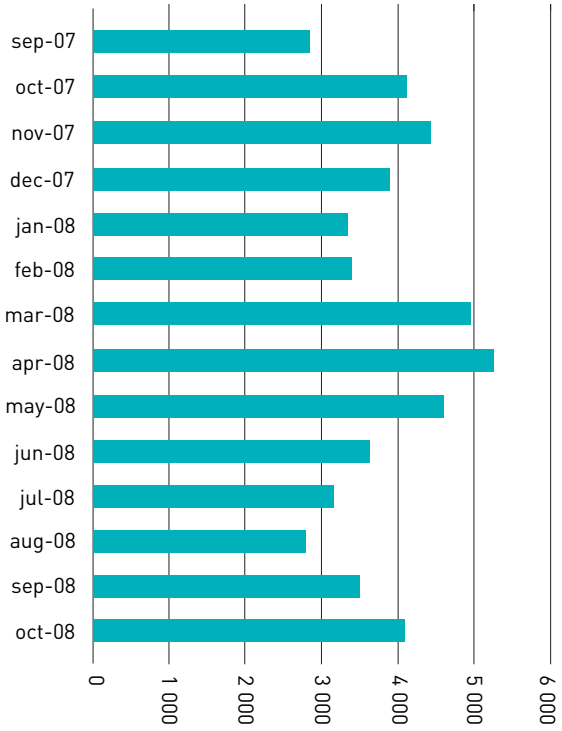
Figure 17: Downloaded files per visit



Source: Patrick Crehan

Finally it is worth remembering that users often end up visiting a website because they have been referred to it from another website. Here is a sample of statistics for the total number of monthly referrals, measuring how many users end up on a site after visiting another one. They are an important element in the classification of sites by importance: the more referrals a site has, the more important it is. At one stage, the EFMN website logged independent referrals from more than 5 000 other sites. Like all statistics, the rate varies over time, but the EFMN website consistently recorded more than 2 000 sites each month forwarding referrals.

Figure 18: Monthly total of independent site referrals



Source: Patrick Crehan

6.5 Concluding remarks

The main conclusions on foresight mapping activities are the complexity and data size, both much greater than initially anticipated. Online visualisation of complex data sets remains a challenge. There is no doubt much more work of an exploratory or experimental nature that can be done on this. The first step is to understand what is useful and meaningful to users and then make it available in interactive form. The cost of development makes it impractical to do these tasks in parallel. In the end the best approach may be to:

- make the raw datasets available online for researchers to download to their desktops;
- process the data on the desktop using powerful dedicated data analysis tools rather than dealing with the latency of a customised online application;
- design the web interface once the data is understood, along with whom the users are and how they might use it;
- implement this with a view to ergonomics and usability.

The other main lesson, not a new one but a confirmation of wisdom that goes back some 10 years to the early days of the Internet, is the difficulty of animating and facilitating discussion groups and communities. Little use was made of the facilities provided for discussion groups: people are not very familiar with this type of collaboration tool, much less so than with email. Using these tools requires at least one person to play a proactive role in developing the dialogue, posting materials and carrying out routine 'housekeeping' tasks, and this person needs to set aside time.

It may even be worthwhile providing training on the use of discussion groups, so that people get over the 'familiarity hurdle' and understand exactly how it can help them. The main point is that the development of a dialogue is not something that can be left to chance: it requires skills that are not generally available, as well as time and effort, and these should be budgeted for in future projects.

However, the main challenge remains that of developing a dynamic website with an active community: the newsletters and the Correspondents section of the website contributed to this. But more interactive ways of creating participation need to be explored AND experienced. Free experimentation is important. Nonetheless, the main success factor was emailing the Briefs to the foresight community: this provided a clearly defined item of information, with high added value, to the individual user and stimulated use of the website.

7 Lessons learned from four years of practice

7

Lessons learned from four years of practice

Over the first four years of the project lifetime, the EFMN can point to some notable successes. But the most valuable lessons are often those learned from failure or where problems have been encountered. Here we provide a summary of successes and outstanding challenges from the different strands of the consortium's work: new initiatives in setting up networks can draw on the lessons learned during the four years of the EFMN.

7.1 Development of the Network

The development of a large network for information collection and dissemination proved to be a significant challenge. Important issues to be addressed were **activation** of the Network and the **coverage**. Development of the Network was planned as a separate activity using the 'wedge strategy'.

The final result has been that a large number of Correspondents are actively participating in the EFMN. The Correspondents network comprises some 175 experts, most of whom are actively participating by producing Briefs and suggesting new foresight initiatives. The coverage is global; not only experts from Europe, but also from the USA, Korea, Australia and Latin America, for example. Although actual participation tends to be linked to the nationalities of the partners, many other nationalities are also actively present. Another positive sign is that experts are continuously registering on the network. Looking at the other more passive facet of the network, some 2 000 experts around the world receive the electronic newsletter, and website visits reflect an enormous interest in EFMN work.

But there are some lessons to be learned in regard to the development of the network. The initial separation of network development and other work packages proved to be superficial and counter-productive. It demonstrated that development of the network was furthered by other activities, and a separate activation of foresight experts without some kind of focused activity was unrealistic. The Correspondents needed *ad hoc* tasks (e.g. writing Briefs, proposing new foresights) to be fully motivated. Building a long list of potential participants was a marginal activity that simply involved collecting contacts suggested by consortium members.

Crucial to the activation of the network was the aspect of 'what's in it for me': more activities linked to their other work were needed to make the project appealing. Also a full 'wedge strategy' of shifting all activities to Correspondents was equally unrealistic. Some activities were just not beneficial for individual Correspondents and/or required a steep learning curve and therefore could not be outsourced (e.g. the mapping activities).

This point refers back to the 'wedge strategy' envisaged at the beginning of the project. Partners would kickstart the network by contributing the bulk of information at the outset, in order to create a critical mass of interest to outsiders. Then, over time, external volunteers would take over the majority of work. This strategy can only succeed where clear incentives make it probable that outsiders will contribute. It was also naïve to think that all the work could be done by volunteers, as there is always need for a core professional team to provide input and monitor outsider activity for quality. In that respect the 'wedge strategy' makes sense, provided one accepts that a complete 'hands-off' situation is unrealistic.

7.2 Monitoring and mapping foresights

The second activity focused on the identification and mapping of foresight initiatives. This process was one of the 'building blocks' of the project, feeding into the issue analysis, Briefs production and dissemination. It was also recognised that a thorough collection of foresight initiatives would be highly appreciated by the community as an information source for new initiatives. It would also lead to the development of an annual Mapping Report. The approach to this identification and mapping process at the outset was, again, the 'wedge strategy': the consortium was to do most of the work, shifting the load to the Correspondents network over time.

These activities resulted in the identification of about 2 000 foresight initiatives, far exceeding the requirements of the project and the initial target of 500 mapped initiatives. This vast resource of information on foresight exercises is unprecedented in the world and the geographical spread of mapped exercises is greater than anticipated, despite the overwhelming Eurocentric focus of the Network. The result was four Annual Mapping reports and several scientific papers that were greatly appreciated by the foresight community.

Yet this volume had repercussions on the quality of mapping, with only some half of the foresight exercises entered in the database mapped against the majority of

indicators. Quality control has proved a difficult problem to solve. The initial procedure was to involve various Partners and Correspondents in this process, but the learning curve and call on expertise was too demanding for this approach. Consequently, all mapping and quality control activities were centred on a small team.

This was also the case for the identification of new foresight initiatives. Even two years into the project, the 'wedge strategy' proved unfeasible as Correspondents would only trigger new initiatives to a limited extent. The mapping team identified the new initiatives, and a periodic request for suggestions was addressed individually to some of the experts. As regards the Annual Reports, an overload of information still has to be published. These Reports only feature a small portion of the information that can be extracted from the data.

The information platform has also proven to be somewhat problematic. Considerable expertise was required and adjustment to specific needs was limited. Although some elements have certainly proved their value (e.g. 'smart' characterisation), modifications can still enhance their usability. Moreover integration of the information platform with the EFMN website and the data analysis tool should be taken further in order to optimise usage between the systems.

7.3 Analysing emerging issues

The objective of the third activity was analysis of the foresight initiatives and the annual Issue Analysis workshop. In cooperation with the European Commission, new emerging science and technology issues were selected that were not on the political agenda and could prompt new discussions within the Commission. Based on an analysis, a series of topics were proposed, one of which was then chosen in discussion with the client. A consolidation report was then made on the chosen topics and, with the help of Correspondents and other foresight experts from the community, discussed in an annual workshop.

In total four topics were selected and discussed. The first year, the focal topic was 'Cognitive Science'; the second year 'Healthy Ageing'; the third year 'The European Knowledge Economy'; and the final year 'The Future of Healthcare Systems'. The discussions held in the workshops proved of added value, and some topics were taken up by the European Commission and discussed further.

However, Issue Analysis has also proved to be a difficult task. True emerging issues tend to be weak signals, touched on only in a limited way in foresight reports, if at all. A database analysis identifying by frequency would have been counterintuitive to the concept of emerging issues. Furthermore, as the indicators used in the mapping were not designed to identify such issues, those working on Issue Analysis always had to search through relevant, usually new, foresight reports. This was a time-consuming task necessitating a guided search. Generally, two main lessons were learned. Attempting to identify emerging issues by searching (past) foresight reports was at best only partially successful: instead these had to be looked for in other, more appropriate, fora. Secondly, the analysis should rely much more on expert input through a workshop, where discussion could be stimulated by a short and provocative input paper, rather than an analytical report. This would increase the currency and relevance of the activity.

7.4 Briefs informing the community

The next important activity was the production of Briefs, designed to provide the foresight community, over the four years of the project, with 40 Briefs annually including policy Briefs and thematic Briefs. The objective of these Briefs was to inform the community about recent and ongoing foresight initiatives throughout the world, so that information and expertise could be exploited in the best way possible. The 'wedge strategy' was also applied to the production of Briefs with the intention that, by the end of the project, it would be the Correspondents who would be writing them. It was planned to call on the services of a number of the Partners for quality control and finalisation.

This activity is perhaps the most successful strand of the EFMN's work. The website counts the downloading statistics for each Brief, with the most popular Brief downloaded more than 1 700 times in less then six months. Although the procedure needed some fine-tuning early on, the objective of producing 160 Briefs over the project period was reached without any major problems. The 'wedge strategy' proved successful as, in the end, many Correspondents were involved in writing them. The Briefs have been highly appreciated and used both by the foresight community and well beyond. The Bled award recognised the quality and value of this work.

Some lessons were also learned here, particularly that attractive, concise summaries of information can have a considerable impact and be the core element for the establishment of a network. They not only contribute to dissemination and establishment of network status, but also enhance participation. The fact that many of

these Briefs have been written by non-consortium members shows the appeal and interest of this work. The high demand for Briefs not only reflects their attractiveness, but also demonstrates the added value the foresight community can offer policy-makers, even beyond the confines of science and technology policy.

If there is one lesson learned, it is that Briefs production can be most efficient if seen as part of the dissemination strategy of foresight initiatives, providing timely presentation of foresight results beyond the normally national or regional audience of sponsors. Some lessons can also be learned from the organisational standpoint. Initially, quality control was highly formalised and shared between various Partners but, early on, it became evident that the work needed to be centralised in order to increase economies of scale and reduce the need for a learning curve. A peer-reviewing process was considered uncongenial for potential writers.

7.5 Exchanging information with the community

A project website was developed to connect with the foresight community and disseminate information, Reports, Briefs and foresight initiatives. The EFMN Correspondents Days also provided an opportunity to disseminate information.

The initiative led to a well-known and widely used website (www.efmn.eu). Evolving over the four years of the project, it now provides a treasure trove of data and information and useful ways of accessing information. The section of this report on 'Dissemination of information' (chapter 6) clearly reflects the substantial interest and intensive rate of use on the part of the foresight community, in terms of both visitors and downloads. The website has also been upgraded with a number of functions enabling Correspondents to feature their profiles and enjoy the additional benefits of participating actively in the EFMN. The EFMN Correspondents Days were successful and highly appreciated, although participation could have been enhanced.

Looking at interaction with the community, the first lesson is that data management and the website need to be integrated in one system in order to reduce interface problems and increase efficiency. In fact, more than three different systems were used for 1) collecting and mapping initiatives, 2) disseminating to the Network, and 3) data analysis. The information flow could be optimised by developing an integrated system, also one offering greater usability to encourage wider use.

The current website is the result of an evolutionary process. Important elements here are system interactivity for users, as well as functions that offer added value to Correspondents: many of the activities and functions should be accessible for a specific group of users and not limited to the system administrator (e.g. sending newsletters, uploading Briefs). This also would enhance the up-to-date character of the website, which is important in maintaining community interest – a more 'wiki' approach would be desirable.

The dissemination of standard-format newsletters has proved to be the primary success factor of the website, as they provide topicality and ready access to the Briefs. Visits to the website increased dramatically after each newsletter. As for the added value to Correspondents, direct connection with individuals is vital in stimulating Network activity: the community function is crucial. But the challenge remains of how to persuade the Correspondents and other members of the foresight community to get more actively involved in the identification and mapping activities.

The website and online tools are crucial for an integrated Network-building strategy. The website should be not just a one-way communication channel for project output but, to be effective for Network-building, needs to provide feedback into different activities by integrating outsiders (Correspondents and others) in an intelligent and effective way. This requires continuous effort, investment in website development, and also community monitoring and management. With IT tools increasingly important not only for communication but for project research, the cost and effort invested in this activity should not be underestimated. However, such investment would be justified by the increased input from a wider community.

The EFMN Correspondents Days have proved an important activity, but there are also some lessons to be learned here. Their key objective is the development of an EFMN family of Correspondents and the recruitment of new members. A specific central theme proved to be an important success factor in attracting people to the conference and showing what the EFMN is about. This central theme can and should be linked to a major output, namely the annual Issue Analysis. The dinner financed by the project enhanced the EFMN 'family feeling' significantly.

An important added value is the so-called 'pecha Kucha', where individual participants get five minutes to present a project – an opportunity to show their work that was greatly appreciated. It also became clear that the priority of an EFMN Day was not a major one and the right timing to avoid clashing with other events was crucial: if another foresight event takes place

within a few weeks of the EFMN Day, then participation will be under pressure. But overall it can be said that the EFMN Correspondents Day is a key tool in permitting face-to-face meetings and creating informal relationships – a vital factor in establishing a network.

7.6 Final conclusions

Was the EFMN a successful initiative? This question should be looked at formally from the perspective of the achievement of the specific project objectives. Altogether 2 000 foresight initiatives were identified, and the EFMN Network is now well-known throughout the foresight community and beyond. The programme included annual overviews of foresight activities at country level, as well as an analysis of all foresight initiatives identified. Four annual Issue Analysis workshops, focusing on crucial societal topics, were organised. These were all the result of a systematic analysis of the emerging issues.

Informally, there is more to add. Perhaps one of the most convincing facts is that the EFMN was honoured with the 2009 Bled Forum Award. By identifying the big scientific, technological and social challenges of tomorrow and bringing relevant information on crucial societal topics to the attention of the foresight community and policy-makers, the EFMN was considered to be one of the most valuable foresight initiatives of recent times. The Bled award honoured the EFMN consortium and showed the appreciation of the entire foresight community.

Building up the Network from scratch was an extremely resource-consuming task that required intense commitment with frequent setbacks. The results were the fruits of hard labour that only started to become evident several years later. Four years on, the team feels it is only now beginning to enjoy these fruits, even those resulting from the efforts of establishing the Network itself. With uncertain funding in the future, the EFMN is at risk of jeopardising the build-up of the Network structure. The mapping has also been a struggle. Not only improved work methods had to be learned, but the collected data is still a valuable source to be explored further. Many foresights have still to be uncovered and can provide new insights into the future.

The results show we have achieved a lot, but it is only now that we know how much more there is out there. Briefs production has become one of the most valuable resources in the foresight community and is a clear success, especially in the unique way it informs the community. However, at the close of these four years, production has stopped – despite requests for more still coming from the community. The success of the Issue Analysis process was, on the other hand, mixed. The European Commission is satisfied with the results achieved, but the added value to the community is limited. New ways have to be explored to address the needs of monitoring emerging issues.

Last but not least, the EFMN website has been highly successful. Many daily visitors and many downloads prove this. Here again, though, we feel we are just at the beginning, and further development will increase the website's value to the foresight community and beyond.

We could not have done the job without the help of the Correspondents. Outsiders need to be given an active stake in the development of the Network, with clear reward incentives. Only through the voluntary support of outsiders can a Network operate sustainably over time. Providing a forum for people's work and ideas – such as writing Briefs, with acknowledgements to the different authors – is an extremely useful tool in that respect. Periodic newsletters are a very effective tool for keeping people informed and interested in the Network, but these need to be supported with high-quality content as, otherwise, the risk of losing people's interest is real.

The final conclusion is that the EFMN project has been a success, but needs to be extended in future. We are still at the beginning of its development as a central tool for interaction within the foresight community, also connecting this community with the other users of future-oriented information.

8 Annexes

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Annex II – Overview of EFMN Briefs

No. 01-The German Research Dialogue • No. 02-Swedish Technology Foresight 2004 • No. 03-Milanese SME Internationalization 2012 • No. 04-Anticipating Change for Europe's Industries 2020 to 2025 • No. 05-Danish Technology Foresight 2015 • No. 06-Foresight Vehicle Technology Roadmap 2020 • No. 07-Archaeology in Ireland 2020 • No. 08-Foresight Embedding in Malta • No. 09-FISTERA – Foresight on Information Society Technologies in the European Research Area 2020 • No. 10-Cyber Trust and Crime Prevention • No. 11-Nordic Hydrogen Energy Foresight • No. 12-Greek National Technology Foresight 2021 • No. 13-Green Technological Foresight on Environmentally Friendly Agriculture 2024 • No. 14-Universities and the City-Region as a Knowledge Capital 2008 • No. 15-Production Chains 2016 – The Brazilian Technology Foresight Programme • No. 16-The BMW Region of Ireland – 2025 • No. 17-Bionic Buildings 2020 • No. 18-Dynamo 2004 • No. 19-Transport and Mobility in an Enlarged Europe – 2020 • No. 20-The US Hydrogen Roadmap 2030 • No. 21-Transition to Sustainable Production Systems – Austria 2020 • No. 22-Cognitive Systems 2020 • No. 23-UK Foresight on Exploiting the Electro-Magnetic Spectrum – 2020 • No. 24-Operation FutuRIS – France 2020 • No. 25-The Chemical Industry in Flanders – Towards 2010 • No. 26-The Food Industry in Flanders – Towards 2010 • No. 27-AGORA 2020 – Transport, Housing, Urbanism and Risk • No. 28-FORETECH – Bulgarian Technology and Innovation Foresight 2015 • No. 29 -Futur Radar 2030 • No. 30-East German Cross-Border Regions 2020 • No. 31-Sensor Technology Foresight in Denmark – 2015 • No. 32-Danish Nano-science and Nano-technology for 2025 • No. 33-Austrian Safety and Security Research 2011 • No. 34-Sustainable Transformation of German Utilities 2025 • No. 35-Japanese S+T Foresight 2035 • No. 36-Korea 2030 • No. 37-New Zealand Futurewatch 2025 • No. 38-The Polish Foresight Pilot – Health and Living 2013 • No. 39-Turkish S+T Vision 2023 • No. 40-Converging Technologies Enabling the Information Society • No. 41-Imagineering Ireland: Future Scenarios for 2030 • No. 42-Emerging S+T Priorities in the Triadic Regions • No. 43-Youth Foresight Germany 2020 • No. 44-Foresight for Mobile Radio Spectrum 2020 • No. 45-UNIDO Technology Foresight Initiative • No. 46-Canada Looking Forward S+T 21C • No. 47-Quebec S+T Development Based on Social Needs • No. 48-2020 Living in a Networked World Individually and Securely • No. 49-Achieving an Ethical Future for Biomedical R+D • No. 50-Knowledge Society Foresight • No. 51-The Millennium Project 2050 • No. 52-Austrian Tourism 2015 • No. 53-European Manufacturing Visions ManVis 2020 • No. 54-Spanish Nuclear Energy Futures 2030 • No. 55-'AGENCE FUTURE' Futures Conversations around the Globe • No. 56-The Region of Lecco Industrial System 2015 • No. 57-Greece's Path to the European Knowledge Society • No. 58-The Household Horizon 2012 • No. 59-Knowledge Society in Germany 2015 • No. 60-Rural Ireland 2025 • No. 61-Malta's Marine Sector 2020 • No. 62-Technology and Innovation in Romania 2015 • No. 63-South African Benchmark 2020 • No. 64-Communication Media Spain 2018 • No. 65-Insular Regions 2015 • No. 66-The Euro-Latin Foresight Network: SELF-RULE • No. 67-Children's TV Malta 2015 • No. 68-Dutch Biotech Scenarios 2030 • No. 69-Madrid 2015 • No. 70-Biotech Estonia 2020 • No. 71-Technology Foresight Slovenia 2020 • No. 72-Dutch Hospitality 2020 • No. 73-Central Macedonia 2018 • No. 74-Ukrainian STI 2025 • No. 75-Russia's Nanotechnology Foresight • No. 76-SCOPE 2015 • No. 77-Technology for Industry Foresight – Kocaeli 2012 • No. 78-German Delphi on Corporate Foresight • No. 79-Russian Critical Technologies 2015 • No. 80-The 'Jordan 2020' Scenarios Project • No. 81-Aufbruch Musik – German Music 2020 • No. 82-Corporate Foresight in Europe • No. 83-Cyprus 2013 • No. 84-Preventative Healthcare Mecklenburg-Pomerania • No. 85-Linz 21 • No. 86-The Future of Design • No. 87-Ambient Intelligence 2020 • No. 88 -Summit for the Future 2006 • No. 89-England's Regions 2030 • No. 90-The Global Technology Revolution 2020 • No. 91-Government and Corporate Social Responsibility 2020 • No. 92-OPEC – Long Term Strategy • No. 93-Changes in Production and Demography, the supporting role of ICT • No. 94-IRIS Futures • No. 95-ICT and Robotics in Agriculture and the related industries • No. 96-Pathways towards user centred innovation in European manufacturing industry (UCIM) • No. 97-Bashkortostan • No. 98-Technology and Innovation in Flanders: Priorities • No. 99-Luxemburg • No. 100-Bionik in Österreich • No. 101-Corporate Foresight in Medium-Sized Enterprises – A Research Project • No. 102-Creative System Disruption: Towards a Research Strategy Beyond Lisbon • No. 103-Public Service 2022 • No. 104-Agricultural Futures in England and Wales and Implications for the Environment • No. 105-APEC-wide Foresight Project on 'Future Fuel Technology' • No. 106-City 2030: Shaping the City of the Future: 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No. 125-Technology Foresight on Cognition and Robotics • No. 126-In the long run: Long-Term Thinking in Business: Corporate Foresight and Global Change • No. 127-FUTURREG (Futures for Regional Development) • No. 128-Priorities for the third national research progamme of the Czech Republic (2009-2014) • No. 129-Rural Areas: One of the most important challenges for Europe • No. 130-Migration: One of the most important challenges for Europe • No. 131-FUTURE OF BANKING • No. 132-Target 2020 • No. 133-The role of the EU in the world • No. 134-Future challenge for Europe: Providing security and safety to citizens • No. 135-Globalisation in the 21st century: Where optimism and fear collide • No. 136 -Intellectual property rights • No. 137 -The Future of Manufacturing in Europe: A Survey of the Literature and a Modelling Approach • No. 138-Old and New Energy • No. 139-The Dependent Elderly: 'Creating a Free choice scenario' • No. 140-Security of energy supply • No. 141-Vienna Scenario Process • No. 142-EU SCAR Foresight • No. 143-Teagasc 2030: Reinventing the Irish Agri-food Knowledge System • No. 144-U.S. Families 2025 – Trends and Alternative Futures • No. 145-Constructing Dark Scenarios for Privacy Policy Formulation • No. 146-Germany 2020 New Challenges for a land on Expedition • No. 147-ERoSC – The Socio-enonomic Impact of Emerging Social Computing Applications • No. 148-Transregional Foresight to improve and Coordinate Regional Innovation Strategies in Europe • No. 149-EU-Africa Energy Partnership: Implications for Biofuel Use • No. 150-Strategic Capacity Building in Clusters to Enhance Future-oriented Open Innovation Processes • No. 151-Furniture Foresight Center – CEFFOR • No. 152-Combining ICT and Cognitive Science: Opportunities and Risks • No. 153-Extremadura Regional Foresight Exercise • No. 154-Looking Forward in the ICT and Media Industry – Technological and Market Developments • No. 155-A Roadmap for the Commercial Development of Medicinal Plants and Market Developments • No. 156-Heatlhy and Safe Food for the Future – A Technology foresight Project in Central and E.E. • No. 157-Roadmap Robotics for Healthcare • No. 158-MONA: A European Roadmap for Photonics and Nanotechnologies • No. 159-ForeSec: Europe's Evolving Security • No. 160-Future Jobs and Skills in the EU.

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EUR 24043 – Final report – Monitoring foresight activities in Europe and the rest of the world – November 2009

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This report is the concluding report of the European Foresight Monitoring Network. After 4 years of activity, the report provides you with a concise overview of the backgrounds and organization of the EFMN. It gives you a more detailed insight in how the organization of work and network development evolved. It shows the results of the Mapping, Issue analysis, Briefs production and Dissemination, being the main activities of the network. 2 000 Foresight initiatives were identified. Annual overviews of foresight activities were produced at country level as well as an analysis of all the collected foresight initiatives. Four annual issue analysis workshops have been conducted, focusing on crucial societal topics. They were all the result of a systematic analysis of the emerging issues.

The aim of the report is to provide the academic reader, as well as the policy-maker and the otherwise interested an overview of some of the most inspiring results, as well as show them some insights in the lessons learned. By identifying the big scientific, technological and social challenges of tomorrow and bringing relevant information on crucial societal topics to the attention of the foresight community and policy-makers, EFMN was considered as being one of the most valuable current foresight initiatives.

Series of EFMN publications:

- Collection of EFMN briefs: Part 1 and Part 2 (EUR 23095)
- Report 'Mapping Foresight – Revealing how Europe and other world regions navigate into the future' (EUR 24041)
- Final report – Monitoring foresight activities in Europe and the rest of the world (2004-2008) – EFMN project (EUR 24043)
- Special issue on healthcare – Healthy ageing and the future of public healthcare systems – EFMN project (EUR 24044)

The European Commission under its Framework Programme 7 is providing the means to continue the activities of the European Foresight Monitoring Network. The new project, EFP (European Foresight Platform – supporting forward looking decision-making) started in October 2009 and will last for 3 years.

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