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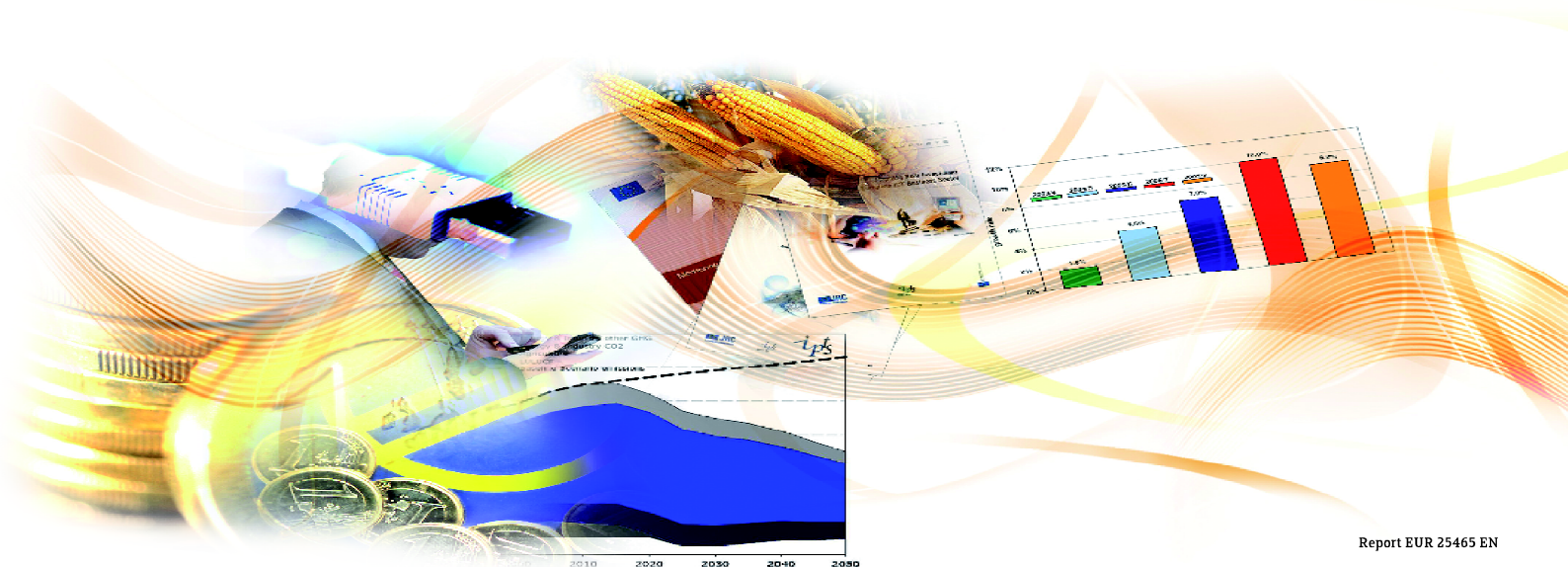
NETWATCH Policy Brief
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ERA-NETs and the realisation of ERA: Increasing coordination and reducing fragmentation

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Joint Research Centre

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ERA-NETs and the realisation of ERA Increasing coordination and reducing fragmentation

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■ Summary

The primary objective of the ERA-NET scheme was to support the realisation of the European Research Area (ERA). With the new impetus recently given to the ERA concept by Europe 2020, Innovation Union, the development of Horizon 2020 and the consultation on the ERA Framework1 it is an appropriate time to consider whether this objective is being met. This brief draws on the European Commission's information platform on transnational research collaboration, NETWATCH. Through analysis of its comprehensive database on the nature and operation of ERA-NETs and other collaborative networks, it develops an overview of the scheme's success. There is clear evidence that cooperation has taken place between research programme actors, leading to benefits in terms of mutual learning and joint activities, most notably the number of joint calls launched. The extent to which this represents genuine coordination of European research programmes and has led to a reduction in duplication and fragmentation of activities and the achievement of critical mass emerge as key questions for the ongoing assessment activities of NETWATCH.

Keywords: ERA, ERA-NETs, research programmes, cooperation, coordination, fragmentation duplication, critical mass

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1 From 13.09.2011 to 30.11.2011 see http://ec.europa.eu/
   research/consultations/era/consultation_en.htm.

■ 1. Introduction

1.1. Purpose of the brief

The NETWATCH central information platform on transnational R&D programme collaboration has been created by the European Commission in response to an identified need for information on ''the implementation, conduct and even impact of ERA-NETs.''[2] Following a one year development phase NETWATCH is now in the third year of its operational phase. Currently, at the core of NETWATCH activity is the collection of information on the characteristics of operating ERA-NETs[3], including their thematic focus, participant characteristics, the joint activities they undertake and the rating of the importance of these activities to the network. The majority of the information currently in the NETWATCH database relates to ERA-NETs, but other formal networks for collaboration, such as Article 185s[4] are now included, and work is in progress to include the recently established Joint Programming Initiative (JPIs)[5].

The principle sources of information for NETWATCH are the network coordinators. NETWATCH uses the large body of information collected on the networks to provide analytical support to policymakers and other stakeholders. These include regular reports mapping and monitoring the ERA-NET landscape[6]. The current document is the first in a series of planned policy briefs. It will draw on these analyses and other sources, to provide an overview of ERA-NETs, particularly with regard to the participants and how the networks are implemented. The brief also considers the impact of the scheme and requirements for its future assessment.

The current European Community Framework Programme for research, technological development and demonstration activities runs from 2007 to 2013. Following a recent consultation7, the European Commission (EC) is preparing proposals for ''Horizon 2020,'' a new EU support framework for future research and innovation by the end of 2011.

In line with the development of Horizon 2020, this policy brief aims to contribute to the debate by synthesising the rationale for and subsequent analyses and reports related to one of the main policy instruments of the Sixth Framework Programme (FP6) and the current Seventh Framework Programme (FP7): the ERA-NET scheme.

1.2. Guiding Policy Objectives

The policy objectives that underpin the ERA-NET and related schemes were articulated in the EC Communication entitled 'Towards a European Research Area'8. The European Research Area (ERA) was conceived in 2000 as an attempt to correct identified deficiencies in an EU level research system that was effectively 15 separate research systems (the Member States) and the EC. The starting point was competition with the USA (and Japan): that in terms of research and development (R&D) Europe was a laggard in comparison. Inefficiencies in Europe were

2 Page 30 - Horvat et. al. ''ERA-NET Review 2006: The Report of the Expert Review Group'' (ftp://ftp.cordis.europa.eu/pub/coordination/docs/era_net_review_report_dec2006_en.pdf).
3 See Section 2.1 for a description of ERA-NETs.
4 See Section 2.2 for a description of Article 185s.
5 See Section 2.3 for a description of JPIs.
6 Perez, S (2010) ''Mapping ERA-NETs across Europe: overview of the ERA-NET scheme and its results'' at: http://ftp.jrc.es/EURdoc/JRC61540.pdf.

7 http://ec.europa.eu/research/csfri/index_en.cfm
8 COM(2000) 6 Final available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2000:0006:FIN:EN:PDF.

identified as part of the reason, particularly the duplication of effort, resulting mainly from the fragmentation[9] of research in the EU. In order to create a genuine ERA, greater coordination between national and EU research activities was required. It is within this context that the Sixth Framework Programme saw the introduction of schemes such as ERA-NETs, aiming to better coordinate the activities of various national and regional funding mechanisms.

In 2007 the EC revisited the ERA concept to assess progress and how it could be taken forward. The resulting Green Paper acknowledged achievements (ERA-NETs were noted as a start at addressing the coordination issues), but ultimately concluded that *''National and regional research funding (programmes, infrastructures, core funding of research institutions) remains largely uncoordinated.''* [10]

We are currently in a period of change for EU research funding. There are three principle elements to this change: Europe 2020, the Innovation Union and Horizon 2020. The Europe 2020 strategy replaces the Lisbon strategy, aiming to generate smart, sustainable and inclusive growth in the EU. It has identified major societal challenges on which research and innovation policy should be focussed, namely: climate change, energy and resource efficiency, health and demographic change[11]. It has also emphasised that the EC should seek to enhance joint programming with Member States and regions.

The Europe 2020 strategy articulates five objectives. Among these five "Flagship Initiatives" the Innovation Union,[12].sets the deadline to deliver the ERA by 2014. Within this context the arguments on decreasing fragmentation and avoiding inefficient duplication are reiterated as one of the three principle weaknesses to be tackled:

- *Under-investment in our knowledge foundation. Other countries, like the US and Japan, are out-investing us, and China is rapidly catching up.*

- *Unsatisfactory framework conditions, ranging from poor access to finance, high costs of IPR to slow standardisation and ineffective use of public procurement. This is a serious handicap when companies can choose to invest and conduct research in many other parts of the world.*

- *Too much fragmentation and costly duplication. We must spend our resources more efficiently and achieve critical mass.* [13]

The European Innovation Partnerships (EIP)[14] initiatives have been conceived as part of the Innovation Union. The rationale is that they will be challenge driven and operate across the whole research and innovation process. However, rather than being established as yet another new instrument, they will aim to better coordinate existing instruments, including those related to joint programming. However, they will also coordinate tools and actions related to lead markets, joint pre-commercial and commercial procurement schemes, and regulatory screening.

9   See 'Challenging Europe's Research: Rationales for the European Research Area (ERA) - Report of the ERA Expert Group' for a discussion on fragmentation.

10 Page 7 - The European Research Area: New Perspectives Green Paper at: http://ec.europa.eu/research/era/docs/en/understanding-era-european-commission-eur22840-161-2007-en.pdf.

11 Communication from the Commission - Europe 2020: A strategy for smart, sustainable and inclusive growth available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:2020:FIN:EN:PDF

12 EC Communication - Europe 2020 Flagship Initiative: Innovation Union. Available at: http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf#view=fit&pagemode=none.

13 Page 2 - EC Communication - Europe 2020 Flagship Initiative: Innovation Union.

14 For further details see the Innovation Union Information and Intelligence System (I3S) at: http://i3s.ec.europa.eu/commitment/43.html.

Following the end of FP7 in 2013, Horizon 2020 will encompass the Europe 2020 and Innovation Union initiatives outlined above. It is also proposed as a broader framework succeeding both the current Framework Programme for research, and the Competitiveness and Innovation Programme, as well as also encompassing the operation of the European Institute of Innovation and Technology, so as to have coherent goals and shared strategic objectives.[15] Alongside these substantial changes, selected elements from previous programmes remain, including the realisation of ERA, and thus the need for coordination and the potential for schemes such as ERA-NETs to play a role.

"Increasing added value and leverage and avoiding duplication and fragmentation. EU research and innovation funding should provide more added value, increase its leverage effect on other public and private resources and be used more effectively to support the strategic alignment and pooling of national and regional funds to avoid duplication and achieve scope and critical mass." [16]

15 Green Paper -From Challenges to Opportunities: Towards a Common Strategic Framework for EU Research and Innovation funding. Available at: http://ec.europa.eu/research/horizon2020/pdf/com_2011_0048_csf_green_paper_en.pdf#page=2.

16 Page 5 - ''Council conclusions concerning joint programming of research in Europe in response to major societal challenges'', available at http://register.consilium.europa.eu/pdf/en/08/st16/st16775.en08.pdf.

■ 2. ERA-NETs and related schemes

While the Open Method of Coordination (OMC)[17] enables Member States to participate in a process of mutual learning and policy development, at the level of research programmes other instruments are used. This section outlines the instruments used to underpin the policy objectives relating to improving the coordination of research activities between the national, EU and regional levels.

2.1. ERA-NETs

First implemented in FP6, ERA-NETs are based on a variable geometry[18] approach, where participants are involved based on their shared problems or capabilities[19]. The scheme is aimed at programme level cooperation and therefore the programme owners and managers, defined as follows:

• Programme Owners: national ministries/regional authorities responsible for defining, financing or managing research programmes carried out at national/regional level.

• Programme Managers: other national/regional organisations that implement research programmes under the supervision of the programme owners, such as research councils or funding agencies.

The review of the FP6 ERA-NETs[20] emphasised that these targets should remain the case, with participation based on existing research programmes. However, those planning new programmes that allow for transnational cooperation should also be able to participate.

The research activities that were to be coordinated had to be undertaken at the national or regional level, financed or managed by public bodies and strategically planned. The EC described four steps of cooperation and coordination, and in FP6, ERA-NETs were expected to at least meet the first two. In FP7 ERA-NETs that had had FP6 funding but submitted a proposal to FP7 had to focus directly on steps three and four. New ERA-NETs had to address one to three as a minimum, but were strongly encouraged to address step four[21]. The steps are:

1. Systematic exchange of information and good practices on existing programmes;

2. Identification and analysis of common strategic issues;

3. Development of joint activities between national or regional programmes;

4. Implementation of joint transnational research activities.[22]

While the first two steps are preparatory in nature, the second two represent the design and implementation steps of the process. The most

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17 http://ec.europa.eu/invest-in-research/coordination/coordination01_en.htm.

18 A process of differentiated integration where not all Member States need be involved - http://europa.eu/legislation_summaries/glossary/variable_geometry_europe_en.htm.

19 The Chairman's foreword - Workshops on continuation of ERA-NET networks: http://netwatch.jrc.ec.europa.eu/static/download/workshops_nov_2010/Report_continuation_ERANETs.pdf.

20 Horvat et. al. ''ERA-NET Review 2006: The Report of the Expert Review Group''.

21 European Commission (2007) – Work Programme 2007-2008, Cooperation: Annex 4 General Activities.

22 2005-2006 Work Programme – Strengthening the foundations of the ERA: 11. Support for the coordination of national, regional and European activities in the field of research and innovation (including ERA-NET).

visible realisation for the research community of the final step would be funding joint research activities by launching joint calls. A joint research programme would also be a manifestation of the final step.

There are three main modalities for funding the joint research activities. The 'common pot,' whereby participants pool their funds, represents the greatest degree of integration, and arguably aligns most closely to the ERA objectives. As this model can meet national political and administrative barriers, under the 'virtual pot' model funding does not cross national boundaries, with national and regional funders only contributing the funds for their own participants. Under the 'mixed-mode' model, researchers are funded by the network participants from their country, although, but under certain conditions participants may fund researchers from a different country.

The ERA-NETs in FP6 were bottom-up in nature as the participants decided the areas of interest, rather than a top-down process with deliverables stipulated by the EC[23]. The networks could be focused on any research field (or interdisciplinary) or horizontal, in areas such as foresight or gender issues that crossed the spectrum of fields. Under FP7, the ERA-NET scheme evolved. Answering a call for a ''*strategic 'top-down' element*''[24] led to more ERA-NET calls aligned to the thematic priorities of FP7. A further evolution was the creation of the ERA-NET Plus scheme, which provides funds to 'top-up' those already dedicated to transnational joint calls and so acts as an incentive[25].

Another interesting development in relation to ERA-NETs has been the self-sustaining networks. These are ERA-NETs for whom funding from the EC has finished but they have continued their work[26].

2.2. Article 185s

Under Article 185 of the Treaty on the Functioning of the EU[27], the EU can participate in the R&D programmes of Member States to assist in the coordination of R&D in Europe. The projects are not decided upon through a call and evaluation process, rather the EC formally submits a proposal for which there needs to be agreement from the European Council and the European Parliament. There are currently four Article 185s that have been adopted: Ambient Assisted Living (AAL), European Metrology Research Programme (EMRP), BONUS, and Eurostars.

Participating Member States commit to integrate their research through a jointly-defined programme, with the EU providing financial support. The funding from the EU varies for each of the Article 185s and they represent a degree of integration of Member States' research activities that goes beyond the programme coordination of the ERA-NETs. Rather than participating organisations and programmes forming a network and responding to a call, the decision and priorities of an Article 185 initiative are decided between several Member States and the EC[28]. Article 185 Initiatives are also required to have dedicated structures (such as an agency or secretariat) for their implementation[29].

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23 The only indication of appropriate fields was those given as example topics in the specific programme ''Integrating and strengthening the ERA''. The broad areas were: health, biotechnology, environment and energy. See ''Provisions for implementing the ERA-NET scheme'' for more details at: ftp:// ftp.cordis.europa.eu/pub/rtd2002/docs/era-net_0103.pdf.

24 Page 21 - Horvat et. al. ''ERA-NET Review 2006: The Report of the Expert Review Group''

25 ERA-NET Plus Review 2010 - Final Report of the Review Panel: ftp://ftp.cordis.europa.eu/pub/fp7/coordination/ docs/era-net-plus-review-2010_en.pdf.

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26 The membership of the network would be similar but may not be exactly the same as when supported by EC funds.

27 This was previously Article 169 of the Treaty establishing the European Community.

28 Report of the ERA Expert Group: Optimising research programmes and priorities, at ftp://ftp.cordis.europa.eu/ pub/fp7/docs/report-era-eg5.pdf.

29 See the Ambient Assisted Living (AAL) decision at: ftp:// ftp.cordis.europa.eu/pub/fp7/art169/docs/aal.pdf.

2.3. Joint Programming Initiatives (JPIs)

The concept of JPIs centres on the idea of major societal challenges (or Grand Challenges)[30,31]. While these major societal challenges are transnational in nature, and are usually too big for one country to address on its own, the research required to address them is predominately designed and supported at the Member State level. The rationale is that in order to develop a genuine ERA, 'Grand Challenges' relevant research undertaken in the Member States should be better coordinated, to counter the results of the compartmentalisation of the European research landscape already outlined.

Unlike the ERA-NETs and Article 185s, whose themes are proposed by the EC, the JPIs are Member State driven. The high-level group consisting of Member State and Associated Country representatives, the *Groupe de Programmation Conjointe* (GPC), supports the implementation of JPI predominately by proposing themes and developing guidelines[32]. Based on the work of the GPC proposals for areas in which JPIs should be supported are made to the Council[33].

So far a pilot JPI has been launched on Neurodegenerative diseases (including Alzheimer's disease) and, following the process outlined above, the Council has adopted the launch of three further JPIs[34]:

• Agriculture, Food security and Climate Change

• Cultural Heritage and Global Change

• A healthy diet for a healthy life.

The broad process that the implementation of the JPIs follows is:

• Development of a common vision for the Joint Programming Initiative;

• Definition of a Strategic Research Agenda (SRA), specific objectives and related deadlines;

• Implementation of the SRA and monitoring of results to ensure maximum impact.

The Council conclusions on Joint Programming[35] urged consideration, by Member States, on the best way to deal with certain issues that it was felt required a common approach. This set of issues is commonly referred to as the ''Framework Conditions''. Experience with ERA-NETs and Article 185s has demonstrated that there needs to be a balance between flexibility and the need for a standard model to prevent further fragmentation within ERA[36]. Therefore, while Framework Conditions and guidelines for their implementation have been developed, JPIs are not formally obliged to use them. The issues relating to the Framework Conditions for Joint Programming, and for which guidelines are available, are:

30 Council conclusions concerning joint programming of research in Europe in response to major societal challenges are available at: http://register.consilium.europa.eu/pdf/en/08/st16/st16775.en08.pdf.

31 Major societal challenges include climate change, energy and resource scarcity, health and ageing. See http://ec.europa.eu/research/innovation-union/pdf/innovation-union-communication_en.pdf#view=fit&pagemode=none

32 Framework Conditions for Joint Programming in Research - http://ec.europa.eu/research/era/docs/en/voluntary_guidelines.pdf.

33 Joint Programming in research 2008-2010 and beyond: Report of the High Level Group on Joint Programming to the Council. Available at: http://ec.europa.eu/research/era/docs/en/joint-programming-in-research-2008-2010-and-beyond---report-of-the-high-level-group-on-joint-programming-to-the-council.pdf

34 A further six JPI topics are in the process of having proposals prepare for consideration by the Council. See http://ec.europa.eu/research/era/areas/programming/joint_programming_en.htm.

35 Council conclusions concerning joint programming of research in Europe in response to major societal challenges are available at: http://register.consilium.europa.eu/pdf/en/08/st16/st16775.en08.pdf.

36 ''Voluntary Guidelines on Framework Conditions for Joint Programming in Research 2010'', available at: http://ec.europa.eu/research/era/docs/en/voluntary_guidelines.pdf.

• Peer review procedures;

• Foresight activities;

• Evaluation of Joint Programmes;

• Funding of cross-border research by national or regional authorities;

• Optimum dissemination and use of research findings; and

• Protection, management and sharing of intellectual property rights.[37]

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37 Based on the four step process described in Section 2.1.

■ 3. Participation in ERA-NETs and network implementation

As explained, ERA-NETs aim to contribute to the policy objective of reducing 'fragmentation' and increasing coordination to realise the ERA. Meeting these objectives is dependent on the construction and activities[37] of the networks. This section will therefore consider the characteristics of ERA-NETs and the implementation of the networks.

The main source of information is analysis of the NETWATCH database[38]. This analysis is based on networks that were active at the end of 2010; two samples have been mapped in January 2010 and January 2011[39] as a first step in monitoring the evolution of the scheme.

3.1. The participants

Based on the NETWATCH analysis of active networks it is unsurprising that, given the nature of the scheme, the majority of the organisations that participate are national organisations. However, there are also regional organisations (13% of participating organisations in 2011), and there are several international organisations (3.3%).

The basic distinction made between programme owners and programme managers, has required further refinement to better characterise the stakeholder community for analysis. The following classification is now used in NETWATCH[40] to better characterise the participants in ERA-NETs:

• International organisation

• National Ministry or Department with responsibilities for distributing funds to Research Agencies or Councils

• National Ministry or Department with responsibilities for distributing funds directly to researchers

• National Agency or Council with responsibilities for distributing funds directly to researchers

• Regional organisation

• Other.

The most frequently indicated category of national participant was a national agency or council (49% of those that responded) with the total for ministries being 36% of respondents. These results are comparable to finding in previous studies[41].

Of the 528 organisations, not including those only acting as observers, included in the NETWATCH analysis, only 243 indicated a related programme. However, the ERA-NET scheme is intended for the coordination or programmes and the FP6 review[42] recommended that whenever possible participation in the scheme should be based on existing programmes. The FP7 Cooperation 2012 Work Programme[42] states that participants should identify programmes they wish to coordinate, and if they currently do not have such a programme but are planning to do so can participate in justified cases. This apparent contradiction may be for one of the three reasons listed below:

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37 Based on the four step process described in Section 2.1.
38 NETWATCH Mapping and Monitoring: First Report available at: http://netwatch.jrc.ec.europa.eu/nw/static/mapping.pdf.
39 Those networks that were at least still active at the end of 2010 were selected and analysed in January 2010 and 2011. In 2010 the cohort contained 47 networks and in 2011 82 (including 4 Article 185s).
40 For an explanation see '' Mapping ERA-NETs across Europe: overview of the ERA-NET scheme and its results'' at: http://ftp.jrc.es/EURdoc/JRC61540.pdf.

41 Horvat et. al. ''ERA-NET Review 2006: The Report of the Expert Review Group''
42 Work Programme 2012: Cooperation – Annex 4.2

1. There is an issue with regard to the definition of programmes. While for the proposal a suitable funding stream can be identified, these are not easily identifiable programmes that can be added to NETWATCH. In effect the programmes as envisaged by the ERA-NET scheme do not exist, but the type of funding activities do.

2. Participants name programmes associated to their organisation so that the proposal is eligible. However, in reality rather than coordinating existing programmes they collaborate on areas of mutual interest and the programme is not really taken into account.

3. NETWATCH has incomplete information with regard to the programmes related to the participating organisations.

In the first case, while the system of research as envisaged by the ERA-NET scheme is not always applicable, the scheme does in fact capture the relevant actors. In the second case (and to a lesser extent the first) it raises the question of whether new activities are being created, instead of the coordination of existing ones that may lead to more, but different, fragmentation.

The different ways programmes are defined indicates systemic differences between countries. Further systemic differences are apparent when comparing the number of times a country participates in ERA-NETs, compared to the number organisations in that country who participate. There can be countries with relatively high participation, but with a relatively low number of organisations that participate, while others have lower participation than would be expected given the number of organisations that participate in the country[43]

Figure 1: Network participation by country

2011 ERA-NETs
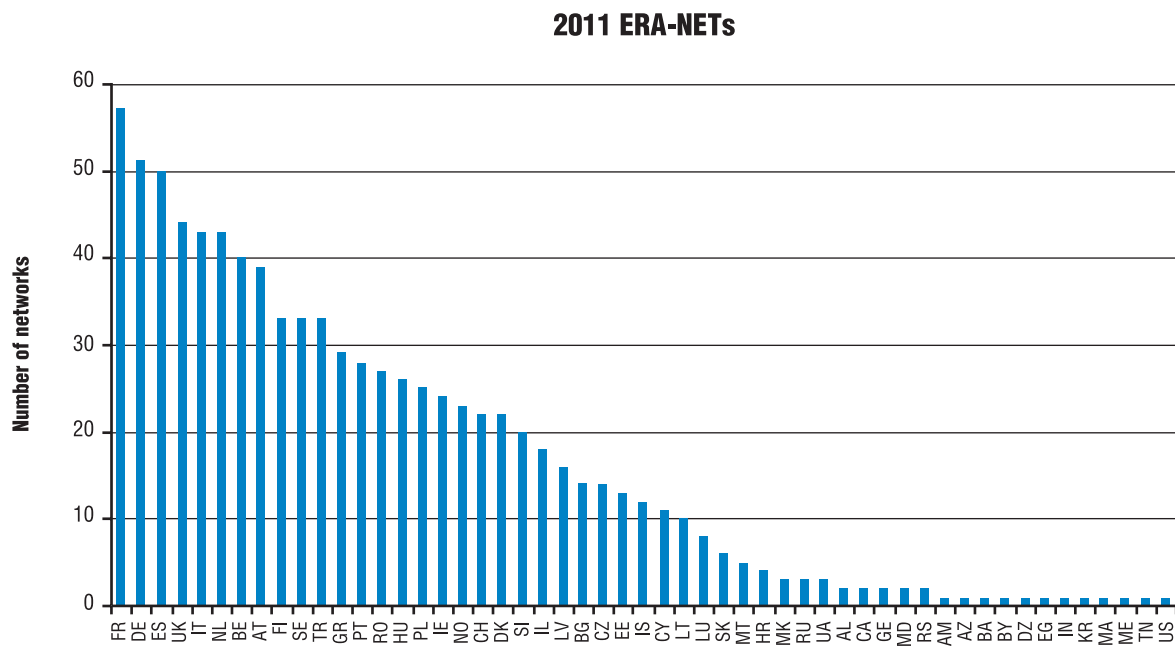
43 This is based on a visual comparison rather that a statistical analysis.

Figure 2: Number of times organisations participate in the ERA-NET scheme

2011 ERA-NETs
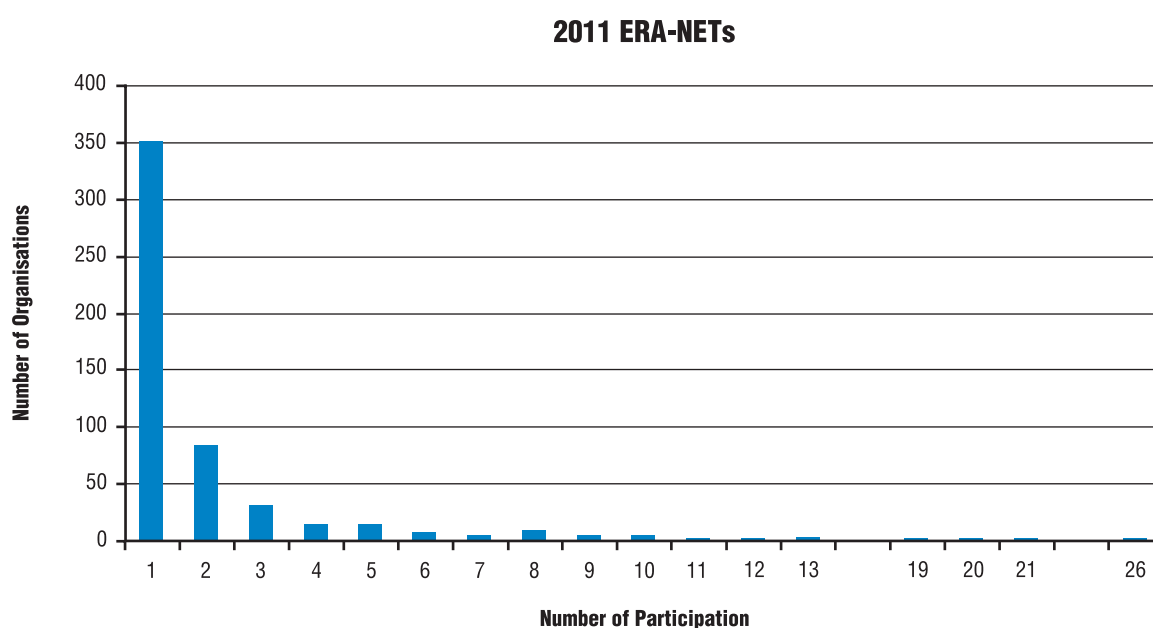
In terms of country involvement organisations from all EU Member States, and most Associated Countries, participate in ERA-NETs (see Figure 1). There are also participants from Third Countries[44]. As would be expected the larger EU countries are involved in more networks.

Most organisations participate in only one ERA-NET (Figure 2). However, there is a strong concentration of participations by relatively few participants. For the analysis in 2011 there were 1195 participations in ERA-NETs. Almost half of these participations were undertaken by 78 organisations out of the 597 total organisations involved in ERA-NETs (14.4%).

3.2. Implementation and activities of the networks[45]

The coordinators of networks are requested to rate the importance of a set of predefined strategic objectives for the network when providing information to NETWATCH. These objectives can be aligned with the four steps described earlier in Section 2.1, which broadly define the activities that can be funded by the ERA-NET scheme. The results of this demonstrate that the implementation of joint calls (effectively step four) is considered the most important, followed by the exchange of information and good practices (step one). Surprisingly, ranked of least importance is the coordination of national programmes, the main purpose of ERA-NETs, followed by the implementation of joint research programmes.

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44 A Third Country is a country that is neither an EU Member State or a country associated to the Framework Programme.

45 The data presented in this section is aggregated from the NETWATCH database. This database includes Article 185s, however, they only account for four of the 82 networks analysed in 2011 (they were not present in 2010).
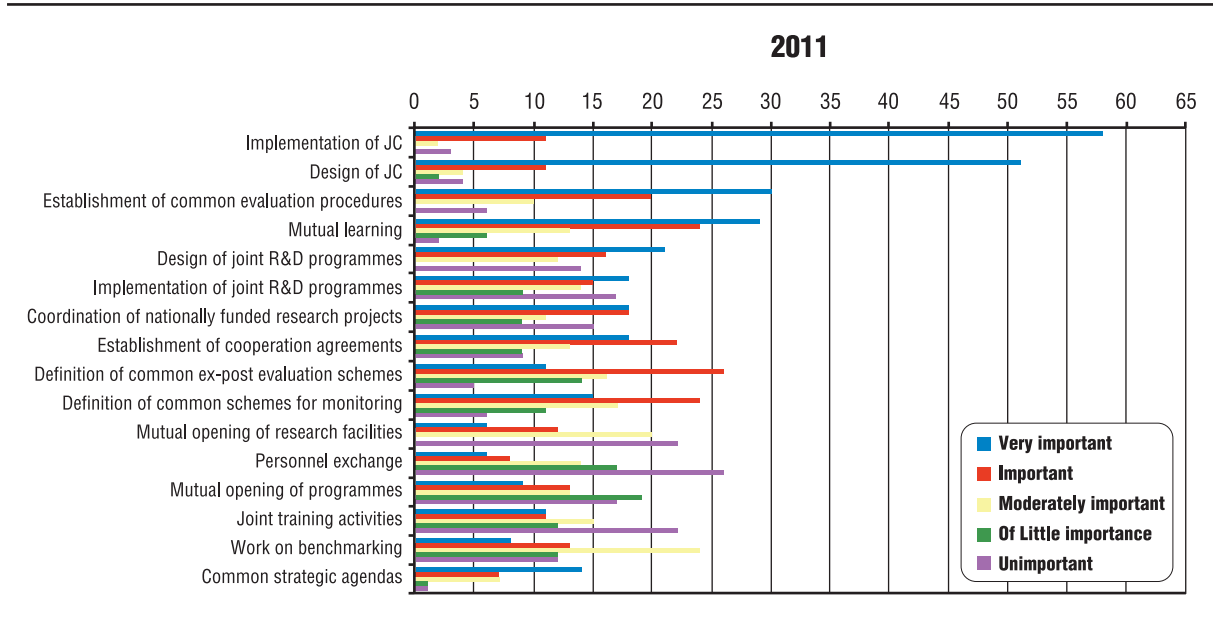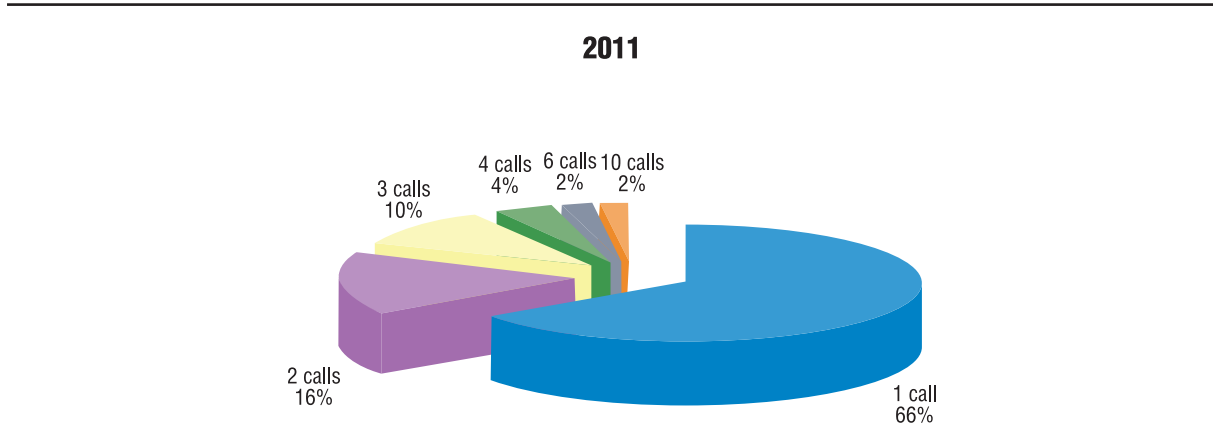
Figure 3: Importance of activities

Figure 4: Number of calls by networks having launched calls (N=49)

Another measure of the implementation of the network activities is through ranking the importance of the joint activities. Figure 3 shows that in 2011 (as was also the case in 2010) the implementation and design of joint calls is of major importance. This means that attaining step four is important. It is interesting that much less importance is attached to the design and implementation of joint programmes implying that there are limits on how far towards joint programming participants are prepared to go using the ERA-NET scheme.

Of the 82 active networks in 2011, 60% had launched at least one joint call, with a total of 89 calls launched (see Figure 4). This further emphasises the positive inclination of networks towards implementing joint calls. The most common mode of joint call funding was through a virtual common pot[46].

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46 Of the 89 calls in the 2011 analysis 46% utilised a virtual pot.

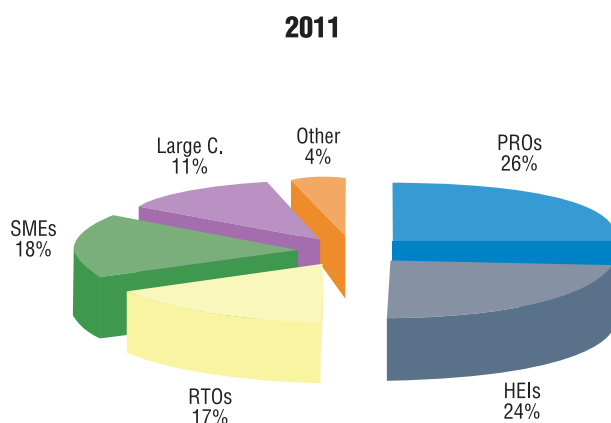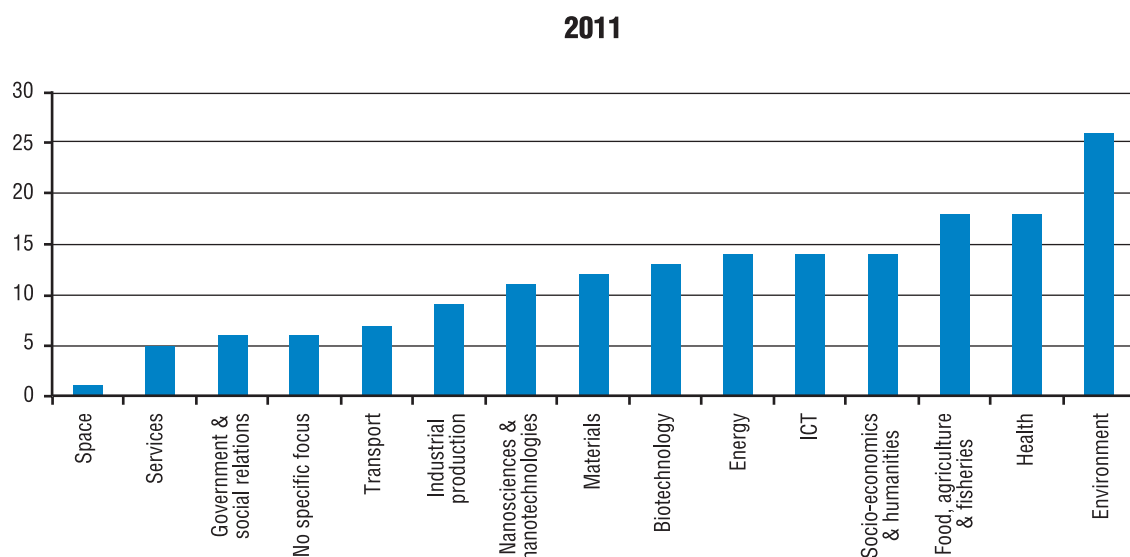■ *Figure 5: Target group of active networks*

2011

■ *Figure 6: Research fields covered by active networks*

2011

The networks in the NETWATCH analysis most frequently focussed on a scientific or technical domain, and the target of their research activity was most often Public Research Organisations (PROs) or Higher Education Institutions (HEIs), see Figure 5. Meanwhile the type of research supported tended to be applied research, followed by basic, but with an increase in pre-competitive from 2010 to 2011.

While there are private sector groups targeted by the networks, and it is predominately applied research that is supported, there is a bias, based on the fact that it is the coordination of national and regional programmes, towards public research. Consideration could be given to how this aligns to the current policy focus relating to the Innovation Union, and the future role of ERA-NETs in European Innovation Partnerships (EIP)[47].

47 Innovation Union - Frequently Asked Questions regarding European Innovation Partnerships under Europe 2020 available at: http://ec.europa.eu/research/innovation-union/pdf/eip_faq.pdf#view=fit&pagemode=none.

In terms of the research that is supported one could consider the thematic areas of FP7, particularly as most of the networks in the NETWATCH cohort were supported under that programme. The problem is that the results are then heavily dependent on the calls launched within the FP7 thematic areas[48]. A better measure is therefore to look at the research fields covered by the networks, while the thematic area under which the call may have been launched will still have an influence it will not be so direct, particularly as the network coordinators could select more than one research field. Figure 6 shows the research fields assigned to the networks studied. The fields are the same classification as those used by ERAWATCH[49].

In 2011 environment was clearly the field most commonly addressed by the networks, followed by health and food, agriculture and fisheries, and then socio-economic, ICT and energy. The number of networks with no specific field focus is low, whereas those with no thematic focus (based on the FP7 thematic areas) accounted for the largest proportion of networks in both 2010 and 2011[50]. So the networks do tend to focus on specific research fields, albeit with varying degrees of inter-disciplinarity.

48 The thematic areas of the FP7 Cooperation specific programme are: Health; Food, Agriculture and Fisheries, Biotechnology; Information & communication technologies; Nanosciences, nanotechnologies, materials & new production technologies; Energy; Environment (including Climate Change); Transport (including aeronautics); Socio-economic Sciences and the Humanities; Space; Security.

49 http://cordis.europa.eu/erawatch/index.cfm

50 NETWATCH Mapping and Monitoring: First Report available at: http://netwatch.jrc.ec.europa.eu/nw/static/mapping.pdf.

■ 4. Impact of ERA-NETs

So far this brief has focussed on the rationales for ERA-NETs and how they are intended to be implemented. The results from the NETWATCH analysis has provided details on the characteristics of ERA-NETs, the activities performed, and type and target of the research activities. In this section, studies undertaken to determine the impact of the ERA-NET scheme will be presented. These studies are a formal impact assessment, a review of the scheme, and broader reports that include ERA-NETs. Consideration is also given to a framework and key questions for future NETWATCH assessments.

4.1. ERA-NET impact assessment

To date, only been one impact assessment of the ERA-NET scheme has been undertaken. Commissioned by DG RTD in 2007 and undertaken by Matrix Insight and Rambøll Management, this study focussed on 71 ERA-NETs launched under FP6 (2002-2006)[51]. The study utilised quantitative and qualitative methods which aimed to answer the following questions:

• *Q.1: To which extent, and how, FP6 ERA-NET participation had **an effect on the landscape of publicly funded national/regional research programmes** in certain targeted EU countries?*

• *Q.2: To which extent FP6 ERA-NETs had **a structuring effect** in certain targeted research fields that ERA-NETs addressed?*

• *Q.3: Which **direct benefits** and **indirect benefits** have been generated through the ERA-NET scheme in FP6 and how can the impacts be measured for both types of benefits?*

• *Q.4: Have FP6 ERA-NETs helped to mutually **open up national programmes** in ERA? If yes, to what extent and what is needed to assure that this result becomes a durable lasting effect within ERA?*

• *Q.5: What are the **lessons learned** for all possible stakeholders and where can these lessons be traced?[52]*

These questions closely relate to the ERA Rationale and the consequent goals of the ERA-NET scheme. Overall the study concluded that the scheme had been a success in relation to the original objectives to foster the cooperation and coordination of national or regional research programmes. There was additionality as such activities would not have been funded at the national level and hence required EC funding.

The main impact on national or regional programmes was identified as being the creation of new opportunities to enable transnational R&D activities. There was also some limited evidence of a decrease in duplication, increases in budgets for transnational R&D projects and influence on national policy. However, achievement of ERA objectives, such as reducing fragmentation, was so far seen as limited by national R&D policies and structures, and the role assigned to ERA-NETs[53].

51 Matrix-Rambøll –Final Draft Report – FP6 ERA-NET Evaluation – Volume 1 - May 2009. Available at: http://ec.europa.eu/research/evaluations/pdf/archive/other_reports_studies_and_documents/fp6_era-net_evaluation_-_final_report_-_volume_1.pdf.

52 Page 14 - Matrix-Rambøll –Final Draft Report – FP6 ERA-NET Evaluation – Volume 1 - May 2009. Available at: http://ec.europa.eu/research/evaluations/pdf/archive/other_reports_studies_and_documents/fp6_era-net_evaluation_-_final_report_-_volume_1.pdf.

53 ERA-NETs were often seen as a way to implement national policy rather than influence it.

The overall effect of ERA-NETs on structuring the research landscape could not be determined, although in specific fields some structuring was detected. There was certainly a strengthening of relationships and in some cases bilateral or trilateral cooperation agreements were signed resulting from participation in the ERA-NET scheme.

Evidence was found of both direct benefits, derived from the activities of the four ERA-NET steps, and indirect benefits. In terms of direct benefits the participation in joint calls (and other joint activities) was the most productive, leading to access to foreign research communities, new types of research projects, the inclusion of researchers with little previous international experience and improved project quality. Indirect benefits were less explicit but can include improving the perception of the benefits of transnational cooperation, and informal interactions.

ERA-NETs provided the conditions to allow for the mutually opening up of national programmes by the funds provided to joint activities being available to non-residents. However, in practice the national constraints proved a hindrance.

The identification and exchange of good practices was a key driver for participating in the ERA-NET scheme within the ERA-NETs practices such as international evaluation panels were adopted. Participants adopted practices that could be accommodated by the funding models and national rules by which they were constrained.

4.2. ERA-NET Reviews

The EC has also commissioned a major review of FP6 ERA-NETs by an Expert Group[54] with a particular focus on policy and strategic aspects. The review concluded that the ERA-

NET scheme filled a real need and helped to overcome barriers to the coordination of national and regional research activities. Particular benefits being mutual learning, coordination of policy responses to shared problems, create critical mass in key areas, and the reduction of unnecessary duplication. However, in order to have greater impact emphasis should be placed on launching joint calls and programmes (step 4). This has been addressed under FP7[55].

While noting that the 'bottom-up' nature of the schemed was liked by the participants, and mechanisms to allow it should continue, the review identified a need to focus on strategically important areas, and so require a more directed 'top-down' approach. It was also postulated that FP7 ERA-NETs with previous experience of the scheme should preferably utilise a mixed-mode or full common pot approach to funding joint activities.

The review also considered the ERA-NET Plus scheme, recommending increasing the budget and a reconsideration of only allowing the envisaged common pot funding approach as the mixed-mode is more attractive to participants. However, as at the time the ERA-NET Plus scheme was still very new, a subsequent Expert Panel was set up in 2010 tasked with a more focused review of the ERA-NET Plus scheme[56]. This review concluded that based on the original expected impact the ERA-NET Plus scheme has performed well, and has been demonstrated to act as a bridge between ERA-NETs and Article 185s. However, in other areas it is still too early to determine the impact, for example, on the coordination of national programmes outside the area covered by the action and whether joint calls act as a focal point for international coordination. Furthermore, as the instrument is designed without incorporating strategic networking activities it is questionable whether it can achieve the desired coordination

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54 Horvat et. al. ''ERA-NET Review 2006: The Report of the Expert Review Group''.

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55 Work Programme 2012: Cooperation – Annex 4.2
56 ERA-NET Plus Review 2010 - Final Report of the Review Panel. ftp://ftp.cordis.europa.eu/pub/fp7/coordination/docs/era-net-plus-review-2010_en.pdf

impact on its own. It therefore needs to be implemented as part of effective networks with clear strategic agendas.

4.3. Broader reviews and projects

Analysis of ERA-NETs also forms part of broader reviews of European research. The ERA Green Paper[57], acknowledged some successes, but also highlighted that many of the problems identified in 2000 remained. To address these, a series of expert groups were established, the most pertinent for the topic of this brief being those on 'Challenging Europe's Research: Rationales for the ERA'[58] and 'Optimising Programmes and Priorities'[59].

Interesting discussion points arising from the Expert Group Reports relate to the definition and empirical measurement of fragmentation and critical mass. Related to these is also duplication: at what point is the effort being undertaken by different actors so similar that it constitutes an inefficient use of resources, and when is it the effort sufficiently different to produce the required variety.

''From an ERA perspective, though, we are more interested in systemic failures that could potentially lead to duplication through each country chasing the same targets and potentially coming up with the same priorities. In part these could arise from insufficient information about what others are doing. However, we are sceptical about whether such duplication exceeds what is necessary for competition if we increase the level of granularity.''[60]

The Expert Group report on the rationales for ERA[61] was concerned that more effective use should be made of instruments such as ERA-NETs. It was noted that rather than improving coordination the scheme may have the risk of creating additional fragmentation and as such there is a limit to what can be achieved solely with the instrument. A similar point was made in the Commission Staff Working Paper that accompanied the ERA Green Paper, suggesting that there could be a plethora of networks with little strategic focus, leading to another layer of fragmentation, rather than greater coherence[62]. It was proposed that there is a need to re-orientate strategic and applied research so that the Framework Programme and national programmes are linked through ERA-NETs, and other instruments, to engage more effectively with policy needs in certain areas, effectively engagement with grand challenges.

The optimising research programmes and priorities Expert Group highlighted the positive feedback that there has been in relation to the ERA-NET scheme. However, concern was also noted with respect to the number of projects and the creation of new overlaps between different programmes and the plethora of joint calls lacking the 'critical size and mass to make a real difference in Europe.''[63] In order to bring greater coherence to ERA-NETs and related programme coordination activities (such as Joint Technology Initiatives (JTIs), Article 185s and potentially JPIs) it was recommended that a so-called 'ERA-Frame' should be established. This would be a portfolio of common guiding principles, rules and criteria for such transnational programmes.

57 The ERA: New Perspective – Green Paper. Available at: http://ec.europa.eu/research/era/docs/en/understanding-era-european-commission-eur22840-161-2007-en.pdf.
58 http://ec.europa.eu/research/era/docs/en/era-partnership-expert-group-era-rationales-2008-en.pdf.
59 ftp://ftp.cordis.europa.eu/pub/fp7/docs/report-era-eg5.pdf.
60 Page 21 - 'Challenging Europe's Research: Rationales for the European Research Area (ERA) - Report of the ERA Expert Group.

61 'Challenging Europe's Research: Rationales for the European Research Area (ERA) - Report of the ERA Expert Group.
62 Commission Staff Working Document Accompanying the Green Paper 'The European Research Area: New Perspectives' available at: http://ec.europa.eu/research/era/pdf/era_swp_final.pdf.
63 Page 26 - Optimising research programmes and priorities: Report of the ERA Expert Group. Available at: ftp://ftp.cordis.europa.eu/pub/fp7/docs/report-era-eg5.pdf.

There are also projects undertaken where ERA-NETs at least form part of the analysis. Two projects currently being undertaken are Joint and Open Research Programmes (JOREP) and one on the critical mass of public R&D programmes called CRIMASS[64]. The first project aims to map joint and open programmes that include ERA-NETs and other programmes. An initial mapping has classed ERA-NETs as existing in an organisational setting where joint coordination between national agencies takes place but without the creation of a supranational agency[65]. The CRIMASS project sets out to determine whether public R&D programmes in Europe are achieving critical mass using ERA-NETs as a reference. The project aims to develop a clear definition of critical mass and determine the requirements to achieve critical mass in selected areas.

4.4. Rationales for future assessments

An important element in the assessment of the impact of ERA-NETs is the degree to which they have met the original objects of the scheme, and a framework for the impact assessment has been devised on that basis. The over-arching objective is the contribution to ERA: the reduction of fragmentation and increased coordination, to have a single more efficient area where there is no unnecessary duplication of effort of both policy initiatives and research activities. The high-level goals of ERA can be identified as:

• The creation of an 'internal market' for research, involving the free movement of knowledge, researchers and technology;

• The development of a European research policy, taking into account other EU and national policies;

• The restructuring of the fabric of research in Europe via the improved coordination of national and regional research activities and policies.

It is the third high-level goal which ERA-NETs seek to address through improved cooperation and coordination at the programme level. A conceptual framework developed under NETWATCH outlines how these high-level goals correspond to the intermediate goals of joint coordination of programmes, calls and related activities, mutual opening of national and regional programmes, and mutual learning. These objectives are translated through ERA-NETs to the activities which are realised through the four-step process. The type of activities undertaken can then be used to identify potential outputs, outcomes and their impact in relation to the goals. Those activities undertaken at step one will have outputs, outcomes and impacts related to the goal of mutual learning, as will step two. Steps three and four will have outputs, outcomes and impacts relevant to the goals of joint coordination of programmes calls and related activities, and mutual opening of national and regional programmes. Table 1 summarises the concept.

From the activities, indicators can be derived to measure the attainment of the intermediate goals. Consideration can also be given to indicators for the attainment of the higher level goals not addressed through the logical hierarchy: creation of an international market and the development of EU research policy. For the broader conceptual framework see Annex I

While the above framework should provide a robust evaluation of the impact of the ERA-NET scheme based on the original objectives the developments in European research and innovation, and the future developments, necessitate a broader analysis. This broader analysis should accommodate a similar logical hierarchy based on the objectives of the Europe 2020, Innovation Union and Horizon 2020. This analysis should focus on the areas that are novel in comparison with the initial ERA-NET

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64 http://www.criticalmassproject.eu
65 More detail can be found at: http://www.enid-europe.org/conference/abstract%20pdf/Lepori_al_ENID_2011_JOREP_REV.pdf.

Table 1: Impact of ERA-NETs based activities under the steps for implementation

High level Goals	Intermediate Goals	Impacts demonstrated by activities	Activities
Restructuring the fabric of research in Europe via the improved coordination of national and regional research activities and policies	Improved cooperation and coordination at the programme level		**Steps 3 and 4** **Development and implementation of joint activities**
		Joint coordination of programmes, calls and related activities	Impacts on joint coordination	Coordination of nationally funded research projects Establishment of common evaluation procedures Joint training activities Mutual opening of research facilities
		Mutual opening of national and regional	Impacts on mutual opening	Mutual opening of programmes Definition of common ex-post evaluation schemes Definition of common schemes for monitoring Personnel exchange Establishment of cooperation agreements Design of JC Implementation of JC Design of joint R&D programmes Implementation of joint R&D programmes
		Mutual learning	Impacts on mutual learning	**Step 2** **Identification of strategic issues (common strategic agendas)** Research activities of mutual interest Practical networking arrangements Barriers to trans-national activities New opportunities and gaps in research Work on benchmarking
			Step 1 **Information exchange**

objectives. Within this context, an assessment should also go beyond just ERA-NETs and take into account related schemes and how they can complement each other within the current and future developments.[66]

Furthermore, another strand can be added to any future impact assessment. ERA-NETs, and joint programming more generally, are based on the coordination of national and regional programmes. Therefore the question should be asked as to the Member State and associated countries´ objectives for the scheme, and an assessment undertaken against those national objectives.

Consideration should also be given to the assessment of ERA-NET impact on the actual research. This is in terms of "*new combinations of excellence or in terms of new problem solving capabilities.*"[67] In this context there is needed a better understanding of what is duplication and fragmentation and the need for variety within a research and innovation system.

Finally, analysis of the ERA-NET contribution to ERA, and its impact on fragmentation could consider of the types of networks formed. Recent work has analysed networks in the European Framework Programmes (1984-2006)[68]. The

66 See also EC Communication on "Partnering in Research and Innovation". Available at: http://ec.europa.eu/research/era/pdf/partnering_communication.pdf.

67 Page 8 - Workshops on continuation of ERA-NET networks: http://netwatch.jrc.ec.europa.eu/static/download/workshops_nov_2010/Report_continuation_ERANETs.pdf

68 JRC/IPTS Analysis of Networks in European Framework Programmes (1984-2006).

authors determined small world networks which favour knowledge diffusion and a build up of expertise, but are less effective at integration. Distributed cluster networks, with a balance of expertise accumulation and integration and distributed network structures that are better for integration as it is easy to form links and become part of the network. The type of networks that ERA-NETs are generating, and the consequences for ERA, is a further area for investigation.

■ 5. Conclusions

When considering the initial objectives for ERA-NETs, which were developed to support the ERA concept, several positive outcomes can be identified. Data from the NETWATCH database and other sources indicate that there is wide participation from programme owners and managers across Europe. There is considerable enthusiasm for joint calls and participants have been able to overcome national administrative procedures to develop workable mechanisms. There has also been a considerable mutual learning between the different participants and over they seem to find value in the overall process.

ERA-NETs have had a positive influence on transnational cooperation between research programme actors leading to beneficial outcomes. However, there are reasonable questions to be asked regarding the impact of the scheme in relation to the higher-level policy objectives. To what extent is there genuine coordination of programmes that minimises unnecessary and wasteful duplication? What is the net impact on fragmentation, with the implementation of yet more instruments? Does the cooperation between organisations lead to critical mass in a specific research area, or has the plethora of calls simply led to more of the same with little overall coordination? Clearly there is scope to consider how ERA-NETs are
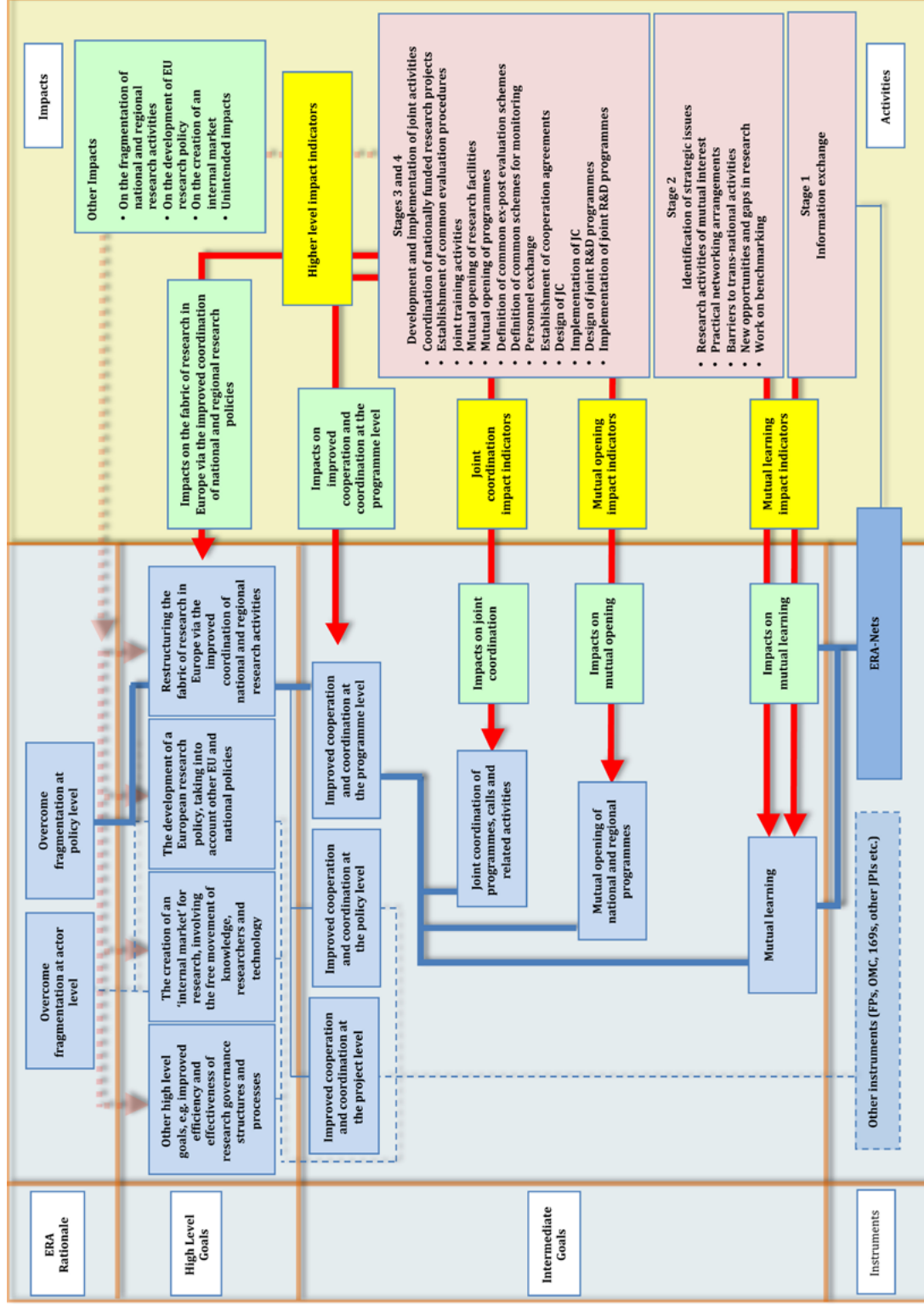
configured, particularly in relation to other schemes. This has already been acknowledged in the EC Communication on Partnering in Research and Innovation with the proposal to merge the ERA-NET and ERA-NET Plus schemes, and parts of Europe INNOVA and PRO INNO Europe, into a single scheme[69].

A move from abstract to more concrete understanding of the key concepts is also desirable, examining what is actually meant by duplication, fragmentation and critical mass. An appropriate approach to understanding how ERA-NETs contribute to the ERA objectives is to gain a better understanding of the types of network produced. Moreover, variety needs to be considered and the need to guard against the belief that reducing fragmentation and duplication, and achieving critical mass, necessitates larger networks.

Finally, future impact assessments will need to not just take account of the original objectives for the ERA-NET scheme, but also the objectives for participation at the national level, and the objectives being developed within the context of Europe 2020, the Innovation Union and the future objectives of Horizon 2020. There is also a need to better understand the impact on the actual research being performed.

69 EC Communication on "Partnering in Research and Innovation". Available at: http://ec.europa.eu/research/era/pdf/partnering_communication.pdf.

Annex I: ERA-NET Assessment Framework - goals, instruments, activities and impacts

Abstract

The primary objective of the ERA-NET scheme was to support the realisation of the European Research Area (ERA). With the new impetus recently given to the ERA concept by Europe 2020, Innovation Union, the development of Horizon 2020 and the consultation on the ERA Framework it is an appropriate time to consider whether this objective is being met. This brief draws on the European Commission's information platform on transnational research collaboration, NETWATCH. Through analysis of its comprehensive database on the nature and operation of ERA-NETs and other collaborative networks, it develops an overview of the scheme's success. There is clear evidence that cooperation has taken place between research programme actors, leading to benefits in terms of mutual learning and joint activities, most notably the number of joint calls launched. The extent to which this represents genuine coordination of European research programmes and has led to a reduction in duplication and fragmentation of activities and the achievement of critical mass emerge as key questions for the ongoing assessment activities of NETWATCH.

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