



# Monitoring progress towards the ERA

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## Preface

This report documents the main findings of an original and exploratory study seeking to measure progress towards the European Research Area (ERA) based on a sample of seven EU Member States. The report characterises the situation in four areas: (i) national mobility initiatives, (ii) transnational strategic partnerships and opening-up of universities, (iii) opening-up of national programmes, (iv) and joint R&D initiatives at country level. The seven countries are Austria, Finland, the Netherlands, Germany, Poland, Italy, and the United Kingdom.

JRC-IPTS designed the study, which was conducted by a consortium led by UNU-MERIT. It is part of a series of studies by JRC-IPTS to capture the dynamics of the ERA<sup>1</sup>. Other studies include the *ERAWATCH Country Policy Mix Reports 2009*, which complements analysis done at actors' level in the present study with an assessment at the level of national policies, and the *Contribution of Policies at the Regional Level to the Realisation of the ERA* study, which complements the present study on national initiatives by providing an assessment at the level of the regions.

The study delivered seven reports with national case studies on the state of play of ERA developments on the four dimensions, and a report with a horizontal reading of the same dimensions across seven countries. The main messages and reflections arising from the study as a whole are presented in the Executive Summary. A preliminary analysis of the state of play of the four areas across the seven countries is presented in Chapter 1. The key questions proposed to collect information to feed into a possible ERA monitoring system, as well as a discussion on the availability of data and the use of relevant indicators, are presented in Chapter 2. Finally, conclusions of the analysis, structured along the four areas, are provided in Chapter 3.

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<sup>1</sup> See the "Reports" section in the ERAWATCH website <http://cordis.europa.eu/erawatch/>.

## Executive Summary

Openness and internationalisation of national research systems and policies are gaining pace throughout the European Union. The various dimensions of this phenomenon get increased policy attention, and a host of recent initiatives show that this attention goes beyond declarations of intent and is turned into real action. ERA construction is progressing, but not much is known on the actual content and intensity of this evolution. This study sheds some light on this phenomenon, and provides guidance with a view to developing monitoring systems for ERA.

Four broad messages emerge from the analysis of ERA developments across four specific areas (mobility initiatives, transnational partnerships and opening up of universities, opening of national R&D programmes, and joint R&D initiatives) in seven EU Member States.

A **first message** is that progress towards ERA is fuelled by initiatives developed at three levels: the EU level, the national level, and the grassroots level.

In all the countries under study, the role of EU initiatives in stimulating the evolution towards the ERA has been put in evidence. There is even a kind of division of labour emerging in some instances, whereby national initiatives are targeting non-EU countries, while the intra-European coordination objective is seen as being covered by EU endeavours (such as Marie Curie grants, Joint Technology Platforms, and the Framework Programme). Making good use of these EU-level instruments is indicated as a priority for national governments in order to construct the ERA. This primary attention to EU-level initiatives also reveals a lack of understanding of the role of national endeavours for ERA construction.

At a national level, all four areas are subject to initiatives. However, by and large, justifications for ERA-related initiatives have a domestic flavour: the aim is to improve the quality of the national research system, rather than the creation of ERA with all its expected synergetic effects.

Mobility of human resources appears as an important priority, reflecting the policy concern on the need to attract qualified human resources to fuel the national research system. The rationales for opening up the national research system to the outside, on the other hand, are linked to three types of justifications: (a) the need to access complementary expertise not available domestically, (b) the need to share important R&D costs, and (c) the value of aligning national policy agendas.

The third type of justification, which falls at the heart of ERA construction, is the least common amongst the three types. ERA-NETs are paving the way towards the acknowledgement that aligning research agendas across borders is an important road for ERA construction.

Last but certainly not least, ERA construction is the result of bottom-up, grassroots initiatives from agencies and research actors themselves. This is definitely an important driving force, as testified by the analysis of internationalisation of universities. The progressive opening up of national research programmes is very much the result of agencies' initiatives (sometimes supported by experimentation under ERA-NETs), rather than the implementation of guidelines from the government. The same is true for the

launch of joint R&D initiatives and the establishment of joint R&D centres, for example, which may fall under inter-governmental agreements, but which ultimately rely on research actors' initiatives. In this respect the ERA project does not appear as a process mostly steered from above. In some countries, such as the United Kingdom, this third grassroots level is even viewed as the dominant driver. Amongst the bottom-up drives for ERA, one should also mention the role of the regions, which are involved in advanced cross-border experiments based on bottom-up and flexible needs. Cases were found in the study where such moves towards a better articulation of research agendas across borders are notably visible. This orientation is well in line with the philosophy of the Open Method of Coordination, based on voluntary moves and organised on a variable geometry basis.

It should be noted that the articulation between the three levels are not clearly indicated in strategic policy documents at Member States' level, with the exception of the cases where the national level cares particularly about non-EU openness, leaving the responsibility for intra-EU openness to EU initiatives.

A **second message** is that many national-level and grassroots initiatives do not make a distinction between EU countries and non-EU countries. In most cases, the objective is to internationalise domestic research systems with a view to reaching a higher quality and level of excellence. Those criteria are guiding the rules for funding (e.g. selection of mobile researchers under mobility schemes, funding rules for transnational R&D projects, selection of partners for university strategic agreements, etc.). Those criteria prevail over those linked to geographic location. Of course, proximity and research cooperation traditions play a role in the preference that could be given to research partners located in the EU, and in practice the use of initiatives from actors located in the EU Member States is quite high. But there is also a strong sense of a need for openness to research partners in non-EU countries for which it is thought that benefits can be drawn from research collaboration. While the ERA project focuses essentially on EU-27 countries, in practice the developments at national and grassroots levels do not point towards the creation of an R&D fortress Europe. The process appears very much guided by necessity and opportunities, rather than driven by a political stance "from Brussels".

A **third message** is a reflection on barriers and incentives towards ERA construction. These are still manifold, but perhaps the most important one is the lack of genuine incentives for national policy-makers in the form of visible, possibly quantifiable, benefits from ERA, which can be valued on the national scene. The "costs of non-ERA" are largely invisible for national policy-makers. Conducting impact evaluations of openness of research systems (see next point) is one way forward to build an evidence base for ERA and to grab the attention of national policy-makers.

As is mentioned in the analysis of the topic *opening up national R&D programmes to foreign participation (with funding possibilities)*, barriers to such openness seem to be mostly political: it is very sensitive to transfer money to foreign research actors when the benefits and spillovers of research are not going to be captured domestically. While this represents a rather narrow and short-term view on research, it nevertheless is a very important reason for the hesitant opening up domestic research funds to foreign contributors. In our analysis, the situation showed a rather timid first stage of openness of programmes, and we found very few cases where trans-border flows of money were actually taking place. Those cases, found in Austria and the Netherlands, might be subject to further impact analysis and hopefully demonstrate the ERA value-added in a pragmatic

and policy-oriented way. Establishment of trans-border research centres is also one of the initiatives that may most easily lead towards demonstration of ERA benefits in a real world perspective.

A **fourth message** from this study is that not much is actually known about the actual contribution of all initiatives to the process of internationalisation (and Europeanisation) of research policies and research systems. Strategic evaluations of impacts of the initiatives are relatively rare and immature: most of the existing information relates to schemes consumption. Collecting data on the degree of internationalisation of programmes, universities, labour force, etc., are fraught with difficulties, identified in the second section of the study. Indicators for measuring ERA development are still at infancy stage. Another difficulty is that the relative weight of the initiatives might be relatively meagre compared to the intrinsic characteristics of national research systems. This problem is especially acute for mobility initiatives. The push and pull factors for mobile researchers are more closely linked to the quality and attractiveness of domestic and foreign research systems, career opportunities, access to funding sources, quality of infrastructure and research environment, etc., than driven by mobility-specific initiatives. One additional problem is that a gap is often present between intention of initiatives and their actual results. Typically, funding programmes which are open for foreign participation in theory might end up with very low rates of foreign participation due the existence of several hidden barriers for such participation (implicit national preference in projects selection, etc.). It is, for example, very difficult to know how rigorously the rule that foreign participation is allowed, conditional to a demonstration of absence of domestic know-how, is applied. The degree of actual collaboration in joint R&D projects is also largely unknown: do we face true synergetic efforts, or rather division of labour and parallel efforts?

The situation with respect to ERA construction is today one of a proliferation of initiatives, of which the value-added is unclear in a wider perspective of "R&D internationalisation" policy portfolios. Conducting systematic information collection, coupled with impact evaluations of these initiatives, would not only improve the visibility on ERA evolution, but also provide the missing evidence base for policy-makers and research actors to engage more forcefully into this project with such high ambition and importance for the European knowledge-based economy.

# 1 Evolution towards ERA: general trends and country-specific situations

At the eve of this century, faced with the challenges of globalisation, the heads of European Union (EU) Member States agreed in Lisbon that Europe should evolve towards a knowledge-based society. The construction of the European Research Area (ERA) is one pillar of this grand ambition. The ERA vision is to build a single space for research and innovation, where knowledge and ideas flow freely. The initial vision has been reinforced in 2007 with the ERA Green paper<sup>2</sup> specifying further the needs and challenges to attain this objective. The ERA involves heightened resources for research and development (R&D), an increase in performance and effectiveness of R&D investments, and more interactions and synergies throughout the European space to the benefit of economic and societal goals. The process of building the ERA addresses the problem of fragmentation in research resources and activities: better alignment of research agendas, more efficient use of resources and a reinforced drive towards excellence, are expected from this endeavour.

A gradual but determined process of opening of research systems across national borders within Europe lies at the heart of the ERA. EU level instruments have paved the way towards the creation of an integrated European space for science and technology. Primarily the joint research projects funded by the successive Framework Research Programmes but also mobility schemes such as Marie Curie grants, and then complemented by a number of more recent initiatives such as Joint Technology Platforms and Initiatives, Networks of Excellence, ERA-NETs experiences, and ESFRI, the roadmap for European Infrastructures, etc..

The construction of a single European space for research however should not be equated with EU-level initiatives: the ERA cannot be realised without the essential direct contribution of Member States, the major players in research policy (Georghiou, 2001). With the exception of transnational initiatives that predate the conception of the ERA (COST, EUREKA), advances in this respect are relatively marginal: national perspectives are still dominant in research policy. Nevertheless, recent years have seen a lot of changes towards a more open perspective for national research policies — charting this evolution is the focus of the present study.

This evolution follows the open method of coordination: this means that the “Europeanisation” of research systems and policies is mainly based on bottom-up and voluntary initiatives by Member States, on a variable geometry basis, and on the ground of shared interests. It is also the result of individual research actors’ strategies within their sphere of autonomy, as the product of planned initiatives at governmental or inter-governmental levels.

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<sup>2</sup> European Commission (2007) Green Paper: The European Research Area: New Perspectives COM(2007) 161 final

Hence, the ERA construction is not a top-down, standardised and centrally-driven process. ERA today evolves through a combination of initiatives taken at three levels:

- The EU level, under which a host of initiatives, old and recent, contribute to the Europeanisation of Member States research systems;
- The national level, in which Member States develop rules and regulations, initiatives, programmes and policies with the aim to open up and facilitate the free transborder flow of R&D;
- The actors (“grassroots”) level, in which public research actors, agencies or other actors implement actions to heighten the openness of research activities.

“Europeanisation” of research policies is also to a large extent part of the broader phenomenon of internationalisation of policies and research systems. Most of the initiatives at the above latter two levels - national and grassroots - aim at opening up the research systems to the outside, but are not necessarily confined to the European space. Building up the ERA does not equal constructing a fortress Europe: therefore an important goal is to open up research systems not only in an intra-European perspective, but also outside the EU. The creation of international linkages and synergies with R&D resources and activities in Europe and the rest of the world is an important part of ERA's success. On the other end, regional co-operations, such as Nordic and Baltic region for Finland, and Central and Eastern Europe for Austria, are important priorities meaning that the EU-27 space does not necessarily represent main point of reference for many of the national or grassroots initiatives.

A difficulty in measuring the contribution or progress towards the ERA is that the ERA vision is not yet a perfectly defined, measurable, steady state, final goal. i.e. the ERA vision revolves around a delicate balance between cooperation and competition among European actors, but it is difficult to quantify in advance how much internal competition regarding research would be optimal from an EU point of view.

Before entering into the details of the 4 Topics in the next sections, a short overview of the state-of-play of Europeanisation of research systems and policies is sketched below.

The general attitude towards the ERA is positive in all 7 countries: the fact that EU Member States are too small to be efficient and effective in all research domains on their own, is being recognised, most explicitly in smaller countries for obvious size reasons. But the level of internationalisation of research systems varies across countries in our sample, in the degree of engagement of governments into internationalisation of their own policies, intensity of grassroots level initiatives, and the relative priority between the various pillars of ERA. With respect to internationalisation of research systems, Austria and the Netherlands represent two cases of small and very open economies: this openness is also present within the research systems. In both cases foreign-owned companies play a major role in the Europeanisation of the national research systems, and influence policy orientations. The United Kingdom (UK) is an example of a large economy faced by the challenge of maintaining its attractiveness for the location of mobile R&D activities. Such a situation provides incentives to open up policy perspectives beyond the national borders. International cooperation in research and scientific activities benefits from a long tradition in this country, and this is reflected in high figures on most indicators of international collaboration in science and technology (S&T).



The internationalisation of the research system is at the other extreme of the scale poor in Poland, a recent Member State. Thanks to participation in EU level research activities and the availability of EU Structural Funds, the inclusion in the EU membership is seen as main driving force to foster openness and raise quality in the Polish research system. New regulations introduced in 2007 and 2008 aim to secure funding possibilities for research activities carried out in cooperation with foreign partners. Public funding for international cooperation activities is on the increase.

From a public research system perspective, internationalisation of higher research and education establishments is growing in all countries, both in terms of inputs and outputs. Typically, the shares of papers with international collaboration, and shares of foreign staff and students at universities, are on the rise. However, the intensity of this openness varies from lower levels in Finland or Poland to highest levels in the UK. Up to 50% of PhD students and 40% of research staff at British universities are non-nationals. The breadth of openness also differs: the high degree of openness in Austria is to a large extent explained by the attraction of German nationals, while the UK attractiveness is more of a worldwide dimension.

On the policy side, ERA or Europeanisation (or rather, internationalisation) is becoming an important strategic direction for research policies in many countries, and taking an important stance in policy documents as well as in the reform of universities and public research organisations. The main entry points for supporting the development towards ERA vary across Member States, e.g.:

- Support to international networking of universities and public research organisations (PROs) and coordination with EU level activities is a main priority in Finland, and is also present at the forefront in Austria, UK, Italy and Germany;
- Networking and opening up of national research programmes, and launching joint research programmes is another key direction for Finland, the Netherlands, Austria and Germany;
- Support to mobility of researchers is another top-ranked priority. The primary one in the Netherlands, Germany and the United Kingdom, and very important in Finland and Austria;
- Cooperation for the funding of research infrastructures is important too and benefits from existing traditions of multilateral government agreements namely in Finland, the Netherlands, Austria, United Kingdom, and Germany.

Most countries see their contribution to ERA firstly through the participation and active use of European level initiatives (EU Framework programme, Technology Platforms (TP), Joint Technology Initiatives (JTI), etc.) and promote such participation as a way to “Europeanise” their research systems. Here, the question arises when and how national or multilateral initiatives should complement those EU level instruments. The role of national-level initiatives, in addition to the EU portfolio of instruments, is in general not clearly articulated in policy documents.

Focussing on research for global issues is a common justification for research internationalisation, notably in larger countries with significant domestic R&D potential, such as Germany or the United Kingdom. As it is more appropriately conducted at a larger

scale and addressing knowledge of a public good nature (such as environment, energy or safety).

Barriers towards ERA development do exist: international cooperation moves are still mainly seen as a way to improve national research and technology capabilities, rather than as a way to reach synergies at EU level to further upgrade those capabilities to the level needed on a global scale. One barrier to ERA developments lies in the difficulty for national organisations to accept transferring national money to foreign research partners and this appears to be an important limitation for Europeanisation of research policies<sup>3</sup>. Facing budgetary limitations, as mentioned for Italy, incentives for international cooperation might be amongst the first budget lines to suffer, casting doubts on the real policy commitment to the ERA.

Too much focus on “Europeanisation” of incentives and policies might however distort the analysis from the core condition for successful internationalisation of any national research system: this will first and foremost depend on its intrinsic quality. In Germany, for example, the policy priority on raising competences is a clear indication that setting framework conditions for excellence in the research system of which human capital is key resource, is a privileged driver towards ERA. In Poland, the main barriers for inward mobility of researchers are to be found in the national research system’s weaknesses rather than in the lack of specific incentives to promote mobility. Conversely, the strength of the Finnish research system is thought to impede outwards mobility of Finnish researchers. In this country, on-going reform of university research careers is perhaps the most important recent change that supports especially inwards mobility (in addition to specific international mobility incentives).

It is the aim of this study to shed more light on the ERA construction process at national level, through the lens of four topics of Europeanisation of research policies. These topics represent only a fraction of the whole process: in particular the question of Europeanisation of research infrastructures is only incidentally touched in the study. The four topics are:

1. Mobility initiatives;
2. Transnational partnerships and opening up of universities;
3. Opening of national R&D programmes;
4. Joint R&D initiatives.

Among the three levels of initiatives contributing to the ERA (EU, national, grassroots levels), the study focuses on national initiatives. However reference is made to the other two levels, whenever relevant, namely the use of EU level initiatives, and the existence of grassroots endeavours. The focus of the study is on the intra-EU dimension, but mention is made of wider internationalisation strategies too.

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<sup>3</sup> This is discussed in more detail in the section 1.3. (Openness of national research programmes).

## 1.1 National mobility initiatives

### 1.1.1 Key dimensions of human resources mobility for ERA

Human resources mobility and the free flow of researchers within the EU is one cornerstone of the ERA: “brain circulation” is thought to be beneficial for the ERA as a whole. The fact that most governments and research institutions in the Member States have developed programmes to foster mobility of researchers from and to their country is one of the most visible contributions of national level towards the ERA.

Initiatives covered under this topic refer to programmes, schemes, organizations, regulatory changes and other instruments developed at national level, with the aim to increase inward and outward international mobility of researchers. Initiatives include financial and non-financial incentives. They target long-term or short-term mobility. They vary in scope, from coverage of all research costs including salaries and infrastructures for several years, to limited interventions to support ad hoc travel costs. They can take the form of mobility-dedicated initiatives, or be integrated as elements of wider research funding schemes. They are usually part of the research policy domain, but can also belong to other policy domains (e.g. immigration, development cooperation or employment policy).

The focus is on national initiatives, but their articulation with the uptake of EU initiatives and schemes (like Marie Curie schemes), and grassroots initiatives taken at the level of research institutions are also mentioned. The latter is important to refer as in certain speciality fields exist research agreements for exchange of students and scientists promoted by large research institutes (often bilateral) which are important promoters of dedicated mobility.

To assess the extent and illustrate the diversity of efforts paid to foster internationalisation of research workforce as a contribution to the ERA in the 7 countries under review, a typology of mobility initiatives is established according to the criteria presented in Table 1.

Table 1- Criteria for typology of mobility initiatives

Criterion	Possible choices
Target group	Young researchers Established researchers All categories
Duration	Short time Long time Any duration
Direction	Inwards Outwards Both
Geographical coverage	EU Non-EU Both
Instruments used	Subsidies (types of costs covered) Tax incentives Non-financial incentives

Position in policy mix	Single dedicated programme Part of a larger programme Dedicated action line
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The case studies (3 per country) are classified according to the typology in Tables 2-4.

**Table 2 -Classification of case studies of mobility initiatives (Austria and Finland)**

<b>Criterion</b>	<b>FWF Erwin Schrödinger Fellowships (AU)</b>	<b>FWF Lise Meitner Programme (AU)</b>	<b>Brainpower Austria (AU)</b>	<b>FiDiPro (FI)</b>	<b>Academy of Finland (FI)</b>	<b>Tekes mobility activities (FI)</b>
Target group	Young researchers	All	All	Top level senior researchers	Variety	Variety
Duration (years)	1-2	1-2	-	2-5	mix	Up to 3
Direction	Outwards	Inwards	Inwards	Inwards	Both	Both
Geographical coverage	EU non-EU	EU non-EU	EU non-EU	EU non-EU	EU non-EU	EU non-EU
Instruments used and costs covered	Fellowships travel	Salaries travel other costs	Website, career info travel relocation grants, events	Salaries, infrastructure other costs	Grants	Funding under R&D projects
Position in policy mix	Single dedicated programme	Single dedicated programme	Single dedicated programme	Single dedicated programme	Part of larger programme	Part of larger programme

**Table 3 - Classification of case studies of mobility initiatives (Netherlands and United Kingdom)**

<b>Criterion</b>	<b>Rubicon (NL)</b>	<b>SPIN Mobility (NL)</b>	<b>Knowledge Migrant 30% rule (NL)</b>	<b>Dorothy Hodgkin Postgrad. Award Scheme (UK)</b>	<b>British Council Partnership Prog (UK)</b>	<b>International Joint projects Royal Society (UK)</b>
Target group	Young	All	All	Young	Young	All
Duration (years)	1-2	short	No limit, 10 (tax incentives)	3-4	short	up to 2
Direction	Both	Both	Inwards	Inwards	Both	Both
Geographical coverage	EU non-EU	non-EU	EU non-EU	non-EU	EU	EU non-EU
Instruments used and costs covered	Salary costs	Travel training grants	Soft support, alleviating rules tax deduction	Scholarships	Travel costs seminars	Seed money r (international projects)
Position in policy mix	Single dedicated programme	Part of larger programme	Integrated programme	Single dedicated programme	Dedicated action line	Dedicated action line

**Table 4 - Classification of case studies of mobility initiatives (Poland and Italy)**

<b>Criterion</b>	<b>British-Polish Young Scientists Programm (PL)</b>	<b>German-Polish Programme for scientific cooperation (PL)</b>	<b>Polish Welcome Programme (PL)</b>	<b>Return of the Brains Programme (IT)</b>	<b>Visa and tax deductions (IT)</b>	<b>Research Network Programme in Physics (IT)</b>
Target group	Young	Young	Established researchers	All (preference for young)	All	All
Duration (years)	2	2	3-5	2-4	-	variety
Direction	Both	Both	Inwards	Inwards	Inwards	Both

Geographical coverage	UK and PL	PL and DE	EU non-EU	EU non-EU	EU non-EU	EU non-EU
Instruments used and costs covered	Grants (Travel Salary)	Grants (Travel salary)	Salary project expenses stipend	Salary	Alleviation administrative barriers tax deduction	Grants Travel Living (salary)
Position in policy mix	Single dedicated programme	Single dedicated programme	Single dedicated programme	Single dedicated programme	Single dedicated programme	Dedicated action line

Table 5 - Classification of case studies of mobility initiatives ()

<b>Criterion</b>	<b>Italy New Researchers Scheme Piedmond (IT)</b>	<b>Sofja Kovalewskaja Award (DE)</b>	<b>German Academic Exchange Service –DAAD (DE)</b>	<b>Max Planck Int Researchers Exchange (DE)</b>
Target group	All	Young	All	Academics and researchers
Duration (years)	2	5	2	Variety
Direction	Inwards	Inwards	Outwards	Both
Geographical coverage	EU non-EU	EU non-EU	EU non-EU (bilateral)	EU non-EU
Instruments used and costs covered	Travel and living	research project	Travel and living	Travel and living
Position in policy mix	Single dedicated programme	Single dedicated programme	Single dedicated programme	Dedicated action line

### 1.1.2 State-of-play of national mobility initiatives in the 7 countries

Researcher mobility initiatives feature prominently in policy portfolio for research internationalisation in the seven countries, with the special situation of Poland where the initiatives are more recent and of smaller scale. This priority reflects the fact that human resources are considered a core ingredient for progress towards a knowledge economy. The main underlying rationale for the implementation of these initiatives is more to reinforce national research systems, not much ERA construction as such.

In most countries, the main justification for launching dedicated mobility schemes relates to the current or expected shortage of qualified researchers to feed the national research system. Increasing attractiveness of national research system for foreign highly qualified researchers is a core objective in most contemporary strategic policy statements in EU Member States. This implies that a national initiative which aims to attract researchers from other Member States might increase shortages in those Member States. Although the ERA vision in some sense aims to increase competition (i.e. to promote excellence) within European Research Area, it would not be efficient or benefit to the ERA as a whole, if national policy makers would compete with each other, in attracting each others best researchers with ever more generous public funded grants.

The fact that the main rationale for national schemes is to attract qualified researchers it places a premium on inward mobility schemes. Examples are “return of brains” schemes such as the Italian “Reintro dei cervelli”, the Dorothy Hodgkin Postgraduate Award Scheme in the UK, the Welcome programme in Poland, or tax incentives to attract foreign researchers, like the 30 % tax rule for foreigners in the Netherlands. Simplification of administrative procedures for third-country nationals (such as the knowledge migrant scheme in the Netherlands) also contribute to this objective. Outwards mobility schemes focus primarily on young researchers, such as the British-Polish Young Scientists Programme, and implicitly target the same objective: to raise the qualification of national young researchers through a stay abroad and when they return to their home country to improve the workforce of the domestic research system.

Poland presents a specific picture in our sample, where the fight against dramatic brain-drain is the key rationale for developing mobility initiatives in a country that is still closed to foreign researchers.

A secondary priority of mobility schemes can have is the aid to development, most notably present in the UK, through the increase of qualifications of researchers from developing countries.

#### **Types of instruments:**

##### *Financial incentives:*

- Grants for incoming researchers - several small grant schemes in the Netherlands, UK Research Councils programmes, the major Finnish FiDiPro programme, mobility grants within research funding of Tekes and Academy of Finland, Lise Meitner programme in Austria, Sofja Kovalewskaja Award, Max-Planck, Heisenberg, Helmholtz, Humboldt in Germany, the Foundation for Polish Science initiatives such as the Welcome programme);
- Grants for outgoing researchers - several small grant schemes in the Netherlands, British Council Partnership Programmes, mobility grants within research funding of Tekes and Academy of Finland, Erwin Schrödinger fellowships, APART in Austria;



- A combination of both - the Rubicon programme in the Netherlands and the German Academic Exchanges services;

Most national schemes either address incoming mobility or both (incoming and outgoing). Schemes focusing on outgoing mobility are less frequent.

#### *Fiscal incentives*

- Fiscal incentives for incoming researchers - 30% rule in the Netherlands, and personal tax incentives in Italy.

#### *Non-financial incentives:*

- Legal and administrative changes to facilitate inward mobility for third country researchers - Knowledge migrant scheme in the Netherlands, simplification of visa procedures in Poland;
- Information centres for mobile researchers - Fulbright centre, Brainport, Nuffic in the Netherlands, Brainpower in Austria, “High Potential Initiative” and Alexander von Humbolt Foundation in Germany.

Overall, it is observed that the vast majority of existing schemes specifically target researchers at an early stage of their career.

In general, a distinction can be made between on the one hand, broader schemes, which provide substantial funding for longer term mobility of excellent researchers (e.g. Finnish FiDiPro programme, German Sofja Kovalewskaja Award) and, on the other hand, facilitating schemes, such as the UK seed money schemes addressing financial barrier to mobility of researchers at an early stage of their career.

With respect to financial incentives, the size and scope of grants vary a lot, between small grants limited to individual travel expenses found in all countries, to multi-year funding for large projects such as in the Finnish FiDiPro programme or the Sofja Kovalewskaja Award in Germany.

Proliferation of initiatives across many agencies or public research organisations (PROs) is a common situation, each developing their own specific programmes, sometimes restricted to specific fields of research and countries: the Netherlands, Austria, Germany and the United Kingdom are such typical cases. In Italy, a decentralised situation prevails, as most of the schemes promoting researchers mobility find their origin within the framework of bilateral scientific collaboration programs contracted by the Ministry of Foreign Affairs (Mae). In Finland, initiatives are centred in the Academy of Finland and Tekes, but a host of small other dedicated programmes exist. The German situation with a central organisation taking care of a large number of exchange schemes, the DAAD (German Academic Exchanges Service), is a case where coordination is achieved through a central organisation. It dates back from the 50s, and is mainly geared towards exchange of students. In Austria a recent analysis recommended to merge sub-critical initiatives into larger schemes: the multiplicity of schemes was considered to cause problems on visibility and accessibility of the support.

Funding for mobility is often included into larger schemes, like in the support to large-scale facilities, or into generic research funding programmes, such as research grants schemes of Academy of Finland. Other example is the Austrian APART scheme for top researchers working both at Austrian and foreign institutions; and Italian support within international research project funding. Student-oriented mobility schemes may also devote a share of their funds to researcher mobility (CIMO in Finland). When the mobility initiatives are part

of larger programmes there is a real challenge for monitoring its progress both in terms of inputs, and of impacts on effective mobility.

Researcher mobility programmes are typically confined to the public domain. Funding sources emanate from national research funds, and programmes mainly target researchers in the public sphere. One atypical programme in our analysis is the Dorothy Hodgkin Postgraduate award scheme in the UK, a result of a public-private partnership, with co-funding from the British Research Council and private partners. This is the only example of that type found in the 7 countries under study.

In addition to the national schemes, several country reports reviews that some universities and PROs have developed mobility schemes, mostly oriented towards student mobility, including sometimes researchers. The Max-Planck Research Award is an example of such grassroots initiatives. Because of the dispersion of such schemes and orientation towards student mobility, it is difficult to trace a picture of their contribution to the phenomenon of researcher mobility.

The most visible element in research policies portfolios for international mobility of researchers are initiatives involving financial incentives, but it seems that a growing interest exist in soft initiatives with a focus on information accessibility and targeting mobile researchers, e.g. Brainport and Nuffic in the Netherlands, Brainpower Austria, Gate-Germany and Hi-Potentials in Germany or CIMO in Finland, or derived services like provision of housing facilities acting as complement to funding schemes. Changes in regulation for highly-skilled knowledge workers also fall into this category, such as the Knowledge Migrant scheme in the Netherlands, the decisions of the German Federal Government in 2005 to open labour market to foreign graduates, and the removal of work permit to people working at higher education institutions in Poland. Those initiatives bring us outside of the R&D specific policy domain (e.g. for the Dutch scheme, the implementing agency is the Dutch Immigration and Nationalisation Service).

The ERA dimension is not clearly distinguished in the policies, as mobility initiatives are seldom restricted to European countries. Policies most often address worldwide mobility without distinction between EU and non-EU countries. Many schemes focus on specific countries or group of countries, e.g. schemes for attracting researchers from developing world or emerging countries (the Dorothy Hodgkin Postgraduate award scheme in the UK, or the Marco Polo programme in Italy focusing in China). Other schemes are in the form of bilateral agreements between countries (e.g. the Hendrik Casimir – Karl Ziegler research Grant sponsoring exchanges of researchers between the Netherlands and Germany, the Alliance Research Programme which promotes Franco-British research co-operation). In some cases national mobility schemes tend to have as priority non-EU mobility such as Finland or Italy, on the ground that EU mobility is promoted through EU-level instruments. A certain division of labour tends thus tend to appear between the national and EU levels in such cases.

Besides the use of national schemes, all countries surveyed in the sample make use of EU-level mobility instruments, most notably the Marie Curie grants. These grants are reported to play an important role in promoting mobility, but it is difficult to compare their financial implication with the national ones, due to the complexity of measurement at national level (see below).

Other policy aspects and institutional differences that might have an impact on mobility flows are not addressed in this study, like the specific procedures which may act as a barrier to become a university professor in Germany or Poland, for instance.

### 1.1.3 Reflections from the analysis

Increasing international attractiveness of a domestic research system is a priority objective for national governments in the EU. Attracting “top research talents” is an explicit goal of many mobility initiatives. It is however, not clear what role these focused initiatives effectively play in this overall attractiveness, since the intrinsic quality of a domestic research system depends on many other factors (career paths, ease access to research funding, salaries, working conditions for researchers, quality of research infrastructure, international status, visibility and degree of excellence of public research organisations, quality of living environment, etc.). In principle policy should aim to address market-failures, but it is not sufficiently clear what kind of failures the mobility schemes address or should address, and what their impact is on these failures.

Grant schemes for outgoing mobility (e.g. the Austrian Erwin Schrödinger fellowships) try to combine the objective of raising the level of excellence of national research system as primary aim of such programme, and building the ERA through circulation of brains as secondary. But to what extent is the “return commitment” of researchers effective? To what extent are the grant holders subsequently more involved in international co-operations? Measuring such impacts would be very relevant to assess progress towards ERA.

Grants to attract foreign researchers similarly pursue the goal of improving national research base, and at the same time contribute to the objective of fostering international connections of national research institutions. How far this second objective is reached as a contribution towards ERA is a question that can also be subject of further analysis and enquiry.

The relative paucity in our sample of in-depth evaluations of mobility schemes impacts, along with an understanding of associated barriers and incentives for mobility, points towards a need for more knowledge about this phenomenon. This would help policy-makers in their choice for the right “policy mix” favouring mobility of researchers, for example, for shedding some light on which priority to give to financial versus non-financial support schemes. Austrian schemes and the UK Dorothy Hodgkin Postgraduate Award Scheme are examples of schemes which have undergone evaluations shedding light notably on the retention rates of mobile researchers after the funding period.

Available (patchy) evidence gained through evaluations or enquiries show that volume and continuity of grants are key conditions for the success of mobility initiatives. In several cases of inward mobility schemes, individual amounts had to be raised over time because it was found that prevailing schemes were ineffective to attract top-level researchers. Lack of funding continuity was found also as a deficit in the Italian ‘Reintro dei cervelli’ programme, which points towards the importance of appropriate funding conditions for schemes’ effectiveness.

The choice between prioritising short-term versus long-term awards in mobility initiatives might have important consequences; as mentioned in the Finnish review, the forms of international research activities have changed. Short-term visits and continuous cooperation through internet might have reduced the incentives for long-term researcher mobility. This raises the question whether virtual mobility can substitute real longer-term mobility, and what are the differences between them, and the relative benefits of the two types of mobility for ERA construction. But, small seed money for international travel, such as grants for research networks run by the British Council, has been found useful to lead towards longer term research collaboration.

Most initiatives do not differentiate between EU and non-EU mobility: as mentioned repeatedly, the main rationale for initiatives is to raise quality of national research system and activities, and hence there is no reason to restrict mobility to or from specific countries. The intrinsic attractiveness of research institutions becomes the key determinant of selection of places for outgoing and incoming schemes. This raises the following question with a view to ERA construction: does this preclude the establishment of “EU-only” mobility schemes, or preferential treatment for EU mobility? But national schemes that promote incoming mobility of excellent researchers from other EU Member states could result in too much competition between Member States, where institutes would compete with each other with public support for the same best researchers. In this respect it is good for the ERA vision that the national schemes do not differentiate between EU and Non-EU.

Mobility of researchers in the private sector takes place naturally through the activities of R&D-active multinational corporations and on the private sector labour market. Are there however unexploited opportunities in the form of mobility incentives of a public-private partnership nature, such as with the Dorothy Hodgkin Postgraduate award scheme in the UK?

A certain degree of division of labour seems to be emerging between the EU instruments and national initiatives. The EU initiatives would care for intra-EU mobility, while the national initiatives complement these by targeting mobility of researchers outside of the EU. From an ERA viewpoint it appears to be good that schemes that promote inward mobility are not specifically focusing on attracting researchers from other Member States, because this could lead to a competition in public funding among national policy-makers within the EU. In this respect, attracting researchers from outside the EU are probably more beneficial to ERA objective of making it a more attractive area to do research.

To conclude, together with the participation in EU schemes in particular the Marie Curie grants, mobility initiatives developed in EU Member States contribute to the goal of ERA. However, strong emphasis in several schemes on supporting only mobility of the most excellent researchers and attempts to out-compete other countries in Europe is not fully in line with some of the aims of ERA, namely the harmonisation of regulations and conditions for a level playing field for research within Europe as a whole.

The importance of mobility schemes in creating freedom of movement for researchers within the European space should not be overestimated. The attractiveness of different systems in Europe does not depend only on availability of funds and grants, but also on many other aspects like lack of valorisation of foreign experiences in career progression, or lack of attractiveness of national research institutes, quality of research infrastructures etc. . The case of Poland shows that barriers to outwards mobility are linked with lack of incentives within the domestic research system: “in Poland there is no impediment to (public researchers) mobility, but it is not popular or even well-seen. The law on Science and Higher Education does not impose on the researchers to visit or to do research at foreign research institutes. The issue of foreign experience is also very seldom taken into account when formulating the requirements for researchers to establish their careers. From the perspective of Polish researchers, the system of grading and promotion favours seniority and strong domestic presence, often with years spent abroad rather seen as a disadvantage, since they may make the reintegration into the Polish research community difficult - more experienced researchers sometimes discover that their work outside the country is not sufficiently recognized by national research institutions” (extract from the Polish report). Barriers to inwards mobility have to do with the lack of attractiveness of this

system, not up-date infrastructures, lower levels of funding and excellence, etc. The existing inwards mobility schemes are not in a position to reverse the situation.

Both outflow and inflow of students from EU Member States are increasing within Europe. The table below shows that Austria and Finland have the highest percentage of outgoing students in 2000 (3.8% and 3.2%) who went to study in other country in Europe (including associated countries). Austria also has the highest inflow of students from elsewhere in Europe, followed by the UK and Germany. The inflow of students from other European countries has most increased in the Netherlands (more than doubled from 1.6% in 2000 to 3.9 % in 2006) and the UK (from 5.9% to 10.5%). For Italy, Poland and Finland the outflow to other countries in Europe exceeds the inflow from other countries in Europe.

**Table 6 - Outflow and inflow of foreign students within Europe, as share of all students in 2000 and 2006**

	<b>Students studying elsewhere in Europe (outward) (2000)</b>	<b>Students from other European countries (inward) (2000)</b>	<b>Students studying elsewhere in Europe (outward) (2006)</b>	<b>Students from other European countries (inward) (2006)</b>
European Union (27 countries)	2.1%	2.4%	2.7%	3.0%
Germany	1.8%	5.1%	2.8%	5.6%
Italy	1.7%	0.7%	1.7%	0.8%
Netherlands	1.9%	1.6%	2.1%	3.9%
Austria	3.8%	9.2%	4.6%	12.1%
Poland	0.9%	0.1%	1.6%	0.1%
Finland	3.2%	0.8%	3.0%	1.1%
United Kingdom	0.6%	5.9%	0.8%	10.5%

Source: Eurostat

Note: 'students' refers to ISCED 5-6; 'Europe' refers to EU-27, EEA and Candidate countries.

**Table 7 - Average annual Share of (non-European and European) foreign students as percentage of all students**

	<b>Annual growth total foreign students (average 2000-2006)</b>	<b>Annual growth foreign from Europe (average 2000-2006)</b>
European Union (27 countries)	19 %	8 %
Germany	7 %	6 %
Italy	16 %	17 %
Netherlands	28 %	35 %
Austria	5 %	5 %
Poland	14 %	14 %
Finland	10 %	8 %
United Kingdom	66 %	4 %

Source: Eurostat

#### 1.1.4 Measurement issues for national mobility initiatives

Measuring accurately the extent of efforts paid by national actors to foster researchers mobility in Europe (and the subsequent impacts of these efforts), is fraught with a lot of difficulties. For several reasons it is hardly possible to calculate the total budget for all national mobility initiatives.

Information on major national mobility-dedicated schemes, such as the ones covered as case studies in this review is relatively easy to obtain, at least for core elements such as annual budgets and number of interventions, and eligibility criteria (e.g. FiDiPro in Finland, Rubicon in the Netherlands, the Sofja Kovalevskaja Award in Germany or the Austrian Erwin Schrödinger Fellowships and Lise Meitner Programme). However, information on smaller schemes or are part of larger R&D schemes is much more difficult to get. Often, agencies in charge of funding projects with an international dimension, do not report separately on mobility when it is integrated into the project funding.

Grassroots initiatives taken at level of research institutions cannot also be reviewed systematically due to their multiplicity, and lack of coordinated and exhaustive inventory. Individual investigations at the level of research institutions need to be carried out to capture these efforts.

Another difficulty is related to the third topic of this study<sup>4</sup>, namely the opening up of national research programmes for foreign participation. National research grant schemes without the aim of promoting cross border mobility have nevertheless impact on mobility when they allow foreign participation, as for instance it is the case of the Innovative Research grant scheme in the Netherlands. This scheme is addressed under topic 3, but the point is that increased openness of national research programmes might reduce relevance of mobility schemes.

The danger is thus to limit the measurement of mobility to those centrally-managed major schemes, while data and figures aggregated on the basis of national mobility dedicated schemes might represent a fraction (sometimes quite small) of the intensity of efforts paid for fostering researchers mobility at national level.

In addition, soft measures, such as the alleviation of administrative barriers for researcher mobility, are not translated in budgetary figures, and their take-up rates or size of beneficiary groups are not measured. Some of the regulations, such as the Knowledge Migrant scheme in the Netherlands, do not apply only to researchers, but have a broader application to highly-skilled workers. Such changes are likely to play an important role for attractiveness of a national research system for foreign researchers.

Another difficulty for the assessment of the “researchers mobility” dimension of ERA is that most schemes cover both intra-EU and extra-EU (incoming and outgoing) mobility. Disentangling the ERA component in the mobility schemes is an additional step to take when analysing monitoring data, which is not always readily available.

It is also necessary to distinguish between funding to students mobility and to researchers mobility, in the case of programmes and schemes that target a multiplicity of groups.

Finally, regions can also launch mobility schemes. In our review, Italian and German regions were mentioned as being involved in bi- or multi-lateral mobility schemes. This is not likely to be recorded at national level, and should therefore be investigated at regional level.

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<sup>4</sup>See Section 1.3 Opening up of national programmes

## **1.2 *Transnational strategic partnerships and opening up of universities***

### **1.2.1 Key dimensions of transnational strategic partnerships and opening up of universities for ERA**

Universities throughout Europe are increasingly international and engaged into transnational research partnerships. These partnerships can, at one extreme, be formalised in Conventions or Memoranda of Understanding at the level of university boards and at the other extreme be purely the result of bottom-up initiatives at the level of individual researchers or laboratories. Initiatives covered under this topic refer to explicit agreements and strategies adopted at the level of one (or a group of) national university(ies), with the aim to initiate, favour or facilitate transnational research activities of their own staff and labs. The initiatives cover any type of research, with any target groups (including private sector partners), and concern whole universities or specific parts (some disciplines, e.g.). Partnership agreements can be adopted either at the level of general management of universities, at the level of faculties, or very broad research groups. They have a permanent character (to differentiate them from ad hoc collaborative projects). While most agreements are geared towards educational purposes, the focus of this review is on the research part of these agreements.

National initiatives might provide incentives for opening up of universities, i.e. funding programmes in which a premium is awarded for projects meeting international cooperation criteria, specific programmes for developing such partnerships etc. Opening up of universities might be measured by the share of foreign students and staff in the university, as well as the use of European instruments and integration in European and international networks. They act as framework conditions for opening up of universities and are part of the analysis under this topic. Articulation between national initiatives, EU-level initiatives, and grassroots level initiatives is also covered under this topic.

Case studies of universities in the seven countries have been carried out under this topic, to analyse the variety of strategies followed for opening up towards the ERA. In addition, a review of UK studies on university internationalisation has been performed to analyse the phenomenon. Table 8 below presents the various criteria chosen to illustrate the diversity of these strategies. A first set of criteria capture the profile of the university and its degree of outward-orientation (size, specialisation, share of foreign students and staff, location). A second set of criteria relate to the orientation of partnerships (relative importance of research versus education, membership of international networks, intensity of use of EU and national internationalisation instruments, type and number of initiatives, research levels targeted, level of commitment, main instruments, and geographic focus). The case studies completed under this study are pictured in tables below.

**Table 8 - Criteria for classification of case studies of transnational partnerships and opening up of universities**

<b>Criterion</b>	<b>Possible choices</b>
Size of University (number of students)	Large (more than 20,000 students) Medium (10,000-20,000 students) Small (less than 10.000 students)
Technical or generic university	Technical Generic
Share of foreign students	High (>15%) Medium (5-15 %) Low (< 5%)
Share of foreign academic staff	High (>15%) Medium (5-15 %) Low (< 5%)
Centrality of location	C= central, core, capital city location P= more peripheral, provincial, rural or border- or island-region
Scope of partnerships	education mainly Both research and education
Important network memberships	Identification of networks
Degree of use of EU instruments(FP and/or mobility schemes)	Intense Less intense
Degree of use and type of national instruments	Intense Less intense
Grassroots initiatives/partnerships	Type and number of initiatives
Types of research levels	MSc students PhD students Post-docs all
Management of partnerships level of commitment	University level Faculty institute level
Content of partnership, main instruments	Type of activities covered by the partnerships
Focus region	Specific regional focus No specific regional focus



**Table 9 - Classification of case studies of transnational partnerships and opening up of universities (Austria and Finland)**

<b>Criterion</b>	<b>University of Vienna (AU)</b>	<b>University of Innsbruck (AU)</b>	<b>Graz University of Technology (AU)</b>	<b>Helsinki University Technology (TKK) (FI)</b>
Size of University	Large (72,733)	Medium (22,000)	Small (9,949)	Medium
Technical or generic university	Generic	Generic	Technical	Technical
Share of foreign students	19.5 % (mainly Germans)	30.9 % (mainly Italians)	15.3 %	8.4%
Share of foreign academic staff	18.1 %	21.1 %	13.5 %	8%
Centrality of location	Central-core	More Peripheral	More Peripheral	Central-core
Scope of partnerships	Education	Education	Education	Both research and education
Important network memberships	EUA (European University Association) UNICA (Network of Universities from the Capitals of Europe); Danube Rectors Conference;	ASEA-UNINET Eurasia - pacific Uninet CEEPUS	ASIA Eurasia - pacific Uninet Danube	CLUSTER, Nordic 5 Tech network; BALTECH; Nordtec; TIME CESAER
Degree of use of EU instruments	yes	43 ongoing FP projects;	yes	Erasmus (100 partners); FP7
Degree of use of National instruments (high/medium/low)	yes	Yes (mobility)	yes	high
Grassroots initiatives/partnerships	>30 partnerships with universities	25 Joint-Study-Agreements; summer schools	n.a.	50 bilateral mobility agreements
Types of research levels	All	n.a.	n.a	All
Management of partnerships, level of commitment	Central (R&IRO)	International Relations Office,	International Relations Office;	All levels

		Office for Alto Adige		
Content of partnership, main instruments	Joint degree programmes	25 Joint-study Agreements; Summer schools	n.a.	Research and education
Focus region	CEE and SEE, central and south East Europe	CEE and Alto Adige	(South-) East Europe	No specific regional focus

**Table 10 - Classification of case studies of transnational partnerships and opening up of universities (Finland and the Netherlands)**

<b>Criterion</b>	<b>Lappeenranta University of Technology (FI)</b>	<b>The University of Turku (FI)</b>	<b>Technical University Eindhoven (NL)</b>	<b>Maastricht University (NL)</b>
Size of University	Small	Medium	Small	Medium (12,080)
Technical or generic university	Technical	Generic	Technical	Generic
Share of foreign students	3.9%	6.8%	14 % (56% of PhD)	37 %
Share of foreign academic staff	n.a (estimated low)	n.a (estimated medium)	32 %	26%
Centrality of location	More Peripheral	More Peripheral	Central-core	More Peripheral
Scope of partnerships	Mainly education	Both education and research	Research	Both education and research
Important network memberships	n.a.	Baltic Sea Region University Network; Coimbra Group The University of the Arctic	CLUSTER CESAER Santander Group LEO-NET	n.a.
Degree of use of EU instruments (FP and/or mobility schemes)	yes Erasmus (over 100 partners) FP	Yes Erasmus (over 181 partners), FP7	High; scholarships, mobility	Yes FP and mobility schemes
Degree of use of National instruments (high/medium/low)	High	High	Yes	Yes
Grassroots initiatives/partnerships	>30 bilateral agreements	Joint activities through Coimbra	Focused partnerships	Focused regions university (before

	mobility collaborative programmes (Russian universities)		University	unstructured at faculty level)
Types of research levels	All	All	All (PhD level)	All
Management of partnerships, level of commitment	University	University	University International Relations Office	University and faculty
Content of partnership, main instruments	Research and education	Research and education	Mobility research cooperation in projects	Maastricht Univ India Institute Bangalore, scholarships PhD projects
Focus region	Russia (St. Petersburg) Nordic countries	Baltic Sea region Nordic countries	Eindhoven, Leuven, Aachen triangle	Euregio (Aachen, Liege, Hasselt) India, China, Gulf-states, Turkey

**Table 11- Classification of case studies of transnational partnerships and opening up of universities (The Netherlands and Italy)**

<b>Criterion</b>	<b>University of Utrecht (NL)</b>	<b>University of Cagliari (IT)</b>	<b>Sapienza University of Rome (IT)</b>	<b>Bicocca University of Milan (IT)</b>
Size of University	Large (30,000)	Large (36,000)	Large (145,000)	Large (30,000)
Technical or generic university	Generic	Generic	Generic	Generic
Share of foreign students	6.3 %		5,0 %	4.5 %
Share of foreign academic staff	14 %	n.a.	n.a.	n.a.
Centrality of location	Central-core	More Peripheral	Central-core	Central-core
Scope of partnerships	Both education and research	Both education and research	Both education and research	Both education and research
Important network memberships	League of European Research Universities (LERU); Worldwide Universities Network (WUN); Oxford Network;	n.a.	Unica EUA	EUA

	Utrecht Network			
Degree of use of EU instruments (FP and/or mobility schemes)	FP and mobility schemes	Mobility schemes	n.a.	n.a.
Degree of use of National instruments (high/medium/low)	National scholarships	National scholarships	n.a.	n.a.
Grassroots initiatives/partnerships	Utrecht University Partners (UUP), network of 32 universities		Bilateral formal agreements and protocols	Over 250 agreements in 24 countries
Types of research levels	All	n.a.	n.a.	n.a.
Management of partnerships, level of commitment	Region committees	n.a.	n.a.	At project level
Content of partnership, main instruments	Exchange of students and staff	n.a.	n.a.	n.a.
Focus region	No real focus	n.a.	n.a.	n.a.

**Table 12 - Classification of case studies of transnational partnerships and opening up of universities (Germany and the United Kingdom)**

<b>Criterion</b>	<b>Albert-Ludwigs-University Freiburg (DE)</b>	<b>Technical University Chemnitz (DE)</b>	<b>University of Applied sciences Kaiserslautern / Zweibrücken (DE)</b>	<b>University of Manchester (UK)</b>
Size of University	Large (20,714)	Medium (10,682)	Small (5,445)	Large (>20,000)
Technical or generic university	Generic	Technical	Applied	Generic
Share of foreign students	16.7 %	6.4%	0-1%	20%
Share of foreign academic staff	n.a.	n.a.	n.a.	38%
Centrality of location	More Peripheral	More Peripheral	More Peripheral	More Peripheral
Scope of partnerships	Both education and research	Both education and research	Both education and research	Both education and research
Important network memberships				Multiple†
Degree of use of EU instruments (FP and/or)	Erasmus FP	Erasmus FP	Erasmus FP	High

mobility schemes				
Degree of use of National instruments (high/medium/low)	High	ISAP from DAAD Medium	High	High
Grassroots initiatives/partnerships				Multiple†
Types of research levels	All, PhD	All, PhD	All, PhD	All
Management of partnerships, level of commitment	Agreements at faculty level	n.a.	Agreement on faculty level	All levels
Content of partnership, main instruments	Exchange on academic and students level	Exchange on academic and students level	Exchange on academic and students level	Research and education
Focus region	EUCOR Tri-national collaboration (Muhlhouse, Strasbourg, Basel, Freiburg, Karlsruhe)	USA China Russia, North-east Europe	Sweden Singapore Switzerland	Not specific

**Table 13 - Classification of case studies of transnational partnerships and opening up of universities (Poland)**

<b>Criterion</b>	<b>The University of Warsaw (PL)</b>	<b>The Warsaw University of Technology (PL)</b>	<b>Wroclaw University of Technology (PL)</b>
Size of University	Large (55,500)	Medium (29,000)	Medium (32,000)
Technical or generic university	Generic	Technical	Technical
Share of foreign students	1,4%	0,8%	0,4%
Share of foreign academic staff	-	-	-
Centrality of location	Central-core	Central-core	More Peripheral
Scope of partnerships	Both education and research	Both education and research	Mainly education
Important network memberships	EUA UNICA BSURN ACA, CEE, EAIE		n.a.
Degree of use of EU instruments (FP and/or mobility schemes)	High 67 FP6 projects Eureka	High 90 FP6 projects and 21 FP7 projects Eureka	Medium 41 FP6 projects Eureka

Degree of use of National instruments	Low (bilateral, FNP, mobility)	High mainly bilateral	Low mobility
Grassroots initiatives/partnerships	Yes	Yes	Yes
Types of research levels	PhD Post-doc	PhD Post-doc	PhD Post-doc
Management of partnerships, level of commitment	Central International Relation Office	Central Centre for International Cooperation	Central Office for UE Programmes and Regional Cooperation
Content of partnership, main instruments	all types of instruments creation of joint labs common infrastructure exchange programmes and joint research projects	many types of instruments programmes and joint research projects summer schools	exchange programmes and joint research projects
Focus region	EU Offers from Asian or South American universities	EU and non-EU countries bilateral programmes	EU CEE countries CIS countries

### 1.2.2 State-of-play of transnational strategic partnerships and opening up of universities in the 7 countries

The analysis carried out in this study confirms that universities throughout Europe are increasingly opening up: the number of foreign students is on the rise; foreign-born staff is becoming a more widespread feature, e.g. in the UK 27% of academics are of foreign origin; and its share of foreign PhD students even bypasses the share of nationals, with a figure as high as 62.5% (see table 14); the share of foreign funding for universities is also growing; universities enter into multiple international agreements; the share of publications with foreign co-authorships is rising, etc.

The situation differs a lot across our sample of EU Member States, with average shares of foreign staff and students lower in the Finnish, Polish and Italian universities, and higher in the Austrian, Dutch and UK universities (see also figure 1).

Table 14 - Share of foreign PhD-students (European and non-European) in selection of EU countries, as share of total PhD-students, 2006

	Foreign PhD students (non-EU + EU)	Non-European PhD students	Foreign European PhD students
EU 27	-	-	-
Austria	21.0%	5.7%	15.3%
Finland	7.6%	2.9%	4.7%
Germany	-	-	-

Italy	5.1%	2.7%	2.4%
Netherlands	-	-	-
Poland	2.9%	0.5%	2.4%
United Kingdom	62.5%	47.6%	15.0%

Source: Eurostat

Because statistical data regarding foreign staff is mostly lacking, we refer to Eurostat statistics. Both in terms of foreign students as well as foreign PhD students the situation in the UK is extraordinary (see table 14 and 15) with a very high share of non-European nationalities. In Austria on the other hand, foreign students and PhD students mostly originate from other European countries.

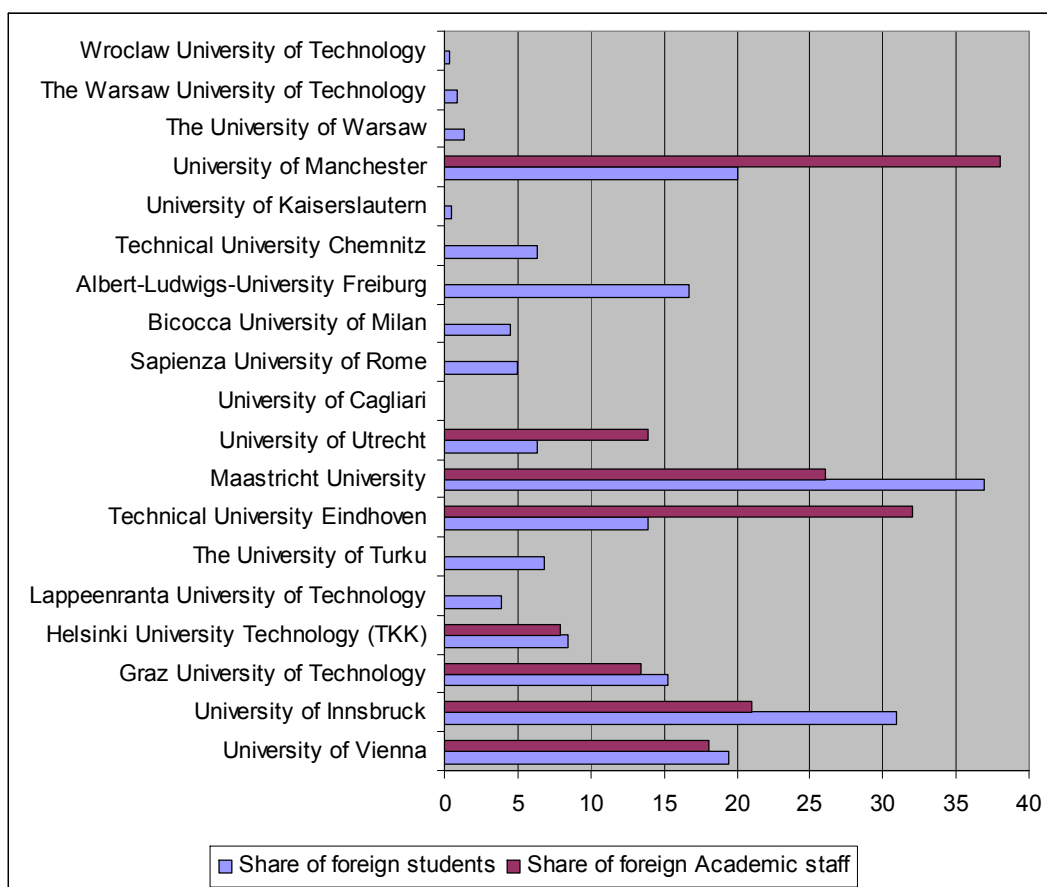
**Table 15 - Share of foreign students (European and non-European) as percentage of all students, in 2000 and 2006**

	<b>Foreign students non-EU 2000</b>	<b>Foreign students other EU 2000</b>	<b>Foreign students non-EU 2006</b>	<b>Foreign students other EU 2006</b>
EU 27	2.5%	2.4%	6.0%	3.0%
Austria	2.2%	9.4%	2.8%	12.7%
Finland	0.9%	1.1%	1.4%	1%
Germany	4.6%	4.5%	5.9%	5.6%
Italy	0.5%	0.9%	0.8%	1.6%
Netherlands	1.4%	1.5%	2.6%	3.9%
Poland	0.1%	0.3%	0.2%	0.4%
United Kingdom	5.5%	5.5%	41.3%	6.1%

Source: Eurostat

The above table shows that growth of foreign students in the UK is almost fully coming from outside Europe. For the Netherlands, Europe is a larger source of growth in terms of foreign students. Between 2000 and 2006 the (already high) share of foreign students in Austria did not increase further.

**Figure 1 - Share of foreign students and academic staff in total students and academic staff at selected universities**



Source: case studies

The opening-up of universities is taking place thanks to both education and research internationalisation trends. In most countries, changes in legislation have facilitated this trend: e.g. in Finland, the 2005 degree reform gave the universities greater potential for international co-operation: universities have launched numerous international Master's programmes and several Erasmus and Erasmus Mundus programmes, while they have also designed provision at Master's and doctoral level in particular to be more suitable for international students. On the research side, the EU-funded collaborative R&D projects have played an important role in creating lasting research partnerships across European university research groups.

Justifications for universities international openness relate to the need to increase quality of education and research. Initiatives like the national Initiative for Excellence in Germany, which aims at distinguishing excellent research universities, or the establishment of Centres of Excellence in Italy, shows that the search for excellence is a driving factor for university internationalisation. The difficulty to find nationals who are willing to do PhD research is reported as a strong incentive for strategic partnerships with foreign universities in the Netherlands. At the postgraduate level, international students have a vital contribution to the UK's research base, as 36% of postgraduate research students are international students. The rationale for university boards is often connected with educational considerations (such as the attraction of overseas students and their fees); although at level of individual researcher the typical motivations and drivers for scientific cooperation apply.



Based on the share of foreign students, in the case studies of universities, it seems that the most international universities are often not the largest universities and most centrally located in the country (e.g. the University of Innsbruck is more international in this respect than the University of Vienna, Maastricht more than Utrecht and Milan more than Rome, see figure 1). The degree of internationalisation as measured by the share of foreign students or researchers seems related to flows between cross-border regions, especially in the case of the Universities of Maastricht and Innsbruck. But it might also be the result of more aggressive internationalisation strategies from these universities (as suggested for example with the case of Helsinki University of Technology). For the most international universities of the present sample of cases: Maastricht University and University of Innsbruck, the share of foreign nationality is higher for students than for academic staff. For the larger Universities of Vienna and Utrecht, and the Technical University of Eindhoven this situation is different, with almost equal or higher shares of foreign nationality among academic staff. This difference could be related to more focus on reputation and research excellence, as a driver of internationalisation.

This internationalisation process of universities is driven mainly by factors from the education side: the Bologna agreement is of course an important driving force in this evolution. A focus of internationalisation is on the implementation of joint transnational study programmes, the provision of English-language courses, which eases the attraction of foreign students (the Erasmus programme being a remarkable catalyst of this evolution). This situation impacts also on research activities, but in an indirect way, since the accent is chiefly placed on education matters. As an example, the EURON (European Graduate School of Neuroscience) consists of a group of 10 universities in the Netherlands, Germany and Belgium who have signed an agreement to aim for a joint master and Ph.D. degree programme. Students will get a joint degree but with a local annotation. Such a co-operation in education is also a formalisation of cooperation practices regarding research. The development of research partnership agreements is often closely linked to some kind of education agreement, e.g. regarding supervision of PhD students.

Typically, universities do have some sort of institutional infrastructure (i.e. international relations offices) for enhancing/promoting international activities. International collaboration with specific universities (or a distinct group of universities) is generally geared towards university teaching and enhancing the exchange of students (cf. joint study programs etc.). Institutional research collaboration seems to be less frequent and typical international research co-operation is fostered by other means (i.e. EU framework programs etc.).

Like in the mobility topic, EU level instruments play an important role for internationalisation of universities: EU instruments to promote transnational cooperation most intensively used by the universities are the research projects under the successive EU Framework Programmes, and mobility schemes such as Erasmus and Marie Curie.

Picturing the nature and direction of transnational partnerships of universities is made difficult by lack of systematic and standardised record for such activities. Such activities vary a lot even within countries and at every university this is in constant change and evolution over the last few years. To a large extent universities are experimenting all kinds of approaches. Hence, the analysis of trans-national strategic partnerships of universities in the 7 countries delivers less clear-cut results than for the first topic: the main reason for this is that universities, which in many cases enjoy an increasing degree of autonomy, enter into a huge number of cooperative agreements (up to several hundreds for large

universities!), which are not systematically recorded and managed at various decision-levels. A Survey for DIUS<sup>5</sup> of higher education institutions (HEI) in the Great-Britain found that in 2007 HEI have a considerable amount of international research collaboration. The survey showed that the recording of information related to international research activities is more likely to occur at central level if it is related to income; otherwise, such information is likely to be held at more local levels. This is reflected in the recording of information on unfunded research collaborations, which is recorded more carefully by specialised institutions than other kinds.

Also at the level of faculties and research schools, there are numerous transnational strategic partnerships, but often not recorded in a structural manner. A recent example of this is the cross-border-cooperation between the Dutch Academic hospital Maastricht (azM) and the German Universitätsklinikum Aachen (UKA) that signed an agreement in 2004 to join efforts to become a European centre for healthcare and research. At the level of universities as a whole, the number of transnational partnerships is smaller, but broader, more in depth and more of a long term strategic partnerships type. An example is the strategic cooperation of the Dutch Technological University Eindhoven (Tue) with German TU Munchen and DTU Lyngby (Denmark).

Hence, there is no possibility to provide a complete picture of the situation relying on integrated and codified sources: the only possibility is to investigate specific universities strategies on the basis of case studies. National monitoring of opening up of universities receives a particular attention in the UK and the Netherlands, where specific bodies have been established to gather data on the phenomenon. Still, the evidence is quite poor with respect to the nature and size of international partnership agreements.

The evidence provided by this study indicates that the content of the university partnerships is highly variable. It is difficult, from the sample covered by this study, to derive any robust conclusion, e.g. linking the content of the partnerships with the characteristics of universities.

The activities covered by the partnerships, within the research domain, include a variable portfolio of initiatives within the following menu:

- Establishment of joint transnational institutes that can be physical or virtual institutes – most of this type of institutes are promoted by public research organisations as CNRS (Centre national de la recherche scientifique ) or Max-Planck but there is evidence of centres promoted by universities e. g the Saaremaa University Centre established by the University of Turku and four Estonian universities, or the plans of Eastern Finland University and the Lappeenranta Technical University to set up a joint Finnish-Russian Innovation University;
- Establishment of overseas offices of universities - e.g. Middlesex university in the UK, Maastricht University in the Netherlands;
- People exchange agreements, rules and incentives for foreign staff recruitment, and inwards/outwards mobility: mainly grants for outwards mobility of students and staff (see Topic 1).

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<sup>5</sup> McCaig, C., Drew, S., Marsden, D., Houghton, P., McBride, J., McBride, D., Willis, B. and Wolstenholme, C. *“International Research Collaboration in UK Higher Education Institutions”*, Centre for Education and Inclusion Research and Centre for Research and Evaluation, Sheffield Hallam University. DIUS Research Report 08 08.2008.

- Joint research projects - e.g. the Alexander von Humboldt Foundations funding for research group linkage (Institutspartnerschaften), an alumni programme that sponsors long-term research collaboration between academics in Germany and abroad. Its aim is to foster the sustainable basis for long-term international academic collaboration and the integration of doctoral and post-doctoral junior researchers into these collaborations. Eligible for funding are projects-teams from a German institute and at least one from Australia, Canada, Japan, New Zealand, Western Europe and the USA. In Italy, every year the Conferenza dei Rettori delle Università italiane - CRUI (Conference of Rectors of Italian Universities) in collaboration with other Institutions in Germany, Great Britain and France launches research programmes to increase collaborations between university research groups. The programmes are Vigoni Programme (Italy-Germany), British Council Programme (Italy-United Kingdom) and Galileo Programme (Italy-France). These programmes focus on promoting collaboration of young researchers. Preference is given to projects which provide research training opportunities, post-doctoral training in the partner country. Projects applications are assessed and selected by a Joint Committee consisting of Italian and Partner country's experts.
- Pure information exchanges.
- Exchanges and support for good practices in university management issues.

As put in evidence by the various case studies, the scope of universities international co-operation/networking/partnership efforts varies to a considerable degree. European universities enter into:

- Numerous bilateral agreements with other universities, within or outside the EU;
- Multilateral agreements with universities in specific world regions;
- University Networks, broad or narrow, specialised along disciplines or not. The EU-initiated Networks of Excellence are a case in point.

General networking activities (like memberships in university networks) aim at representing the specific interests of universities to the public and political sphere. In addition, mutual learning and exchange play an important role (e.g. management expertise, experiences with reform efforts etc.). Partnership programmes and various joint study programmes aim at enhancing the mobility of both researchers and students and are geared towards increasing the 'compatibility' of universities (e.g. studying at several universities etc.). The larger universities such as Vienna and Utrecht seem to be more often linked up to a range of international networks of universities. Technical universities have their own relevant networks, e.g. Helsinki University of Technology and Eindhoven University of Technology are both members of CLUSTER and CESAER. The Italian Universities make more use of bilateral formal agreements and protocols with foreign universities. Conclusions from several British reports point towards the fact that universities in the UK tend to adopt an individual approach to the creation of transnational partnerships, implementing them at a variety of levels, from institutional memberships down to the networking activities of individual staff. Many of these tend to be bilateral partnerships between UK and foreign institutions.

The case study results show that new initiatives come from both top-down strategic drives as well as bottom-up processes. Several models are used to structure and institutionalise new initiatives. One model is through membership of a transnational network of

cooperating universities, e.g. the League of European Research Universities (LERU), or CLUSTER which stands for: Consortium Linking Universities of Sciences and Technology for Education and Research. Another model used is for universities to build their own network, which often starts with a series of bilateral agreements.

The geographical coverage of those agreements is very diverse: ranging from cross-border partnerships reported for the Netherlands, to “regional” preferences (such as the priority placed on central and eastern European countries by Austrian universities, or Baltic and Nordic area for Finnish universities), and to participation in worldwide networks for the largest universities.

Like for mobility initiatives, both EU and non-EU networks are in place. Regional partnerships and worldwide links are not mutually exclusive choices. The example of the Maastricht University shows that numerous cooperation agreements exist with partners from outside the EU, particularly China and India. But there are many other ways in which the university works with partners, like the Euregion, which consists of the nearby border-regions in Germany (RWTH in Aachen) and Belgium (University in Hasselt, and Liege). Seeking for complementarity in disciplines has been an important incentive for UM to engage in regional cooperation, because some technological disciplines are not present in UM's curricula.

National governments provide incentives to universities for such partnerships through programmes that foster collaboration between specific research groups (like the Linkage programme in Germany) or to attract foreign researchers, such as the Finnish FiDiPro programme, covered under the mobility initiatives, and the Dutch Innovative Research Scheme, also covered under the openness of programmes topic. Other incentives, changes in legislation allow universities to charge tuition fees to foreign students and provide incentives for universities to open in the education sphere. Some governments actively promote internationalisation of universities by setting performance targets related to international activities (this was reported in the Finnish case).

Regional and local considerations also play a role in cross-border openness of universities, e.g. the Turku University in Finland. The basic rationale for strategic partnership especially in the Baltic Sea region has been the value added on working in areas of joint interest around the Baltic Sea. The UTU approach to opening up differs from many other universities in a way that it has taken a more regional approach to transnational collaboration and has developed specific expertise related to culture, society and economy of the Baltic Sea Region. There is also a strong local and regional push towards Baltic collaboration by the city government.

### **1.2.3 Measurement issues for transnational strategic partnerships and opening up of universities**

Universities are the unit of analysis for this topic. As mentioned above, work on the case studies showed that it is very difficult to quantify and qualify in a structural, comparative way, the extent to which a university is engaged in transnational strategic partnerships and are opening up. There are several reasons for this. First of all, it is problematic to get good objective information, because all universities are promoting themselves as very open and cooperative in the international setting. Although some of them simply provide more and more transparent information on this issue than others in public communications.

Second, getting reliable university openness indicators are fraught with difficulties. Even for ‘the share of foreign students’, one of the best available general indicator for

international openness of universities, the information is sometimes missing and is not clear which definition has been applied. For example, in Poland a large share of “foreign” students are students with Polish origin. More, information on the share of foreign academic staff is even less frequently available than information on foreign students. The share of staff with foreign nationality tends to say more about the internationalisation of research than the indicator on the share of foreign students. However, to draw appropriate conclusions one has to consider the differences between the universities when using the ratio between staff and students, and the extent to which the number of academic/scientific staff is engaged in research.

Third, to analyse the partnerships of universities one needs to get access to a large diversity of sources. The study revealed that such partnerships for any university are numerous, of different kind, and often managed by different people. There may be a central organisation responsible for reporting on it, in the form of an international relations office. But the actual cooperation is done at a decentralised level, even when signatures and commitments in the formal agreements are at central university level.

Fourth, it is not easy to separate the education from research components within university international partnerships as drivers of openness, which makes it hard to classify universities accordingly. Except for some FP research projects, almost any research partnership between universities includes an element of education. When it involves PhD students, the research component is likely to be higher than when it involves students. The number and share of foreign PhD students could therefore be a relevant indicator.

The cases of the UK and recently of the Netherlands may pave the way towards more advanced practices in terms of monitoring universities internationalisation. Two years ago the IMON-reports, with monitoring data on internationalisation of Dutch education institutes, have started to be published annually. The UK Higher Education International Unit has been established to coordinate, promote and undertake activities designed to support British HEI in a globally competitive world. Amongst its core functions is the timely assembling of high quality data and information on international developments and movements in higher education.

## **1.3 Opening up of national research programmes**

### **1.3.1 Key dimensions of Opening up of national research programmes for ERA**

This topic covers the openness of national funding programmes to foreign based participants as partners of projects publicly supported by domestic funds. National R&D funding programmes are increasingly open for foreign based participants, on the ground that international research cooperation is beneficial for the quality and reach of research activity. This is one important pillar of ERA construction, as it addresses the problem of research fragmentation and dispersion. When we refer to “foreign participants” under this topic we do not refer to the nationality of a researcher or nationality of ownership of a company, but to the country of location: foreign based research.

The modalities for participation of foreign based research performers in national R&D programmes vary across countries and types of programmes. These can range from mere acceptance of foreign partners in research projects, without any explicit selection criterion or funding associated, to the establishment of compulsory participation of foreign research performers and allocation of a substantial share of the funds to the latter. Domestic funding allocated to foreign partners is not compulsory to define a programme as “open” but its presence is a good proxy for a high degree of openness. Programmes covered here include those addressing public or private research performers, or a combination of the two. The topic also includes the possibility for foreign funding to contribute to national R&D programmes on a structural (not project) basis. National funding agencies are the main actors under this topic.

The next topic, joint R&D initiatives, covers programmes or initiatives which are jointly defined by national authorities, while this topic deals with programmes that are defined and launched on a national basis, but allow for foreign participation. ERA-NETs are joint initiatives<sup>6</sup> (covered under Topic 4), which can facilitate openness of programmes.

A simple typology of programmes’ openness is proposed in Table 16 below. We make a distinction between three successive stages in programme’s openness, in between the two extreme situations of fully closed and fully open programmes. Trans-border flows of money only start to occur, but to a limited extent, at the second stage of openness.

Tables 17-19 allocate the case studies within this typology.

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<sup>6</sup> See section 1.4 (Joint R&D Initiatives at country level) for more details

Table 16 - Typology of national R&D programmes openness

Degree of programme openness	Participation of foreign-based research actors	Direct Funding to foreign-based research actors or funding from abroad
Not open	Forbidden	No
Participation allowed	Allowed - sometimes a positive selection criterion for projects	No all funding goes to domestic actors some foreign subcontracting might be allowed to a limited extent
Subcontracting allowed	A compulsory eligibility criterion	Yes only as subcontractors of domestic actors limited to minor expenses (e.g. travel, other expenses)
Minor limitations	Compulsory eligibility and selection criterion	Yes all types of expenses, Some limitations or restrictions hold: Budget ceiling (maximum x% of the programme can be spent on foreign actors); Foreign funding of structural R&D programmes or initiatives
Fully open	Compulsory eligibility and selection criterion	Yes same rules as domestic actors No budget ceilings

Table 17 - Classification of case studies of national R&D programmes openness (Finland, Poland and Italy)

Degree of programme openness	SuSen (Fi)	Symbio (FI)	MicMan FI	Research fellowships CEE (PL)	Focus (PL)	FIRB (IT)
Not open						
Participation allowed	Yes	Yes	Yes	Yes	Yes	Yes
Subcontracting allowed						
Minor limitations						
Fully open						

Table 18 - Classification of case studies of national R&D programmes openness (The Netherlands and Austria)

Degree of programme openness	TTI (NL)	Innovatie Research	Energy Research	Kpls/COMET (AT)	CIR-CE (AT)	Christian Doppler

		(NL)	(NL)			(AT)
Not open						
Participation allowed		Yes				
Subcontracting allowed			Yes			
Minor limitations	Yes			Yes	Yes	Yes
Fully open						

**Table 19 - Classification of case studies of national R&D programmes openness (The United Kingdom and Germany)**

Degree of programme openness	Basic Technology (UK)	Knowledge transfer Networks (UK)	Knowledge transfer partners. (UK)	Pro INNO (DE)	Innonet (DE)	ZIM (DE)	Microsys (DE)
Not open	Yes	Yes	Yes				
Participation allowed				Yes		Yes	Yes
Subcontracting allowed							
Minor limitations					Yes		
Fully open							

### 1.3.2 State-of-play of Opening up of national research programmes in the 7 countries

The degree of internationalisation of research programmes has increased substantially during the past decade in Europe. There are more and more provisions for international cooperation within national research programmes, joint calls, bilateral funding agreements as well as other forms of activities with international partners. However, most of these activities are still mainly based on partnerships with foreign funding organisations rather than actually opening up funding opportunities for foreign research performers.

The main finding of the review under this topic is that very few programmes can be qualified as open in the sense of allocating funding to foreign based research performers under conditions which are close to the ones applied to domestic actors (third stage of openness or fully open type as defined above). Linking national research programmes to EU priorities under the FP, or planning large infrastructures according to EU directions, and using EU-level instruments such as ERA-NETs, are various ways to encourage international collaboration in R&D: the prevailing national approaches to ERA are to use EU-level instruments rather than opening national funding sources to foreign-based research actors.

The most common situation across the seven countries is that of R&D programmes which are increasingly open to foreign participants, but with funding restricted to actors based in the country, i.e. the first stage of openness in our typology. The principle of “each agency funds those residing in the country” is the most widespread rule. More and more recent programmes favour international partnerships, including this as a compulsory selection criterion, but with still no or very marginal funding allocated to foreign partners, i.e. moving towards the second stage of openness. Examples of programmes at the third stage of



openness are rarely found in our sample, i.e. programmes, where money directly flow to foreign actors. This is the case of programmes in the Netherlands and Austria, but a number of restrictions apply (see below). However, within this third stage, several examples are found of structural programmes in which foreign funding is sought for the establishment of excellence research centres, i.e. where incoming foreign R&D funding is also part of the programme.

**First stage of openness category** - programmes have the following typical characteristics:

1. Presence of international experts in selection panels. ex: SusEn and MicMan programmes in Finland;
2. Soft support for preparation and participation in transnational R&D cooperation projects, information, partner search, etc. - ex. Symbio in Finland;
3. International participation and international dimension are “encouraged”, i.e. they act as criteria for selection of research projects - ex. K-Plus/COMET centres in Austria, SusEn programme in Finland, Symbio in Finland, Fund for Basic Research (FIRB) in Italy). One step further are the cases where international cooperation give the right to heightened subsidy rate (such as 10% extra for the Dutch Energy Research Programme, the Polish Operational Programme Innovative Economy, or the German Pro-Inno II programme;
4. Foreign partners in programmes which are launched in coordination with other countries, but should apply for funding to the partner funding organisation of their own country - ex: SusEn programme in Finland.

**Second stage of openness category** - programmes display the following typical characteristics:

5. Funding for preparatory stages of transnational R&D cooperation projects (ex. Austrian FFG funding), including some funding for mobility of researchers;
6. Participation of foreign actors as sub-contractors of domestic actors - ex. Dutch Energy Research Cooperation programme;

**Third stage of openness category** - programmes provide for:

7. Participation of foreign actors in domestic research programmes or structures:
  - a. foreign firms are allowed - ex. K-Plus/COMET centres in Austria, within a limit of 25% of foreign shares, actual participation 12%; Christian Doppler laboratories in Austria, limit for foreign participation set to 15%;
  - b. both foreign firms and public research institutions are allowed - ex. Dutch Top Technology Institutes;
8. Programmes involving transfer of money to foreign research partners – ex. Dutch Innovation Oriented programmes, Voucher schemes;
9. Programmes specifically dedicated to international research collaborations - ex. CIR-CE programme in Austria. In this case: between 25% and 40% of funding is transferred abroad.

Those types of programmes showing a “third type” degree of openness are not widespread, but probably pave the way towards future practice in opening research programmes within an ERA perspective.

In summary, **Transborder funding channels** for research actors are found under the following circumstances:

1. Foreign actors can sometimes be refunded for travel costs in the framework of cooperative R&D projects with domestic actors who are holding the grant (e.g. the Dutch Open Technology Programme of STW). The transborder flow of money in these cases is marginal with respect to total R&D funding (this is covered under the second stage of openness in our typology);
2. Foreign researchers might be eligible for funding if they agree to come and work in a domestic research organisation. This is typically the case for mobility programmes, covered under topic 1, which provide funding to foreigners when they move to the country. In this case the funding remains in the country despite the transnational element. The Innovative Research Incentive scheme in the Netherlands, The Polish Focus programme or the FIRB fund in Italy are examples of this category;
3. Foreign actors can receive money as sub-contractors of domestic research actors funded by their national agency, but some conditions apply - ex. in the Dutch Energy Research Cooperation Programme managed by SenterNovem: "In case the knowledge is not available in the Netherlands, it can be transferred from abroad, e.g. by co-operating with a foreign research partner";
4. Programmes which allocate money directly to non-residents (third stage of openness) –like in the Netherlands and Austria, but in general some restrictions apply, such as the following:
  - a. It should be demonstrated that the relevant expertise is not available in the country. For example, the Innovation Oriented research Programmes (IOP) coordinated by SenterNovem. e.g the IOP Photonic Devices include encouragement of mobility and fund short stays abroad (up to three months) and foreign partners can participate as paid partners if there is no national capability. Other example is the involvement of companies not based in Austria in the Austrian International Christian Doppler Laboratories, whose application requires a detailed statement describing the benefit for the Austrian industry and/or research base;
  - b. The exploitation of the research should be done within the country (BSIK Dutch programme). This means that non-residents can apply for funding when the results of the projects are relevant for and can be applied in the Netherlands, and when the participation of the non-resident researchers is of clear benefit to the project;
  - c. A domestic company buys R&D services from a research actor located abroad, e.g. Voucher scheme in the Netherlands. The amounts per Voucher are small, but it is a good example where Dutch public funds are transferred abroad for research performed outside the Netherlands;
  - d. Foreign participants can be funded under the same rules as domestic applicants but budget ceilings apply. e.g. under the Austrian CIR-CE programme, up to 25% and 40% of the budget can go to foreign partners depending on their number in the projects.

As an example of the restrictions, the following specific rules apply for foreign participation in the Austrian Christian Doppler laboratories:

- e. Addressing know-how and relevant expertise concerning the envisaged research/technological field within Austria;
- f. Envisaged research/technological field is of particular economic and/or public interest for Austria;
- g. Appropriate value-added or research expenditures in Austria;
- h. Providing full information to Austrian controllers (or their representatives);
- i. Illustration of positive effect for the Austrian economic system and/or Austrian research system (e.g. through intensive R&D co-operation with other Austrian firms/R&D institutions);
- j. Overall the maximum quota for foreign/international labs is set to 15 % of the total programme volume;
- k. The funding of top-level technology or research institutes increasingly involves foreign funding (notably from private sources) and this represents an important aspect of opening of R&D activities in a country (this is the case for the Netherlands, Finland and Austria). This is an important source of trans-border R&D funding, covered under the third stage of openness.

Some national programmes are established in partnership with foreign funding agencies, so that international projects can be jointly funded, each agency funding its own nationals, notably in Finland and Poland. ERA-NET initiatives are playing an important role to develop such coordinated programmes across countries. These initiatives will be covered under Topic 4 below. Joint funding practices are also developed outside ERA-NET scheme, like the tripartite agreement between Germany, Austria and Switzerland (also covered under Topic 4).

International openness is in the overwhelming majority of cases not limited to European countries. Like for the previous topics, the rationale for favouring openness is to enhance research quality and hence there is no a priori reason to limit the list of eligible countries to European ones. Exceptions exist, such as the CIR-CE programme in Austria which targets Central and Eastern European countries. There is also a phenomenon of favouring non-EU research partners to complement actions by the EU Framework programme. This reflects somehow a division of labour where ERA collaboration is mainly carried out through ERA-NETs and EU framework programmes.

Barriers for opening up national R&D programmes to foreign participation, with funding possibilities, seem to be mostly political. It is very sensitive to transfer money to foreign research actors, when the benefits and spillovers of research are not going to be captured domestically. While this represents a rather narrow and short-term view on research, this seems to be a very important barrier for opening up domestic research funds to foreign contributors. Opening up of national R&D programmes to overseas participants without funds transfer appears also problematic. The problems here include the necessity to obtain matching co-funding and the issue of double jeopardy (i.e. the need to ensure complementarity and agreement between differing peer review mechanisms and processes). Joint R&D programmes covered under the next topic are an effort to respond to these problems. For international collaborations with industry, issues such as intellectual property rights (IPR) and differing legal regimes are also significant hindrances.

Incentives for transnational research funding are found more easily for research of a public good nature. The rationale for opening up programmes to foreign participation is the

benefit for the research (programme) objectives and/or the involved participants located in the country. Since the challenges related to energy are global, it is recognised (e.g. Dutch government) that international cooperation and opening up to foreign participation is important for future perspectives. It also means that further energy research is less viewed from a competitive viewpoint, compared to the policy focus on other technological fields which are basically aimed at enhancing competitive benefits. In this respect the research policy is more demand-driven or can even be seen as mission-oriented research policy. This also implies that there is less focus on supporting specific existing strengths of research in the Netherlands. In the case that needed knowledge or competencies are not available, the programmes allow for the transfer of money to foreign partners, with the view of stimulating and/or importing knowledge.

### **1.3.3 Measurement issues for Opening up of national research programmes**

In general, it can be noted that monitoring of the international dimension in national research programmes is not the rule, especially in the majority of cases where such participation is only “encouraged”. Hence not much information is directly available on the extent and nature of foreign participation in “open” programmes. The suspicion is that this participation is in general low (ex. first data obtained for the Dutch Polymer Institute (DPI) in the Netherlands indicate that foreign shares in the order of magnitude of 5%).

There seems to be often a distance between the possibilities offered by the programmes, and the actual foreign participation. Since this is likely to be a sensitive issue, detailed information on the phenomenon is difficult to gather.

Domestic money flowing across borders through sub-contracting agreements goes also largely unrecorded at programme management level.

Finally, like in the other topics, openness of programmes is often not confined to research performers from the EU. Hence, existing data will not often make the distinction between internal ERA- and outside-ERA collaborations.

## 1.4 Joint R&D initiatives at country level

### 1.4.1 Key dimensions of Joint R&D initiatives at country level for ERA

Most national governments in the EU have signed bilateral, or less frequently, multilateral cooperation agreements with other governments to stimulate scientific and/or technological international cooperation. Intergovernmental bilateral or multilateral R&D agreements fall into one of two broad categories:

- Goodwill agreements, where the motivation is to express a willingness to collaborate and to facilitate collaboration over broadly specified range of scientific and technological areas;
- Strategic agreements, which have a specific scientific objective. This type of bilateral or multilateral agreement might include joint facilities, joint research centres, funds for joint projects, for mobility of researchers, etc.

The focus of the study is on the second type of agreement. Under these broad agreements, specific initiatives, cooperation or programmes are supported, sometimes by dedicated budget lines, and are managed jointly by at least two governments in the form of joint R&D initiatives.

A joint R&D initiative for ERA is defined as a programme or instrument jointly initiated or launched, funded and managed by at least two EU Member States, and falling into the broader framework of an inter-governmental science and cooperation (S&T) cooperation agreement. The programmes should be characterised, as a minimum, by shared goals identification, and at least mutual information on implementation procedures. Implementation mechanisms can go as far as taking the form of joint programmes with common funding pot, joint calls, and common selection procedures with no “juste retour” considerations. Joint programmes which result from the coordination and integration of existing national (and regional) research programmes - rather than from the setting up of entirely new joint programmes - also fall into the range of initiatives covered.

National participation in EU schemes supporting long-term research coordination and collaboration like the ERA-NET, ERA-NET Plus and other related schemes under the broader EU umbrella such as those adopted under Art. 169 (e.g. the Eurostars programme promoted by EUREKA) are included. In fact they receive particular focus as in several countries they are currently the most important, if not the only means, for getting involved in joint research initiatives.

A typology of joint R&D initiatives is presented in Table 20 below, and case studies are classified within this typology.

Two criteria are proposed for this **typology of joint R&D initiatives**:

1. Geographic scope - which reflects the extent of cooperation from transborder, bilateral, to multilateral, incorporating also the combination of multilateral and the EU, such as under the Joint Technology initiatives;
2. Content of the initiatives - they can include information exchange and coordination activities, researcher mobility funding (Topic 1), transnational R&D programmes, shared infrastructures, and joint R&D centres. These activities are not mutually exclusive and can be combined within a single initiative. Case studies are indicated based where their main focus lies.

Table 20 - Typology of joint R&D initiatives and distribution of case studies in the 7 countries

Content	Geographical scope			
	Transborder	Bilateral	Multilateral	EU-multilateral
Mutual information, coordination activities	Austrian Science & Research Liaison Offices	Austrian Science & Research Liaison Offices British ESRC bilateral research agreements	Nordforsk International Visegrad Fund	
Researchers Mobility funding				
Transnational R&D programmes	Knowledge with Neighbours (NL-DE-BE)	Swedish-Finnish Wood Material Science & Engineering Research Programme Polish-French projects in cancer research French-German cooperation programmes on cancer research Polish-German Joint research projects in neurobiology Italian-Hungarian Executive Programme for S&T cooperation Franco-German programme Carnot and Fraunhofer (PICF) UK-India Education and Research Initiative (UKIERI)	D-A-CH agreement Nordforsk NERC Rapid Climate Change Programme Dutch Innovation Subsidy for collaborative projects Joint programme genomics plant-KBBE (FR-DE-ES-PT)	Austrian participation in JTI Artemis Dutch participation in Eurostars
Sharing infrastructures		The European Mouse Mutant Archive (EMMA) Franco-German AWIPEV base	Nordic Optical Telescope Scientific Association (NOTSA)	
Joint funding of R&D centres	Knowledge with Neighbours (NL-DE-BE)	French-German cooperation programme on cancer research	Nordforsk Centres of Excellence	

(When an initiative applies to several cells, only the major activity has been used for classification)

#### 1.4.2 State-of-play of Joint R&D initiatives at country level in the 7 countries

The adoption of bilateral and multilateral cooperation agreements at governmental level in the area of science, research and technology is common practice across the 7 countries,

sometimes with a long history behind them. This is complementary to a wide range of agreements signed at the level of research organizations or universities, as discussed in Topic 2.

The rationale for launching joint R&D initiatives like for Topic 3, relates to the need to add complementary expertise to national research potential, but the additional element of reaching critical mass becomes here dominant. This is especially the case of initiatives of a multilateral nature or EU & multilateral initiatives like ARTEMIS, and infrastructure-oriented initiatives such as NOTSA. Sharing high R&D costs often figures prominently in the justifications for joint R&D initiatives. The move towards alignment of research agendas, a core principle of ERA construction, is especially visible in the larger and deeper initiatives, at the bottom-right of the table (typically, JTIs).

A full record of all R&D agreements for a country is not easily obtained, but this review enlightened the following types of agreements in place:

1. Trans-border agreements involving regional level (notably in the Netherlands, Germany and Austria);
2. Bilateral agreements between two national governments (the most traditional form of international agreement);
3. Multilateral agreements between several national governments;
4. And last but not the least, agreements falling into the realm of European initiatives as Eureka, and the EU initiatives as TP and JTI, namely Eurostars. These agreements might involve both Member States and the EU, and often third countries.

Most countries have a central organisation in charge of managing such international agreements (e.g. the Royal Netherlands Academy of Arts and Science; The Ministry of Science and Education in Poland; or the coordination network for agreements with countries in central and south-eastern Europe managed by the Austrian Centre for Social Innovation).

Like for previous topics, those agreements are not limited to EU countries, covering a wide range of regions across the world. Here, historical connections between the countries, through economic and political linkages, dating sometimes from the colonial times, play a role in prioritising such agreements. But also the forward-looking strategies and open up strategies to new areas of the world, in particular to Asian countries. Like the cooperation with India, which is well present in Dutch and UK international S&T cooperation policy; Russia and former soviet countries are strong cooperation partners for Poland; The French-German axis of cooperation is the most developed line for German international cooperation; Austrians and Germans have a specific connection to central, eastern and south-eastern European countries; the Nordic connections are important in the Finnish case, but links with China and India also figure prominently in the list of cooperation agreements of this country.

As can be observed in Table 20 above, these agreements provide an umbrella for the initiatives, such as the following ones, tentatively classified according to a growing commitment to internationalisation of research activities. However, in the absence of a thorough quantification of money flows involved (used as the best proxy to measure this intensity) the ordering is subject to criticism:

1. Providing mutual information on scientific and research capacities (e.g. Austrian Science and Research Liaison Offices). This element is not necessarily the most

visible or reported part of agreements, but is likely to form part of most of them, as a core pre-condition for more in-depth forms of collaborations;

2. Fostering researchers exchanges and mobility schemes (e.g. through Visegrad Fund);
3. Sharing of facilities and infrastructure (e.g. NERC shared marine facilities agreement between UK and several countries, joint use of Nordic infrastructures under NordForsk, European Mouse Mutant Archive, German-Dutch Wind tunnels, etc.);
4. Transnational R&D funding programmes involving features such as joint or coordinated funding, joint peer reviews, bilateral research awards, etc.: this element is the most frequent in the cases studies, and occurs at any geographic scope (e.g. the multilateral initiatives as the German-Austrian-Swiss cooperation agreement between national funding agencies D-A-CH, NordForsk joint research funding programmes and the national participations in Article 169 initiatives such as JTI and Eureka; and bilateral initiatives as the Finnish-Swedish Wood Material Science and Engineering Research Programme, the French-German DEUFRAKO agreement in the transport area; Polish-French research programme on cancer, and the NERC Rapid Climate Change of Economic and Social Research Council agreement in the UK, etc.);
5. Joint funding of research centres (e. g. Dutch-German-Flemish Holst centre, Nordic Centres of Excellence, AWIPEV French-German research base).

Depending on the content of implementing protocols deriving from such agreements – and the amount of money devoted to them - the ambition and reach of the agreements vary a lot. The Nordic countries have gone quite far in implementing agreements covering all types of activities in the table. In the UK, it seems that many agreements focus on mobility schemes.

Some of the case studies point towards advanced practices of alignment of policies, which are likely to bring important contributions to the ERA. Especially the last type of initiative in Table 20 points to important paths towards ERA creation: the creation of transnational research centres jointly funded by several Member States. The Nordic Centres of Excellence, commonly funded by the joint pot managed by NordForsk, are typical examples of such initiatives.

Another case is the double cross-border agreement “Knowledge with neighbours” studied in the Dutch report. The agreement covers border regions in The Netherlands, Germany and Belgium. The scope in terms of R&D fields is quite broad, and the focus is placed on areas where complementary strengths could be identified. The Dutch part of the agreements involves the national government (both the Ministry in charge of national science policy and the Ministry in charge of innovation policy) and not the sub-national bordering Dutch regions (Provinces). Cooperation between regions does also exist (and are part of the agreements) but the involvement of the national level means more power and resources from the Dutch side. The implications of both agreements for Dutch policy are far-reaching. One of the implications touches on alignment of research policies, as mentioned by an interviewee at the Ministry of Economic Affairs: “before we can introduce any change to our national policy, the head of innovation policy demands us to first consult the Flemish government”. According to a Flemish interviewee, a top-down thematic approach is not appropriate, because the initiatives of institutes and companies are essential, and good initiatives can emerge in any area of activity; “in case a research



project has added value for Flanders and for the Netherlands, it is often better to support certain projects together. In the past, we did not pay enough attention to such win-win situations". "Knowledge with neighbours" is in this respect a typical example of organising policy efforts in a flexible, horizontal way addressing both research and innovation and involving both public and private research actors from all sides of the border. This points to initiatives that aim at further integration, on a bottom-up mode, starting with neighbouring regions, under a variable geometry principle.

The 'D-A-CH' agreement between the three German-speaking funding organisations, the German Research Council (DFG), the Swiss National Fund (SNF) and the Austrian Research Fund (FWF), is another example of this type of agreement covered in the Austrian report. In this agreement, the 'Lead agency principle' facilitates the application procedure for transnational funding of research projects. The most important aspect of this principle is the possibility to jointly apply for a research project in cooperation between Austrian, German and Swiss research partners. It is expected that all partners have a significant scientific stake in the research project. Depending on who is the lead partner, who carries out the main part of the project, the corresponding funding agency of this country overtakes the review of the proposal. The lead agency carries out the project review according to national procedures. In case of approval, it funds the financial part of its national applicants. The other participating agencies accept the decision of the lead agency and decide autonomously regarding their amount of funding.

In the same vein is the British Economic and Social Research Council (ESRC) bilateral research agreements scheme, it recognises the lack of funding across national borders as an important barrier for joint R&D initiatives. This can be attributed not to the lack of trust but to the reluctance of national agencies to open their funding to researchers in other countries. Additionally, through the bilateral agreements ESRC aims to reduce institutional barriers for joint R&D initiatives. The latter include bureaucratic barriers in documentation, procedures, timelines and decision-making processes. Thus, the Bilateral Agreements initiative aims to remove the double jeopardy from collaborative international research introducing one single application for collaborative research project proposals and a single peer review process. To overcome some of the aforementioned barriers within this agreement was created an international common application process, signed by five funding agencies, that comprises a set of procedures that ensure common criteria for the evaluation and peer review of proposals, removing any considerations regarding the evaluation of joint projects. While the above two examples provide innovative developments for joint R&D initiatives, a fragmented situation remains. Though project selection runs cross-border financing remains mainly national.

The use of EU-level instruments is particularly important as a driving force for this topic: Participation in ERA-NETs, European TPs and JTIs, coordination under the ESFRI Roadmap, are mentioned in all countries as major vehicles for implementing S&T and research cooperation across countries.

### **1.4.3 Measurement issues for Joint R&D initiatives at country level**

As mentioned above, R&D agreements are often complex and a multi-facet umbrella initiatives, including a variable mix of activities. Hence it is difficult to obtain a clear picture of the boundary of activities. Joint R&D initiatives are numerous, complex and dispersed and no systematic recording process is available. Before collecting information, preliminary screening based on expert advice is recommended for selecting the most relevant initiatives. Disentanglement of actions within broad umbrella cooperation programmes for

quantification is also cumbersome. The following description of the afore-mentioned Dutch-Belgian-German agreement “Knowledge with Neighbours”, studied in the Dutch report, illustrates the complexity of measurement issues under this Topic.

“The Knowledge with Neighbours programme (composed of two agreements) is not a traditional research programme, nor two traditional bilateral research agreements. Besides of being an umbrella for several joint research projects, it is also about cross-border policy integration. The programme also has characteristics adopted from the new so-called ‘programme approach’ which are also evident in the Innovation Oriented Programmes along the key area’s (‘sleutelgebieden’) and for instance in the “Peaks of the Delta” programmes. These programmes are in fact tools to improve the efficiency of existing policy instruments and to initiate new initiatives by developing comprehensive mini-mix frameworks of interlinked policy initiatives. One consequence is that most elements of the programme also are part of other programmes, e.g. national thematic programmes, or regional projects. Moreover, also in terms of funding most cooperation initiatives are funded by other programmes. This also implies that there is no overall budget known, but only for certain elements, e.g. the The Holst Centre received 47.5 million Euro from the Dutch Ministry of Economic affairs”.

## 2 Proposal for an ERA Monitoring system

Building the ERA is a priority goal at EU level. Internationalisation and Europeanisation of research systems have moved up to the top of national policy agendas. However, evolution of 4 Topics studied does not easily lead to a clear picture on ERA developments. In order to address this deficiency in ERA monitoring, two lines of action are discussed in this section of the report: The first section deals with possible key questions to be integrated into the ERAWATCH base-load service, to add an ERA dimension to the monitoring of national research policies carried out so far under ERAWATCH; The second section describes the state-of-play with a number of possible indicators linked to the 4 Topics covered under this study.

### 2.1 Key questions for ERA Monitoring

In this section we propose a list of questions which could be investigated at country level, to collect information on schemes, initiatives and developments under the 4 topics of the study. This is intended to serve as an input into a possible additional activity for the ERAWATCH network, in the framework of the Base-load research inventory. Depending on resources available, all or part of the questions could be integrated in the inventory, and the degree of details can be extended or restricted (e.g. collection of time series versus on-off data; sample of schemes or exhaustive coverage, etc.).

The questions cover both qualitative information (mostly related to initiatives) and quantitative (this is more developed in section 3.2 below) of the 4 pillars of ERA.

It should be noted that some dimensions of ERA are not well covered by the 4 topics under investigation here, notably:

- Europeanisation of infrastructures
- Activities of PROs in terms of transborder research centres establishment.
- Knowledge sharing

#### 2.1.1 Researchers mobility – Topic 1

1. To what extent is the EU-Marie Curie scheme used by your country (Number of incoming and outgoing fellowships)?
2. What is the inflow (and share) of foreign researchers (EU and non-EU) in your country? (Specify source and definition used)?
3. What is the outflow (and share) of domestic researchers (EU and non-EU) going abroad? (Specify source and definition used)?
4. What are the key mobility initiatives developed at national level?
5. What is the main rationale for these national mobility initiatives?
6. What is the main direction of supported mobility: outward/inward/both?
7. What is the main target group?
  - a. Is there a focus on junior researchers with recent PhD degree? (high focus, medium, low focus, no focus);

- b. Focus on excellence? (high focus, medium, low focus, no focus)
  - c. Main overall geographic focus? EU, or non-EU, or no focus?
  - d. Are there schemes in your country addressing specific countries? (neighbouring Member States; other specific group of EU member states; Diaspora/ex-colonies; other specific group of non-EU countries)
8. Is the emphasis on short or long duration? (<6 months; or more)
  9. Are national initiatives specific for mobility or embedded into broader initiatives (project R&D funding)? (mostly specific; both; mostly embedded).
  10. Can foreign residents (EU, and/or non-EU) apply for national research grants in your country?
  11. What share of national research grants is allocated to researchers of foreign nationality (EU, non-EU)?
  12. Does your country have a dedicated income tax relief for foreign researchers?
  13. Does your country offer (incoming, and/or outgoing) travel grants?
  14. To what extent are non-financial support services offered in your country to promote international mobility of researchers? (in the form of advice, counselling, networking with other service providers, including in non-R&D areas such as housing, dual careers opportunities, legal and administrative issues, etc.)
  15. What is the total budget for national researcher mobility schemes in your country? (mention if this amount refers to sum of budgets of a few random schemes, or the main large schemes, or all dedicated schemes)
  16. Is there a monitoring system for international mobility?

## **2.1.2 Transnational strategic partnerships and opening up of universities – Topic 2**

1. What is the overall degree of internationalisation of universities in your country (% foreign students, % foreign PhD students, % foreign academic staff)?
2. To what extent are universities participating in Framework Programme projects (number of FP projects in which universities of your country participates; FP6, or FP7, or latest available year)?
3. Are national instruments or initiatives in place to foster opening up of universities? If yes, which ones?
4. What is the main rationale in your country for universities to engage in strategic partnerships? (Which of the following objectives apply: improve education; more or better research; linking to top universities, networking with peers; attract new staff)
5. What is the main strategy? (initiating bilateral partnerships, and/or through membership of university networks)
6. Where does it lie with the initiative & commitment for the partnerships? (central: university board, or internationalisation unit; or de-central: faculty, major research labs, individuals), or other structure?)

7. Who implements the partnership activities? (central: university board, or internationalisation unit; or de-central: faculty, major research labs, individuals, or other structure?)
8. Is there a focus on specific disciplines? (no focus, specific targeted disciplines, namely...?)
9. What is the geographic focus of the partnerships? (EU, non-EU, neighbours, diaspora/ex-colonies, other specific group of countries, no focus).
10. What are the main activities taking place under these transnational (research) partnerships:
  - a. information exchange
  - b. developing joint research proposals
  - c. guest lectures/researcher visits
  - d. cooperation on PhD research projects (e.g. joint supervision)
  - e. joint conference, publications
  - f. promote foreign staff mobility
  - g. (complementary) funding for international projects
  - h. joint funding schemes/labs/infrastructure
  - i. creation of antennas abroad
11. Are specific budget lines available for international research projects/partnerships within university budgets?
12. What specific soft (non-financial) support mechanisms exist for international research collaboration?
13. What are the remaining barriers for opening up of universities?

Note: for this Topic, it will be especially difficult to report this information at country level. Most probably, this should be collected based on a sample of universities.

### **2.1.3 Opening up of national research programmes – Topic 3**

1. To what extent do national R&D programmes in your country allow for participation of non-residents as partners without funding? (0 %; less than 10%, 10-30%; 30-50%;...>90%; 100% of programmes)
2. To what extent do national R&D programmes allow for funding of non-resident research partners, but within a financial ceiling?;
3. To what extent do national R&D programmes allow for funding of non-resident research partner, without a financial ceiling?
4. To what extent are national R&D funding programmes in your country open for participants of foreign (EU, non-EU) nationality residing in your country? Can local subsidiaries of foreign-owned multinationals apply for national funding?
5. To what extent do national R&D programmes allow funding for non-resident researchers (in EU, non-EU) as sub-contractors to a national partner? Is there a limit to the amount of subcontracting?

6. Is domestic funding for research abroad only possible if there are no domestic alternatives? Is the application of this rule a major barrier for foreign participation?
7. Are new national R&D programmes more open?
8. Is there a difference in openness of national R&D programmes regarding participants from EU and non-EU?
9. Is there a specific focus in the openness: specific type of programmes, specific countries?
10. What are the barriers for opening up national R&D programmes?
11. Do national programmes stimulate, or offer soft support for foreign participation?
12. Do national programmes offer funding for preparation and attracting of foreign participation in national R&D programmes?

#### **2.1.4 Joint R&D initiatives at country level – Topic 4**

1. To what extent are EU initiatives used: number of ERA-nets, number of Joint Technology Initiatives the country is participating in?
2. To what extent is your country engaged in agreements with other EU governments to stimulate scientific and/or technological cooperation of domestic research actors with foreign actors?
3. To what extent is your country engaged in agreements with other non-EU governments to stimulate scientific and/or technological cooperation of domestic research actors with foreign actors?
4. Are the agreements mostly cross-border, bilateral or multilateral?
5. Is there a geographical focus?
6. Is it mostly a broad framework for cooperation on a broad range of scientific and or technological areas? Or focused on specific strategic research objectives?
7. Are they mostly old, long lasting goodwill agreements? Or are they new or renewed initiatives?
8. What are the most common aspects included in the agreements: exchanging information; joint facilities, joint research centres, funds for joint projects, for mobility of researchers; sharing infrastructure?
9. What is the rationale for undertaking such joint international R&D initiatives?

#### **2.2 State-of-Play with indicators under the 4 Topics**

In this section, we present the state-of-play with respect to availability of indicators under the 4 Topics, to assess progress towards the ERA. This covers data available on the national scene, not at aggregated level (Eurostat or OECD).

Table 21 provides a conclusion on the availability of indicators across the 7 countries. The reader is referred to country reports for the specific situation in each country (availability of each indicator, sources, year's coverage, etc).

It should be noted that some indicators cannot be easily classified into one topic: e.g., the number of Marie Curie schemes awarded to a country can be used as an indicator for both Topics 1 and 2. Actually, there are important links, even overlap, between the 4 Topics: Mobility schemes are part simultaneously of joint R&D initiatives and R&D funding

programmes; joint R&D labs can stem from universities initiatives as well as from governmental agreements, etc.

The analysis of the table with the indicators for the 7 countries and 4 Topics, confirms the fact stressed at the launch of the study, i.e. that these issues are still at a very preliminary stage of development in terms of measurement.

The main identified difficulties are:

1. Grassroots initiatives by individual research actors are not covered by systematic and centralised monitoring activities. This is typically the case for Topic 2, where the unit of analysis is the individual university. This may lead to serious underestimation of the phenomenon;
2. Initiatives embedded in larger schemes (e.g. mobility promotion as part of joint R&D funding programmes) cannot be disentangled without going back to individual projects data;
3. International agreements might combine educational and research purposes (this is typically the case in Topic 2, and is also valid for Topic 4). It is almost impossible to disentangle the two elements in monitoring such agreements;
4. Existing monitoring systems on internationalisation do often not provide a distinction between EU and non-EU openness;
5. There is often a distance between the intention of schemes (e.g. allowance for funding to foreigners in national R&D programmes) and actual use of the possibility (mentioned in Topic 3). Because of the political sensitivity of this question, a dedicated monitoring system might not be easily put in place;
6. Some hidden form of programmes openness (such as funding foreigners through subcontractors of domestic research actors), are largely ignored in monitoring systems;
7. Umbrella schemes such as joint R&D agreements covered in Topic 4 do not necessarily benefit from specific budget lines but rather rely on a combination of existing schemes. Hence identifying budgets going into those agreements is a very complex task;
8. Regions, or even local authorities, are also involved in a number of initiatives. These efforts are unlikely to be monitored at national level.

**Table 21 - State-of-play with indicators for ERA under the 4 Topics of the study in 7 countries**

<b>Indicator</b>	<b>Comments</b>
<b>TOPIC 1: National mobility initiatives</b>	
Inflow of foreign researchers in public and private research sectors	Available in several, but not all countries. Mostly without distinction between public and private sector (better for public sector). Survey in Italy.
Outflow of domestic researchers in research positions abroad	Available in several but not all countries, with restrictions e.g. Poland only young researchers. One-off survey in Italy.
Amounts spent in mobility initiatives	Only for some initiatives, not as an aggregate of the total. It is not possible to distinguish mobility funding in larger programmes. Specific study in Austria.
Use of tax relieves for foreign researchers	No data, in Italy and the Netherlands
Share of national research grants allocated to foreign researchers	Not available, or only for specific programmes.
Participation in EU mobility schemes like Marie Curie fellowships	It should be made available at EU level. Marie Curie integrated in FP funding in some cases, possibility to disaggregate.
<b>TOPIC 2: Transnational strategic partnerships and opening up of universities</b>	
Number of international research agreements signed by universities	Not available systematically, would need enquiries at university level. Difficult or impossible to separate agreements with education versus research goals.
Number of antennas or affiliated institutes in other countries	Same as above
Share of foreign funding in research funding sources of universities (including from FP)	Mostly available, at aggregate level
Number of international cooperation projects in which universities are involved	Not available systematically, would need enquiries at university level
Number of projects with international sharing of facilities	Not available systematically, would need enquiries at university level



Share of foreign research staff in universities (by type: academic, scientific personnel, permanent or not, etc.)	Mostly available, but with restrictions. Lack of harmonisation of definition (academics only, including or not support staff, full time versus part time, etc.)
Share of staff from the country of origin having moved to similar position in another country	Mostly not available. Relies on one-off enquiries. Available in UK.
Share of university staff working in international collaboration	Not available, would need case study work or enquiries.
Share of international joint publications on total publications	Available from Thomson ISI database
Sales of research services to foreign clients	Mostly not available, except NL
Share of foreign students in total student population	Available
<b>TOPIC 3: Opening up of national research programmes</b>	
Number of programmes open to foreign participation, by type (including funding or not, etc.)	Not available, need programme by programme review
Amount of national R&D funding allocated to foreign participants (public/private)	Not available systematically and comparatively
Number of ERA-NETS in which the country is involved	Available
<b>TOPIC 4: Joint R&amp;D initiatives at country level</b>	
Number of joint R&D initiatives	Some can be identified but a complete coverage cannot be guaranteed. Too many different types of arrangements
Number of countries involved	Idem
Budget lines devoted to joint initiatives (total, per initiative)	Idem. Easier for bilateral agreements
Number of research projects under joint R&D initiatives	Only partial information, e.g. for Nordic projects

Extent of cross-funding (outwards funding, inwards funding)	Not available
Contributions to Eurostars	Should be available
Number of involvement in Technology Platforms/JTI	Available
<b>General indicators of research policy openness</b>	
Share of total R&D funding from international origin (distinguish between EU and non-EU sources; private and public)	Available
Share of national public R&D budget for international cooperation	Should be available in State budget
Number of EU FP projects in which nationals are involved (distinguish between coordinators and partners).	Should be available

### 3 Conclusions

The conclusions of the study regarding the state of the play in the four topics and how they can be measured are the following:

#### *1. Mobility Initiatives*

Mobility Initiatives are centred in raising the national research systems capacities, creating incentives for attracting highly qualified researchers or graduation students from all over the world. The ERA dimension is not a primary aim, but a secondary one. Size and scope of financial incentives vary widely from large and long duration schemes to small grants for travelling purposes. Mobility Initiatives tend to be dispersed in many agencies and public organisations, therefore difficult to track. Apparently non-financial incentives are growing in importance.

Mobility initiatives are designed to increase country's competitiveness in attracting inflows of researchers to support the demand for human resources. National mobility initiatives and EU instruments are contributing to achievement of ERA goals in what concerns free circulation of researchers. However care should be taken in order to reduce potential increase of competition between Member States for highly qualified human resources, as the degree of attractiveness of national research systems vary across Europe.

Measuring the investment made by national actors to foster mobility is difficult because of several reasons. Firstly, the existence of voluminous number of small initiatives promoted by various agencies and research-performing actors; secondly, most of the schemes are not confined to EU, requiring extra effort to delineate the EU borders in the mobility; thirdly the lack of systematic recording of use of non-financial incentives, discriminated by categories of professions. Finally, complexity increases when initiatives are part of broader schemes without separated accounting for mobility.

#### *2. Transnational strategic partnerships and opening up of universities*

Universities in sample are becoming more internationalised and open with increasing number of foreign students and academic staff, but varying in their degree of openness. This trend is favoured by recent changes in governing laws of universities and legislation. Universities located at bordering regions tend to be more internationalised in terms of students, whereas universities with an internationalised strategy for research tend to have higher shares of foreign staff.

Measurement of universities partnerships at level of research is daunting at ERA level. Information is dispersed and not easily differentiated from education components, with multiple protocols and agreements being done at decentralised unit levels. Unavailability of data and unclear defined categories are also a problem. Most of the time protocols and agreements between universities are done for university functions, education and research. Although recent efforts made by some countries to create a centralised monitoring system might be adopted by other countries.

#### *3. Opening up of national research programmes*

Countries in the sample are increasingly opening their national programmes to foreign residents in the country (not limited to Member States), and to coordinate research programmes in partnerships with other European funding agencies, namely in basic research or global issues. Alignment of topics, national regulations and procedures, is also

in increase. Opening up is seldom occurring with transborder flows of money, or in programmes that supports research closer to the market. Due to political sensitivity, when transborder flows of money exist, are limited to particular cases and the benefits to the funder research system are in general visible. Funding agencies tend to define restrictive clauses, funding only research that brings new capabilities or complements national competences, namely in topics of their national interest.

Opening up of national programmes is difficult to measure. Systematic recording of amount of funding awarded to projects done in cooperation with non-residents within a national programme is not implemented in most of funding agencies. Easier to access, at national level, is the volume of funding awarded to national researchers in programmes implemented in partnerships with foreign funding agencies.

#### *4. Joint R&D initiatives at country level*

Joint R&D initiatives in the sample showed that historical ties between countries and neighbourhood are important features in their implementation. These initiatives mainly target critical mass creation around common strengths and complementarities. They are promoted top down by national governments or a result of research actors' bottom-up strategies. Most frequently ones envisage common calls, application procedures and selection processes, either organised around common scientific themes, or addressing continuous regional research communities. A variety of agreements exist at various geographical levels (transborder, regional level, bilateral, multilateral, or EU multilateral initiatives) which address different type of joint initiatives, ranging from sharing information to the creation of common infrastructures and centres.

Joint R&D initiatives are numerous, complex and dispersed and no systematic recording process is available. Before collecting information, preliminary screening based on expert advise is recommended for selecting the most relevant initiatives. Disentanglement of actions within broad umbrella cooperation programmes for quantification is also cumbersome.

The study concluded as well that national European research systems are opening up towards the ERA countries and the world. ERA is more and more part of the policy agendas, and a host of recent initiatives testifies that this attention goes beyond declarations of intent and is turned into real moves. ERA construction is progressing in a multitude of entangled initiatives taken at different levels - EU, national, regional, and grassroots. Countries in the sample converge in the use and relevance given to new ERA instruments promoted by the European Framework-Programmes (FP), the sixth and seventh, as privileged instruments for ERA. The rationale for the national initiatives is predominantly centred on the reinforcement of national capacities (as the top priority given to attract talents shows); opening to ERA is mainly centred on achieving complementarities in expertise not available nationally, sharing of Research and Development (R&D) costs and concentration of resources in common facilities, and alignment of national agendas and priorities in topics of common interest with other countries in a variable geometry

As mentioned before, this study was exploratory and aimed to grasp how much could we learnt from the actor's initiatives on the progress towards the ERA. New knowledge has been acquired and methodological lessons were learnt. Deeper knowledge on how countries are progressing towards the ERA vision 2020 is needed. More work needs to be done on the topics that have been studied here, and to enlarge this study to topics and countries not yet covered.

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#### **1st Workshop 18 November 2008 (Seville)**

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## Glossary

APART	Austrian Programme for Advanced Research and Technology
ASEA-UNINET	Austrian South-East Asian University Partnership Network
AWIPEV	Joint French German polar research base
BALTECH	Baltic Sea University of Science and Technology
BE	Belgium
CEE	Central and Eastern Europe
CEEPUS	Central European Exchange Program for University Studies
CESAER	Conference of European Schools for Advanced Engineering Education and Research
CIMO	Centre for International Mobility
CIR-CE	Cooperation in Innovation and Research with Central and Eastern Europe
CLUSTER	A University Network in Science and Technology for Europe
CNRS	Centre national de la recherche scientifique
CRUI	Conference of Rectors of Italian Universities
DAAD	German Academic Exchange Service
DE	Germany
DEUFRAKO	Transport Research Knowledge Centre
DFG	German Research Council
DIUS	Department for Innovation, Universities and Skills
DPI	Dutch Polymer Institute
EAIE	European Association for International Education
EMMA	European Mouse Mutant Archive
ERA	European Research Area
Erasmus	European Region Action Scheme for the Mobility of University Students
ES	Spain
ESFRI	European Strategy Forum on Research Infrastructures
ESRC	Economic and Social Research Council
EU	European Union
EUA	European University Association
EUREGIO	European region
Eureka	Europe-wide Network for Market Oriented Research
EURON	European Graduate School of Neuroscience



FI	Finland
FiDiPro	the Finland Distinguished Professor Programme
FP	Framework Programme
FR	France
FWF	Austrian Science Fund
HEI	Higher Education Institutions
ISAP	International Training and Exchange programme
IT	Italy
JTI	Joint Technology Initiatives
KBBE	Knowledge Based Bio-Economy
LEO-NET	Leveraging Education into Organisations
LERU	League of European Research Universities
MicMan	MICROBES AND MAN RESEARCH PROGRAMME
NERC	Natural Environment Research Council
NL	The Netherlands
NOTSA	Nordic Optical Telescope Scientific Association
Nuffic	Netherlands Organization for International Cooperation in Higher Education
PhD	Doctor of Philosophy
PL	Poland
PROs	Public Research Organisations
PT	Portugal
R&D	Research and Development
S&T	Science and Technology
SNF	Swiss National Fund
SuSen	Sustainable Energy Programme
Tekes	Finnish Funding Agency for Technology and Innovation
TKK	Helsinki University Technology
TP	Technology Platforms
UK	The United Kingdom
UKIERI	UK-India Education and Research Initiative
UNICA	Network of Universities from the Capitals of Europe
Unica	Network of Universities from the Capitals of Europe
UUP	Utrecht University Partners
WUN	Worldwide Universities Network

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